Integration of Environmental Assessment with Planning and Policy-Making on a Regional Scale: Towards an Environmental Governance Agenda

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ABSTRACT

Regional environmental assessment sits delicately at the intersection of assessment, land use planning, and policy-making processes. The need for improved integration among these three domains has grown especially keen recently, given the shift in the past decade toward more landscape-wide and strategic forms of environmental assessment. Paradoxically, existing works have failed to engage its complex, multi-institutional dimensions and their implications for sustainable regional environmental governance. This thesis advances work in this area by assessing the state-of-research, evaluating the state of practice, and exploring key environmental governance concepts that could better facilitate cross-domain integration in regional environmental assessment. The research draws on a mixed-method approach that includes three key methods: an in-depth literature review; a web-based survey; and semi-structured interviews.

The results are presented in three manuscripts. The first manuscript details the dimensions, conceptual approaches, and a research agenda towards facilitating cross-domain integration in regional environmental assessment. The second manuscript develops a set of evaluative criteria to characterize and gauge the challenges related to cross-domain integration in regional environmental assessment as well as emergent opportunities for learning and multiple domain expertise in practice. The third manuscript reviews lessons learned from a mature regional environmental assessment case study in North America from an environmental governance perspective. Significant findings include that cross-domain integration is a phenomenon limited by institutional, transactional, and disciplinary factors, and that actors in regional environmental assessment need to explicitly recognize these divides in its design.

Further, the research indicates that cross-domain integration in regional environmental assessment processes can be better facilitated by adopting an environmental governance perspective that includes strong leadership; alignment of the decision-making scales with the analytical scales; operationalizing the principle of subsidiarity; bridging, bonding, and linking via social capital; and connecting assessments to high-level decision-making contexts within a region. Moving forward, there is a pressing need for explanatory theories to support cross-domain integration in regional environmental assessment, mainstreaming an adaptive context that anticipates uncertainty and

failure into the process, and expanding the discourse to a holistic context that takes into consideration the distributional effects of regional environmental impacts on wide-ranging stakeholders, including non-institutional actors such as the local communities and civil society.

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DEDICATION

To my loving wife, Grace, for her unflinching support and uncommon sacrifice towards getting this work done. Thank you!

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LIST OF ABBREVIATIONS

AESRD	Alberta Environment and Sustainable Resource Development
AIS	Aquatic Invasive Species
ALCES®	A Landscape Cumulative Effects Simulator
ANOVA	Analysis of Variance
BC	British Columbia
CEA	Cumulative Effects Assessment
CEMA	Cumulative Environmental Management Association
CIMP	Cumulative Impact Monitoring Program
CMP	Crown of the Continent Managers' Partnership
CO_2	Carbon Dioxide
EA	Environmental Assessment
EDA	Exploratory Data Analysis
EHP	Ecological Health Project
EIA	Environmental Impact Assessment
EQC	Environmental Quality Committee
EU	European Union
GSH	Great Sand Hills
MOU	Memorandum of Understanding
RLAP	Regional Landscape Analysis Project
SEA	Strategic Environmental Assessment
SPSS®	Statistical Package for Social Sciences
UK	United Kingdom
US	United States

CHAPTER ONE

Introduction: The Environmental Assessment, Planning and Policy-Making Nexus

1.1 Background

Over the past four decades of environmental assessment (EA) practice and research, an extensive body of work has emerged that concludes that integration with planning and policy-making processes is the panacea to realizing both the substantive and normative expectations of EA on a regional scale (Nitz and Brown 2001; Dubé 2003; Noble 2008; Gunn and Noble 2009a,b; Monteiro and Partidario 2012; Seitz et al. 2011; Chilima et al. 2013; Kristensen et al. 2013; Dubé et al. 2013; Duinker et al. 2013). Yet these scholarly works often take the form of commentaries and recommendations, stopping short of exploring in detail many of the issues raised by this suggestion. Paradoxically, despite the resurgence of interest and scholarship in regional EA, evidenced by hundreds of works that have emerged in the past decade, research has tended to focus on increasing the scientific rigour and methodological advancement of regional EA than also on integration across the domains of planning and policy-making to ensure collaborative processes and successful implementation (e.g. Dube 2003; Quinn et al. 2004; Gunn and Noble 2009a,b; Duinker et al. 2013). This thesis argues that existing works on integration in EA research fail to engage its complex, multi-institutional dimensions in the context of regional environmental governance. Rather, it has reduced the discourse to inward reflection (within the field of EA), and inward integration of EA frameworks and approaches which has served to reinforce the decision-oriented, and rationalist aspects of regional EA both philosophically, and in practice. These tendencies derive from the single-project focus of EA historically.

It is now well known that a single-project assessment lacks the regional context to adequately capture cumulative effects (Harriman and Noble 2008; Gunn and Noble 2011; Johnson et al. 2011; Seitz et al. 2011) or integrate sustainability considerations in EA (Gibson et al. 2005; Duinker and Greig 2006; Swor and Canter 2008; White and Noble 2013). In fact, there is a great deal of connection among the processes of EA, land use planning, and policy-making institutionally, procedurally, and operationally: many aspects of successful environmental governance (i.e. the rules and regulations, both formal and informal, that govern resource use or environmental planning and management actions), including strategic planning and decision-making, involve cooperation among all three realms (Noble and Harriman 2008). From a broader environmental management perspective, there is a growing need to gain a clearer understanding of regional EA processes and outcomes especially within this increasingly multi-institutional framing of environmental discourse. Boundaries between EA domain and planning and policy institutions are becoming increasingly blurred, particularly in jurisdictions where planners are required within existing policy frameworks to lead the assessment process (e.g. sustainability appraisal in the UK). As a result, there is call for more engaged and collaborative approaches to practice. However, simple collaboration is no guarantee for effective integration, which suggests that the topic of integration must consider shared issues across these domains.

Within this premise, a few studies have explored the principles, models, and case studies on the subject of assessment-planning-policy integration. Sheate et al. (2001, 2003) have focused on the scheme for integrating institutional processes and tools into strategic EA and policy processes in the European Union context. Elling (2000) and Tang (2008) reported key principles and conceptual models for integration of EA with planning domain. More recent studies, primarily from policy-making literature, have introduced the concept of decision/policy-windows, which emphasises leveraging on political climate to advance integration (e.g. Kirchhoff et al. 2010; van Stigt et al. 2013). In addition, there is a growing body of case study works, which offers insights into how integration is operationalized within country-specific cases e.g. Israel, China, Ireland, the Netherlands, Italy, and the United States (Niekerk and Arts 1996; Amir 1997, Keysar and Steinemann 2002; Cooper and Sheate 2004; D'Auria and Cinneide 2009; Che et al. 2011, Rega, C., and Bonifazi 2014). These works have shed considerable lights on the various aspects of cross-integration scholarship, such as participation, sustainability, methodology, conceptual approaches, and the political environment. In addition, they have identified issues related to utility, quality,

practices, and outcomes of integration. Lacking in many of these works, however, is an interrogation of the mechanisms through which functions and perspectives of institutional actors influence effectiveness of cross-domain integration and an understanding of the critical success factors as a tool for environmental governance.

In the face of several environmental problems—biophysical, social and economic—that defy social and political boundaries, EA practitioners, planners, and policy-makers, though confined to their respective domain expertise, have realized that interdependence and interrelationships among the domains are contingent to effectiveness of environmental action plans and governance. Defining regional environmental governance itself is riddled with many questions, one being whether the concept is an element of cooperative or conflictive fragmentation or whether current levels of institutional arrangements towards addressing environmental challenges are adequate (Balsiger et al. 2012). Sitting conveniently within this debate is what exactly constitutes a "region" for environmental governance purposes. Several works have recognized the 'multidimensionality and plurality' of both concepts (e.g. Balsigera and Debarbieux 2011; De Lombaerde et al. 2010; Balsiger et al. 2012) suggesting that a region can be considered along areas of interest related to place, practice, and/or interests. For example, a region can be defined operationally based on (i) the principle of functional integration (i.e. administrative-political boundaries); (ii) principle of homogeneity (i.e. a group of contiguous areas with similar natural or socio-economic characteristics); and (iii) for planning-programming purposes (i.e. for specific planning goals) (Sokari-George 1990).

Drawing on these three principles, a region, particularly in the context of regional EA, can be defined as "a politically defined geographic space where interdependence of environmental consequences is considered high" (Komori 2010, p. 4). Similarly, in recognition of this plurality of perspectives on the concept of region, this thesis takes an eclectic approach to the definition of regional environmental governance, which aligns with the multi-institutional dimension of regional EA. In doing so, it focuses on the definition offered by Komori (2010) i.e. "the formal and informal processes of coordinating mechanisms, involving public and private actors, that effectively guide and regulate human activities in the pursuit of collective goals of managing natural resources and mitigating environmental damages at the regional level" (p. 4). It is often viewed as part of an environmental governance architecture spanning the local and global levels,

where assessments at regional level complement, rather than substitute for, the policies and efforts at higher or lower scales of institutions (Esty 1999; Lian and Robinson 2002). This approach is also implied in the normative literature on integration in regional EA, with its conscious efforts at re-imagining scales and levels of assessment, the distribution of actors' roles, and perspectives on how these roles should be distributed in ways quite different from existing socio-political boundaries (e.g. Geneletti et al. 2007; Fischer et al. 2009; Franks et al. 2010; Elvin and Fraser 2012).

From a practical perspective, the Canadian economy has over the decades become increasingly based on secondary and tertiary activities related to the resource sector (e.g. oil and gas development) (Natural Resources Canada 2012) especially in the west and provincial norths and territories. This resource development shift is exerting pressure on the existing regulatory framework for environmental assessment and thus, the demand for efficacy and efficiency in environmental management is growing, suggesting the need for a shift toward a regional approach that integrates various domains is becoming evident (e.g. Hegmann and Yarranton 2011; Gibson 2012; Bond and Pope 2012; Morgan 2012). For example, Parkins (2011) asserts the need to migrate from the current "episodic" approach to EA to a longer-term institutional context of regional planning and policy. On the whole, it is becoming increasingly acknowledged among the scholarly works on integration that many regional EAs are initiating and maintaining new shared environmental governance mechanisms that are divorced from, or at least not fully contained within, the existing regulatory regime (de Loe 2008). This shift in the focus of regional EA, toward becoming a tool for environmental governance, should arguably be an integral part of the discourse on integration and on regional EA research, generally.

A flashback to the beginning of EA practice in North America would reveal the importance placed on the subject of integration of EA with policy-making and planning domains for effective practice (Cocklin et al. 1992; Livingstone 2004; Jay et al. 2007). In the proceedings of the conference on environmental impact analysis held at the University of Wisconsin in 1972, for example, two years after the promulgation of the United States Environmental Protection Act and the very year the first EA regulation emerged in Canada, it was argued that: "What appears to be needed are regional environmental assessment and planning programs that will be able to integrate with and give comprehensiveness to the impact statement process" (Sorenson 1972, p. 100). Early

practice in Canada seemed to have entrenched this perspective with the establishment of the federal Environmental Assessment and Review Process, where any assessment subject to federal decision could be subject to EA (Gibson 2002; Noble 2009). Examples of early projects set within such wider institutional contexts included the Beaufort Hydrocarbon Review (1982–1984), the Cluff Lake Board of Inquiry (1977-78), and the Churchill River Inquiry in Saskatchewan (1978) (Bartlett 1980; Palmay and Gwilym 1980; Salter 1981; Harding 1985; Noble 2009). While this approach became popular in the early years of EA practice, wielding significant influence on environmental policy decisions, the changing regulatory environment has in the recent decades shifted emphasis to the scientific rigour of EA (Gunn and Noble 2015).

As a result, the challenge reported by Sorenson (1972) seemed to have reappeared: many contemporary regional EA processes are disconnected from the wider institutional contexts—i.e. policy-making and planning—in which they are carried out. This thesis is an attempt to fill this gap by investigating the means to facilitate a cross-domain approach to regional EA and environmental governance, and thereby engender more effective regional EA processes and a more comprehensive approach to addressing regional environmental impacts, including cumulative effects. The introductory chapter of the thesis describes the research context, literature gaps, study design, the theoretical perspective, and gives an overview of the research products.

1.2 Progress in Regional Environmental Assessment Research

Since the mid-1900s in North America, the "region" has been promoted as the appropriate scale at which to address many land use, environmental, and resource development challenges (Cullingworth 1987; Eidelman 2016; Wagner 2016). The rationale is that natural regions such as watersheds or ecosystems often have less arbitrary boundaries than political delineations such as states, provinces, territories, or nations (Montgomery 2011). Thereby the term "region" was identified in the 20th century with concepts such as industrial development, economic growth, and urban-rural interaction (Krätke 1999; Zimmerbauer 2013; Angeli 2015). Progressively, regional scale of analysis has shaped many social economic issues ranging from resource development (e.g. Noble et al. 2013), transportation planning (e.g. Monios 2015), environmental management (e.g. Bryan and Crossman 2008), and more recently, to sustainable development debates (e.g. Counsell

and Haughton 2006). Mitchel (2014, p. 12) observed that the perceived benefits of a regional approach to resource management is rooted in its potential to create "capacity to anticipate or respond to regional issues, and to develop custom-designed solutions" in such a way that power and authority can be devolved to those closest to the issues for effectiveness and efficiency.

In Canada, regional land use planning and development regulatory regimes have progressed fairly well since the 1950s (e.g. Robinson and Webster 1985), particularly in the provinces of Ontario, Alberta, and British Columbia where economic development has historically been concentrated. Calls for regional EA began immediately with the emergence of EA in North America the early 1970s (e.g. Sorenson 1972), though this form of EA has largely developed outside of the formal regulatory-based environmental impact assessment processes (Sheelanere et al. 2013). In Canada, one such early high-profile case was the Mackenzie Valley Pipeline Inquiry (1974–77), which took a dramatic turn from simply project-specific concerns toward a more regional, strategic approach to assessing the potential impacts of oil and gas development. The Honourable Justice Thomas Berger insisted on a much more comprehensive approach to the project assessment than was called for by authorities; upgrading the assessment from a project-oriented exercise to a regional scale assessment of the long-term impacts to socio-economic and environmental sustainability, including increased attention to cumulative impacts on livelihoods of northern residents. Given that the Indigenous peoples have constitutionally protected rights, which is significant in the Canadian context, the protection of traditional cultures, aboriginal and treaty rights, and the economy became the center-piece of the EA (Mulvihill and Baker 2001; Gibson 2013).

Over the years, within the broad family of impact assessment tools, regional EA has also been promoted as a proactive, integrated approach to achieving sustainable regional development and is seen as a forum to promote integration across silos of institutional and scientific disciplines (Duinker and Greig 2006; Noble 2008; Francis and Hamm 2011). The importance of regional EA in this regard is underscored by its potential to "consider priorities for future environmental management with respect to general policy objectives and with regard to potential development options" (Cocklin et al. 1992: 46). It is believed that while regional EA processes help build relationships and databases as well as influence development decisions taken at a project-specific level (Livingstone 2004; Fuggle 2005; Jay et al. 2007; Harriman and Noble 2008), it arguably has

considerable potential to also inform planning and policy making, and vice versa (Noble 2008; Runhaar 2009; Francis and Hamm 2011; Kirchhoff et al. 2011). As such, regional EA is proving to be an especially important tool in energy resource-rich regions that are also ecologically significant such as British Columbia Northeast Region; Ontario Lands for Life Planning regions; Alberta Wood Buffalo region; and the Crown of the Continent ecosystem shared across Alberta, British Columbia, and Montana.

Specifically, and from a conceptual perspective, one of the threads that binds the three— -policy, land use planning, EA—together is the growing emphasis on sustainable development (Haughton and Counsell 2004), especially with respect to their future-oriented nature as well as the types of and approaches to environmental (i.e. social, economic, and biophysical) problems being addressed. Despite this common but elusive goal of sustainable development, both normative and substantive expectations of environmental planning, policy-making, and assessment are unmistakeably at variance to one another (e.g. Nitz and Brown 2001; Overgaard 2004; Stoeglehner et al. 2009) An institutional disconnect has often occurred among the three: their functions are undertaken separately under different arrangements and by experts with different worldviews (e.g. Nitz and Brown 2001; Monteiro and Partidario 2012; Kristensen et al. 2013). Although in the past three decades, numerous regional EAs have been undertaken in Canada, a significant number of them were not explicitly linked to broader regional planning and policy-making processes that also shape regional economic development (e.g. Noble 2008; Gunn and Noble 2009a; Duinker et al. 2013; Kristensen et al. 2013). This disconnect has long been recognized as a major barrier to progress in regional EA practice (e.g. Grove-White 1984; Robinson and Webster 1985; Stead and Meijers 2009; Stoeglehner et al. 2009).

Given the constraints of the complex institutional contexts within which many regional EAs take place, realizing meaningful integration is often difficult. There are several studies that insist that many of the benefits of investing in regional EA will not be realized unless major institutional challenges are understood, contextualized, and bridged to advance its practice (Noble 2008; Gunn and Noble 2009a; Duinker et al. 2013; Kristensen et al. 2013). This research is therefore rooted in the following implicit assumptions, that: (i) scientific and methodological advancements are necessary but not sufficient precondition for regional EA effectiveness; (ii) regional EA stakeholders are interested in practice improvement and want to foster an environment

conducive to multi-institutional and multi-scalar integration; (iii) purposeful reflection upon existing practice can serve as a catalyst for such improvements; (iv) perceptions of institutional actors are valuable in the process; and (v) improved regional EA practice has the potential to contribute to the long-term environmental governance of viable resource regions and ecosystem management.

1.2.1 Silo Effects in Regional Environmental Assessment

Over the past decade there has been a marked increase in emphasis on developing the principles and practice of regional EA. The main focus of research had been on questions of importance, effectiveness, methodology, and application (e.g. Cocklin et al. 1992; Weber et al. 2012; Dubé et al. 2013). Advancement has also been recorded from a methodological perspective, especially from recent studies that emphasize a strategic context that includes "assessing cumulative effects and exploring alternatives, scenarios, futures and opportunities for sustainable development" (Gunn and Noble 2015, p. 79). It is also argued that regional EA should be a forum for promoting cross-scale planning, coordinating multi-partnership arrangements, priority setting, and maximizing effectiveness of project-based environmental assessment (see e.g. Magee and Carroll 2006; Stead and Meijers 2009; Porter et al. 2013). It is also seen to be a compelling platform for reconciling scientific analysis and social choice with public policy development (Parkins 2011; Duinker et al. 2013). A recurrent theme in all of these works is that regional EA should influence planning and policies, enhance implementation outcomes, promote efficiency, and encourage environmental sustainability (i.e. the capacity of a region to continue to deliver its intended benefits over a long period— Bamberger and Cheema (1990)) (Duinker and Greig 2006; Francis and Hamn 2011; Hegmann and Yarranton 2011).

However, within this rapidly growing field, there has been significantly less exploration of actual implicit or explicit relationships with regional planning and policy making, and the effects that lack of integration can exert on the process of regional EA and its outcomes. In addition, there is little empirical evidence that demonstrates the ideals associated with regional EA are realized in practice, despite the increasing uptake of regional EA as a means to guide resource development in various regions in Canada. Internationally, a few recent works are beginning to demonstrate that

regional EA, if set up within larger planning and policy frameworks, have the potential to facilitate better environmental outcomes and enable improved compliance with the objectives of regional EA (Fidler and Noble 2012; Bidstrup 2015). Nevertheless, maximizing integration and its benefits remains an "elephant in the room" in EA research that requires urgent attention if EA, particularly at a strategic level (Tetlow and Hanusch 2013, p. 22), will exert any influence on planning and policy-making processes that also affect the same landscapes.

This research is premised on this gap and explores it within the context of silo effects, and the need for better mechanisms for improving assessment/governance relationships to promote necessary linkages among the silos. Silo effects—simply defined as the real or perceived understanding of hierarchical, geographical, or expertise boundaries as borders that are difficult to cross or cannot be crossed—often occur in the context of domain-thinking such as policy-making or planning processes. A domain can be defined as "the body of knowledge, the set of rules and procedures, the symbolic system" which are used by individual actors to approach issues in a collective assessment (Fulton and Paton 2016, p. 29), and is a term that may be used to describe the assessment, planning, and policy making realms. These are traditions and conventions individual actors tend to rely on in making contributions or decisions in multi-stakeholders' environmental assessments such as in regional EA. From a broader context, it can be a discipline-specific perspective, "issue areas" such as mining, energy and agriculture, or a combination of both. Such domain-thinking is embedded in the epistemic communities described by (Haas 1992, p. 3) as "a network of professionals with recognized expertise and competence in a particular domain and an authoritative claim to policy-relevant knowledge within that domain or issue-area." Regional EA processes need innovative strategies to overcome such epistemic divides as well as other silo effects that undermine effectiveness in practice.

There have been clear and consistent submissions in recent EA literature explaining how silo effects undermine the effectiveness and outcomes of regional EAs. In a critique of the Northwest Territories (Regional) Cumulative Effects Assessment Management Framework for instance, Gunn and Noble (2009b) found that actual performance of the regional EA in terms of its delivery capability at the implementation phase does not reflect the original expectations and assumptions that guided the assessment. The main problem was that the EA process was divided from the policy-making and regulatory regime within the region at the time. Another more recent

review of two Canadian cases by Parkins (2011) includes a somewhat similar observation—expressing the mismatch between expectations of regional EA and the prevalence of decision-oriented and technocratic approaches in EA generally. These studies conclude that the growing urgency attached to resource development should ideally induce a more reflexive understanding of success factors in regional EA, and more importantly, trigger further research on the institutional planning and policy contexts in Canada (Gunn and Noble 2009; Parkins 2011).

Some criticisms related to silo effects also exist outside of the Canadian practice. Margerum (1997), for example, observed that despite huge investments and a multi-agency approach to the visioning of the Yellowstone Integrated Management Plan (United States), the process is largely regarded as a failure primarily due to lack of understanding of policy and planning processes by participants. There is also a consensus in wider international EA practice that lack of connection between the different management assessments emerging from regional EA and the governance processes that should shape the same region will continue to serve as constraints to its effectiveness and implementation (e.g. Nitz and Brown 2001; Monteiro and Partidario 2012). This challenge is further exacerbated by the mismatch between political structures and existing governance mechanisms in most multi-jurisdictional environmental assessments in North America (e.g. Norman and Bakker 2009). Most management assessments are state-centric and thus provide little space for other governance arrangement outside of such formal institutions. It is the intent of this research to engage with regional EA and related environmental governance scholarship in order to advance research and practice in the multi-jurisdictional, socio-political contexts that the process often occurs.

1.2.2 Purpose and Objectives

The purpose of this research was to gain a clear understanding of how regional EA processes can better be integrated with planning and policy-making to facilitate better EA outcomes and strengthen regional environmental governance. The specific objectives of the research were: (i) to aggregate and assess scholarly literature that attempts to integrate EA, planning, and policy-making in order to identify key research themes to date, investigate common conceptual approaches to cross-domain integration, and suggest an agenda for future research in this area; (ii)

to investigate how institutional actors perceive cross-domain integration vis-à-vis their own involvement in regional EA cases in Canada in order to identify barriers and facilitators associated with integration; and (iii) to explore the nature and outcomes of specific joint environmental management assessments that emerged from the Crown Managers' Partnership Regional Cumulative Effects Study in order to identify critical success factors for optimizing regional environmental governance via regional EA.

1.3 Research Methodology Overview

The research adopts a mixed-methods approach in collecting and analyzing data (see Figure 1.1 for the research design). The methods include: (1) an in-depth literature review; (2) a web-based survey; and (3) semi-structured interviews. A mixed methods approach is appropriate because of its potential to draw out multiple meanings and realities throughout the investigation. This is an important factor in research such as this where diverse perspectives are being explored and reported on (Morse 2003; Johnson et al. 2007; Creswell 2009). The rest of this sub-section provides an overview of the data collection methods and approach to analysis, which are further elaborated in each of the papers (Chapters 2, 3, and 4).

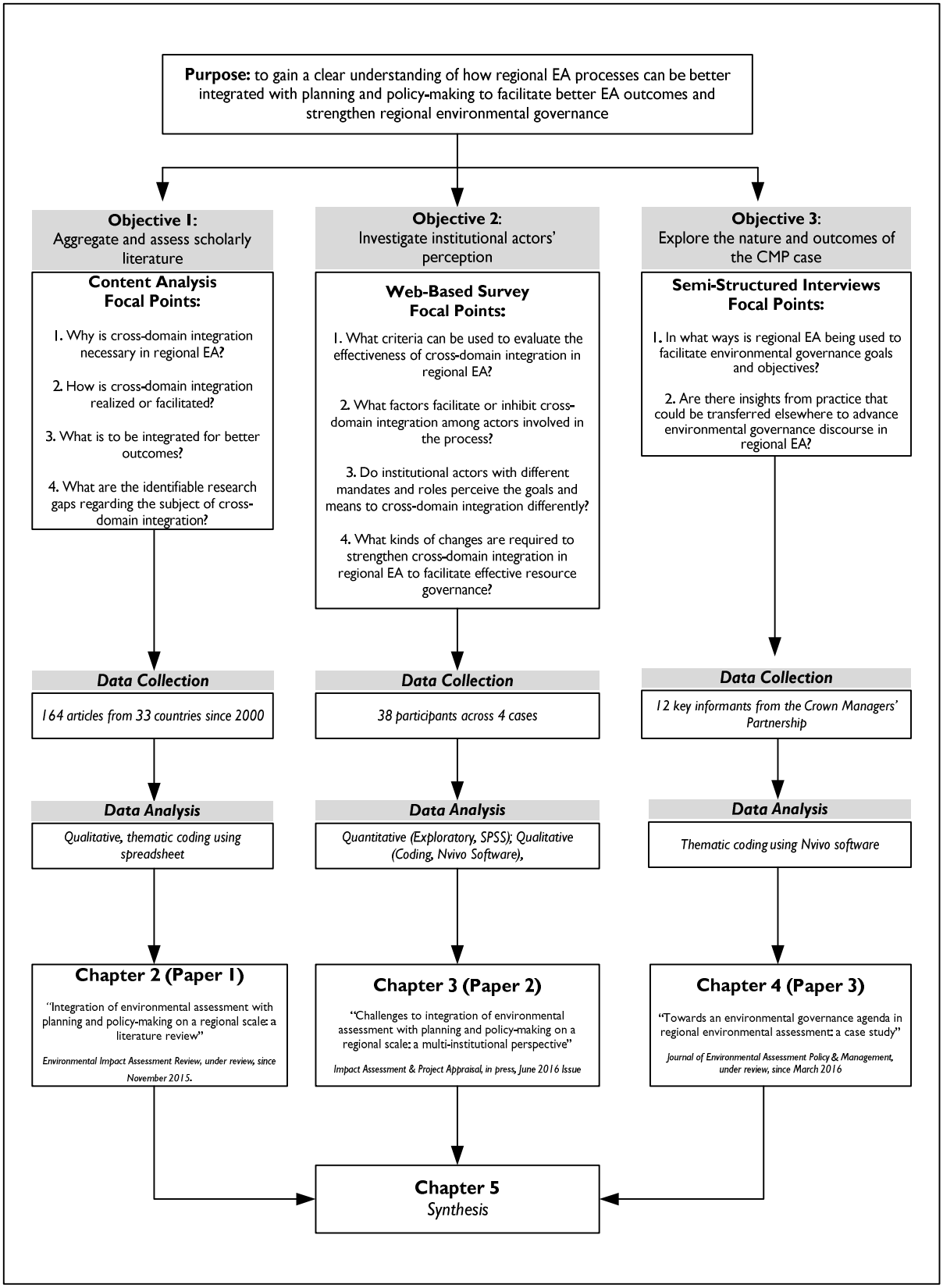

Figure 1.1: Overview of research design

1.3.1 Content Analysis

A structured and systematic content analysis was conducted to understand existing research connections and gaps among the three domains of interest—planning, policy, and EA, especially on the nature and dimensions of integration. The scope of the review was academic literature from 2000 to date, a period when repeated calls for planning-policy-assessment integration became persistent with emphasis on its direct and indirect benefits and impacts (e.g. Lawrence 2000; Fuggle 2005; Cashmore 2004; Richardson 2005; Harriman and Noble 2008) (Objective 1). It was also a period characterized by substantial progress in collaborative approaches to EA particularly in the context of regional EA and particularly in Canada (e.g. Quinn et al. 2004; Duinker and Greig 2006; Duinker et al. 2013). During this period, debates also extended to include its potential added-value to regional environmental governance (Sheate et al. 2003; Richardson 2005; Parkins 2011). In order to located a wide array of relevant peer reviewed works, including those originating from the fields of planning and policy-making, the review included an extensive search of one of the most robust databases for social research—Scopus®. Further details on the search criteria are provided in chapter 2.

A thematic approach that captured key perspectives on cross-domain integration and interaction was adopted for coding and analysis using a spreadsheet software. The primary focal points of the content analysis are: (i) Why is cross-domain integration necessary in regional EA? (ii) How is cross-domain integration realized or facilitated? (iii) What is to be integrated for better outcomes? And (iv) what are the identifiable research gaps regarding the subject of cross-domain integration? While this method principally informed the first objective (chapter 2), the results also contributed significantly to the second and third objectives reported in chapters three and four respectively.

1.3.2 Web-Based Survey

A web-based survey was used to gather data on the perceptions of planners, policy-makers, and EA practitioners involved in select regional EA studies in Canada in order to understand factors that aided or impeded cross-domain interaction and establish the nature of silo effects in

the process (Objective 2). A web-based survey was selected for several reasons: its low cost relative to a mailed survey or telephone survey; it is less rigid in terms of completion time and duration as surveys can be completed based on individual respondents' schedule, pace, and convenience. In addition, the data collected can be automatically loaded into the software used for the data analysis (Cobanoglu et al. 2001; Gunn 2002; Fleming and Bowden 2009). Madge and O'Connor (2005) argue that modern technology (web-based survey platform) offers an attractive and user-friendly alternative to traditional survey approaches that encourages higher response rates. A web-based survey is especially appropriate given that targeted participants are professionals with strong technology backgrounds, as will be seen in chapter three. Respondents were identified from the following Canadian regional EA examples: (i) Northern Saskatchewan Environmental Quality Committee (1995); (ii) Northwest Territories Cumulative Impact Monitoring Program (1999); (iii) Regional Municipality of Wood Buffalo Cumulative Environmental Management Association (2000); and (iv) Crown of the Continent Regional Cumulative Effects Study (2001)[1].

The main criteria for selection of cases and participants used in the survey are: a regional focus to the assessment; evidence that the three domains are represented in the processes; and a history of at least 10 years to ensure an adequate length of time has passed to be able to gauge interaction and integration among the domains[2]. Data were collected over three months using the University of Saskatchewan Fluidsurvey® platform (see Appendix I for the survey questionnaire). Approximately 120 invitations to participate were sent with 52 indicating interest in the survey. Of those, 45 visited the survey platform, and 38 respondents completed the survey. Twenty-four open-ended (text responses) and fifty-one closed-ended (Likert scale, multiple options, and binary) questions were asked. An exploratory data analysis (EDA) in the Statistical Package for Social Sciences (SPSS) software was used to analyse the data. This proved especially suitable to identify median response patterns in the Likert scale questions and compare results within and across each group of professionals. Simple box-plot diagrams were used because of their potential to capture outliers in the distribution and project a rich visual representation of the results (Kelder et al. 2010).

[1] The years shown in brackets are the dates the assessments commenced.

[2] Effort was made to include cases other than those from western Canada, however, there were no known cases to the author from other parts that met these criteria as at the time the study commenced.

Key themes emerging from the open-ended texts in the survey were integrated into the analysis. Chapter three provides further details on this method.

1.3.3 Semi-Structured Interviews

The Crown of the Continent Manager's Partnership (CMP) is a joint management assessment involving over 20 government agencies across the provinces of Alberta and British Columbia (Canada) and the state of Montana in the United States. For the past 15 years, the CMP has adopted a regional framework for assessing cumulative effects within the resource-rich but rapidly changing regional ecosystem. The case was selected for in-depth review based on the following rationale: (i) proximity and access to empirical data; (ii) a high degree of multidisciplinary and multi-jurisdictional collaboration with evidence of interaction among experts involved; and (iii) a history of partnership spanning over a decade supported by availability of relevant technical and policy documents. In contrast to many other regional EA studies that are often 'one-off', or tied to the regulatory project-based EA context, the CMP has experimented with more than one approach to regional EA over the past decade and has maintained a continuous membership structure allowing for in-depth review.

Twelve semi-structured interviews were conducted with CMP representatives over the phone between October and December 2014 (see Appendix 2 for a copy of the interview guide). The interviewees were from 11 different agencies/institutions and spread across the three socio-political jurisdictions: Alberta (n=7); British Columbia (n=1), and Montana (n=4). The managers were selected on the basis of their experience in the CMP: all of them have been involved for at least seven years and seven of the interviewees had served or are serving as members of the steering committee at the time they were interviewed. All the interviews were audiotaped and transcribed verbatim to gain a rich understanding of the various perspectives represented and absorb the context of important statements. The interview data were analysed with the aid of Nvivo® software. A thematic coding approach was employed to facilitate identification of key trends as well as contrasting and/or outlying perspectives found among the data. More details are provided in chapter four.

1.3.4 Research Quality and Validity

Apart from the online questionnaire survey where a significantly quantitative approach was used, the research is dominated by a qualitative approach. Traditionally, and in contrast to quantitative research, one major critique of qualitative research techniques is a lack of "scientific rigour." (May and Pope 1995). This is often expressed in terms of validity i.e. accuracy, meaningfulness, credibility, and the ability to use statistical analyses to examine and address patterns in data (Myers 2000; Giorgi 2002; Leedy and Ormrod 2005); reproducibility of the research product (Kirk and Miller 1986); and the issues of researcher's bias or subjectivity (Collier and Mahoney 1996; Hartman et al. 2002). These criticisms do not only overlap in meaning, context, and application, they are also not absolutely particular to the qualitative paradigm. However, in order to give credibility to the quality of the study, triangulation—a procedure where researchers search for convergence among multiple and different sources of information to form themes or categories in a study (Creswell and Miller 2000)—was employed. This procedure is especially evident in the final chapter of this work where the author revisits the research objectives and the key messages of each chapter to synthesize findings from all methods and establish a set of conclusions for the study.

1.4 Theoretical and Conceptual Perspective

The development of theory and theoretical perspectives within EA is still largely in its infancy with much of the influence coming from the field of land use planning (Lawrence 2000; Cashmore 2004). To date, there are very few studies that have established links between EA practice and theory (Briassoulis 1989; Barlett and Kurian's 1999; Lawrence 2000; Cashmore 2004; Richardson 2005; Cashmore and Kørnøv 2013), most of which predominantly focus on the roles of science and politics in the process of theoretical development in EA (Cashmore 2004; Richardson 2005). One notable seminal work is Cashmore's (2004) paper, which explores the role of science in environmental impact assessment and highlights five notable theoretical trajectories in the field of EA over the past four decades. According to Cashmore, there is an *analytical science model* that is rooted in the "epistemology of positivism" with emphasis on hypothesis testing, strict separation of facts and values, and a prominent role for ecologists. Second, an *environmental*

design model posits EA as part of the wider planning process, with assessment akin to an applied science narrative which involves evaluation of alternatives, design options, and proactive decision-making rooted in environmental design and engineering disciplines. Third, an *information provision model* combines natural (analytical) and social science (value judgments) orientations to support EA processes. Fourth, a *participation model* of EA is based on the assumption that: "Sound environmental management, not accurate predictions, is the primary aim of EA" (p. 412), and thus it privileges social values and stakeholder involvement over quantitative analysis. Lastly, and perhaps the most relevant to the context of this research, EA can be viewed as an *environmental governance model*, which is based on the assumption that: "the predictive capabilities of natural and social sciences must be harnessed to identify the probable consequences of societally defined alternatives" (p. 414). All of these have implications for cross-domain integration in regional EAs. An environmental governance approach therefore provides an opportunity to better conceptualize and interpret study participants' experiences and perceptions with respect to the key dimensions of cross-domain integration in order to better understand its dynamics in an institutionally diverse setting such as in regional EA.

Among these perspectives, the participation or 'collaborative' perspective has received the greatest emphasis, likely in part due to the fact that collaboration is a core mechanism of cross-domain integration. Application of a collaborative approach indicates the acceptance of a postmodern desire to focus environmental debates on a more pragmatic view of reality (Lawrence 2000; Briassoulis 1989). The 'collaborative' perspective explains why EA, planning, or policy processes are often perceived as centres of political debates (Cashmore 2004; Hegmann and Yarranton 2011) with emphasis on substantive outcomes, inclusivity, and transparency in decision-making. As noted by Innes and Booher (1999, p. 415): "No matter how good an agreement is by some standards, if it was reached by a process that was not regarded as fair, open, inclusive, accountable, or otherwise legitimate, it is unlikely to receive support." This is in contrast to emphasizing the best science and accurate predictions of the rational-analytical science school of thought, which in the past did not always make way for full collaboration (Innes and Booher 1999; Healey 2003; Bryan 2004).

Despite the prevalent use of collaborative approaches, however, it has been found that they have not been sufficient enough to realize the objectives of many regional environmental studies

(Gunn and Noble 2009), perhaps due to inherent lack of attention to power relationships and privilege of science/expertise in these "collaborative" processes. This raises new questions about governance arrangements necessary to advance regional-scale EA in a multi-jurisdictional context where silo effects are easily registered. Although this research is not primarily focused on theory, it helps expand the EA discourse on specific issues related to environmental governance such as subsidiarity, scale, social capital, conformity, and leadership: subjects not often covered in mainstream EA literature, with its rational-technical emphasis. The focus on environmental governance perspective is contextualized against the backdrop of growing complexity in actor structures in regional EA processes and the need to steer individuals and institutions toward mutually beneficial or less harmful outcomes (Janicke and Jorgens 2006), in which regional EA is becoming embedded. This suggests that, if the aim of regional EA is to have tangible effect on regional environmental outcomes and influence the domains of regional planning and policy-making, there should be a clear focus on improving the quality and effectiveness of "epistemic communities" that make up the arrangement (Haas 1992; Cashmore 2004).

1.5 Thesis Organization

This thesis follows a *dissertation by manuscript* style and it is organized into five chapters[3]. This first chapter provides the background to the nature of regional EA research and the research problem under investigation. Chapter 2 reports the results of the content analysis in a manuscript entitled: "Integration of environmental assessment with planning and policy-making on a regional scale: a literature review." This paper examines EA literature that integrates it with planning and policy-making in order to understand the goals, dimensions, and frameworks for cross-domain integration and to identify a set of research agenda towards more effective regional-scale assessments in the twenty-first century. The paper was submitted for publication in *Environmental Impact Assessment Review* in November 2015 and is currently undergoing a double-blind peer-review process under the direction of the journal editor. Environmental Impact Assessment Review

[3] Chapters 2 to 4 are co-authored with the candidate's supervisor (for the purpose of publication) as per the practice in graduate supervision. The research design, selected concepts, data collection and analysis, manuscript titles and journal selection, and the full drafts of the thesis are the candidate's original ideas. The supervisor's role as co-author was mainly that of oversight and suggesting revisions to draft materials in the manner and standards applicable in graduate student supervision.

is a journal targeted to an interdisciplinary audience interested in the impact of policy, projects, processes and products and is focused on theory and practice of environmental impact assessment, including concepts, methods, techniques, approaches and systems that influence the process.

The second manuscript (Chapter 3) is entitled: "Challenges to integration of environmental assessment with planning and policy-making on a regional scale: a multi-institutional perspective." This manuscript characterizes challenges related to cross-domain integration in regional EA from an institutional, disciplinary, and transactional perspectives, as well as emergent opportunities for learning and multiple domain expertise in practice. This paper was submitted to *Impact Assessment and Project Appraisal* in January 2015, underwent a double-blind peer-review process between January and March 2016, has been accepted for publication and will appear in the June 2016 issue of the journal. Impact Assessment and Project Appraisal is a journal published by International Association for Impact Assessment and targeted to a diverse research and practice audience working on the environmental, social, health, sustainability, and/or other assessments of projects, programs, plans and policies internationally.

The third and final manuscript (Chapter 4) entitled "Towards an environmental governance agenda in regional environmental assessment: a case study" reports lessons from the Crown Managers' Partnership regional EA germane to other regions seeking to address regional cumulative environmental effects as a continuous assessment within multi-disciplinary, multi-jurisdictional systems. The manuscript further highlights the potential of regional EA as a foundation for an effective collaborative, regional environmental governance, and argues for the strengthening of both procedural and transactional aspects of regional EA to promote better integration and improved environmental and social outcomes. This paper was submitted to *Journal of Environmental Assessment Policy and Management* in March 2016 and is currently under review. The journal primarily targets academics as well as policy and decision makers working in interdisciplinary fields across the social, natural and engineering sciences.

Lastly, Chapter 5 synthesizes the results from the three manuscripts, offering a meta-analysis of the findings in relation to the research purpose and objectives, and recommendations for progress in the field of regional EA and beyond.

1.6 References

Amir, S., Frenkel, A., Law-Yone, H., Shefer, D., and Trop, T. (1997) Integration of environmental assessment into the regional development planning process of the Galilee. *Environmental Management*, 21(1), 59-68.

Angeli, V., Angelis-Dimakis, A., and Dimaki, K. (2015). The region and its multiple images. *Procedia Economics and Finance*, 33, 188–199.

Balsiger, J. and Debarbieux, B. (2011). Major challenges in regional environmental governance research and practice. *Procedia-Social and Behavioral Sciences*, *14*, 1-8.

Balsiger, J., Prys, M. and Steinhoff, N., (2012). The nature and role of regional agreements in international environmental politics: mapping agreements, outlining future research. Hamburg: GIGA German Institute of Global and Area Studies.

Bamberger, M. and Cheema, S. (1990). *Case Studies of Project Sustainability: Implications for Policy and Operations from Asian Experience*. Washington, DC: The World Bank.

Bartlett, R. (1980). Indian and Native Rights in Uranium Development in Northern Saskatchewan. *Saskatchewan Law Review*, 45, 13-51.

Bartlett, R. and Kurian, P. (1999). The theory of environmental impact assessment: Implicit models of policy making. *Policy and Politics*, 27(4), 415-433.

Bidstrup, M. (2015). The 'grey'assessment practice of IA screening: Prevalence, influence and applied rationale. *Environmental Impact Assessment Review*, doi:10.1016/j.eiar.2015.07.008.

Briassoulis, H. (1989). Theoretical orientations in environmental planning: An inquiry into alternative approaches. *Environmental Management*, 13(4), 381-392.

Bryan, B. and Crossman, N. (2008). Systematic regional planning for multiple objective natural resource management. *Journal of Environmental Management*, 88(4), 1175–1189.

Bryan, T. (2004). Tragedy averted: The promise of collaboration. *Society & Natural Resources*, 17(10), 881-896.

Cashmore, M. (2004). The role of science in environmental impact assessment: Process and procedure versus purpose in the development of theory. *Environmental Impact Assessment Review*, 24(4), 403-426.

Che, X., English, A., Lu, J., and Chen, Y. D. (2011). Improving the effectiveness of planning EIA (PEIA) in china: Integrating planning and assessment during the preparation of Shenzhen's master urban plan. *Environmental Impact Assessment Review*, 31(6), 561-571.

Chilima, J., Gunn, J., Noble, B., and Patrick, R. (2013). Institutional considerations in watershed cumulative effects assessment and management. *Impact Assessment and Project Appraisal,* 31(1), 74-84.

Cobanoglu, C., Warde, B., and Moreo, P. (2001). A comparison of mail, fax, and Web-based survey methods. *International Journal of Marketing Research*, 43(4), 441–442.

Cocklin, C., Parker, S., and Hay, J. (1992). Notes on Cumulative Environmental Change 1: Concepts and Issues. *Journal of Environmental Management*, 35, 31-49.

Collier, D. and Mahoney, J. (1996). Insights and pitfalls: Selection bias in qualitative research. *World Politics*, 49, 56-91.

Cooper, L. and Sheate, W. (2004). Integrating cumulative effects assessment into UK strategic planning: implications of the European Union SEA Directive. *Impact Assessment and Project Appraisal*, 22(1), 5-16.

Counsell, D. and Haughton, G. (2006). Sustainable development in regional planning: The search for new tools and renewed legitimacy. *Geoforum*, 37(6), 921-931.

Creswell, J. (2009). *Research Design: Qualitative, Quantitative and Mixed Methods Approaches* (3rd ed.), Sage Publications: Thousand Oaks.

Creswell, J. and Miller, D. (2000). Determining validity in qualitative inquiry. *Theory into Practice,* 39(3), 124-131.

Cullingworth, J. (1987). *Urban and Regional Planning in Canada*. Oxford: Transaction Press.

D'Auria, L., and Cinneide, M. (2009). Integrating strategic environmental assessment into the review process of a development plan in Ireland. *Impact Assessment and Project Appraisal, 27*(4), 309-319.

De Loë, R., Armitage, D., Plummer, R., Davidson, S. and Moraru, L. (2009). *From Government to Governance: A State-of-the-Art Review of Environmental Governance*. Final Report. Prepared for Alberta Environment, Environmental Stewardship, Environmental Relations. Guelph, ON: Rob de Loë Consulting Services.

De Lombaerde, Phillip et al. (2010), The Problem of Comparison in Comparative Regionalism. *Review of International Studies*, 36, 731–753.

Dubé, M. (2003). Cumulative effects assessment in Canada: a regional framework for aquatic ecosystems. *Environmental Impact Assessment Review*, 23(6), 723-745.

Dubé, M., Duinker, P., Greig, L., Carver, M., Servos, M., McMaster, M., Noble, B., Schreier, H., Jackson, L., and Munkittrick, K. (2013). A framework for assessing cumulative effects in watersheds: an introduction to Canadian case studies. *Integrated Environmental Assessment and Management*, 9(3), 363-369.

Duinker, P. and Greig, L. (2006). The impotence of cumulative effects assessment in Canada: Ailments and ideas for redeployment. *Environmental Management*, 37(2), 153-161.

Duinker, P., Burbidge, E., Boardley, S., and Greig, L. (2013). Scientific dimensions of cumulative effects assessment: Toward improvements in guidance for practice. *Environmental Reviews,* 21(1), 40-52.

Eidelman, G. (2016). Rethinking public land ownership and urban development: A Canadian perspective. *Cities*, in press, doi:10.1016/j.cities.2015.12.003.

Elling, B. (2000). Integration of strategic environmental assessment into regional spatial planning. *Impact Assessment and Project Appraisal*, 18(3), 233-243.

Elvin, S. and Fraser, G. (2012). Advancing a national strategic environmental assessment for the Canadian offshore oil and gas industry with special emphasis on cumulative effects. J*ournal of Environmental Assessment Policy and Management*, 14(3), DOI: 10.1142/S1464333212500159.

Esty, D. (1999). Toward optimal environmental governance. *New York University Law Review,* 74(6), 1495-1574.

Fischer, T., Kidd, S., Jha-Thakur, U., Gazzola, P., and Peel, D. (2009). Learning through EC directive based SEA in spatial planning? Evidence from the Brunswick region in Germany. *Environmental Impact Assessment Review*, 29(6), 421-428.

Fleming, C. and Bowden, M. (2009). Web-based surveys as an alternative to traditional mail methods. *Journal of Environmental Management*, 90(1), 284–292.

Francis, G. (2003). Governance for Conservation. In: F. Westley and P Miller (eds.) *Experiments in Consilience: Integrating Social and Scientific Responses to Save Endangered Species*. Pp. 223-243, Washington: Island Press.

Francis, S. and Hamn, J. (2011). Looking forward: using scenario modeling to support regional land use planning in Northern Yukon, Canada. *Ecology and Society*, 16(4), 18. http://dx.doi.org/10.5751/ES-04532-160418 .

Franks, D., Brereton, D., and Moran, C. (2010). Managing the cumulative impacts of coal mining on regional communities and environments in Australia. *Impact Assessment and Project Appraisal, 28*(4), 299-312.

Fuggle, R. (2005). Have impact assessments passed their "sell by" date? *International Association for Impact Assessment Newsletter*, 16(3), 1-6.

Fulton, J. and Paton, E. (2016). The systems model of creativity. In: McIntyre P. et al. (eds.): *The Creative System in Action: Understanding Cultural Production and Practice*, pp. 27-45, New York: Palgrave Macmillan.

Gibson, R. (2002). From Wreck Cove to Voisey's Bay: the evolution of federal environmental assessment in Canada. *Impact Assessment and Project Appraisal*, 20(3), 151-159.

Geneletti, D., Bagli, S., Napolitano, P., and Pistocchi, A. (2007). Spatial decision support for strategic environmental assessment of land use plans. A case study in southern Italy. Environmental Impact Assessment Review, 27(5), 408-423.

Gibson, R., Hassan, S., Holtz, S., Tansey, J., and Whitelaw, G. (2005). *Sustainability assessment: criteria and processes*. London: Earthscan.

Gibson, R. (2013). Why sustainability assessment? In: Bond, A., Morrison-Saunders, A., and Howitt R. (eds.) *Sustainability Assessment: Pluralism, Practice and Progress*. Pp. 3-17, London: Routledge.

Giorgi, A. (2002). The Question of Validity in Qualitative Research. *Journal of Phenomenological Psychology*, 33(1), 1-18.

Grove-White, R. (1984). The role of environmental impact assessment in development control and policy decision-making (UK). In: *Planning and Ecology,* Roberts, R. D. and Roberts, T. M. (eds.)*,* pp. 145-152.

Gunn, H. (2002). Web-based surveys: Changing the survey process. *First Monday*, 7(12) http://journals.uic.edu/ojs/index.php/fm/article/view/1014/935

Gunn, J. and Noble, B. (2009a). A Conceptual Basis and Methodological Framework for Regional Strategic Environmental Assessment (R-SEA). *Impact Assessment and Project Appraisal*, 27(4), 258-270.

Gunn, J. and Noble, B. (2009b). Integrating Cumulative Effects in Regional Strategic Environmental Assessment Frameworks: Lessons from Practice. *Journal of Environmental Assessment Policy and Management*, 11(3), 267-290.

Gunn, J. and Noble, B. (2011). Conceptual and Methodological Challenges to Integrating SEA and Cumulative Effects Assessment. *Environmental Impact Assessment Review*, 31, 154-160.

Gunn, J. and Noble, B. (2015). Sustainability considerations in regional environmental assessment. In: A Morrison-Saunders, J Pope, A Bond (eds.) *Sustainability Assessment Handbook*, pp. 79-102, Northampton, MA: Edward Elgar.

Haas, P. (1992). Introduction: epistemic communities and international policy coordination. *International Organization*, 46(1), 1-35.

Harding, J. (1985). A Content Analysis of Attitudes towards Uranium Mining Expressed in the Local Hearings of the Cluff Lake Board of Inquiry. *Impact Assessment*, 4(1-2), 189-209.

Harriman, J. and Noble, B. (2008). Characterizing project and strategic approaches to regional cumulative effects assessment in Canada. *Journal of Environmental Assessment Policy and Management*, 10(1), 25-50.

Hartman, J., Forsen, J., Wallace, M., and Neely, G. (2002). Tutorials in clinical research: part IV: recognizing and controlling bias. *The Laryngoscope*, 112**,** 23–31.

Haughton, G. and Counsell, D. (2004). Regions and sustainable development: regional planning matters. *The Geographical Journal*, 170(2), 135–145.

Healey, P. (2003). Collaborative planning in perspective. *Planning Theory,* 2(2), 101-123.

Hegmann, G. and Yarranton, G. (2011). Alchemy to reason: Effective use of cumulative effects assessment in resource management. *Environmental Impact Assessment Review*, 31(5), 484-490.

Innes, J. and Booher, D. (1999). Consensus building and complex adaptive systems: a framework for evaluating collaborative planning. *Journal of the American Planning Association*, 65(4), 412-423.

Janicke, M. and Jorgens, H. (2006). New Approaches to Environmental Governance. In: M. Janicke and K. Jacob (eds.) *Environmental Governance in Global Perspective: New Approaches to Ecological Modernisation*. Berlin: Freie Universität Berlin.

Jay, S., Jones, C., Slinn, P., and Wood, C. (2007). Environmental impact assessment: Retrospect and prospect. *Environmental Impact Assessment Review, 27*(4), 287-300.

Johnson, D., Lalonde, K., McEachern, M., Kenney, J., Mendoza, G., Buffin, A., and Rich, K. (2011). Improving cumulative effects assessment in Alberta: Regional strategic assessment. *Environmental Impact Assessment Review*, 31, 481–483.

Johnson, R., Onwuegbuzie, A., and Turner, L. (2007). Toward a definition of mixed methods research. *Journal of Mixed Methods Research*, 1(2), 112-133.

Keysar, E., and Steinemann, A. (2002). Integrating environmental impact assessment with master planning: Lessons from the US army. *Environmental Impact Assessment Review*, 22(6), 583-609.

Kelder, T., Conklin, B., Evelo, C., and Pico, A. (2010). Finding the Right Questions: Exploratory Pathway Analysis to Enhance Biological Discovery in Large Datasets. *PLOS Biology*, 8(8), e1000472. doi:10.1371/journal.pbio.1000472.

Kirchhoff, D., McCarthy, D., Crandall, D., and Whitelaw, G. (2011). Strategic environmental assessment and regional infrastructure planning: The case of York Region, Ontario, Canada. *Impact Assessment and Project Appraisal*, 29(1), 11-26.

Kirk, J. and Miller, M. (1986). Reliability and validity in qualitative research. Beverly Hills: Sage Publications.

Komori, Y. (2010). Evaluating regional environmental governance in Northeast Asia. *Asian Affairs: An American Review*, *37*(1), 1-25.

Krätke, A. (1999). A regulationist approach to regional studies. *Environment and Planning A*, 31, 683-704.

Kristensen, S., Noble, B., and Patrick R (2013). Capacity for watershed cumulative effects assessment and management: lessons from the Lower Fraser River Basin, Canada. *Environmental Management*, 51(5), 360–373.

Lawrence, D. (2000). Planning theories and environmental impact assessment. *Environmental Impact Assessment Review*, 20(6), 607-625.

Leedy, P. and Ormrod, J. (2005). *Practical research: Planning and design* (8th ed.). Upper Saddle River: Prentice Hall.

Lian, K. and Robinson, N. (2002). Regional Environmental Governance: Examining the Association of Southeast Asian Nations (ASEAN) Model. In: Esty, D and Ivanova, M. (eds.), *Global Environmental Governance Options & Opportunities.* Connecticut: Yale School of Forestry & Environmental Studies.

Livingstone, D. (2004). Cumulative effects assessment and management in the Northwest Territories - Challenges and opportunities for supporting long-term sustainability. *American Fisheries Society Symposium*, 43, 231-242.

Madge, C. and O'Connor, H. (2005). Exploring the Internet as a medium for research: web-based questionnaires and online synchronous interviews. ESRC Research Methods Programme Working Paper No 9. The University of Manchester, pp. 14.

Magee, J. and Carroll, P. (2006). Using tiered assessments to focus land use plans and management instruments on the highest priorities. *Environmental Practice*, 8, 218–227.

Margerum, R. (1997). Integrated approaches to environmental planning and management. *Journal of Planning Literature*, 11(4), 459-475.

May, N. and Pope, C. (1995). Qualitative Research: Rigour and qualitative research. *British Medical Journal,* 311(6997), 109–12.

Mitchel, B. (2014). Evolving Regional, Integrated and Engagement Approaches for Natural Resources Management in South Australia. Adelaide: Faculty of Social and Behavioural Sciences, Flinders University.

Monios, J. (2015). Intermodal transport as a regional development strategy: The case of Italian freight villages. *Growth and Change*, in press, DOI: 10.1111/grow.12129.

Monteiro, M. and Partidario, M. (2012). Perceptions on SEA: not all that glitters is gold. Paper presented at the 32nd Annual Conference of the International Association for Impact Assessment, Porto, May 27 –June1.

Montgomery, C. (2011). *Regional Planning for Sustainable America*. London: Rutgers University Press.

Morse, J. (2003). Principles of mixed methods and multi-method research design. In: A.Tashakkori and C. Teddlie (Eds*.), Handbook of Mixed Methods in Social and Behavioral Research.* Thousand Oaks, CA: Sage, pp. 189-208.

Mulvihill, P. and Baker, D. (2001). Ambitious and restrictive scoping: Case studies from Northern Canada. *Environmental Impact Assessment Review*, 21(4), 363–384.

Myers, M. (2000). Qualitative research and the generalizability question: standing firm with Proteus. *The Qualitative Report (Online Serials)*, 4, Nos. 3/4 http://www.nova.edu/ssss/QR/QR4-3/myers.html.

Niekerk, F. and Arts, J. (1996). Impact assessments in Dutch infrastructure planning: towards better timing and integration. *Project Appraisal*, 11(4), 237-246.

Nitz, T. and Brown A. (2001). SEA must learn how Policy Making Works. *Journal of Environmental Assessment Policy and Management*, 3(3), 329-342.

Noble, B. (2009). Promise and dismay: the state of strategic environmental assessment systems and practices in Canada. *Environmental Impact Assessment Review*, 29(1), 66-75.

Noble B., Ketilson, S., Aitken, A., and Poelzer, G. (2013). Strategic environmental assessment opportunities and risks for Arctic offshore energy planning and development. *Marine Policy*, 39, 296-302.

Noble, B. (2008). Strategic approaches to regional cumulative effects assessment: a case study of the Great Sand Hills, Canada. *Impact Assessment and Project Appraisal*, 26(2), 78–90.

Norman, E. and Bakker, K. (2009). Transgressing scales: water governance across the Canada–U.S. borderland. *Annals of the Association of American Geographers*, 99(1), 99-117.

Overgaard, K. (2004). Planning methods. In; Robinson, R. and Thagesen, B. (eds.), Road Engineering for Development (2nd ed.), London: Spon Press, pp. 92-113.

Palmay, F. and Gwilym, R. (1980). Preparing and presenting environmental impact statements in support of mining operations with particular reference to uranium mining. *Minerals and the Environment,* 2(3), 114-123.

Parkins, J. (2011). Deliberative democracy, institution building, and the pragmatics of cumulative effects assessment. *Ecology and Society* 16(3), 20. http://dx.doi.org/10.5751/ES-04236-160320

Porter, M., Franks, D., and Everingham, J. (2013). Cultivating collaboration: Lessons from assessments to understand and manage cumulative impacts in Australian resource regions. *Resource Policy*, 38, 657-669.

Quinn, M., Greenaway, G., Duke, D., and Lee, T. (2004). *A Collaborative Approach to Assessing Regional Cumulative Effects in the Transboundary Crown of the Continent*. Research supported by the Canadian Environmental Assessment Agency's Research and Development Program. Ottawa, ON: Canadian Environmental Assessment Agency.

Rega, C., and Bonifazi, A. (2014). Strategic environmental assessment and spatial planning in Italy: Sustainability, integration and democracy. *Journal of Environmental Planning and Management*, 57(9), 1333-1358.

Richardson, T. (2005). Environmental assessment and planning theory: four short stories about power, multiple rationality, and ethics. *Environmental Impact Assessment Review*, 25, 341–365.

Robinson, I. and Webster, D. (1985). Regional planning in Canada history, practice, issues, and prospects. *Journal of the American Planning Association*, 51(1), 23-33.

Runhaar, H. (2009). Putting SEA in context: A discourse perspective on how SEA contributes to decision-making. *Environmental Impact Assessment Review*, 29, 200-209.

Salter, L. (1981). The role of the public in scientific determination of policy: The Canadian inquiry process. *The University of Toronto Law Journal*, 31(4), 343-362.

Seitz, N., Westbrook, C., and Noble, B. (2011). Bringing science into river systems cumulative effects assessment practice. *Environmental Impact Assessment Review,* 31(3), 172–179.

Sheate, W., Dagg, S., Richardson, J., Aschemann, R., Palerm, J., and Steen, U. (2003). Integrating the environment into strategic decision-making: conceptualizing policy SEA. *European Environment*, 13, 1-18.

Sheate R., Dagg, S., Richardson, J., Aschemann, R., Palerm, J., and Steen U. (2001). SEA and Integration of the Environment into Strategic Decision-Making, Final Report by IC Consultants Ltd (ICON) to the European Commission under Contract No. B4-3040/99/136634/MAR/B4, Vols 1–3. http://ec.europa.eu/environment/archives/eia/sea-studies-and-reports/pdf/sea_integration_main.pdf.

Sokari-George, E. (1990). Planning and the Rural Regions of Nigeria. *GeoJournal*, 22(1), 93-98.

Sorenson, J. (1972). Some procedures and programs for environmental impact assessment. In: Ditton, R. and Goodale, T. (eds.), *Proceedings of the Conference on Environmental Impact Analysis: Philosophy and Methods*, Green Bay, Wisconsin, January 4-5, p. 97-106.

Stead, D. and Meijers, E. (2009). Spatial planning and policy integration: concepts, facilitators and inhibitors. *Planning Theory and Practice*, 10(3), 317–332.

Stoeglehner, G. and Wegerer, G. (2006). The SEA-Directive and the SEA-Protocol adopted to spatial planning—similarities and differences. *Environmental Impact Assessment Review*, 26(6), 586-599.

Stoeglehner, G., Brown, A., and Kørnøv, L. (2009). SEA and planning: 'Ownership' of strategic environmental assessment by the planners is the key to its effectiveness. *Impact Assessment and Project Appraisal*, 27(2), 111-120.

Swor, C. and Canter, L. (2008). Promoting environmental sustainability via an expert elicitation process. Presented at Assessing and Managing Cumulative Environmental Effects, Special Topic Meeting, International Association for Impact Assessment, November 6-9, Calgary, AB, Canada.

Tang, Z. (2008). Integrating the principles of strategic environmental assessment into local comprehensive land use planning. *Journal of Environmental Assessment Policy and Management*, 10(2), 143-171.

Tetlow, M. and Hanusch, M. (2012). Strategic environmental assessment: the state of the art. *Impact Assessment and Project Appraisal*, 30(1), 15-24.

Van Stigt, R., Driessen, P., and Spit, T. (2013). A window on urban sustainability: Integration of environmental interests in urban planning through 'decision windows.' *Environmental Impact Assessment Review,* 42, 18-24.

Wagner, E. (2016). Law's rurality: Land use law and the shaping of people-place relations in rural Ontario. *Journal of Rural Studies*, in press, doi:10.1016/j.jrurstud.2016.01.006.

Weber, M., Krogman, N., and Antoniuk, T. (2012). Cumulative effects assessment: linking social, ecological, and governance dimensions. *Ecology and Society*, 17(2), 22. http://www.ecologyandsociety.org/vol17/iss2/art22/

White, L. and Noble, B. (2013). Strategic environmental assessment for sustainability: A review of a decade of academic research. *Environmental Impact Assessment Review*, 42, 60–66.

Zimmerbauer, J. (2013). Constructing supranational regions and identities through branding: Thick and thin region-building in the Barents and Ireland–Wales. *European Urban and Regional Studies*, 0969776413512842.

CHAPTER TWO

Integration of Environmental Assessment with Planning and Policy-Making on a Regional Scale: A Literature Review

Abstract:

Integration of environmental assessment (EA) with planning and policy-making is increasingly central to contemporary debates on its effectiveness, particularly at a regional-scale. In this paper, we aggregate and assess scholarly literature that attempts to integrate EA, planning, and policy-making in order to identify key research themes to date, investigate common conceptual approaches to cross-domain integration, and suggest an agenda for future research in this area. Insights are drawn from a diverse set of peer-reviewed works (n=164) across 33 countries. The results reveal that the transactive and procedural aspects of cross-domain integration in regional EA are well addressed in literature but the time is nigh to address the missing theoretical link. Other literature gaps warranting further investigation are highlighted and discussed. The review provides EA practitioners, land use planners, and policy-makers involved in regional EA processes with the foundations and insights for facilitating a more efficient, more effective regional EA practice. This chapter is submitted to *Environmental Impact Assessment Review* and currently under review[4].

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2.1 Introduction

Proactive integration of environmental assessment (EA) with planning and policy-making is an integral part of EA effectiveness discourse (Benson 2003; Lyhne 2011; Parkins 2011). EA effectiveness research in the past two decades includes reflections on the institutional dimensions of integration (Carmichael et al. 2012; Weber et al. 2012); the need for EA frameworks that recognize the interconnectedness of EA, planning, and policy-making domains (Dubé 2003; Gunn and Noble 2009a,b); and the need for 'cross-domain integration' in support of regional sustainable development assessments and goals (Rega and Bofazi 2013). The need for improved integration among the three domains has grown especially keen recently, given the shift in the past decade toward more regional and strategic forms of EA (Gunn and Noble 2009a,b; Franks et al. 2010; Weber et al. 2012) which require coordinated assessment of cumulative environmental effects and the establishment of long-term partnerships in the development and delivery of regional monitoring and follow-up programs.

The debate regarding the exact nature of the relationship between policy-making and planning has been extensive in both planning and policy literature (e.g. Mintzberg 1994; Nitz and Brown 2001; Everett 2005). The debate primarily focused on whether one is a subset of the other or both are independent processes, or they are intertwined to the extent that they are indistinguishable (Yiftachel 1998; Overgaard 2004; Everett 2005). Despite a lack of clarity, the dominant narrative privileges a hierarchical relationship where planning is seen as an integral part of or a vehicle to policy-making. For instance, Overgaard (2004) states: "a plan provides strategy for putting a policy in place—it provides the dimensions of time and responsibilities for action, whereas policy is essentially 'a statement of intent'…a result of planning exercise" (p. 92). Perhaps, a more appropriate context at conceptualizing the difference is the scientific/theoretical perspectives that underpin both processes. While the basic tenets of rational-comprehensive are the building blocks of planning processes (Lawrence 2000; Cashmore 2004; Richardson 2005; Higgins and Duane 2008; Kato and Ahern 2008), this paradigm is insufficient in the policy-making context where a complex and interactive process influenced by politics and the exertion of power determines outcome (Overgaard 2004; Nitz and Brown 2001). A politically driven, pluralist paradigm often shapes this process.

While the rigid separation of planning and policy processes is difficult to undertake, this paper adopts the distinction offered by Overgaard (2004) which delineates planning as the recognition of an existing problem that requires correction, and the use of the existing technical process and formal requirements to recommend actions. On the other hand, the policy-making process is shaped by the 'play of power' and political mechanisms that are put in place to manage anticipated contentions and controversies, and to ensure implementation is successful. In other words, while regional planning essentially focuses on the existing technical-regulatory procedures for managing land use issues and/or the recognition that such issues that require correction is a regional one and is within the purview of land-use planners, policy-making "introduces the political/government/bureaucratic elements of the process and satisfies the political requirements" (p. 352) to support decision-making.

In regional EA, besides weighing the consequences of regional development assessments on the environment, it is often required to integrate planning and policy imperatives into its process (Nitz and Brown 2001; Duinker and Greig 2006; Noble 2008). These connections with regional planning and policy-making are both inevitable and essential because all are future-oriented; address similar types of environmental management and land use problems; share a legislative and regulatory context; and have the broad goal of promoting sustainable regional change (Spaling and Smit 1993; Harriman and Noble 2008). Quite often the regional government representatives, industry actors, stakeholders, and affected publics are the same or similar in all three processes, and the outcomes of the processes inform and influence one another. While there are some documented case examples of cross-domain integration of EA, planning, and policy-making in support of sustainable regional development (see: Johnson et al. 2011; Rega and Bonifazi 2013; van Stigt et al. 2013), there has been no systematic review of cross-domain research, nor overview of the breadth, depth, or character of scholarly work that attempts to unite these three fields.

The purpose of this paper is to aggregate and assess scholarly literature that attempts to integrate EA, planning, and policy-making in order to identify key research themes to date, to discover: (i) the goals of cross-domain integration; (ii) what is to be integrated, and when; (iii) how integration is to occur; and (iv) what domain is best suited to facilitate or drive cross-domain integration. The premise for this exploration is that meaningful integration of EA with planning and policy-making is inhibited by a number of unanswered questions in EA research—some of

which are centered on efficiency, integrity, and legitimacy of the process. Addressing the gaps in knowledge can trigger an improved regime of regional EA that is more focused and responsive to the dynamics of institutions and actors involved, especially for regional governments who often are the promoters or key partners in this type and scale of assessment. In the next sections, we summarize recent efforts at a better integration of EA, planning, and policy-making (Section 2.2), and describe our approach to the review (Section 2.3). In Section 2.4, following an analysis of the literature reviewed, we present and discuss key findings on the above themes. We conclude with a suggested future research agenda to strengthen cross-domain integration scholarship.

2.2 Context

Cross-domain integration is the subject of many scholars and extensive studies in several social sciences fields (e.g. governance, decision sciences, social services, urban designs, etc.), with each offering unique contextual perspectives. For instance, in governance literature, the subject is approached via different concepts including: multi-level governance (Peters and Pierre 2001; Reed and Bruyneel 2010), polycentric governance (Pahl-Wostl 2009; Bakker and Morinville 2013), and nested governance (Marshall 2008; Wyborna and Bixler 2013)[5]. The specific "integration problem" has also been part of the discourse in different aspects of planning and policy literature including: infrastructure (Niekerk and Arts 1996); regional development (Amir et al. 1997); transportation (Hildén et al. 2004); sectoral policy (Lyhne 2011); and land use planning (Tajima and Fischer 2013). While we recognize the diversity of scholarship on the subject, it is important to state that our focus in this review is only on peer-reviewed works that seek to harmonize the domains of EA with planning and policy-making especially on a regional scale.

The quest for an explicit integration of EA with land use planning and policy-making on a regional basis began with the inception of EA practice in the early 1970s. This was partly influenced by the socio-ecological idealism of the same period that suggested the physical

[5] *Polycentric governance* emphasizes the structure where actors mutually order their relationships under a general system of rules; *multi-level governance* emphasizes the level necessary to deal with the different components of environmental issues i.e. – local, provincial, national, regional, and global; *nested governance* implies the "nesting of local and larger institutional arrangements to accommodate the goals and interests of groups organised at different levels" (Brondizio et al. 2009)

environment was one among several important factors that affect development decisions, and that collective action should be predicated on a holistic view of contemporary environmental challenges (Cocklin et al., 1992; Lawrence 2000). Within the field of EA, integration with planning, and policy-making has primarily been attempted under the banner of strategic environmental assessment (SEA) (Fischer 2006; D'Auria and Cinneide 2009), particularly regional strategic environmental assessment (R-SEA) (Gunn and Noble 2011; Johnson et al. 2011). Gunn and Noble (2009a), for instance, explain what cross-domain integration entails in R-SEA: "it is more than expanding the boundaries of EA 'up' to a higher tier or 'out'… rather, it represents a different way of approaching the relationships between environment and development decision making at a regional scale" (p.2), particularly with regard to managing cumulative environmental effects.

There has been a general promotion of more strategic and more integrated approaches to EA practice since the mid-1990s, but became more pronounced following the introduction of the European Union *SEA Directive* in 2001. The *Directive* highlighted the importance of EA as a tool to integrate environmental considerations into plans and policies and emphasized that synergy among assessment, plan-making, and policy-making domains would contribute to more sustainable and effective environmental decision-making (Feldmann et al. 2001; Cooper and Sheate 2004; Stoeglehner and Wegerer 2006). In Canada, the integration of EA into certain federal policies, plans, and programs has been mandatory for over two decades (Noble 2009).

Numerous international assessments also connect EA with planning and policy-making at the regional scale, especially in developing countries, where this approach is often a core component of international aid agencies' pre-requisites for project assistance. For example, the World Bank currently has projects that support the integration of EA and policy-making processes in Bangladesh, Kenya, Malawi, Sierra Leone, Guinea, and China (Axelsson et al. 2012). There is also growing emphasis on the need for trans-sectoral networks to address 'wicked' environmental problems (Franks et al. 2010; Folkeson et al. 2013; Bragagnolo and Geneletti 2014) characterized by high uncertainties and for which solutions hardly ever sit conveniently within the responsibility of any one agency or domain (Weber et al. 2012). All these efforts suggest the need to recognize and bridge scientific and government disciplinary silos because they lead to compartmentalized approaches to addressing environmental issues (Lachapelle et al. 2003; Cleaver 2012). The 'silo

effect' can undermine effectiveness and efficiency of both EA, and regional sustainability. Ultimately, cross-domain integration is intended to connect and ideally coordinate environmental decision-making processes in support of sustainability and good governance (Jackson and Illsley 2006; van Buuren and Nooteboom 2010; Elvin and Fraser 2012).

However, the establishment of synergistic cross-domain relationships is generally weak due to differing disciplinary, methodological, and political arrangements and competencies (Nitz and Brown 2001; Folkeson et al. 2013). Much of the literature promoting cross-domain integration appears to have emerged from within the field of EA (see for e.g. Nitz and Brown 2001; Therivél and Minas 2002; Stoeglehner et al. 2009) rather than also from the planning and policy-making perspectives—possibly because EA is a process generally subsumed within broader planning and policy making processes, and the need to 'fit' EA within such processes exists. At the same time, EA scholarship has been criticized for an apparent lack of understanding of how planning and policy processes work (Nitz and Brown 2001): decision-making in EA is often premised on positivist science, which significantly differs from the more multidisciplinary, governance-oriented empiricism that more often underpins planning and policy-making processes. A recent special edition of *Impact Assessment and Project Appraisal (2014, Vol. 32 Issue 1)* promotes strengthening EA through integration, but the focus is 'inward' on uniting the various EA frameworks and disciplines (Cashmore and Morgan 2014; Morrison-Saunders et al. 2014; Retief et al. 2014). Little attention is devoted to 'outward' integration of EA with planning and policy-making, which is equally important given that EA does not exist within a vacuum, but rather within planning and policy-making contexts.

A lack of 'outward' integration can present significant challenges to EA practice, particularly regional-scale EA. A recent study by Tang (2008), for instance, observed that lack of early integration of EA with planning often makes EA looks like a 'paper tiger' meant to ratify project development decisions already taken. He developed and tested a conceptual model to integrate SEA principles into land use plans, and concluded that EA, planning, and policy domains share a common interest in the stewardship of land and natural resources, and that there are system-wide benefits derived from such integration. However, the vast uncertainties surrounding environmental impact prediction (Duncan 2013; Mesa-Frias et al. 2013) mean that improved EA requires significant integration with land use planning tools and would benefit from adopting a

policy/governance lens (Parkins 2011; Weber et al. 2012). An understanding of regional environmental change (which EA can offer) can hardly be separated from the institutional environment in which it occurs (Weber et al. 2012)—or which drives and manages it.

In consideration of the need to expand the influence of EA beyond a technical, regulatory-focused exercise (Elling 2000; Podhora et al. 2013) and more fully evolve it as a value-added tool to support sustainable regional development (Fidler and Noble 2012; Folkeson et al. 2013), we believe it is helpful to review scholarship that integrates EA with planning and policy-making in a regional context.

2.3 Methodology

We focus on peer-reviewed articles published in international journals in the fields of EA, and environmental planning and policy-making since 2000. This is a period in which repeated calls for planning-policy-assessment integration became persistent, with specific emphasis on the direct and indirect benefits and impacts of integration (e.g. Lawrence 2000; Fuggle 2005; Cashmore 2004; Richardson 2005; Harriman and Noble 2008). Table 2.1 provides a framework for the literature review, underscoring the intent of the study to explore existing works at intersection of EA, policy making and planning. A search query of the Scopus database was conducted for articles that contained one of the following terms in their title: 'environmental assessment', 'impact assessment', 'cumulative effects', 'strategic environmental assessment', 'SEA', 'CEA', or 'EIA', and one of the terms 'planning', 'plans', 'plan', 'policy', 'policies', 'land use', 'regional strategic', or 'integration'. This initial search returned 1,024 documents. The documents were then manually screened to ensure each was relevant to the three fields of interest, and to remove editorial papers. This reduced the total to 207. A reading of all the abstracts was then carried out to ensure each article was relevant to the present study, and in particular, to eliminate articles from other fields containing similar acronyms or keywords, given that Scopus database codes are not case sensitive. For instance, the inclusion of SEA in the search returned papers related to 'sea' or ocean studies. In filtering the papers, one overarching question was proposed, which is, does the article explicitly consider the integration of or link EA practice with planning and/or policy? If yes, the paper is included; otherwise, the paper is excluded. This paper screening reduced the number of articles to

153. Because a database search cannot fully assemble all relevant articles, we added 11 articles which we consider relevant to the subject based on our previous experience as researchers in the field, bringing all articles reviewed to 164 and spread across 17 journal titles.

Table 2.1 Article selection and analysis sequence

Article Selection	Content Analysis	Summary of Major Themes
■ Query of Scopus database* ■ Filtering of outputs to focus on journal outputs ■ Manual screening of titles and abstracts to ascertain relevance ■ Addition of other known studies not returned	■ Identification of the initial major codes e.g. ■ Sorting for meta- and sub-codes ■ Processing of the codes to identify major themes	■ Type/contexts of assessment, policy and planning ■ Rationale ■ Dimensions ■ Conceptual approaches ■ Facilitators
*Query: *(TITLE({SEA} OR {EIA} OR {CEA} OR {cumulative effects} OR {environmental assessment} OR {impact assessment}) AND TITLE({planning} OR {plans} OR {plan} OR {policy} OR {policies} OR {land use} OR {integration} OR {regional strategic})) AND PUBYEAR > 1999)*[6].		

We recognize that despite our detailed approach, there are other equally useful works we were not able to capture in our analysis, particularly on the subject of integration at an international geographic scale, and those printed in languages other than English. Our choice of Scopus is motivated by several recent studies that identify the database as the most accurate multidisciplinary bibliometric database (e.g. Fischer and Onyango 2012; Franceschini et al., 2016; Zibareva et al. 2016). The authors' recent checks also confirm this, for example, Scopus hosts over 21.5 active journal titles in over 300 subject areas in comparison to the Web of Science—another database with global spread—with 8.5 thousands and 150 respectively. A key limitation of the Scopus database, however, is its indexing error, particularly the tendency to return duplicate publications or completely omit key references (Franceschini et al. 2016). Since Web of Science is equally not

[6] Output is based on this query as of March 2015

immune from these indexing errors, Franceschini et al. (2016) recommended the adoption of some basic data checking systems, such as manual screening, which is the approach this study adopts as described earlier (Table 2.1). Throughout the review process, Refworks® software was used to store and manage the references throughout the literature review process. Once assembled, the articles were initially organized according to year of publication, journal, country, and document type. Next all articles were read in full and content analysis was carried out, i.e. content was identified, sorted, and coded using predefined themes of interest (Creswell 2009; Neuendorf 2011; Benard 2013; Grimmer and Stewart 2013; Finfgeld-Connett 2014). These themes include the rationale, dimensions, conceptual approaches, and facilitators of cross-domain integration. Results of the literature are presented in Section 2.4.

2.4 Results

2.4.1 Profile of literature integrating EA, planning, and policy-making

Table 2.2 shows the number of articles published since 2000 that consider integration of EA with planning and policy-making. More than 65 percent of the papers originate from leading EA journals: *Environmental Impact Assessment Review* (n=52), *Impact Assessment and Project Appraisal* (n=45), and *Journal of Environmental Assessment, Planning, and Management* (n=23). Papers in planning and policy journals were found much less frequently: e.g. *Land Use Policy* (n=5) and *Environment & Planning, B* (n=2). It is also observed that the number of papers on cross-domain integration is steadily increasing, with more than half (n=86) the publications appearing in the last five years.

Table 2.2: Distribution of articles in journals in the period between 2001 and 2014

Journal*	2000-2004	2005-2009	2010-2014	Total
Environmental Impact Assessment Review	7	13	31	51
Impact Assessment and Project Appraisal	10	12	23	45
Journal of Environ Assess, Planning, & Mgt.	3	8	12	23
Journal of Environ Planning & Management	0	4	4	8
European Environment	7	0	0	7
Environmental Management	4	1	0	5
Land Use Policy	0	2	3	5
Environment & Society	0	0	4	4
Environmental Science & Policy	1	1	2	4
Journal of Environmental Management	0	0	3	3
Environment & Planning, B	1	0	1	2
Environmental Practice	1	1	0	2
Energy Policy	0	0	1	1
Environmental Planning & Law Journal	0	0	1	1
Environmental Research Letters	0	0	1	1
Journal of Planning & Environmental Law	1	0	0	1
Planning Practice & Research	1	0	0	1
Total	**36**	**42**	**86**	**164**

** Figures shown are number of corresponding articles*

Table 2.3 shows that the subject of integration at the regional-scale was studied most frequently in the context of SEA (n=100), but that a substantial research at this scale were also carried out under project EIA label (n=46) and that the context of cumulative effects assessment (CEA, n=15) and regional EA (n=3) have been less emphasized. Recognizing that the label attached to these forms of assessment varies according to jurisdictions and regulatory environment, we stick by the dominant assessment theme in the paper since it is often difficult to neatly classify the assessments into these different forms. For instance, CEA is often an embedded subject in most of the papers addressing SEA and regional EA, but is often treated as a less dominant theme.

Table 2.3: Types of planning & policy vs. type of assessment

Planning & policy types*	CEA	EIA	REA	SEA	Total
Land use[1]	3	8	0	32	43
Development[2]	0	3	1	12	16
Transport	1	4	0	10	15
Policymaking	0	10	0	6	16
Regional	7	0	1	10	18
Energy	0	0	0	7	7
Industry[3]	0	3	0	4	7
Infrastructure & project	0	3	1	2	6
Regulatory	1	2	0	3	6
Tourism & recreational	1	1	0	3	5
Water Resource	2	2	0	2	6
Waste management	0	1	0	2	3
Others[4]	0	9	0	7	16
Total	**15**	**46**	**3**	**100**	**164**

[1]*includes master, municipal, spatial, and urban planning*
[2]*includes multi-agency policy-making, national development, and resource management*
[3]*includes forestry*
[4]*includes climate change, theory, & non-specific planning/policy contexts*
**Figures shown are number of corresponding articles*

A similar argument applies to the types of planning and policy considered; papers addressing land use, master, municipal, spatial, and urban planning and policy (n=43) are, for instance, classified as land use because of the conceptual similarity and labelling variations in different jurisdictions. Apart from land use planning and policy papers, specific sectorial issues such as transport (n=15), energy (n=7), industry (n=7), and water resource (n=6) have received fair attention, although these sectorial issues are often embedded in general discussions about land use and regional planning also. About 10% (n=16) of the papers focus on the specific context of policy-making. Many of the studies focusing on nation-state or multi-agency policy-making are grouped under development (n=16) and regulatory (n=6), depending on their emphasis. Further analysis of the papers is provided in the next section.

In terms of the geographic context of the papers reviewed (Figure 2.1), the majority of studies are based on experiences in a European context (e.g. European Union=23; United Kingdom (UK)=14; Italy=8; Denmark=7) and a North American context (Canada =20; United States=5). Some studies, especially in the last five years, are from developing countries with China (n=9) and Brazil (n=5) being the two most common. Approximately 20 percent (n=32) of the publications are multi-country studies. Seventy percent (n=21) of the multi-country-studies are based in the European Union and largely seek to evaluate how the different regional directives on SEA and EA are applied across jurisdictions (e.g. Sheate et al. 2003; Hanusch and Glasson 2008). About 12 percent (n=20) of the 164 papers are conceptual papers without emphasis on any particular geographic region.

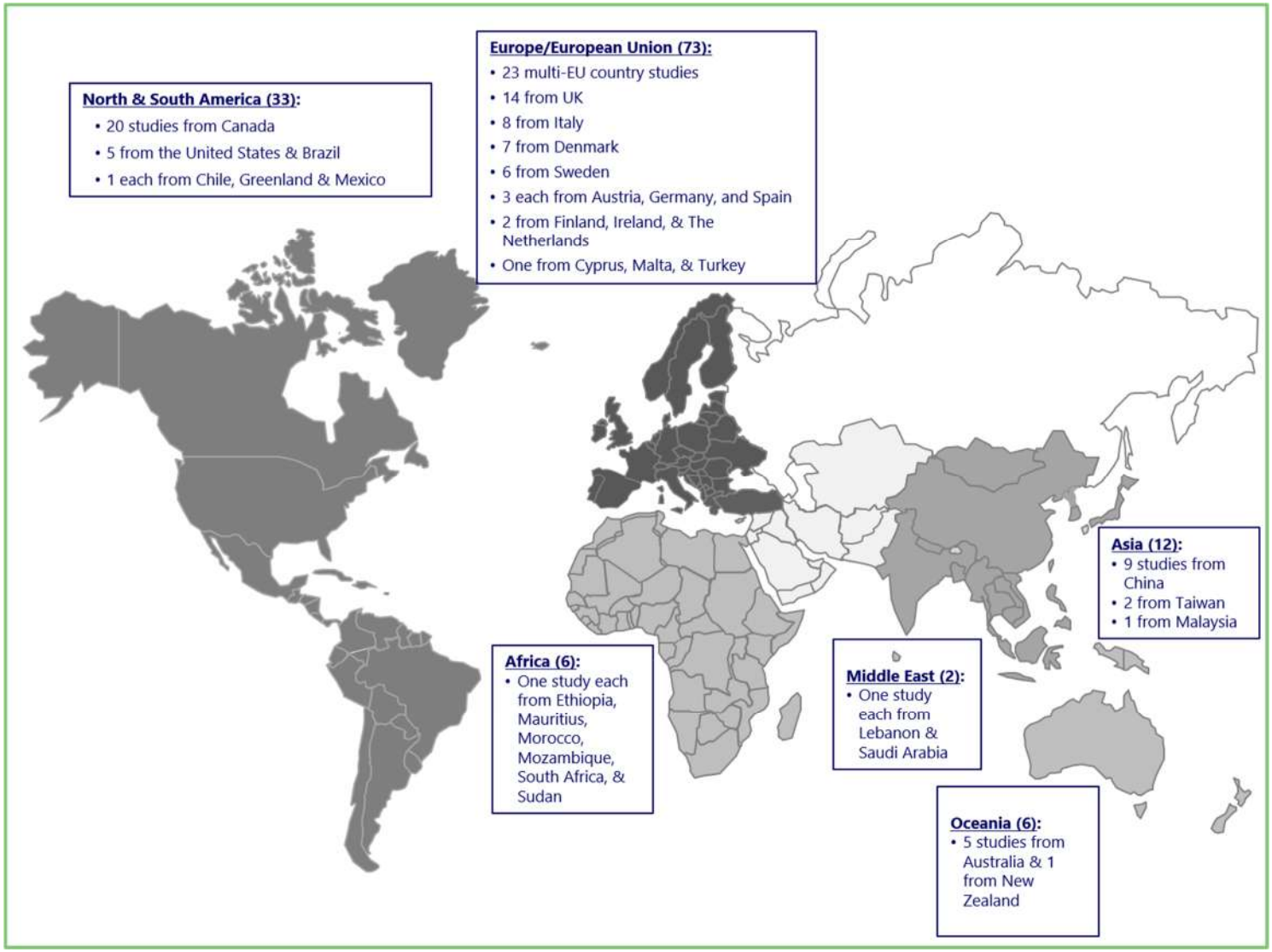

Figure 2.1: Distribution of articles by geographic region

2.4.2 Rationale for cross-domain integration

Several studies note the divide among EA, planning, and policy-making domains (e.g. Cooper 2011; Parkins 2011; Folkeson et al. 2013; Oberling et al. 2013; Victor and Agamuthu 2013), yet there are relatively few empirical studies looking at the integration of all three areas. Most studies focus on either integration of EA and planning processes, or EA and policy-making. Regardless of focus, most integrative studies agree that the nature and quality of cross-domain interaction is fundamental to the level of success achieved in each process (e.g. Cooper 2011; Parkins 2011). The premises for cross-domain integration include: addressing a diversity of value systems (Benson 2003); improving poor coordination between spatial and sectoral decisions (Chen et al. 2011; Bragagnolo and Geneletti 2014); and reducing over-compartmentalization of decision-making processes (Franks et al. 2010; Adelle and Weiland 2012).

Based on the literature reviewed, the two most commonly cited reasons to pursue cross-domain integration are *improving process* and *improving outcomes*. First it is widely asserted that cross-domain integration can increase EA process effectiveness and efficiency, support conflict mediation, and promote multi-dimensional learning (Fischer and Seaton 2002; Persson and Nilsson 2007; Stoeglehner 2010). Second, cross-domain integration can also strengthen the outcomes of project-based EA by more fully addressing cumulative environmental effects issues, and encouraging more coordinated environmentally sustainable decision-making (Hildén et al. 2004; Adelle and Weiland 2012; Fidler and Noble 2012; Folkeson et al. 2013). Bogenschneider and Corbett (2010) argue that understanding policy-making and planning processes helps to build the trust relationships that are imperative in attracting institutional support for implementing the results of an EA.

2.4.3 Dimensions and timing of cross-domain integration

Scales: Elvin and Fraser (2012) suggest that working within complex regional systems poses serious challenges to land use management and governance. Since environmental effects can occur at different scales (Cooper and Sheate 2004; Gunn and Noble 2011; Folkeson et al. 2013), it is

important for actors in all domains to identify actions to address issues at different spatial and temporal scales (Fischer et al. 2009). For example, Hanna et al. (2011), describe the case of the Ontario, Canada, forestry sector where flexible scaling of project-based EAs has helped advance integrated planning and conflict management. In this case, a combination of both 'class EAs' and project EAs was valuable in addressing diverse values and interests both at the local and regional planning and policy scales, and contributed to better regulation of regional forestry sector. Geneletti et al. (2007) argue that at the scale of a region "[a] finer resolution, that can represent processes that are relevant for the design and implementation phase [of a development project], is generally not of interest" (p.413). Instead, Geneletti et al. (2007) argue it is more important to focus at a coarser scale that corresponds to land use patterns and landscape processes. Neither meaningful integration nor successful implementation can be achieved in the absence of a scale-sensitive decision-making arrangement (van Buuren and Nooteboom 2010; Elvin and Fraser 2012).

Tasks: Successful cross-domain integration first requires careful allocation of tasks among the parties involved (Fischer 2006; Franks et al. 2010). Environmental management and governance institutions generally have clearly defined mandates to address different types and levels of environmental impacts (Franks et al. 2010). For example, while energy consumption and CO_2 issues can be handled at the highest tier of decision-making, localized impacts are best treated at the lowest tier (Fischer 2006). The benefit of a stratified approach to task allocation includes improved inter-agency trust and better influence of regional EA on every tier of decision-making, as observed in the case of ScottishPower (UK) SEA (Marshall and Fischer 2006). With respect to the level of cooperation and coordination required from the various sectoral and geographical administrations involved, Fischer (2006) stresses the need for clear and tight interdependence between political actors, planning agencies, and EA practitioners, acting in complimentary roles to push certain infrastructural proposals forward. Similar conclusions are reached by Kørnøv and Thissen (2000) and Fischer et al. (2009), who suggest paying attention to all actors and interests can be beneficial in terms of building sufficient human capacity to formulate and implement an EA at a regional scale.

Knowledge: Successful cross-domain integration is impossible without knowledge integration (Cooper and Sheate 2004; Franks et al. 2010; Adelle and Weiland 2012; Folkeson et al. 2013). Benefits of knowledge integration include: data synthesis (Keith and Ouattar 2004); better environmental effects evaluation (Fischer et al. 2009); better conflict mediation (Peltonen and Sairinen 2010); and creation of multi-dimensional 'learning loops' (Fischer et al. 2009; Che et al. 2011) which can result in individual and organisational changes in attitudes, perceptions and routines. De Smedt (2010) performed a detailed study of EA as a support for developing sustainable policy objectives in Europe and found that there is more to knowledge sharing than information exchange, and that regional studies will be more effective if the knowledge being produced and communicated is perceived as: *credible*, i.e. meeting scientific standards; *legitimate*, i.e. resulting from a fair process that reflects the interests of stakeholders; and *salient* i.e. answering questions relevant to process participants and decision makers. Knowledge integration is facilitated when information-sharing platforms are established (Che et al. 2011). This is especially important in data-limited regions (Weber et al. 2012) and for multi-jurisdictional, regional-scale EAs (Elling 2000).

Timing: The dimension of timing has also received some attention in the literature, especially its implications for enhancing cross-domain integration. These implications are transactional in nature, meaning that the timing and coordination of important activities that occur in EA, planning, and policy-making matters significantly. Some studies suggest that early timing of EA within regional planning studies is a primary determinant of a successful regional EA process (Keysar and Steinemann 2002; Noble and Harriman 2008; D'Auria and Cinneide 2009). This has for instance been proved to be important in managing diverse interests and expectations across domains (Che et al. 2011), as well as a means to more easily determine the nature and scope of alternative projects, assessments, and actions acceptable to those interests (Tang 2008). Furthermore, and in aggregate terms, research has shown that early integration of EA into planning and policy-making processes can be realized through a more comprehensive governance structure that features interdependency of actors and participating institutions, and enhanced through the principle of subsidiarity (Fidler and Noble 2013; Marsden 2013).

2.4.4 Conceptual approaches to cross-domain integration

The literature offers two main perspectives on how to approach cross-domain integration. One theme focuses on the use of more explicit frameworks. 'Tiering'—an important concept in both planning and EA literature—is the most commonly discussed approach to cross-domain integration among the papers reviewed (e.g. Fischer 2004; Bragagnolo et al. 2012). The United Kingdom Department of Transport defines tiering as "the linking of assessments for policies, plans, programs, and projects to achieve a logical hierarchy and avoid unnecessary duplication of assessment work."[7] Tiering is believed to result in better linkages among subsequent land use management activities following EA (Hildén et al. 2004; Lyhne 2011), and improve coordination among the various levels of EA (policy, plan, program, and project levels) (Sánchez and Silva-Sánchez 2008; Fidler and Noble 2012). Tiering can support the hierarchical integration of decision-making processes in EA, planning, and policy-making, and aid in the allocation of tasks and resources to different actors at different tiers (Fischer 2006; Lyhne 2011). However, some studies suggest that such coherence may be difficult to achieve via tiering due to its focus on linear relationships rather than on communication networks (De Smedt 2010; Fidler and Noble 2012).

Other explicit approaches to integration include: adaptive management (Sharma and Norton 2005; Slinger et al. 2005; Azcárate et al. 2012) and system thinking (Chen et al. 2009, 2011). The strongest argument for adaptive management as a potential approach for cross-domain integration in regional EAs occurs in situations where actors and institutional stakeholders are willing to adopt a flexible approach to goal setting and implementation, the so-called 'learning by doing' (Azcárate et al. 2012). System thinking on the other hand, takes a more technical approach by following a multi-staged driving force-pressure-state-impact-response methodology to harmonize EA process with policy and planning institutions within a region (Chen et al. 2011). Another approach to cross-domain integration from the field of policy-making is environmental policy integration. This approach blends the idea of tiering with policy coherence— compliance to and consideration of existing regulations and policies—among collaborating institutions (Rega and Bonifazi 2013). Although all of these frameworks are mentioned in the literature, there is little empirical evidence of their effectiveness as means by which to approach cross-domain integration.

[7] As cited by Gachechiladze 2010.

Other studies suggest cross-domain integration can be achieved in the absence of an explicit framework. The first—rooted in the policy-making literature—is the concept of decision or policy windows (Kirchhoff et al. 2010; van Stigt et al. 2013). The idea is to link "solutions that are ready to be implemented to problems that become paramount due to change in the political constellation" (Van Stigt et al. 2013). Democratic governance is one final way to approach cross-domain integration, which simply means empowerment of all actors to make useful contributions (e.g. Carmichael et al. 2012) toward a shared goal. None of the aforementioned approaches appears to be particularly preferred over the others. Joint fact-finding and coordination among the diversity of expectations is important regardless of approach (Jackson and Illsley 2006; Franks et al. 2010; van Buuren and Nooteboom 2010; Carmichael et al. 2012; Marsden 2013).

2.4.5 Facilitating cross-domain integration

Leadership is thought to be more important than any other factor with regard to participation in regional EA (Franks et al. 2010; Keysar and Steinemann 2002; Fischer et al. 2009). In several recent studies, the planning domain has been promoted as the ideal domain within which to coordinate EA, planning, and policy-making efforts (e.g. Cooper and Sheate 2004; Kørnøv et al. 2015). Kørnøv et al. (2015) provide an evaluation of planners' ability to balance accountability and engagement in SEAs of spatial plans in Denmark through an innovative culture that emphasises flexibility and discretion without losing the overall objectives of the SEA. For example, planners' routine interactions with the public on land use issues was useful in developing a realistic understanding of what will work and the coping mechanism to deal with it to ensure implementation. Accordingly, planners use "their discretionary power as an advantage to be innovative in their work, thus influencing the content and outcome of the SEA" (p. 613).

The danger in this is that actors within their own domains often adhere to mandate-specific reporting lines (Petts 2003; Ruddy and Hilty 2008; Franks et al. 2010; Folkeson et al. 2013) and are only secondarily committed to cross-domain goals and objectives (Gunn and Noble 2009b). The degree of commitment that actors display toward a cross-domain assessment is recognized as a critical determinant of the success of the process (Stoeglehner 2010; Axelsson et al. 2012). It is common to report lack of communication within and among domains. Franks et al. (2010), for

instance, reported on—in an Australian mining context—the disconnection between departments responsible for granting approval for new mines and those responsible for controlling rehabilitation and post-mining land use issues (an EA-planning-policy relationship). Overall, studies suggest clear communication among actors (e.g. Keith and Ouattar 2004) and early agreement on a lead agency (e.g. Elling 2000; Elvin and Fraser 2012) as the starting point for functional cross-domain integration. Retief et al. (2014) argue that power and context (often defined as mandates) are the dominant barriers to integration within all three domains. The next section discusses key insights in cross-domain integration scholarship that emerged from the literature.

2.5 Discussion: Implications for Practice and Theory

There is evidence from a literature review standpoint that the building blocks of cross-domain integration are in place: regional planning, and environmental policy disciplines have contributed both conceptually and empirically to the regional EA literature and vice versa. There has been a sharp rise in cross-domain scholarship, particularly in the European Union, the UK, and North America, particularly in the past five years, but primarily emerging from the field of EA, rather than planning or policy-making. This is possibly related to the rise in interest in regional EA, planning, and policy-making assessments, fuelled by sustainable development agendas. Also clearly evident is the sensitivity among scholars to the disconnection among EA, planning, and policy-domains, and a collective acknowledgement that communication, coordination, and decision-making suffers in the absence of cross-domain integration. The primary motivation for cross-domain integration appears to be a shared perception that it improves processes and outcomes rather than strengthening final outputs—actual implementation and practical influence on day to day operations of each domain of regional studies (Persson and Nilsson 2007; Mandarano 2008; Stoeglehner 2010). Furthermore, best practices research is less evident. There are two overarching implications of this review for cross-domain scholarship and a notable missing link, which are all discussed below.

2.5.1 Transactive Emphasis of Cross-Domain Integration Research

The review shows that foundations for effective cross-domain integration are partially based on how well the scales, timing, and tasks are defined, as well as the credibility and legitimacy of the knowledge guiding decision-making (De Smedt 2010; Che et al. 2011). Furthermore, research suggests that a stratified approach to task distribution among institutions is beneficial to regional EA processes if done in the atmosphere of trust (Marshall and Fischer 2006; Franks et al. 2010). Evidence in literature also shows that a wide range of factors affects the credibility and effectiveness of task allocation—for example, how an assessment is coordinated and who coordinates an assessment is important. There is no consensus on the domain best suited to coordinate an assessment involving divergent expertise and interests, or on which domain should drive integration efforts. The implication of this is that those undertaking regional EAs should be proactive and communicative in order to facilitate a transactive environment to maximize the outcomes of the EA and any associated regional studies.

The literature also suggests that although actors in all three domains may view the benefits of integration positively, anticipating improvements to both process and outcomes, there is also the danger that some institutional actors may be passive due to existing mandate-specific reporting lines, especially where regional EA goals and other planning or policy objectives are not well aligned within such institutions (e.g. Franks et al. 2010). In addition, except in jurisdictions where planners are required by law to lead the assessment process (e.g. sustainability appraisal in the UK), there is the tendency that planners and policy-makers involved in regional EA primarily view their role as supportive in achieving EA objectives, and consequently have less motivation to seek the requisite knowledge to effectively contribute to the process (e.g. Franks et al. 2010; Folkeson et al. 2013). This suggests that regional EA actors have an important role to play in creating effective communication protocols across the domains, and a functional leadership arrangement, or at least the identification of shared goals that are coherent with existing regional planning and environmental policy regimes operating within the socio-political geography of the assessment.

2.5.2 Procedural Issues in Cross-Domain Integration

As the most explicit framework for facilitating cross-domain integration, tiering has received more emphasis than other conceptual frameworks. As regional EA becomes a primary environmental management vehicle in many regions in North America and Europe, inter-agency collaboration will continue to coalesce in tiered arrangements to clarify hierarchical relationships. Insights from this review suggest that tiering can be galvanized into an effective cross-domain integration tool, but its usefulness and influence could be enhanced by incorporating the dimension of communication networks into the framework. Environmental assessment practitioners, planners, and policy-makers involved in regional EA should recognize tiering as a familiar tool. However, the literature raises issues related to the challenge of inter-agency coordination in support of regional EA studies.

The literature asserts that effective regional EA can be facilitated with careful attention to decision windows, democratic governance, changes in political constellation, as well as empowerment of all actors; all of which are aspects of the policy-making arena (Kirchhoff et al. 2010; Carmichael et al. 2012; Marsden 2013; van Stigt et al. 2013). This implies the importance of gaining an in-depth understanding of the social and political dynamics within a region. For this reason, the environmental governance model of EA which was dominant in the last two decades of the twentieth century will likely continue to exert a tremendous influence on how cross-domain integration in regional EA practice is conceptualized (Cashmore 2004) and approached in practice, particularly in explaining the interactions that occur within and across multi-layered institutions.

2.5.3 The Missing Theoretical Link in Scholarship

Apart from a very few works (e.g. Lawrence 2000; Cashmore 2004; Richardson 2005)—all of which were carried out over a decade ago and not in the specific context of regional EA—theoretical literature on the integration of EA with planning and policy-making is evidently non-existent. As highlighted above, there is extant literature that focuses on both the transactive and procedural aspects of regional EA, not only on the values and benefits of cross-domain integration to process and outcomes but also on how practice can be effectively facilitated. However, as

Cashmore (2004) pointed out: "There is also an imperative for more theory-led and purposeful research, conducted within a broader framework of an integrative and connective research strategy focused on theory advancement" (p. 422).

This review underscores the need for further development of theoretical scholarship related to cross-domain integration and regional EA. As an advanced instrument for regional environmental management, regional EA is moving gradually from the edges of politics towards its center (Richardson 2005), and with this movement will follow important questions regarding causal relationships that can be leveraged to facilitate this shift (Cashmore 2004). Theory also deserves a higher profile in regional EA scholarship generally as it is rapidly becoming a widely used tool in its own right (Gunn and Noble 2015). Given the dearth of theory-driven research in this context, there is a pressing need for research to invest in explanatory models to improve the practice of regional EA.

2.6 Conclusions and Future Research

The purpose of this paper was to conduct a review of the EA literature that integrates it with planning and policy-making in order to understand the goals, dimensions, and frameworks for cross-domain integration, particularly in regional EA scholarship. Based on this review, we found that: (i) arguments for cross-domain integration in EA are driven by its transactive and procedural benefits i.e. process and outcome improvements; (ii) an effective integration requires early timing, appropriate decision scale, aligning tasks with capacity, and co-creation of knowledge; (iii) conceptual approaches vary; and (iv) while planning domain offers a veritable platform for facilitating integration due to their routine interactions with the public on land use issues, attention should rather focus on clear communication and early agreement on a lead agency. We conclude that cross-domain scholarship in the context of EA is limited, and still in its infancy; scholarship is primarily practice focused, rather than also focused on establishing shared theoretical or conceptual frameworks with planning and policy perspectives.

The literature shows that regional planners and policy-makers often support regional EAs but that this consideration is often secondary. Results suggest that a stratified approach to task

distribution among institutions is beneficial to the regional EA process and outcomes if done in the atmosphere of trust. There are several options regional EA practitioners can pursue to facilitate cross-domain integration, including (1) identification of a shared regional vision; (2) creation of effective, networked communication protocols; and (3) development of an explicit and functional leadership arrangement. Our study has some limitations, such as our decision to focus primarily on the list of auto-generated references from Scopus database with its potential indexing errors as described in Section 2.3. As well, important concepts related to cross-domain integration which are only covered in policy and planning literature (e.g. policy integration, policy appraisal, integrated decision-making) may not have been captured by our study. However, it should be stated that our study was not designed to address the very expansive concept of integration in its widest sense; rather it focuses on generating insights into its application in the context of EA practice and research. In addition, we do not claim that these findings are representative of scholarships within planning and policy-making arena. Nonetheless, we believe our findings open a new vista to pertinent issues that can help advance cross-domain integration scholarship in EA.

To advance cross-domain integration scholarship, there is a need to extend future research to planning and policy literature to examine whether lessons can be learned from how the subject of integration is approached within these fields. This is an aspect not adequately covered in our study due to our focus on the specific context of EA, but is germane to better practice as land use planning and environmental policy fields have also been learning from EA processes in their formalized tools such as operation plans, master plans, and provincial land use plans. The need for explanatory theories of cross-domain integration in regional EA research is also paramount as discussed in Section 2.5. However, a plethora of other issues demand attention as well, as summarized in Table 2.4.

Table 2.4: Suggestions for further research

1.	Develop explanatory theories of cross-domain integration in regional EA research
2.	Investigate the nature and depth of integration necessary for effective regional-scale EA
3.	Develop indicators to measure success and effectiveness of integrated efforts
4.	Multi-jurisdictional, multidisciplinary analysis of case studies to identify cross-domain integration success stories
5.	Understand cross-domain leadership strategies, issues, and power relations in a regional EA context
6.	Investigate non-EA actors' perspectives on regional EA studies' effectiveness with respect to policy and planning integration
7.	Assess trade-off mechanisms employed by collaborating actors across scales and disciplines
8.	Investigate institutional, cultural, and methodological drivers and barriers to cross-domain partnerships in regional EA processes

Undoubtedly, one of the current obstacles to further research is a lack of consensus on the nature and depth of integration required for an assessment to be effective (Fundingsland and Hanusch 2013), and also the lack of indicators for quantifying all aspects of cross-domain integration and its overall success. There is also a need for conducting retrospective but in-depth studies of multi-jurisdictional, multi-disciplinary cross-domain partnerships in regional EA. Many studies to date have been conducted on collaborative EA especially on the dimensions of learning (Ruddy and Hilty 2008; Fischer et al. 2009; Stoeglehner 2010) and analytical frameworks (Chen et al. 2011; Rega & Bonifazi 2014), but few have explicitly studied the dynamic interactions of domain actors. Given the complex spatio-temporal dynamics of most multi-jurisdictional enterprises in terms of tasks, timing, data, and leadership, such studies could produce insights pertinent to regional EA success and that are transferable internationally. Although some studies have looked at task allocation across scales (e.g. Fischer 2004), understanding how the balance of power among actors affects timing and task completion is also important.

The limited number of studies that propose frameworks or models for cross-domain integration has already been mentioned. This kind of scholarship is important to SEA advancement especially, as it has been criticized for not being sensitive enough to planning and policy-making domains (e.g. Nitz and Brown 2001). Future research needs to include other actors' views of the effectiveness of SEA. In addition, the EA domain is largely driven by the private sector in contrast to planning and policy-making domains, which are often driven by the state. A strong focus on methodological sophistication by the private sector has often caused consternation among planners and policy-makers (Elling 2000), more especially when the transactional benefits of the process are not evident, discouraging other actors from making valuable inputs into EA processes. Further research on the institutional, cultural, and methodological drivers and barriers underpinning cross-domain partnerships would greatly benefit regional EA practice.

Clearly, there is incomplete knowledge with regard to establishing the value-added of cross-domain integration and further research is required to advance knowledge in this area. Research establishing best practices for cross-domain integration is fledgling but a subject which should not be ignored. While these efforts to broaden knowledge in this area should continue, particularly with respect to inputs from planning and policy-making domains, it is apparent that there is urgent need to understand how institutional actors working at the intersection of the three domains perceive the subject of cross-domain integration. Addressing such issues will help enhance the development and utilization of cross-domain integration for a more efficient, more effective regional-scale assessments in the twenty-first century.

2.7 References

Adelle, C., and Weiland, S. (2012). Policy assessment: The state of the art. *Impact Assessment and Project Appraisal, 30*(1), 25-33.

Amir, S., Frenkel, A., Law-Yone, H., Shefer, D., and Trop, T. (1997) Integration of environmental assessment into the regional development planning process of the Galilee. Environmental Management, 21(1), 59-68.

Axelsson, A., Annandale, D., Cashmore, M., Slunge, D., Ekbom, A., Loayza, F., et al. (2012). Policy SEA: Lessons from development co-operation. *Impact Assessment and Project Appraisal,* 30(2), 124-129.

Azcárate, J., Balfors, B., Bring, A., and Destouni, G. (2013). Strategic environmental assessment and monitoring: Arctic key gaps and bridging pathways. *Environmental Research Letters, 8*(4), doi:10.1088/1748-9326/8/4/044033.

Bakker, K. and Morinville, C. (2013). The governance dimensions of water security: a review. Philosophical Transactions of the Royal Society A, 371: 20130116.

Benson, J. (2003). What is the alternative? Impact assessment tools and sustainable planning. *Impact Assessment and Project Appraisal, 21*(4), 261-280.

Bernard, H. (2013). *Social Research Methods: Qualitative and Quantitative Approaches*, 2nd ed. Thousand Oaks, CA: Sage Publications Inc.

Bragagnolo, C. and Geneletti, D. (2014). Dealing with land use decisions in uncertain contexts: A method to support strategic environmental assessment of spatial plans. *Journal of Environmental Planning and Management, 57*(1), 50-77.

Bragagnolo, C., Geneletti, D., and Fischer, T. (2012). Cumulative effects in SEA of spatial plans - evidence from Italy and England. *Impact Assessment and Project Appraisal, 30*(2), 100-110.

Brondizio, E., Ostrom, E., and Young, O. (2009). Connectivity and the governance of multilevel social-ecological systems: the role of social capital. *Annual Review of Environment & Resources*, 34: 253-278.

Pahl-Wostl, C. (2009). A conceptual framework for analyzing adaptive capacity and multi-level learning processes in resource governance regimes. *Global Environmental Change*, 18, 354–365.

Carmichael, L., Barton, H., Gray, S., Lease, H., and Pilkington, P. (2012). Integration of health into urban spatial planning through impact assessment: Identifying governance and policy barriers and facilitators. *Environmental Impact Assessment Review, 32*(1), 187-194.

Cashmore, M. (2004). The role of science in environmental impact assessment: Process and procedure versus purpose in the development of theory. *Environmental Impact Assessment Review*, 24(4), 403-426.

Cashmore, M. and Morgan, R. (2014). The impact assessment arms race and visions for the future. *Impact Assessment and Project Appraisal, 32*(1), 25-26.

Che, X., English, A., Lu, J., and Chen, Y. (2011). Improving the effectiveness of planning EIA (PEIA) in China: Integrating planning and assessment during the preparation of Shenzhen's master urban plan. *Environmental Impact Assessment Review, 31*(6), 561-571.

Chen, C., Liu, W., and Liaw, S. (2011). Integrated dynamic policy management methodology and system for strategic environmental assessment of golf course installation policy in Taiwan. *Environmental Impact Assessment Review, 31*(1), 66-76.

Chen, C., Wu, R., Liu, W., Su, W., and Chang, Y. (2009). Development of a methodology for strategic environmental assessment: Application to the assessment of golf course installation policy in Taiwan. *Environmental Management, 43*(1), 166-188.

Cleaver, F. (2012). *Development through Bricolage: Rethinking Institutions for Natural Resource Management*. Abingdon: Earthscan.

Cocklin, C., Parker, S., and Hay, J. (1992). Notes on Cumulative Environmental Change 1: Concepts and Issues. *Journal of Environmental Management*, 35, 31-49.

Commission of the European Communities (CEC) (2001). Directive 2001/42/EC of the European Parliament and of the Council on the Assessment of the Effects of Certain Plans and Programmes on the Environment (Brussels: CEC).

Cooper, L. (2011). CEA in policies and plans: UK case studies. *Environmental Impact Assessment Review, 31*, 465-480.

Cooper, L. and Sheate, W. (2004). Integrating cumulative effects assessment into UK strategic planning: Implications of the European union SEA directive. *Impact Assessment and Project Appraisal, 22*(1), 5-16.

Creswell, J. (2009). *Research Design: Qualitative, Quantitative and Mixed Methods Approaches* (3rd ed.), Sage Publications: Thousand Oaks.

D'Auria, L., and Cinneide, M. (2009). Integrating strategic environmental assessment into the review process of a development plan in Ireland. *Impact Assessment and Project Appraisal, 27*(4), 309-319.

De Smedt, P. (2010). The use of impact assessment tools to support sustainable policy objectives in Europe. *Ecology and Society*, 15(4), http://www.ecologyandsociety.org/vol15/iss4/art30/

Dubé, M. (2003). Cumulative effects assessment in Canada: a regional framework for aquatic ecosystems. *Environmental Impact Assessment Review*, 23(6), 723-745.

Duinker, P. and Greig, L. (2006). The impotence of cumulative effects assessment in Canada: Ailments and ideas for redeployment. *Environmental Management*, 37(2), 153-161.

Duinker, P., Burbidge, E., Boardley, S., and Greig, L. (2013). Scientific dimensions of cumulative effects assessment: Toward improvements in guidance for practice. *Environmental Reviews,* 21(1), 40-52.

Duncan, R. (2013). Opening new institutional spaces for grappling with uncertainty: a constructivist perspective. *Environmental Impact Assessment Review*, 38, 151–154.

Elling, B. (2000). Integration of strategic environmental assessment into regional spatial planning. *Impact Assessment and Project Appraisal*, 18(3), 233-243.

Elvin, S. and Fraser, G. (2012). Advancing a national strategic environmental assessment for the Canadian offshore oil and gas industry with special emphasis on cumulative effects. J*ournal of Environmental Assessment Policy and Management*, 14(3), DOI: 10.1142/S1464333212500159.

Everett, S. (2005). Policy making and planning for the port sector: paradigms in conflict, *Maritime Policy & Management*, 32(4), 347-362.

Feldmann, L., Vanderhaegen, M., and Pirotte, C. (2001). The EU's SEA directive: Status and links to integration and sustainable development. *Environmental Impact Assessment Review*, 21(3), 203-222.

Fidler, C., and Noble, B. (2012). Advancing strategic environmental assessment in the offshore oil and gas sector: Lessons from Norway, Canada, and the United Kingdom. *Environmental Impact Assessment Review*, 34, 12-21.

Fidler, C., and Noble, B. (2013). Advancing regional strategic environmental assessment in Canada's western arctic: Implementation opportunities and challenges. *Journal of Environmental Assessment Policy and Management*, 15(1), 10.1142/S1464333213500075.

Finfgeld-Connett, D. (2014). Use of content analysis to conduct knowledge-building and theory-generating qualitative systematic reviews. *Qualitative Research*, 14: 341-352.

Fischer, T. (2004). Transport policy making and SEA in Liverpool, Amsterdam and Berlin - 1997 and 2002. *Environmental Impact Assessment Review*, 24(3), 319-336.

Fischer, T. (2006). Strategic environmental assessment and transport planning: Towards a generic framework for evaluating practice and developing guidance. *Impact Assessment and Project Appraisal*, 24(3), 183-197.

Fischer, T. and Onyango, V. (2012). Strategic environmental assessment-related research projects and journal articles: An overview of the past 20 years. *Impact Assessment and Project Appraisal*, 30(4), 253-263.

Fischer, T., Kidd, S., Jha-Thakur, U., Gazzola, P., and Peel, D. (2009). Learning through EC directive based SEA in spatial planning? Evidence from the Brunswick region in Germany. *Environmental Impact Assessment Review*, 29(6), 421-428.

Folkeson, L., Antonson, H., and Helldin, J. O. (2013). Planners' views on cumulative effects. A focus-group study concerning transport infrastructure planning in Sweden. *Land use Policy*, 30(1), 243-253.

Franceschini F., Maisano D. and Mastrogiacomo, L. (2016). The museum of errors/horrors in Scopus. *Journal of Informetrics*, 10:174-182.

Franks, D., Brereton, D., and Moran, C. (2010). Managing the cumulative impacts of coal mining on regional communities and environments in Australia. *Impact Assessment and Project Appraisal, 28*(4), 299-312.

Fundingsland Tetlow, M., and Hanusch, M. (2012). Strategic environmental assessment: The state of the art. *Impact Assessment and Project Appraisal*, 30(1), 15-24.

Gachechiladze, M. (2010). Strategic environmental assessment follow-up: from promise to practice. Case studies from the UK and Canada. Doctoral Thesis, Central European University, Budapest.

Grimmer, J. and Stewart, B. (2013). Text as data: The promise and pitfalls of automatic content analysis methods for political texts. *Political Analysis*, 21:267-297.

Gunn, J. and Noble, B. (2011). Conceptual and Methodological Challenges to Integrating SEA and Cumulative Effects Assessment. *Environmental Impact Assessment Review*, 31, 154-160.

Gunn, J. and Noble, B. (2009a). A conceptual basis and methodological framework for regional strategic environmental assessment (R-SEA). *Impact Assessment and Project Appraisal*, 27(4), 258-270.

Gunn, J. and Noble, B. (2009b). Integrating cumulative effects in regional strategic environmental assessment frameworks: Lessons from practice. *Journal of Environmental Assessment Policy and Management*, 11(3), 267-290.

Gunn, J. and Noble, B. (2015). Sustainability considerations in regional environmental assessment. In: A Morrison-Saunders, J Pope, A Bond (eds.) *Sustainability Assessment Handbook*, pp. 79-102, Northampton, MA: Edward Elgar.

Hanna, K., Pölönen, I., and Raitio, K. (2011). A potential role for EIA in Finnish forest planning: Learning from experiences in Ontario, Canada. *Impact Assessment and Project Appraisal*, 29(2), 99-108.

Hanusch, M., and Glasson, J. (2008). Much ado about SEA/SA monitoring: The performance of English regional spatial strategies, and some German comparisons. *Environmental Impact Assessment Review*, 28(8), 601-617.

Harriman, J. and Noble, B. (2008). Characterizing project and strategic approaches to regional cumulative effects assessment in Canada. *Journal of Environmental Assessment Policy and Management*, 10(1), 25-50.

Higgins, T. and Duane, T. (2008). Incorporating complex adaptive systems theory into strategic planning: The Sierra Nevada Conservancy. *Journal of Environmental Planning and Management*, 51(1), 141-162.

Hildén, M., Furman, E., and Kaljonen, M. (2004). Views on planning and expectations of SEA: The case of transport planning. *Environmental Impact Assessment Review*, 24(5), 519-536.

Jackson, T. and Illsley, B. (2006). Strategic environmental assessment as a tool of environmental governance: Scotland's extension of the European union SEA directive. *Environmental Impact Assessment Review*, 49(3), 361-383.

Johnson, D., Lalonde, K., McEachern, M., Kenney, J., Mendoza, G., Buffin, A., and Rich, K. (2011). Improving cumulative effects assessment in Alberta: Regional strategic assessment. *Environmental Impact Assessment Review*, 31, 481–483.

Kato, S. and Ahern, J. (2008). 'Learning by doing': adaptive planning as a strategy to address uncertainty in planning. *Journal of Environmental Planning and Management*, 51(4), 543-559.

Keith, J., and Ouattar, S. (2004). Strategic planning, impact assessment, and technical aid: The Souss-Massa integrated water management project. *Journal of Environmental Assessment Policy and Management*, 6(2), 245-259.

Keysar, E., and Steinemann, A. (2002). Integrating environmental impact assessment with master planning: Lessons from the US army. *Environmental Impact Assessment Review*, 22(6), 583-609.

Kirchhoff, D., McCarthy, D., Crandall, D. D., McDowell, L., and Whitelaw, G. (2010). A policy window opens: Strategic environmental assessment in York region, Ontario, Canada. J*ournal of Environmental Assessment Policy and Management*, 12(3), 333-354.

Kørnøv, L., and Thissen, W. (2000). Rationality in decision- and policy-making: Implications for strategic environmental assessment. *Impact Assessment and Project Appraisal*, 18(3), 191-200.

Kørnøv, L., Zhang, J., and Christensen, P. (2015). The influence of street level bureaucracy on the implementation of strategic environmental assessment. *Journal of Environmental Planning and Management*, 58(4), 598-615.

Lachapelle, P., Mccool, S., and Patterson, M. (2003). Barriers to Effective Natural Resource Planning in a "Messy" World. *Society & Natural Resources: An International Journal*, 16(6), 473-490

Lawrence, D. (2000). Planning theories and environmental impact assessment. *Environmental Impact Assessment Review*, 20(6), 607-625.

Lyhne, I. (2011). Between policy-making and planning: SEA and strategic decision-making in the Danish energy sector. *Journal of Environmental Assessment Policy and Management*, 13(3), 319-341.

Mandarano, L. (2008). Evaluating collaborative environmental planning outputs and outcomes: Restoring and protecting habitat and the New York New Jersey Harbor Estuary Program. *Journal of Planning Education and Research*, 27, 456-468.

Marsden, S. (2013). Strategic environmental assessment in Australian land-use planning. *Environmental and Planning Law Journal*, 30(5), 422-423.

Marshall, G. (2008). Nesting, subsidiarity, and community-based environmental governance beyond the local level. *International Journal of the Commons*, 2(1), 75-97.

Marshall, R. and Fischer, T. (2006). Regional electricity transmission planning and SEA: The case of the electricity company ScottishPower. *Journal of Environmental Planning and Management*, 49(2), 279-299.

Mesa-Frias, M., Chalabi, Z., Vanni, T., Foss, A. (2013). Uncertainty in environmental health impact assessment: quantitative methods and perspectives. *International Journal of Environmental Health Research*, 23(1), 16–30.

Mintzberg, H. (1994). The rise and fall of strategic planning. *Harvard Business Review*, January/February: 107-114.

Morrison-Saunders, A., Pope, J., Gunn, J., Bond, A. and Retief, F. (2014). Strengthening impact assessment: a call for integration and focus. *Impact Assessment and Project Appraisal*, 32, 2-8.

Neuendorf K. (2011). Content analysis—A methodological primer for gender research. *Sex Roles*, 64:276-289.

Niekerk, F. and Arts, J. (1996). Impact assessments in Dutch infrastructure planning: towards better timing and integration. *Project Appraisal*, 11(4), 237-246.

Nitz, T. and Brown A. (2001). SEA must learn how Policy Making Works. *Journal of Environmental Assessment Policy and Management*, 3(3), 329-342.

Noble, B. and Harriman, J. (2008). Strengthening the Foundation for Regional Scale Strategic Environmental Assessment in Canada. Research report prepared for the Canadian Council of Ministers of Environment Environmental Assessment Task Group. CCME: Ottawa, ON.

Noble, B. (2009). Promise and dismay: The state of strategic environmental assessment systems and practices in Canada. *Environmental Impact Assessment Review*, 29(1), 66-75.

Overgaard, K. (2004). Planning methods. In; Robinson, R. and Thagesen, B. (eds.), Road Engineering for Development (2nd ed.), London: Spon Press, pp. 92-113.

Parkins, J. (2011). Deliberative democracy, institution building, and the pragmatics of cumulative effects assessment. *Ecology and Society* 16(3), 20. http://dx.doi.org/10.5751/ES-04236-160320

Peltonen, L., and Sairinen, R. (2010). Integrating impact assessment and conflict management in urban planning: Experiences from Finland. *Environmental Impact Assessment Review*, 30(5), 328-337.

Peters, G. and Pierre, J. (2001) Developments in intergovernmental relations: towards multi-level governance. *Policy & Politics*, 29(2), 131-135.

Petts, J. (2003). Barriers to deliberative participation in EIA: Learning from waste policies, plans and projects. *Journal of Environmental Assessment Policy and Management*, 5(3), 269-293.

Podhora, A., Helming, K., Adenäuer, L., Heckelei, T., Kautto, P., Reidsma, P., and Jansen, J. (2013). The policy-relevancy of impact assessment tools: Evaluating nine years of European research funding. *Environmental Science and Policy*, 31, 85-95.

Rega, C., and Bonifazi, A. (2014). Strategic environmental assessment and spatial planning in Italy: Sustainability, integration and democracy. *Journal of Environmental Planning and Management*, 57(9), 1333-1358.

Retief, F., Bond, A., Gunn, J., Pope, J., and Morrison-Saunders, A. (2014). International perspectives on the strengthening of impact assessment through integration and focus. *Impact Assessment and Project Appraisal*, 32(1), 27-30.

Richardson, T. (2005). Environmental assessment and planning theory: four short stories about power, multiple rationality, and ethics. *Environmental Impact Assessment Review*, 25, 341–365.

Ruddy, T., and Hilty, L. (2008). Impact assessment and policy learning in the European commission. *Environmental Impact Assessment Review*, 28(2-3), 90-105.

Sánchez, L., and Silva-Sánchez, S. (2008). Tiering strategic environmental assessment and project environmental impact assessment in highway planning in São Paulo, Brazil. *Environmental Impact Assessment Review*, 28(7), 515-522.

Sharma, M., and Norton, B. (2005). A policy decision tool for integrated environmental assessment. *Environmental Science and Policy*, 8(4), 356-366.

Sheate, W., Dagg, S., Richardson, J., Aschemann, R., Palerm, J., and Steen, U.,, and (2003). Integrating the environment into strategic decision-making: Conceptualizing policy SEA. *European Environment,* 13(1), 1-18.

Slinger, J., Huizinga, P., Taljaard, S., van Niekerk, L., and Enserink, B. (2005). From impact assessment to effective management plans: Learning from the Great Brak estuary in South Africa. *Impact Assessment and Project Appraisal*, 23(3), 197-204.

Spaling, H. and Smit, B. (1993). Cumulative environmental change: Conceptual frameworks, evaluation approaches, and institutional perspectives. *Environmental Management*, 17(5), 587-600.

Stoeglehner, G. (2010). Enhancing SEA effectiveness: Lessons learnt from Austrian experiences in spatial planning. *Impact Assessment and Project Appraisal*, 28(3), 217-231.

Stoeglehner, G., and Wegerer, G. (2006). The SEA-directive and the SEA-protocol adopted to spatial planning-similarities and differences. *Environmental Impact Assessment Review*, 26(6), 586-599.

Stoeglehner, G., Brown, A., and Kørnøv, L. (2009). SEA and planning: 'Ownership' of strategic environmental assessment by the planners is the key to its effectiveness. *Impact Assessment and Project Appraisal*, 27(2), 111-120.

Tajima, R. and Fischer, T. (2013). Should different impact assessment instruments be integrated? Evidence from English spatial planning. *Environmental Impact Assessment Review*, 41: 29-37.

Tang, Z. (2008). Integrating the principles of strategic environmental assessment into local comprehensive land use planning. *Journal of Environmental Assessment Policy and Management*, 10(2), 143-171.

Therivel, R. and Ross, W. (2007). Cumulative Effects Assessment: Does Scale Matter? *Environmental Impact Assessment Review*, 27(5), 365-385.

Van Buuren, A., and Nooteboom, S. (2010). The success of SEA in the Dutch planning practice. How formal assessments can contribute to collaborative governance. *Environmental Impact Assessment Review*, 30(2), 127-135.

Van Stigt, R., Driessen, P., and Spit, T. (2013). A window on urban sustainability: Integration of environmental interests in urban planning through 'decision windows.' *Environmental Impact Assessment Review,* 42, 18-24.

Weber, M., Krogman, N., and Antoniuk, T. (2012). Cumulative effects assessment: Linking social, ecological, and governance dimensions. *Ecology and Society*, 17(2), 22. http://www.ecologyandsociety.org/vol17/iss2/art22/

Wyborna, C. and Bixler, P. (2013). Collaboration and nested environmental governance: Scale dependency, scale framing, and cross-scale interactions in collaborative conservation. *Journal of Environmental Management*, 123, 58-67.

Yiftachel, O. (1998) Planning and social control: exploring the dark side. *Planning Literature*, 12(4): 395-406.

CHAPTER THREE

Challenges to Integrating Planning and Policy-Making with Environmental Assessment on a Regional Scale—A Multi-Institutional Perspective

Abstract:

Regional environmental assessment (EA) requires the participation of policy and plan-making institutions to formulate, implement, and monitor regional environmental management strategies. However, there is little understanding of what effective integration is in the context of regional EA and from the perspectives of planners and policy-makers involved. This paper seeks to explore how institutional actors perceive cross-domain integration vis-à-vis their own involvement in regional EAs. Thirty-eight participants from four regional EAs in Canada shared their perspectives in an online survey. Three types of silo effects are identified: institutional—intricately linked to factors such as coordination, goals and expectations, leadership, and capacity; (2) disciplinary—characterized by limited communication and skepticism around data sharing; and (3) transactional—tendency of actors to emphasize individual narrow perspectives rather than collective social and environmental outcomes. Additional findings reveal the importance of learning and multiple domain expertise as opportunities for enhancing cross-domain integration in regional EA practice. Finally, the study concludes that proactive consideration of potential silo effects is necessary for improved regional EA outcomes, and to facilitate more effective regional resource governance. This chapter has been accepted for publication in *Impact Assessment & Project Appraisal*[8].

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3.1 Introduction: The Importance of Cross-Domain Integration to Regional Environmental Assessment

Increasingly in Canada and elsewhere, significant intellectual and financial resources are invested in regional environmental assessment (EA)[9] processes (Gunn and Noble 2009; Seitz et al. 2011; Duinker et al. 2013). The design and results of these regional EAs often affect land, resources, and communities that are also subject to regional land use planning and policy-making policy processes. Integration of these three domains[10]—EA, planning, and policy-making—is a challenging and complex undertaking. Effective regional EA requires not only collective visioning with planners and policy-makers, but also the co-creation of knowledge and resources for interpreting projected landscape phenomena (Dubé et al. 2013; Chilima et al. 2013; Kristensen et al. 2013). The purpose of this paper is to investigate how institutional actors perceive the challenges to cross-domain interaction and integration vis-à-vis their own involvement in regional EA. Specifically, answers to the following questions are sought: What criteria can be used to evaluate the effectiveness of cross-domain integration in regional EA? What factors facilitate or inhibit cross-domain integration among actors involved in the process? Do institutional actors with different mandates and roles perceive the goals and means to cross-domain integration differently? And, what kinds of changes are required to strengthen cross-domain integration in regional EA to facilitate effective resource governance?

Understanding and evaluating the dynamics of relationships among institutional actors involved in or affected by regional EA processes is of great importance to the international EA community (Tang 2008; Folkeson et al. 2013; Bragagnolo and Geneletti 2014), particularly given the increasing role of non-EA actors in realizing certain objectives of regional EA. Folkeson et al.

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[9] The term 'regional EA' is used in a broad sense, encompassing all EAs at the strategic level, including single project assessments with expanded geographic scales for impact prediction and multi-stakeholder regional impact monitoring and management programs (Gunn and Noble 2011; 2015). It will ideally include concepts such as regional EA, regional CEA, regional SEA, regional planning approach to CEA or SEA, as well as other initiatives that mirror these forms of assessments.

[10] By domain, it is meant: "the body of knowledge, the set of rules and procedures, the symbolic system" which are used by individual actors to approach issues in a collective assessment (Fulton and Paton 2016, p. 29). A 'domain' is embedded in the epistemic communities described by (Haas 1992:3) as "a network of professionals with recognized expertise and competence in a particular domain and an authoritative claim to policy-relevant knowledge within that domain or issue-area."

(2013) demonstrate that such understanding can facilitate trans-sectorial relationships as actors become aware of other agencies' internal planning procedures. However, other scholars note that regional EA is sometimes a contentious process for the planners and policy-makers involved (Nitz and Brown 2001; Folkeson et al. 2013). Certain studies indicate that while regional-scale EA is desirable because it has potential to contribute substantively to sustainable regional development (Dubé 2003; Cooper and Sheate 2004; Stoeglehner and Wegerer 2006), the process and its outcomes have often been hampered by the intellectual and operational divides that characterize practice in each of the three domains (Nitz and Brown 2001).

Existing planning and EA studies imply that regional EA practice has failed to demonstrate that tangible benefits are flowing from the considerable resources expended upon them, both in terms of process and outcomes—and that this is partially related to a disconnect among regional EA, planning, and policy-making. For example, in the Greater Yellowstone region (United States), the resources invested in a regional EA exercise during the 1980s (though it was not explicitly labelled as such) failed to yield any significant improvements in terms of its social and environmental outcomes for the region (Grumbine, 1994; Margerum 1997; Clark 2008). Margerum (1997) argued that the failure was largely due to a lack of appreciation of planning and policy perspectives and mandates on the part of participants involved in the regional EA, which was due to a 'silo effect'— i.e. the real or perceived understanding of agency mandates or boundaries as borders that are difficult to cross or cannot be crossed (Mitchell 2005).

In a more recent case of the Great Sand Hills (GSH) Canada regional EA completed in 2007, a strategic EA framework was adopted to understand the cumulative effects of human activities on the region's ecological integrity and sustainability, culminating into a management plan that was expected to guide future land use activities (Noble 2008). During the assessment, there was an obvious attempt to bridge the domains of EA, planning, and policy-making, however, less attention was paid to what would happen after, and the relationships needed to sustain implementation and take advantage of decision-making windows were lacking. Despite that the strategic EA framework used in this case was exemplary and offered a novel approach to conducting regional EA in Canada, the realization of the regional EA goals and objectives seemed to have been 'trapped' by both the lack of a real mechanism to sustain the assessment as an integral

part of a regional plan and the absence of cross-institutional collaboration at the policy level (Noble 2008).

These two cases—the Greater Yellowstone and the GSH examples—imply that regional EA frameworks tend to lack explicit attention to building the institutional relationships needed to bridge the EA, planning, and policy-making domains (Stead and Meijers 2009; Stoeglehner et al. 2009). This is apparently highly important to effective regional EA process: several studies insist many of the benefits of investing in regional EA will not be realized unless major institutional challenges are understood and bridged to advance its practice (e.g. Noble 2008; Gunn and Noble 2009; Duinker et al. 2013; Kristensen et al. 2013). To this end, in Canada, some federal entities including the Department of Fisheries and Oceans Canada and the Canadian Council of Ministers of Environment (Noble and Harriman 2008a,b) have developed generic frameworks and tools to guide regional EA practice that support more spatially relevant, strategically oriented, and institutionally inclusive EAs. However, the potentially lasting contribution of regional EAs to cross-domain integration lies in their ability "to coordinate disparate regional resources, programs, data, management objectives, strategic assessments in relation to a common regional issue" (Noble and Harriman 2008b, p. 13).

Academically, cross-domain integration is a little explored or understood concept (Olagunju and Gunn *draft* 2015), and no studies have been conducted on the subject from the perspective of institutional actors themselves particularly from a regional EA context. Gaining this perspective is important because institutional actors facilitate the means by which changes are defined, promoted, and realized. In addition, they provide critical access to the institutional intricacies and tacit knowledge embodied in the individual domains. Because reasons for failure of integration efforts are difficult to detect and measure, institutional actors' perceptions—based on their prior involvement in similar kinds of regional environmental assessments—provide a unique vantage point on the dynamics of current practice and what changes are needed to strengthen integration among the three domains, as well as regional EA outputs and outcomes. In Sections 3.2 and 3.3, respectively, we explain the study methods, including the framework we used to evaluate cross-domain integration. Sections 3.4 and 3.5 present and discuss the survey results, including changes required to strengthen cross-domain integration. In Section 3.6, the paper

concludes with a highlight of the key contributions of this study and suggestions for future research.

3.2 An Evaluative Framework for Studying Cross-Domain Integration

Framing "integration" is a recognized challenge in EA literature i.e. integration of what, by who, for what purpose. In other words, is it enhancing transparency and participation, integrating different levels of decision-making, integrating assessment results into governance, or integrating across policy sectors? (See for example, Turnpenny et al. 2008; Stoeglehner et al. 2009). For the purpose of this study, cross-domain integration is defined as the process of inter-agency collaboration in which actors co-define the environmental phenomena that shape a landscape, and co-develop and co-implement environmental management strategies perceived to be in their common interest (De Smedt 2010; van Buuren and Nooteboom 2010; Elvin and Fraser 2012). One of the difficulties in exploring cross-domain integration is that there are no clearly defined evaluative guidelines. However, its main building blocks in the context of regional EA must take into account how different interests and decision-making processes can be effectively bridged to realize the vision of the assessment (De Smedt 2010; Franks et al. 2010; Carmichael et al. 2012). The major elements underpinning cross-domain integration are: the relationship among actors (Nitz and Brown 2001; Gunn and Noble 2009; Folkeson et al. 2013); the quality of the decision-making process (Hildén et al. 2004; van Buuren and Nooteboom 2010; Elvin and Fraser 2012); effective task allocation and performance (Kørnøv and Thissen 2000; Fischer 2006; Marshall and Fischer 2006); and effective outputs and outcomes (Mandarano 2008; Adelle and Weiland 2010; Bogenschneider and Corbett 2010; Podhora et al. 2013) (see Table 3.1).

Table 3.1: Key Elements of Cross-Domain Integration

Relationship Among Actors

- Relevance—how actors perceive the relevance of the regional assessment to their own institution
- Benefit to institution—overall perception of the benefit of the assessment to the individual institution
- Spatial relevance—the suitability of the spatial extent of the regional assessment to the institution
- Inclusiveness—balanced representation of institutions, including less influential stakeholders, in the outcomes of the assessment

Quality of Decision Making Process

- Transparency—perceived openness, fairness, and legitimacy of the process on the part of all participating institutions
- Credibility—shared perception that the scientific basis for decision-making is sound, including data sources and projections
- Methodology and data input— shared perception of the appropriateness of the methods and tools, data generated, and decision-making approach adopted
- Thoroughness – in terms of research and documentation, and communication among institutions and across domains

Effective Task Allocation and Performance

- Clarity—shared understanding of both the collective strategic vision and the individual institution's role within the cross-domain assessment
- Capacity—the ability of each institution to effectively, efficiently and sustainably execute assigned roles/tasks
- Linkages—explicit operational linkages among institutions and domains; emphasis on a 'tiered' approach to implementation
- Ownership—acceptance of and commitment to tasks assigned and overall objectives of the regional EA
- Coordination—eliminate task/process duplication and/or enhance cooperation and communication among institutions and across domains

Effective Outputs and Outcomes

- Usefulness of products—whether the reports, tools, and/or techniques developed are useful or being used by the participating institutions
- Measurable influence—on environmental, social or economic conditions in the region, including influence on an institution's operations, plans, and/or policies
- Intra-domain partnerships—strengthened relationships among actors and institutions with similar mandates/values, i.e. within the same domain
- Inter-domain partnerships—strengthened relationships among actors and institutions having different mandates/values. i.e. from different domains
- Trust—shared perception of the adequacy, reliability, and sufficiency of the EA process and an individual institution's ability to achieve its own, related objectives
- Learning—whether learning took place or is taking place among institutional actors, and the types of learning emerging via the assessment (e.g. social, technical, transformative etc.)

Sources: Kørnøv and Thissen 2000; Nitz and Brown 2001; Hildén et al. 2004; Fischer 2006; Marshall and Fischer 2006; Mandarano 2008; Gunn and Noble 2009; Adelle and Weiland 2010; Bogenschneider and Corbett 2010; van Buuren and Nooteboom 2010; Elvin and Fraser 2012; Zhang et al. 2013; Folkeson et al. 2013; Podhora et al. 2013.

A key element of successful regional EA is the *relationships among actors* that are initiated and sustained throughout the life of the assessment. Relationships among actors are configured based on perceived relevance to institution mandates and visions (Che et al. 2011), perceived benefits of the assessment's outputs and outcomes to each institution (Podhora et al. 2013), and the spatial extent of environmental phenomena and relevance to each institution (Genelleti et al. 2007; Noble and Harriman 2008; Folkeson et al. 2013). Inclusiveness, i.e. balanced representation of both influential institutions and those with stakes in the outcomes, including those who may be less influential in the decision-making process, is a fundamental gauge of this relationship (Innes and Booher 1999; Healey 2003; Bryan 2004; Parkins 2011). Relationships among actors provide the social foundation that allows actors to pay attention to decision-making and overall outcomes and outputs of the regional EA. As argued by Innes and Booher (1999, p. 415): "No matter how good an agreement is by some standards, if it was reached by a process that was not regarded as fair, open, inclusive, accountable, or otherwise legitimate, it is unlikely to receive support." In many regional EA studies, power imbalances are difficult to detect, and often ignored in research, because they are embedded within hundreds of (sometimes undocumented) myriad, complex interactions, and the experiences of individual actors who have participated in the assessment have not been explored before now. If it can be demonstrated that good relationships exist among actors, perception of the quality of the decision-making process, task allocation, as well as outputs and outcomes may be positive.

Evaluating cross-domain integration also requires an understanding of the ways in which collective decisions are made and how such decisions affect individual domain mandates. Thus, the *quality of the decision-making process* has a huge impact on the efficiency, effectiveness, reliability, and operationalization of a regional EA (Jackson and Illsley 2006; van Buuren and Nooteboom 2010; Elvin and Fraser 2012). The literature on what characterizes a good practice decision-making process is replete with metrics, but can be synthesized into four key items: the perceived transparency of the process (Parkins 2011); credibility of the science upon which decisions are made (De Smedt 2010); the nature and depth of information flow, i.e. tools, methods, and data exchange (Che et al. 2011; Weber et al. 2012); and the context in which decisions are made, i.e. collaboratively, top-down, or disjointed and how individual institution views such approach (Van Buuren and Nooteboom 2010; Bond et al. 2016). The quality of the decision-making process is also determined by the thoroughness of the process in terms of research and

documentation (Canter and Ross 2010), and the sharing of that information among participating institutions (Song et al. 2011; Rega and Bonifazi 2013), including information about uncertainties (Duncan 2013; Mesa-Frias et al. 2013).

While the quality of the decision-making process can be evaluated separately, closely linked to this is *effective task allocation*—a performance component related to the clarity of tasks assigned to individual institution; the capacity to satisfactorily execute those tasks; whether interdependency paths are clear; and the existence of a coordinated approach to reduce task duplication (Fischer 2006; Marshall & Fischer 2006). A generic framework for evaluating practice in the English and German transport sectors proposed by Fischer (2006) illustrates all of these dimensions. His study suggested that the convergence of sectoral, geographical, and administrative networks for task distribution, built on a "high degree of cooperation and co-ordination of activities," will better facilitate cross-domain integration of EA with planning and policy at the regional transport development scale.

An additional element of effective task allocation is 'ownership', meaning that there is a perceived acceptance of and commitment to tasks assigned on the part of the various institutions involved. Specifically, this means demonstrating a willingness to play out their role within the entire network and lifespan of the regional assessment (Elling 2000; Stoeglehner 2010; Carmichael et al. 2012). The notion of ownership, or the more ambiguous "responsible owners," often arises in discussion of integration in regional EA (Dubè 2003) but the manner in which ownership is perceived could be dependent on the cooperation and coordination of the regional EA. Wondolleck and Yaffee (2000) distinguish between two types of ownership: *ownership of the problem* and *ownership of the process*: while the former emphasizes the establishment of direct, personal connection between individual institution and the problems at hand (akin to the description of relationships among actors), the latter emphasizes providing individuals with latitude to make creative decisions and a condition to effective task implementation.

The perception of the real impact of a regional EA on individual domain is assessed by a whole range of factors—both tangible and intangible—which are addressed under *effective outputs and outcomes*. A distinction can be made between output and outcome measures. Mandarano (2008) defines outputs as "plans, projects, and other tangible items produced directly" (p. 457)

from the assessment, while outcomes are defined as effects of the process and its outputs on changing social and environmental conditions. Although outputs and outcomes are seen as two distinct measures of effective cross-domain integration, generally in EA studies emphasis is often placed on the former (Cashmore 2004). However, evaluative questions should elicit an understanding of both outputs—which is measured here in terms of perceived usefulness of the regional EA products (e.g. reports, tools, and/or techniques). The outcomes dimensions are understood by examining practical influence of the regional EA on day to day operations of each domain, how it has strengthened both intra- and inter-domain relationships, increased the level of trust, and promoted various types of learning that have taken place during the process (Marshall and Fischer 2006; Fischer et al. 2009; Che et al. 2011).

While this evaluative framework provides important insights into the various key elements discussed in this section, cross-domain integration in regional EA can be seen to involve a whole range of more or less interrelated activities and components. For instance, all the measures of task performance such as clarity, capacity, and ownership significantly depend on the quality of actors' relationship, and bear significant influence on the nature of the outcomes and outputs. The interconnectedness of these various dimensions requires an empirical investigation to understand where existing institutions need to be strengthened, which is an aspect that is lacking in international regional EA research. Given the challenges in detecting and measuring cross-domain integration during a regional EA process, social sciences research has argued that the direct survey of actors, prompting them to reflect on their experience and impact of the assessments on their institutional mandates may be helpful in generating key lessons for improved practice (Tyden 1996).

3.3 Methods

According to Owen and Rogers (1999), an evaluation research should ideally involve a four-stage process: (i) establishing criteria of worth through, for instance, a literature review; (ii) constructing standards (e.g. questions); (iii) measuring performance (e.g. answering closed-ended questions); and (iv) synthesizing evidence into a judgment of worth. Section 3.2 of this paper

addresses the first of these stages; while this section presents an overview of stages 2 and 3. The final stage is addressed in the sections that follow.

A web-based survey was used to gather data on the perceptions of planners, policy-makers, and EA practitioners previously involved in selected regional EA cases. The cases are: (i) Northern Saskatchewan Environmental Quality Committee (EQC); (ii) Northwest Territories Cumulative Impact Monitoring Program; (iii) Regional Municipality of Wood Buffalo Cumulative Environmental Management Association; and (iv) Crown of the Continent Regional Cumulative Effects Study. A brief description of each is provided in Table 3.2. All cases involve regions within western Canada except the last case, which is a transboundary region administered to by the Canadian provinces of Alberta and British Columbia, and the state of Montana in the United States. The main criteria for selection of the cases are the regional focus of the EA; evidence that the three domains are implicated in the EA processes; and a case history of at least 10 years to ensure enough time has passed to adequately gauge cross-domain interaction and integration.

Quantitative and qualitative data were gathered to explore the dimensions of cross-domain integration among agencies involved in the regional EAs. Close-ended questions were used to query the professional background of the respondents (years of post-graduation work experience, highest qualification, geographical scope of agency operation, and primary function/role in the regional EA), and to allow participants to evaluate the case they were involved in based on the cross-domain integration criteria described in Table 3.1. All closed-ended questions were designed such that a 5-point Likert scale (1 = strongly disagree, 2 = disagree, 3 = uncertain, 4 = agree, to 5 = strongly agree) could be used to answer them. Respondents were given the opportunity to qualify each of these answers. In the second half of the survey, additional open-ended questions probed the nature and depth of real and perceived institutional divides among the agencies. Combining qualitative and quantitative data is a well-established, more objective measure for aggregating multiple and divergent opinions (Johnson et al. 2007; Creswell 2009) and has been utilized in several EA studies (e.g. Gunn and Noble 2009).

Table 3.2: Regional EA cases from which study participants were drawn

Case	Region	Date of Commencement	Goal of the Regional EA	Sector
Environmental Quality Committee (EQC)	Northern Saskatchewan, Canada	1995	to act as a bridge between communities, the government and uranium mining companies in order to make sure that development is done in a manner which considers the concerns, needs, and aspirations of those most directly affected	Resource-based: uranium mining
Cumulative Impact Monitoring Program (CIMP)	Northwest Territories, Canada	1999	to achieve excellence in environmental management and stewardship through effective monitoring and assessment of cumulative impacts in the NWT	Land use management (multi-sector)
Cumulative Environmental Management Association (CEMA)	Regional Municipality of Wood Buffalo [Fort McMurray, AB, Canada]	2000	to bring stakeholders together to discuss and make consensus-based decisions to manage the cumulative environmental effects in the context of existing and projected oil sands development	Resource-based: oil and gas
Crown Managers Partnership (CMP)	Crown of the Continent Region [Shared by Alberta and BC, Canada & Montana, USA]	2001	adopting transboundary collaborative approaches to environmental management, including the cumulative effects of human activities across the ecosystem	Land use management (multi-sector)

Following a pilot survey conducted in September 2014 with eight randomly selected social researchers, some of whom have expertise in regional EA, and further refinement of the survey questions based on feedback received, the survey platform was opened in October 2014 and closed in January 2015. Approximately 130 potential respondents across the four cases were invited to participate in the study. Ultimately, 38 individuals fully completed the survey. Analysis of quantitative survey responses was performed using SPSS® Statistics v.22 software. Simple box-

plot diagrams were used to visually represent the distribution of the Likert scale results. A one-way ANOVA (Larson 2008) was conducted to examine whether there were statistically significant differences among the domains for each of the items rated. At $\alpha \leq 0.05$, none of the items measured was found significant, which suggests that the number of responses from each domain does not influence the sample mean or median score. A Spearman's rank correlation test (Zar 2005) was also used to determine which factors show some correlation with each other at both $\alpha \leq 0.01$ and $\alpha \leq 0.05$. Finally, the qualitative data were analysed with the aid of Nvivo® v.10 software using a thematic coding approach to facilitate a systematic identification of key themes that are germane to understanding the institutional context to cross-domain integration in regional EA processes.

The intent of the study was to be able to compare experiences across different domains, which arguably materialized since responses were obtained across all groups, including those who self-identified as having multiple roles. However, the low samples (ranging between 8 and 12) obtained from each group limit the statistical power of the ANOVA test to establish any significant difference and reduced the chances of detecting a true effect of the relationships among the domains. Low power, meaning that the chance of discovering effects that are genuinely true is low, is a common challenge in social science research with small samples (Button et al. 2013). A larger sample could have provided further insights on the differences in responses for each of the evaluative elements and a richer understanding of the divergent and convergent factors across groups. This understanding could not be gained based on the statistical test. Hence, the focus on an exploratory approach that emphasizes the median scores and the results of the qualitative analysis in discussing the findings.

3.4 Perceptions of Cross-Domain Integration

3.4.1 Quantitative Measurement of Evaluative Elements

Of the 38 individuals who completed the survey, 10 (26%) were self-identified as EA practitioners; 12 (32%) as land use planners; eight (21%) as policy-makers, and another eight (21%) as having multiple roles (see Table 3.3). This last category (multiple roles) was not anticipated in the survey design, but was useful in evaluating the dimensions of integration in the

regional EA cases. The professional backgrounds of the 38 respondents varied: 95% have at least one university degree, of which 13% (i.e. 5 respondents) have doctoral degrees. About 90% said that they have at least five years' work experience and 82% work for government agencies. The geographical scope of the agencies represented is regional, provincial, national, and international.

Table 3.3: Survey participants by role in the four regional EA cases

Case	Environ. Assess	Land Use Plg.	Policy-Making	Multiple Roles	Total[11]
Environmental Quality Committee	6	1	4	2	13 (34.2%)
Cumulative Impact Monitoring Program	2	4	2	1	9 (27.3%)
Cumulative Environmental Mgt. Association	1	4	1	3	9 (34.6%)
Crown Managers Partnership	1	3	1	2	7 (18.4%)
Total	**10**	**12**	**08**	**08**	**38 (28.1%)**

Perceptions of individual components of cross-domain integration are reported in Figures 3.1 to 3.4, which display boxplots of the scores for policy-makers, land use planners, EA practitioners as well as those who self-identified as having multiple roles. Each boxplot, one per element, graphically represents the distribution of perception ratings from all 38 respondents. Figure 3.1 shows the results of elements used to measure relationship among actors and reveals that *relevance* and *spatial relevance* with a median value of 4.0 each are ranked highly across the domains. Exceptions are for EA practitioners whose boxplot for relevance shows two extreme outliers but normal skewness of 0.000, which suggests that median score can be taken as

[11] Percentage response rate in brackets

representative of the rating for the domain. The ratings for *benefit of participation* and *inclusiveness* are similar across participant categories. For these two items, the median score of 4.0 are calculated for land use planners and those with multiple roles, and 3.5 for EA practitioners. At a median score of 3.0, policy-making domain has the lowest rating for inclusiveness.

The ratings for decision-making process items (Figure 3.2) reveal mixed perceptions across all three domains of EA, planning, and policy-making. While *transparency* and *credibility*—two of the most important indicators of good decision making—seem highly rated across all domains with a median score of 4.0 each, perception of the *thoroughness* as well as the contribution of *methods and data* into the process fluctuate between 3.0 and 4.0, especially among actors with clear disciplinary roles. Box plots for those with multiple roles indicate that this group of actors consistently rate all the four items used to measure decision-making high at a median score of 4.0.

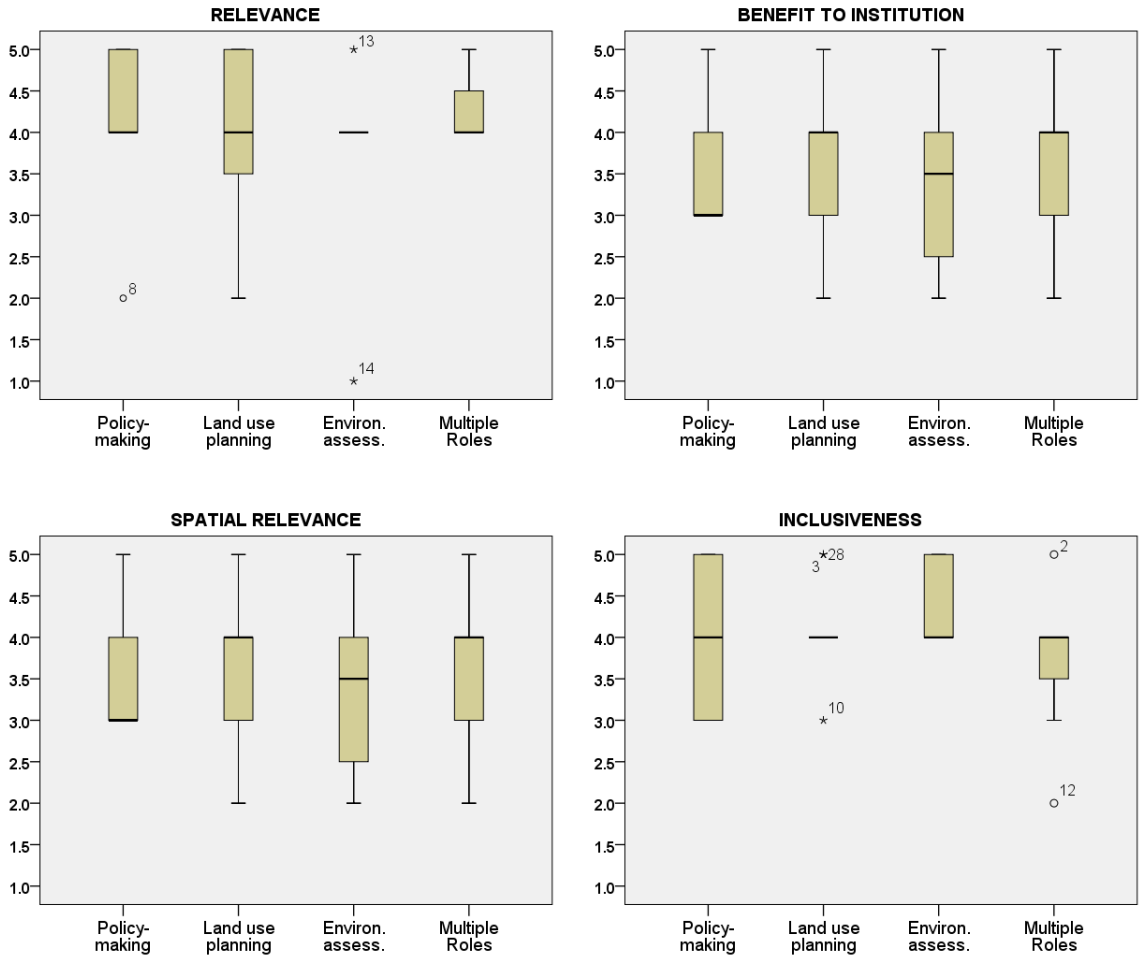

Figure 3.1: Boxplots of perception of *relationship among actors* across the four groups of respondents. Note: Each set of boxplots represents the distribution of responses across the domains. The figures on the *y-axis* are based on the results of 5-point Likert scale responses ranging from 1 to 5 for *strongly disagree* to *strongly agree* respectively. The thick lines at the middle of each plot represent the median values, while * and o represent extreme outliers not included in calculating the median scores.

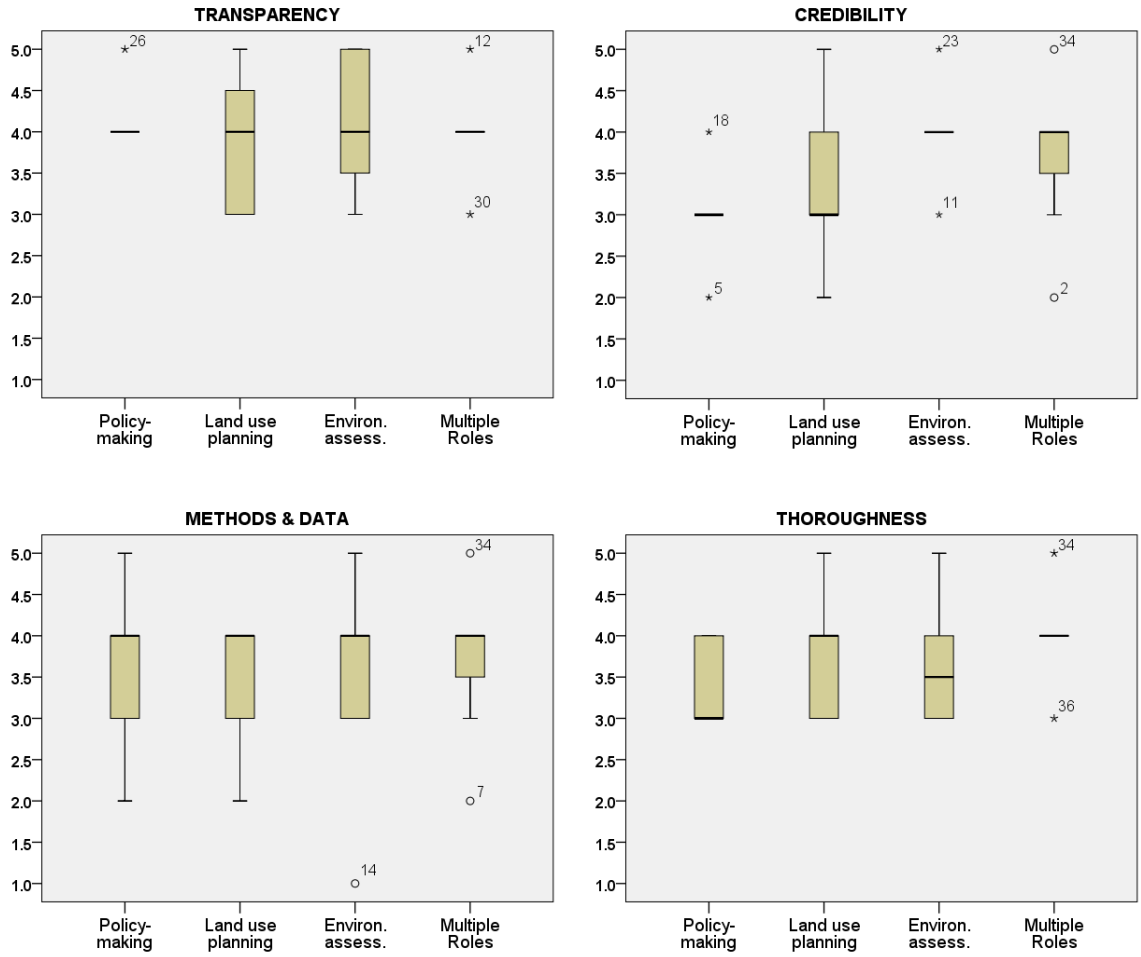

Figure 3.2: Boxplots of perception of *quality of decision making process* across the four groups of respondents. Note: Each set of boxplots represents the distribution of responses across the domains. The figures on the *y-axis* are based on the results of 5-point Likert scale responses ranging from 1 to 5 for *strongly disagree* to *strongly agree* respectively. The thick lines at the middle of each plot represent the median values, while * and o represent extreme outliers not included in calculating the median scores.

As shown in Figure 3.3, apart from EA practitioners and those with multiple roles whose median score is 4.0, *clarity* is lowly rated among policy-makers and land use planners at median value of 3.0 each. *Coordination* is similarly lowly rated across all the groups with as low as a median value of 2.0 for land use planning. Conversely, inter-agency *linkage* and *capacity* seem to be moderately well perceived at a median value of 4.0 for all the domains, except land use planners with a median score of 3.0. The perception of *ownership* of the process is highly ranked (4.0) among EA practitioners and those with multiple roles, while policy-making and land use planning domains reported a median score of 3.0. Again, at a median score of 4.0, boxplots for those with multiple roles indicate that all the four items used to measure task allocation and performance are consistently highly rated.

The *usefulness of products* and *influence* box plots in Figure 3.4 indicate that, at a median value of 4.0 for both elements, most policy-makers and land use planners perceive regional EA as valuable and strategic to their operations. For EA practitioners, median scores for usefulness and influence were both 3.5; however, these two elements are relatively lowly rated among those with multiple roles; median scores of 3.5 and 3.0 were recorded for usefulness and influence respectively among respondents in this group. Quantitative responses across all domains show that the regional EAs have had specific influence on some agencies' strategic plans/policies (n=14), budgetary plans/policies (n=10), sustainability plans/policies (9), and operational (field level) plans/policies (n=6). With respect to the outcomes of the regional EA, Figure 3.4 further shows that all the four elements (intra-domain partnership; inter-domain partnership; trust; and learning) are well perceived with a median value of 4.0 across all domains. With the exceptions of a few outliers, *inter-domain partnership* is more evident in regional EA processes than *intra-domain partnership* across all domains.

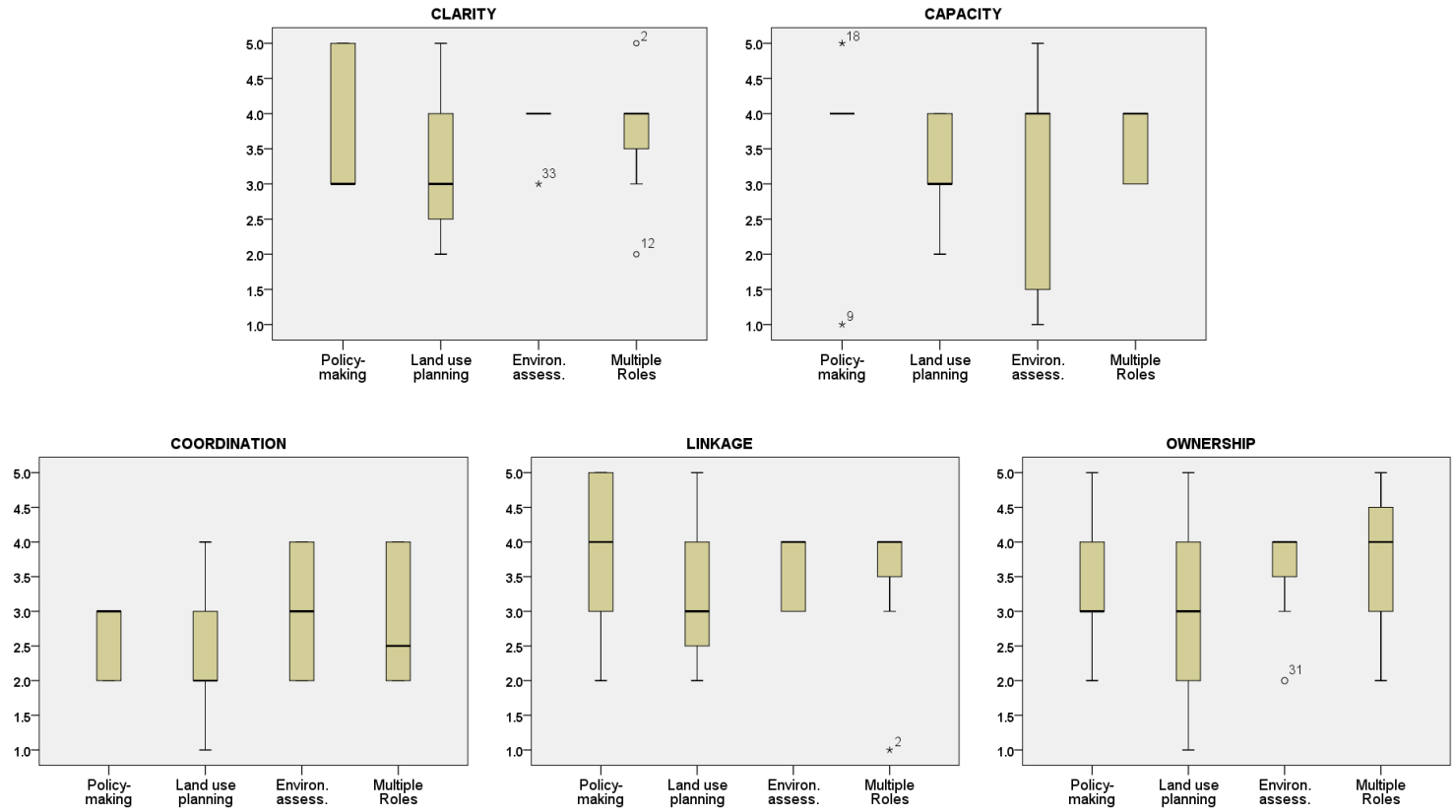

Figure 3.3: Boxplots of perception of *effectiveness of task allocation and performance* across the four groups of respondents. Note: Each set of boxplots represents the distribution of responses across the domains. The figures on the *y-axis* are based on the results of 5-point Likert scale responses ranging from 1 to 5 for *strongly disagree* to *strongly agree* respectively. The thick lines at the middle of each plot represent the median values, while * and o represent extreme outliers not included in calculating the median scores.

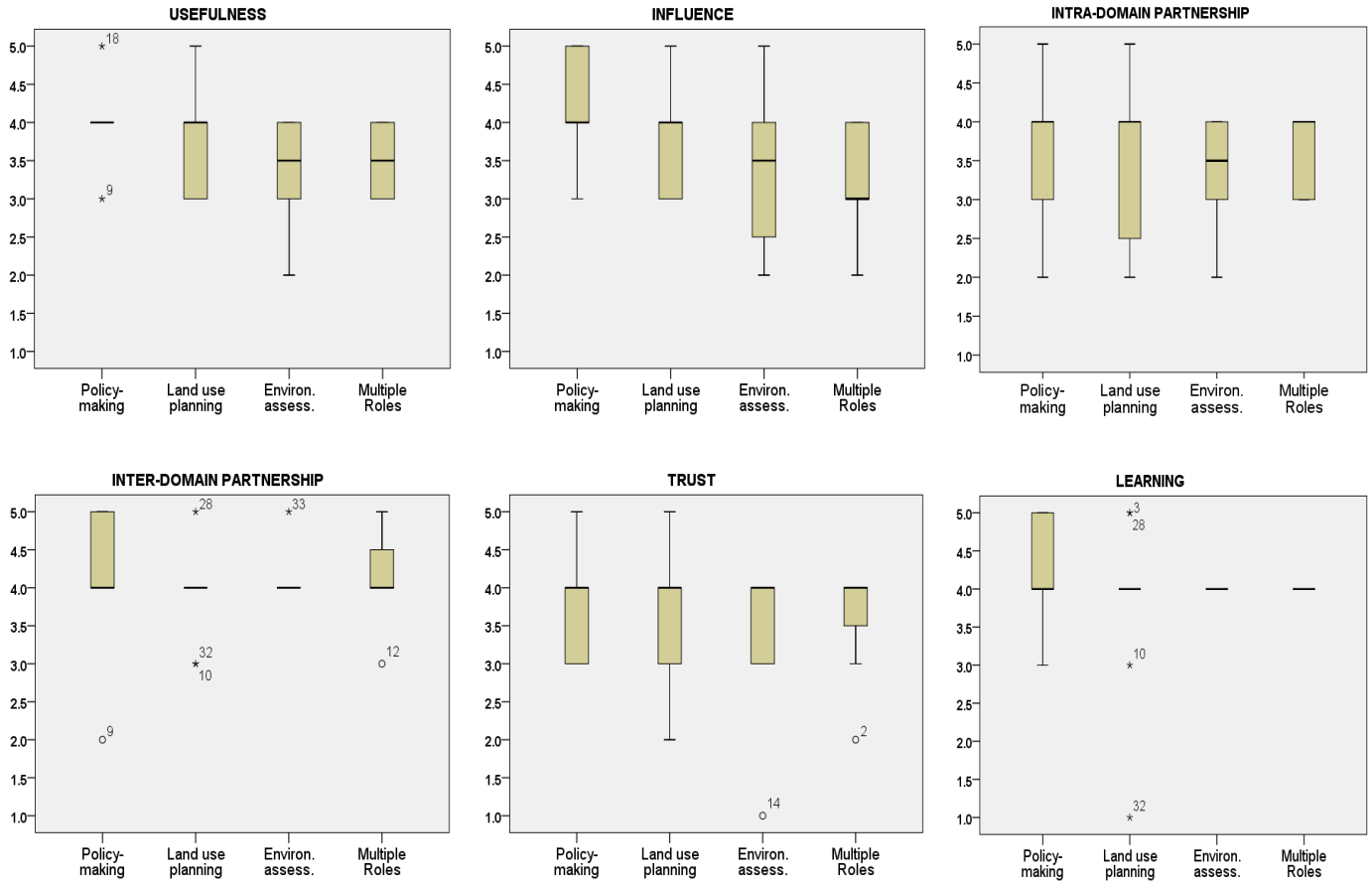

Figure 3.4: Boxplots of perception of *effectiveness of outputs and outcomes* across the four groups of respondents. Note: Each set of boxplots represents the distribution of responses across the domains. The figures on the *y-axis* are based on the results of 5-pont Likert scale responses ranging from 1 to 5 for *strongly disagree* to *strongly agree* respectively. The thick lines at the middle of each plot represent the median values, while * and o represent extreme outliers not included in calculating the median scores.

To examine the possible relationships amongst all 19 elements used to measure perception of cross-domain integration by the respondents, Spearman's rank correlations were examined for all scores across the domains. As shown in Table 3.4, a majority of correlations were found to be positive at both $\alpha \leq 0.01$ and $\alpha \leq 0.05$, the most notable of which is *learning.* At $\alpha \leq 0.01$, learning is positively correlated with clarity (ρ=0.554), linkage (ρ=0.454), spatial relevance (ρ=0.460), and inter-domain partnership (ρ=0.568). Similarly, at α <0.05, learning is positively correlated with capacity (ρ=0.355), trust (ρ=0.384), usefulness (ρ=0.406), and intra-domain partnership (ρ=0.433). These correlations imply that there is tendency for learning to be strongly reported if these enumerated factors are also well ranked. *Clarity* also has positive correlation with seven items, three of which are outcome-based, i.e., intra-domain partnership (ρ=0.475), inter-domain partnership (ρ=0.406), and learning (ρ=0.554). Coordination is the only item that has no significant positive correlation with any other item, although it is slightly negatively correlated with seven items including learning (ρ=-0.299); intra-domain partnership (ρ=-0.290); intra-domain partnership (ρ=-0.280); and spatial extent (ρ=-0.190).

Table 3.4: Spearman's rank correlations amongst the 19 elements used to measure cross-domain integration in regional EA

		Actors' Configuration				Decision-making				Task Performance					Outputs and Outcomes					
		Relevance	Benefit of Participation	Inclusive-ness	Spatial extent	Transparency	Thoroughness	Credibility	Method & Data Input	Clarity	Capacity	Coordination	Linkage	Ownership	Usefulness	Influence	Intra-domain Partnership	Inter-domain Partnership	Trust	Learning
Relationship Among Actors	Relevance	1	.461**	0.08	0.06	0.1	.567**	0.14	0.06	0.23	0.12	0.19	.358*	.415*	-0	0.23	0.07	-0.11	0.21	0.29
	Benefit of Participation		1	0.04	0.19	0.29	0.31	0.27	0.21	0.17	0.29	0.15	0.29	.381*	0.27	0.21	-0.01	0.14	.357*	0.2
	Inclusiveness			1	0.15	0.19	0.01	0.24	.483**	0.2	0.13	0.06	0.05	0.11	0.13	-0.02	-0.26	-0.01	0.08	0.18
	Spatial extent				1	-0.02	0.08	0.07	0.15	.469**	.407*	-0.19	-0.05	-0.1	0.31	0.03	.373*	.709**	0.06	.460**
Quality of Decision Making Process	Transparency					1	0.11	0.18	0.05	0.15	0.26	0.04	0.13	0.18	0.19	0.26	0.09	0.08	.408*	0.1
	Thoroughness						1	0.04	0.14	0.18	0.11	-0.03	.390*	0.2	0.11	0.04	0.07	0.02	0.24	0.05
	Credibility							1	0.21	-0.04	.431**	0.21	0.17	0.15	0.24	0.3	-0.06	0.21	.352*	0.15
	Methods & Data Input								1	0.25	0.21	-0.12	0.08	0.09	0.06	0.16	0.04	0.21	0.13	0.33
Effective Task Allocation & Performance	Clarity									1	.373*	-0.05	.396*	-0.2	.386*	0.26	.475**	.406*	0.11	.554**
	Capacity										1	0.24	0.27	0.03	.539**	.538**	.375*	.468**	.437**	.355*
	Coordination											1	0.09	0.22	0.07	0.14	-0.29	-0.28	0.2	-0.3
	Linkage												1	0.07	.381*	.393*	0.23	0.1	0.28	.454**
	Ownership													1	-0.25	-0.08	-0.2	-0.13	0.2	0.02
Effective Outputs and Outcomes	Usefulness														1	.366*	0.28	.421*	.626**	.406*
	Influence															1	0.32	0.12	0.27	0.26
	Intra-domain Partnership																1	.514**	0.09	.433*
	Inter-domain Partnership																	1	0.28	.568**
	Trust																		1	.384*
	Learning																			1

Notes: *figures shown are the correlation coefficients (R)*
**indicates significance at the .05 level, and*
***indicates significance at the .01 level*

3.4.2 Reported Challenges and Facilitators of Cross-Domain Integration

Data from the qualitative responses suggest that perceptions of cross-domain integration are largely shaped by the perceived relevance and benefit of the regional EA to an agency's mandates (e.g. wildlife management, forestry operations, mining operations, etc.) rather than interest in regional EA itself. An EA consultant explains that in one of the cases: "It's a silo thing—the coordinating agency goes about doing their things, the EA folks, the regulatory folks also doing theirs, and there isn't enough integration of the needs [requirements] of the regulatory process, the operations, funding, decisions that are made by the lead agency." Some do see regional EAs as an opportunity to work with other domains and to be challenged by "working on very broad based assessments" to promote environmental sustainability "from a bigger picture perspective". Despite reporting disparate motivations, most respondents recognize that the success of a regional EA is heavily reliant on perceived benefits immediately or eventually accruing to the participating agencies. This is evident in perceptions about the outcomes of regional EA, especially related to intra- and inter-domain partnerships. For example, respondents across the domains including those with multiple roles said things like "the program helped us have confidence in our level of environmental protection"; and "meeting people outside my normal scope of interaction was valuable." Some of these social outcomes seem, however, appear to be more personal than institutional in nature, e.g. "we have strengthened personal connections more than we have strengthened partnerships."

Interestingly, a few actors reported that rather than regional EA serving as a social connection asset—personal, institutional, or otherwise—it has further confined them to their existing silo. For example, respondents (particularly those with land use planning roles) said "I was unable to create new networks outside of my group"; and "I would say it's more often the other way around and I kept seeing 'pet consultants' who just did the same thing over and over again with no expansion of expertise or experience." Yet the diversity of ways in which individual domain actors perceive the social outcome of regional EAs does not attempt to undermine the amount of learning that occurs during the process. In a number of ways, there is evidence regional EA engenders both social and technical learning.

Social learning is the most common type of learning facilitated by regional EA, according to study participants. For instance, respondents reported improvements in "working relationships," "good communication", a better understanding of "local community interests" and "other stakeholders' sets of needs and values", etc., via regional EA. Technical learning via regional EA was also reported, particularly with respect to developing a better understanding of the "complexities associated with overlapping areas of regional environmental impacts and the associated problems", as stated by a respondent with a policy-making role.

In addition to corroborating some of the findings from the quantitative rating of elements used to measure cross-domain integration, the qualitative data also reveal specific factors that can inhibit integration of the three domains in regional EAs, many of which are related to the decision-making component of the process. At least 12 respondents identify capacity and funding as two leading inhibitors (Figure 3.5) to cross-domain integration. The inhibiting challenge of data accessibility/compatibility and competing agency priorities were also mentioned by 10 (mostly those with multiple roles) and seven respondents spread across all the domains respectively. Figure 3.5 indicates that those with multiple roles are more concerned about funding and data issues, while those with EA roles indicate capacity and clarity of goals as the main challenges to effective cross-domain integration in regional EA. Only respondents from the land use planning domain identify mistrust between agencies as a challenge (n=3). Issues of leadership and communication were also flagged by respondents from policy-making and land use planning domains.

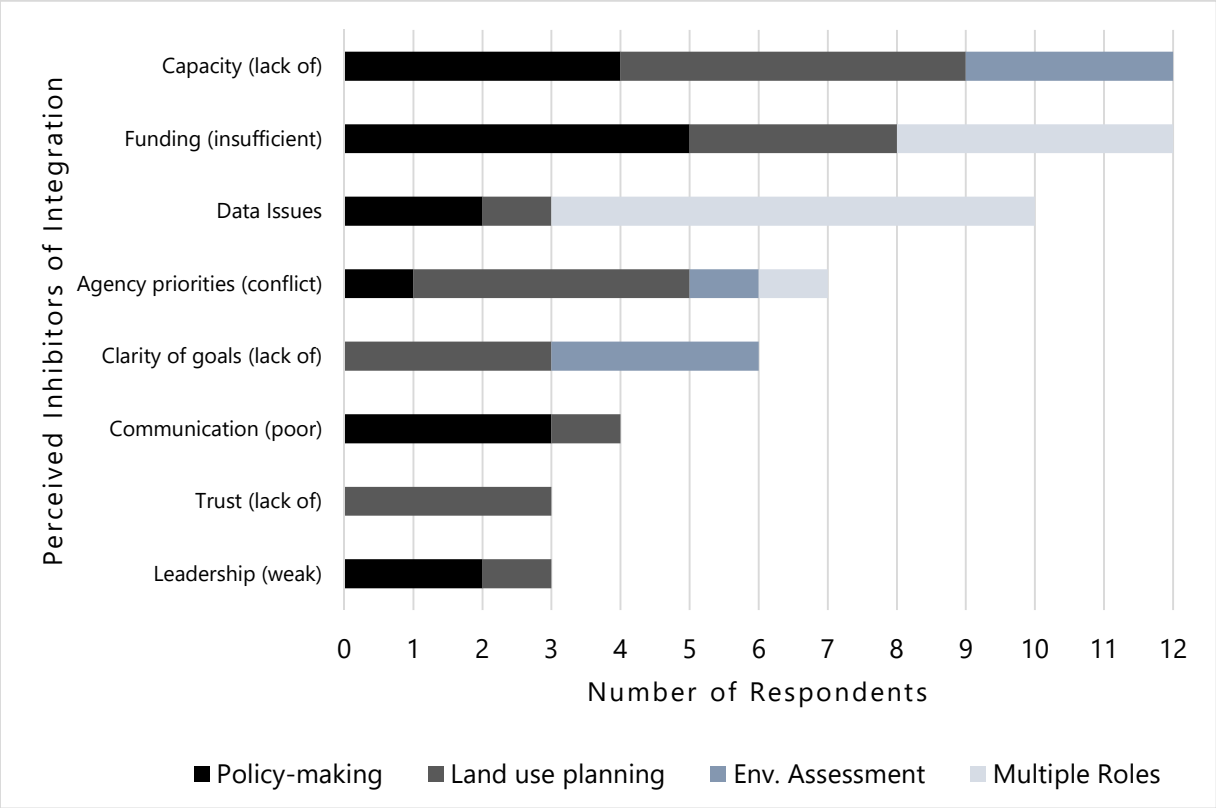

Figure 3.5: Perceived Inhibitors of cross-domain integration in regional EA

Many of the challenges identified in Figure 3.5 are implicitly related. When speaking of capacity challenges, for instance, there were many instances participants asserted that some regional EAs suffered setbacks due to constant staff turnover and/or lack of dedicated staff. As remarked by a policy-maker from one of the regional government institutions: "while everyone acknowledges regional EAs as valuable to regional sustainable development, it is often not the number one priority of any agency, some of which are short-staffed". In other instances, respondents reported the absence of coordination and a clear line of responsibility across collaborating domains, which creates "overlap and gaps" and often results in friction and lack of certainty over who does what. Unfortunately, many agencies involved in the process "over-commit but under-deliver" on their potential contributions. Regarding the challenge of data procurement and sharing, a respondent who self-identified as having multiple roles stated: "Some institutions

choose to 'silo' themselves because they are worried that the data they share may be used in a manner that doesn't help their cause (i.e. is counter to their policy direction or goals)". This kind of situation clearly limits communication and sharing of information and knowledge.

Similarly, among those who identify leadership as a challenge, there is a measure of dissatisfaction with how politics often take the centre stage in decisions about who leads a regional EA. For instance, a land use planner specifically remarked about how obligations are "shunted over to a public board or institution in an attempt at transparency when in fact the body given the responsibility does not have the skill set or authority needed" to effectively handle the task. As stated by another land use planner with over twenty years work experience, the greatest concern involves the "danger of useless work leading nowhere, shelf warmers with nice fonts and pretty pictures." Furthermore, lack of incentives for institutional actors who get involved in regional EAs limits opportunities for effective cross-domain integration, and particularly their sense of ownership. This is aptly summarized by one of the respondents with policy-making role: "in a work environment where people are evaluated based on 'measurable outcomes', there is less tendency to collaborate with others who need assistance, focusing rather on one's own work" and concludes that "this naturally leads to less communication, and a greater silo effect". Respondents were also asked to indicate how regional EAs could facilitate or promote cross-domain integration. A summary of responses to this question is shown in Figure 3.6.

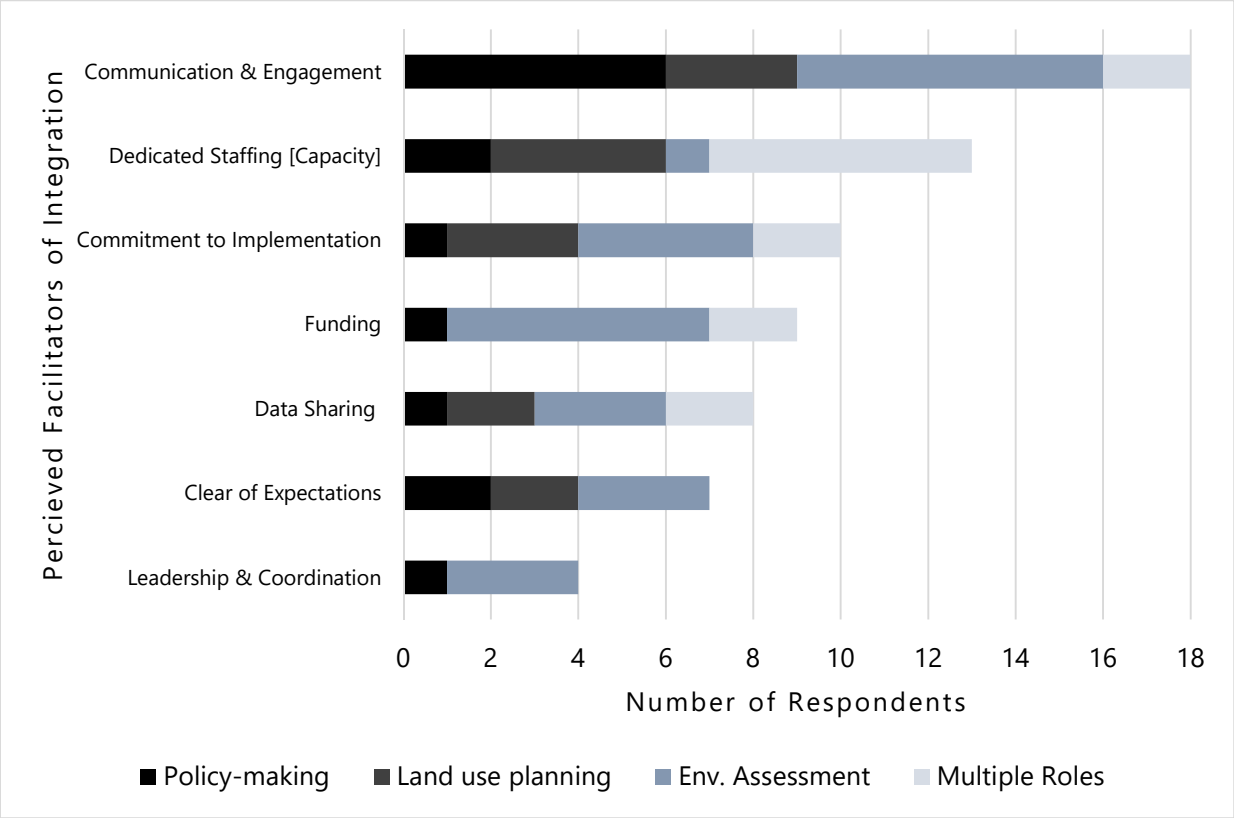

Figure 3.6: Perceived facilitators of cross-domain integration in regional EA

Facilitating factors reported by all four groups of actors included: communication and engagement (n=18); capacity enhancement through dedicated staffing (n=13); commitment to implementation (n=10); and explicit arrangements for data sharing (n=8). All study participants except those with land use planning roles saw the need for sufficient funding (n=9) as important. Despite that only seven respondents explicitly indicated the need for clarity of expectations about what the regional EA process is meant to deliver, the need for clarity on other issues was underscored. For examples, study participants mentioned the need for enhanced clarity about regional environmental gaps; mutual goals; benefits of the EA process; decision-making guidelines; good practice applications and examples; approaches to managing intellectual property; data requirements and use in regional EA; and triggers for an action plan following from the regional EA. Four respondents from the policy-making and EA domains also suggest the need for clear leadership and coordination.

3.5 Discussion: Reconciling Disparate Perceptions for Meaningful Cross-Domain Integration in Regional EAs

Overall, the attributes of cross-domain integration are not uniformly perceived among actors from different domains in our sample. Aggregate results show that the background, roles, and perceptions of individuals are central in enabling effective cross-domain integration in regional EAs, particularly as there are variations in the responses provided by respondents across the domains. However, it was not possible to separate individual perceptions of the effectiveness of integration efforts from the nature of institution to which they belong as many of the respondents are probably very influenced by institutional mandates. Framing these challenges is a key objective of this study as such insight is a prerequisite to advancing regional EA effectiveness discourse. Reflecting on the aggregate data, three kinds of silo effects are apparent in regional EAs: institutional—related to the lack of a coordinated, holistic approach; disciplinary—related to limited communication and data sharing; and transactional—lack of incentives for either the individuals involved or the institution as a whole to pursue the goal of cross-domain integration in regional EAs. Relatedly, we discuss two additional insights about the importance of learning and multiple domain expertise as opportunities for bridging silo effects and enhancing cross-domain integration in regional EA practice.

3.5.1 Characterizing silo effects

3.5.1.1 Institutional Silo

Characterized by broad issues relating to the nature and structure of the individual institutions that belong to a particular domain, as well as the institutional culture that characterizes a domain and relationships among the various actors. This involves a (partially unwritten) set of shared social, political, and legal statements, principles, and values that established the basis for collaboration with other institutions (Folkeson et al. 2013; Bragagnolo and Geneletti 2014). Taking into account both quantitative and qualitative data, there is a striking issue with coordination among the three domains involved in regional EA, suggesting that an institutional silo effect commonly exists in regional EA. Although the box plots for coordination (Figure 3.3) show the same trend of low

ratings across the domains, meaning that each of the domains believes coordination among the domains is lacking in regional EA, there are no significant correlations among coordination and any of the other 18 elements measured. The reason for this is not clear. However, it could be deduced from the qualitative data that lack of clarity (particularly about goals and expectations), limited capacity, politicization of leadership, and to a certain extent, insufficient funding may be contributing factors to the low coordination ratings. This assumption is supported by existing studies. For instance, previous studies advocate clear communication among actors (e.g. Keith and Ouattar 2004) and early agreement on a lead agency (e.g. Elling 2000; Elvin and Fraser 2012) as the foundation for functional coordination and leadership. These elements suffer in regional EAs according to our survey results, particularly due to constant staff turnover and/or lack of dedicated staff to such assessments. Clearly, over the course of a regional EA there would be individuals who were involved in initiating the regional EA and would consider the benefits of the assessment to be valuable to their respective institutions. However, constant turnover of staff may limit the institutional memory required to sustain cross-domain integration in the process. This issue was also observed by Gunn and Noble (2011) and found to impede regional EA practice. In addition, the noted tendency to "over-commit but under-deliver" in regional EA may also be explained by weak scores for coordination. Effective coordination among the domains is evidently a key factor in the transition towards more effective regional EA, and sustainable development via regional EA. However, it may be just as important to explicitly consider how improved coordination can help support decision-making and produce the desired outputs and outcomes of regional EAs for the institutions involved.

3.5.1.2 Disciplinary Silo

Based on the survey results, it appears respondents with EA roles are more aware of the benefits of cross-domain integration in regional EAs as they more likely to report better perception of measuring indicators. For example, EA actors reported relatively higher median scores in the survey: a minimum of 3.5 for all items, except for coordination, which might be linked with institutional silo effects described above. It appears that EA actors also do not seem to perceive a significant silo effect among the disciplines of EA, planning, and policy-making, judging by their

ranking of clarity, ownership, usefulness of products, and influence on environmental, social or economic conditions in the region, including influence on EA institution's operations, plans, and policies. Interestingly, by way of contrast, past studies have emphasized that there is, in fact, a disconnection among EA and the domains of planning and policy-making (e.g. Nitz and Brown 2001; Monteiro and Partidario 2012; Kristensen et al. 2013). The presumed divide among the domains has not been subject to empirical investigation before now; but our findings do include evidence to support this assertion based on the perspective of non-EA actors. Going by the median scores reported, non-EA actors seem to feel there is a disciplinary silo effect at play. For instance, actors with policy-making and land use planning rate factors such as clarity and ownership comparatively lower than those with an EA role, and explicitly indicated in the qualitative survey a concern over the degree of commitment required of them. The disparity in viewpoints among EA and non-EA actors about whether or not a disciplinary silo effect exists might also explain the lack of agreement on the issues of thoroughness, credibility, and methods and data inputs (see Figure 3.3) which are also rated comparatively low by policy-making and land use planning domains. While these differences in perception seem insignificant from a statistical point of view, a closer look at figures 3.5 and 3.6 reveals that non-EA actors have the tendency to identify inhibitors of integration than EA actors, while EA actors tend to focus more on facilitators of integration—which might imply some disparity in perception of key issues undermining integration. These disparities highlight the difficulty in managing the regional EA process and implementation in a manner such that it would be broadly, and similarly viewed as fair, effective, and meaningful by each of the individual disciplines. As long as regional EA is perceived as primarily an EA issue area, it may be difficult to fully engage the other necessary domains, and maximize sustainable development outcomes for regions. Our findings suggest the need for a holistic shift to a co-created, interactive and iterative process in which each discipline perceives regional EA to be "fair, open, inclusive, accountable, or otherwise legitimate" (Innes and Booher 1999: 415) and equally engaging and beneficial to all domains.

3.5.1.3 Transactional Silo

Our results strongly suggest that effective cross-domain integration is very much dependent on the extent to which the regional EA is meaningful and beneficial to individual institutions, as perceived by the various actors, i.e. we observe that perceived institutional transactional benefits are very important. The issue of benefits accruing to institutions has been flagged as a major issue by many authors previously in the EA literature (e.g. Nitz and Brown 2001; Gunn and Noble 2009) and is also widely recognized by our study participants, especially based on the qualitative data. Regarding perceptions of regional EA outcomes/outputs by individuals—while for some actors, it is about expanding their personal networks or strengthening personal connections, there are a few who focus on how regional EA can facilitate more concrete environmental improvements such as landscape-wide management, and strengthening institutional capacity to support such assessments. However, our study suggests there is a lack of incentives for sustained cross-domain integration for individual actors as well as institutions. This is identified as a major challenge because, as a multi-institutional assessment without a dominant leader or custodian, the inputs of actors and individual institution into a regional EA are often not part of their "measurable outcomes" or key performance indicators.

3.5.2 Importance of Fostering Learning and Multiple Domain Expertise

3.5.2.1 Learning As A Key Outcome

It was found that the median scores calculated for learning and the types of learning reported by respondents are consistent across all domains, which suggests that despite the challenges associated with silo effects, regional EA offers a means for actors to advance their knowledge of both social and technical factors influencing the region of study. Many scholars emphasize the importance of EA as a conduit to learning (e.g. Cashmore et al. 2008; Sinclair et al. 2008; Jha-Thakur et al. 2009; Morrison-Saunders et al. 2015), and learning typologies are well described in the EA literature (see for e.g. Sinclair et al. 2008; Fischer et al. 2009; Che et al. 2011). Our results confirm these previous works about the potentials of EA to facilitate social and organizational learning but, in addition, reveal that learning correlates with perception of trust, intra-domain

partnership, and inter-domain partnership—which are used to evaluate the outcome/output component of a regional EA. Together, these findings imply that the intangible outcomes of a regional EA are just as important, and often more readily evident than some of the more tangible outcomes which can be quite limited by the various silo effects that have been characterized.

Furthermore, the findings clearly support previous studies that indicate social learning as the most common type of learning in many multi-institutional assessments (e.g. Sinclair et al. 2008; Jha-Thakur et al. 2009). This has also been observed in the planning and policy-making literature (e.g. Hall 1993; Bourgoin et al. 2012). This type of learning provides opportunities to out-scale (i.e. replicate elsewhere) or up-scale (improve current processes) lessons learned from a particular regional EA in order to facilitate cross-domain integration elsewhere. Although it is important to recognize the importance of various types of social learning as a key outcome of regional EAs, it is argued here that social learning is not sufficient to conclude outcome effectiveness has been achieved in regional EA, especially from the perspective of cross-domain integration. We found from the qualitative survey responses that social learning has little influence on institutions, especially where there is no transformative learning—i.e. "profound changes" in the institutional and/or socio-political dimensions of the actors involved (Sinclair et al. 2008). These kinds of profound changes are highly dependent on the strength of actors' involvement and perception of ownership (Bourgoin et al. 2012) and the existence of a leadership hub for facilitation (Mostert et al. 2007), which are two elements that are perceived disparately in our data. Nevertheless, learning has emerged as an important measurement of effective cross-domain integration in regional EA; and for that reason, more research should elicit its role in bridging the different silo effects identified in the study.

3.5.2.2 Multiple Domain Expertise

With respect to all evaluative criteria (except for coordination which was generally lowly rated, and usefulness and practical influence on day to day activity of institutions which are ranked 3.5 and 3.0 respectively) median scores reported by those with multiple roles are at least 4.0, an average better than those with clear disciplinary role. These findings have implications at two levels: personal and institutional. One, it is unclear whether a participant who self-identified as

having multiple roles simply has years of experience working with other domain actors (personal) or whether these participants actually serve multiple roles and domains as a part of their job requirements (institutional). Two, does having multiple roles confer any special capacity for an individual's normative expectations to evolve and in consequence, influence how cross-domain integration is perceived? These phenomena can better be understood through further investigation, which is outside the scope of this study; however, it has been observed in previous studies (e.g. Kato and Ahern 2008) that actors with multiple domain expertise are likely to be more engaged, communicate better, and demonstrate better commitment to implementation, which is perhaps why this category of regional EA actors rank many of the evaluative elements very high. We consider this multiple domain expertise as valuable for effective cross-domain integration and may help reduce the extent of silo effects, especially those related to disciplinary and institutional silos.

3.6 Conclusion: Toward Improved Domain Integration and Reduction of the Silo Effect

Regional EA has been described as a platform for collaborative relationships among institutions and it is recognized that some degree of interdependence and cooperation is necessary among the domains of EA, planning, and policy-making (Fischer et al. 2009; Kørnøv and Thissen 2000) for it to be effective. This paper has identified the key challenges to cross-domain integration in regional EAs from a variety of dimensions (relationships among actors; quality of the decision-making process; effective task allocation and performance; and measurable outputs and outcomes). An evaluative framework has been developed to explore perceptions of these key dimensions from the perspective of actors directly involved in four cases of regional EA. A limitation of the study is that respondents are drawn largely from cases in western Canada (though with divergent resource and socio-political contexts). As such, our findings may or may not be consistent with cases and socio-political contexts elsewhere in North America and internationally. In addition, our sample size may not have been large enough to detect strong statistical relationship or establish causal relationships among the evaluative factors and across the domains in quantitative sense.

Our findings, however, prompt the need to pay closer attention to silo effects in regional EA, and whether they interfere with achieving desired outputs and outcomes, and regional sustainable development objectives. Based on our analysis, three types of silo effects that

undermine effective cross-domain integration in regional EA have been identified: (1) institutional silo effect—i.e., lack of a coordinated, holistic approach to regional EAs, which is intricately linked to the problems of lack of leadership, lack of funding, lack of clarity of goals and expectations, as well as lack of capacity via dedicated staffing; (2) disciplinary silo effect—i.e., limited communication within and especially across domains, and skepticism around data sharing, confounded by limited sense of ownership; and (3) transactional silo effect—i.e., the tendency of actors to view the value of, and reason for participating in, regional EA from a narrow perspective (meaning that it contributes directly to personal or institutional goals), rather from the bigger picture perspective of collective social and environmental outcomes. Despite the challenges embedded in these silo effects, our results confirm that regional EAs can make a long lasting contribution to cross-domain integration by offering a unique platform to coordinate disparate institutional, disciplinary, and transactional imperatives and mandates toward sustainable regional development.

This study contributes to existing knowledge in two important ways that have implications for regional EA practice and research both at the levels of individuals and institutions. First, our study provides new insight into the nature and characteristics of silo effects in regional EA based on a new set of evaluative criteria designed and tested across different domains and case study experiences. Second, while it affirms the existence and importance of the dimensions of learning in EA, it also suggests that learning—particularly social learning—cannot be considered in isolation of other social capital indices such as trust, intra-domain, and inter-domain partnerships. The latter enriches EA literature by specifying how to facilitate more effective regional EA outcomes in a multi-institutional context.

In conclusion, this study shows that effective regional EA will require explicit recognition of the various dimensions of silo effects: attention to developing mutual agreement of goals and objectives among participating domains; emphasis on fostering multi-domain communication and expertise; and identification of a leader among the domains. We suggest these issues should be further examined through an environmental governance lens, which entails the process through which actors—both state and non-state—influence environmental actions and outcomes through environment-related incentives, knowledge, institutions, decision making, and behaviors ((Lemos and Agrawal 2006; Ali-Khan and Mulvihill 2008). In principle, environmental governance

concepts explicitly recognize divergent institutional contexts and the need to bridge transactional and disciplinary contexts and imperatives (Folke et al. 2005; Ali-Khan and Mulvihill 2008; Arts et al. 2012). Ultimately, this study shows that the development of mechanisms to proactively address silo effects and improve cross-domain integration is necessary for improved regional EA outcomes, and to help justify the huge amount of intellectual and financial resources committed to such processes. We suggest, however, that until regional EA is conceived and undertaken as a co-created, mutually beneficial, and deeply collaborative environmental governance process, silo effects will continue to undermine its success.

3.7 References

Adelle, C. and Weiland, S. (2012). Policy assessment: The state of the art. Impact Assessment and Project Appraisal. 30:25-33.

Ali-Khan, F. and Mulvihill, P. (2008) Exploring collaborative environmental governance: perspectives on bridging and actor agency. Geography Compass, 2(6), 1974–1994.

Arts, J., Runhaar, H., Fischer T., Jha-Thakur, U., Laerhoven, F., Driessen, P., and Onyango, V. (2012). The effectiveness of EIA as an instrument for environmental governance: Reflecting on 25 years of EIA practice in the Netherlands and the UK. Journal of Environmental Assessment Policy and Management, 14(3), DOI: 10.1142/S1464333212500251.

Axelsson, A., Annandale, D., Cashmore, M., Slunge, D., Ekbom, A., Loayza, F., et al. (2012). Policy SEA: Lessons from development co-operation. Impact Assessment and Project Appraisal, 30(2), 124-129.

Bartlett, R. and Kurian, P. (1999). The theory of environmental impact assessment: Implicit models of policy making. Policy and Politics, 27(4), 415-433.

Bogenschneider K, Corbett T. 2010. *Evidence-based Policy-making*. New York: Routledge.

Bond, A., Pope, J., Morrison-Saunders, A., and Retief, F. (2016). A game theory perspective on environmental assessment: What games are played and what does this tell us about decision making rationality and legitimacy? Environmental Impact Assessment Review, 57, 187–194.

Bourgoin, J., Castella, J., Pullar, D., Lestrelinb, G. and B. Bouahomd (2012). Toward a land zoning negotiation support platform: "Tips and tricks" for participatory land use planning in Laos. Landscape and Urban Planning, 104:270–278.

Bragagnolo, C., and Geneletti, D. (2014). Dealing with land use decisions in uncertain contexts: A method to support strategic environmental assessment of spatial plans. Journal of Environmental Planning and Management, 57(1), 50-77.

Bryan, T. (2004). Tragedy averted: The promise of collaboration. Society & Natural Resources, 17, 881-896.

Button, K., Ioannidis, J., Mokrysz, C., Nosek, B., Flint, J., Robinson, E., and Munafò, M., (2013). Power failure: why small sample size undermines the reliability of neuroscience. *Nature Reviews Neuroscience*, 14(5), 365-376.

Canter, L. and Ross, B. (2010). State of practice of cumulative effects assessment and management: the good, the bad and the ugly. Impact Assessment and Project Appraisal, 28, 261-268.

Carmichael, L., Barton, H., Gray, S., Lease, H., and Pilkington, P. (2012). Integration of health into urban spatial planning through impact assessment: Identifying governance and policy barriers and facilitators. Environmental Impact Assessment Review, 32(1), 187-194.

Cashmore, M. (2004). The role of science in environmental impact assessment: Process and procedure versus purpose in the development of theory. Environmental Impact Assessment Review, 24(4), 403-426.

Cashmore, M., Bond, A., and Cobb, D. (2008). The role and functioning of environmental assessment: Theoretical reflections upon an empirical investigation of causation. Journal of Environmental Management, 88: 1233–1248.

Che, X., English, A., Lu, J., and Chen, Y. D. (2011). Improving the effectiveness of planning EIA (PEIA) in china: Integrating planning and assessment during the preparation of Shenzhen's master urban plan. Environmental Impact Assessment Review, 31(6), 561-571.

Chilima, J., Gunn, J., Noble, B., and Patrick, R. (2013). Institutional considerations in watershed cumulative effects assessment and management. Impact Assessment and Project Appraisal, 31(1), 74-84.

Clark, S. (2008). Ensuring Greater Yellowstone's Future: Choices for Leaders and Citizens. New Haven, CT: Yale University Press.

Cobanoglu, C., Warde, B., and Moreo, P. (2001). A comparison of mail, fax, and Web-based survey methods. International Journal of Marketing Research, 43(4), 441–442.

Cooper, L. and Sheate, W. (2004). Integrating cumulative effects assessment into UK strategic planning: implications of the European Union SEA Directive. Impact Assessment and Project Appraisal, 22(1), 5-16.

Creswell, J. (2009). Research Design: Qualitative, Quantitative and Mixed Methods Approaches (3rd ed.), Sage Publications: Thousand Oaks.

De Smedt, P. (2010). The use of impact assessment tools to support sustainable policy objectives in Europe. Ecology and Society, 15(4), http://www.ecologyandsociety.org/vol15/iss4/art30/

Dubé, M. (2003). Cumulative effects assessment in Canada: a regional framework for aquatic ecosystems. Environmental Impact Assessment Review, 23(6), 723-745.

Dubé, M., Duinker, P., Greig, L., Carver, M., Servos, M., McMaster, M., Noble, B., Schreier, H., Jackson, L., and Munkittrick, K. (2013). A framework for assessing cumulative effects in watersheds: an introduction to Canadian case studies. Integrated Environmental Assessment and Management, 9(3), 363-369.

Duinker, P., Burbidge, E., Boardley, S., and Greig, L. (2013). Scientific dimensions of cumulative effects assessment: Toward improvements in guidance for practice. Environmental Reviews, 21(1), 40-52.

Duncan, R. (2013). Opening new institutional spaces for grappling with uncertainty: a constructivist perspective. Environment Impact Assessment Review, 38, 151–154.

Elling, B. (2000). Integration of strategic environmental assessment into regional spatial planning. Impact Assessment and Project Appraisal, 18(3), 233-243.

Elvin, S. and Fraser, G. (2012). Advancing a national strategic environmental assessment for the Canadian offshore oil and gas industry with special emphasis on cumulative effects. Journal of Environmental Assessment Policy and Management, 14(3), DOI: 10.1142/S1464333212500159.

Fischer, T. (2006). Strategic environmental assessment and transport planning: towards a generic framework for evaluating practice and developing guidance. Impact Assessment and Project Appraisal, 24(3), 183-197.

Fischer, T., Kidd, S., Jha-Thakur, U., Gazzola, P., and Peel, D. (2009). Learning through EC directive based SEA in spatial planning? Evidence from the Brunswick region in Germany. Environmental Impact Assessment Review, 29(6), 421-428.

Fleming, C. and Bowden, M. (2009). Web-based surveys as an alternative to traditional mail methods. Journal of Environmental Management, 90(1), 284–292.

Folke, C., Hahn, T., Olsson, P., and Norberg, J. (2005). Adaptive governance of social-ecological systems. Annual Review of Environmental Resources, 30: 441–73.

Folkeson, L., Antonson, H., and Helldin, J. (2013). Planners' views on cumulative effects. A focus-group study concerning transport infrastructure planning in Sweden. Land Use Policy, 30: 243-253.

Francis, G. (2003). Governance for Conservation. In: F. Westley and P Miller (eds.) *Experiments in Consilience: Integrating Social and Scientific Responses to Save Endangered Species*. Pp. 223-243, Washington: Island Press.

Franks D, Brereton D, Moran C. (2010). Managing the cumulative impacts of coal mining on regional communities and environments in Australia. Impact Assessment Project Appraisal, 28, 299-312.

Fulton, J. and Paton, E. (2016). The systems model of creativity. In: McIntyre P. et al. (eds.): *The Creative System in Action: Understanding Cultural Production and Practice*, pp. 27-45, New York: Palgrave Macmillan.

Geneletti, D., Bagli, S., Napolitano, P., and Pistocchi, A. (2007). Spatial decision support for strategic environmental assessment of land use plans. A case study in southern Italy. Environmental Impact Assessment Review, 27(5), 408-423.

Grumbine, R. (1994). What is ecosystem management? Conservation Biology, 8:27-38.

Gunn, J. and Noble, B. (2009). Integrating Cumulative Effects in Regional Strategic Environmental Assessment Frameworks: Lessons from Practice. Journal of Environmental Assessment Policy and Management, 11(3), 267-290.

Gunn, J. and Noble, B. (2011). Conceptual and methodological challenges to integrating SEA and cumulative effects assessment. Environmental Impact Assessment Review, 31, 154-160.

Gunn, J. and Noble, B. (2015). Sustainability considerations in regional environmental assessment. In: A Morrison-Saunders, J Pope, A Bond (eds.) *Sustainability Assessment Handbook*, pp. 79-102, Northampton, MA: Edward Elgar.

Haas, P. (1992). Introduction: epistemic communities and international policy coordination. International Organization, 46(1), 1-35.

Hall, P. (1993). Policy paradigms, social learning and the state: the case of economic policymaking in Britain. Comparative Politics 25:275-296.

Harriman, J. and Noble, B. (2008). Characterizing project and strategic approaches to regional cumulative effects assessment in Canada. Journal of Environmental Assessment Policy and Management, 10(1), 25-50.

Hildén, M., Furman, E, and Kaljonen M. (2004). Views on planning and expectations of SEA: The case of transport planning. Environmental Impact Assessment Review, 24, 519-536.

Innes, J. and Booher D. (1999). Consensus building and complex adaptive systems: A framework for evaluating collaborative planning. Journal of American Planning Association, 65, 412-423.

Jackson, T., and Illsley, B. (2006). Strategic environmental assessment as a tool of environmental governance: Scotland's extension of the European union SEA directive. Journal of Environmental Planning and Management, 49(3), 361-383.

Jha-Thakur, U., Gazzola, P., Peel, D., Fischer, T. and S. Kidd (2009). Effectiveness of strategic environmental assessment - the significance of learning. Impact Assessment and Project Appraisal, 27(2),133-144.

Johnson, R., Onwuegbuzie, A., and Turner, L. (2007). Toward a definition of mixed methods research. Journal of Mixed Methods Research, 1(2), 112-133.

Kato, S. and Ahern, J. (2008). 'Learning by doing': adaptive planning as a strategy to address uncertainty in planning. Journal of Environmental Planning and Management, 51(4), 543-559.

Keith, J. E., and Ouattar, S. (2004). Strategic planning, impact assessment, and technical aid: The Souss-Massa integrated water management project. Journal of Environmental Assessment Policy and Management, 6(2), 245-259.

Kørnøv, L., and Thissen, W. (2000). Rationality in decision- and policy-making: Implications for strategic environmental assessment. Impact Assessment and Project Appraisal, 18(3), 191-200.

Kristensen, S., Noble, B., and Patrick R (2013). Capacity for watershed cumulative effects assessment and management: lessons from the Lower Fraser River Basin, Canada. Environmental Management, 51(5), 360–373.

Larson, M. G. (2008). Analysis of variance. Circulation, 117(1), 115-121.

Lemos, M. and Agrawal, A. (2006). Environmental governance. Annual Review of Environment and Resources, 31: 297-325.

Madge, C. and O'Connor, H. (2005). Exploring the Internet as a medium for research: web-based questionnaires and online synchronous interviews. ESRC Research Methods Programme Working Paper No 9. The University of Manchester, pp. 14.

Mandarano, L. (2008). Evaluating collaborative environmental planning outputs and outcomes: Restoring and protecting habitat and the New York New Jersey Harbor Estuary Program. Journal of Planning Education and Research, 27, 456-468.

Margerum, R. (1997). Integrated approaches to environmental planning and management. Journal of Planning Literature, 11(4), 459-475.

Marshall, R., and Fischer, T. B. (2006). Regional electricity transmission planning and SEA: The case of the electricity company ScottishPower. Journal of Environmental Planning and Management, 49(2), 279-299.

Mesa-Frias, M., Chalabi, Z., Vanni, T., and Foss, A. (2013). Uncertainty in environmental health impact assessment: quantitative methods and perspectives. International Journal of Environmental Health Research, 23, 16–30.

Mitchell, B. (2005). Integrated water resource management, institutional arrangements, and land-use planning. Environment and Planning A, 37:1335-1352.

Monteiro, M. and Partidario, M. (2012). Perceptions on SEA: not all that glitters is gold. Paper presented at the 32nd Annual Conference of the International Association for Impact Assessment, Porto, May 27 –June1.

Morrison-Saunders, A., Bond, B., Pope, J., and Retief, F. (2015). Demonstrating the benefits of impact assessment for proponents. Impact Assessment and Project Appraisal, 33, 108-115.

Mostert, E., C. Pahl-Wostl, Y. Rees, B. Searle, D. Tàbara, and J. Tippett. (2007). Social learning in European river-basin management: barriers and fostering mechanisms from 10 river

basins. Ecology and Society 12(1), 19. [online] URL: http://www.ecologyandsociety.org/vol12/iss1/art19/

Nitz, T. and Brown A. (2001). SEA must learn how Policy Making Works. Journal of Environmental Assessment Policy and Management, 3(3), 329-342.

Noble, B. (2008). Strategic approaches to regional cumulative effects assessment: a case study of the Great Sand Hills, Canada. Impact Assessment and Project Appraisal, 26(2), 78–90.

Noble, B. and J. Harriman (2008a). A Federal Government Approach to Regional Environmental Assessment in Canada. Research report prepared for Fisheries and Oceans Canada under contract agreement. Department of Fisheries and Oceans Canada: Ottawa, ON.

Noble, B. and J. Harriman (2008b). Regional Strategic Environmental Assessment in Canada: Principles and Guidance. Research report prepared for the Canadian Council of Ministers of Environment Environmental Assessment Task Group. CCME: Ottawa, ON.

Olagunju, A. and Gunn, J. (2015). Integration of environmental assessment with planning and policy-making on a regional scale: a literature review. Under review.

Owen, J. and Rogers, P. (1999). Program Evaluation: Forms and Approaches (2nd ed.). St. Leonards, NSW: Allen & Unwin.

Parkins, J. (2011). Deliberative democracy, institution building, and the pragmatics of cumulative effects assessment. Ecology and Society 16(3), 20. http://dx.doi.org/10.5751/ES-04236-160320

Podhora, A., Helming, K., Adenäuer, L., Heckelei, T., Kautto, P., Reidsma, P., et al. (2013). The policy-relevancy of impact assessment tools: Evaluating nine years of European research funding. Environmental Science and Policy, 31, 85-95.

Quinn, M., Greenaway, G., Duke, D., and Lee, T. (2004). *A Collaborative Approach to Assessing Regional Cumulative Effects in the Transboundary Crown of the Continent*. Research supported by the Canadian Environmental Assessment Agency's Research and Development Program. Ottawa, ON: Canadian Environmental Assessment Agency.

Rega, C., and Bonifazi, A. (2013). Strategic environmental assessment and spatial planning in Italy: Sustainability, integration and democracy. Journal of Environmental Planning and Management,

Seitz, N., Westbrook, C., and Noble, B. (2011). Bringing science into river systems cumulative effects assessment practice. Environmental Impact Assessment Review. 31:172–179.

Sinclair, J., Diduck, A. and P. Fitzpatrick (2008). Conceptualizing learning for sustainability through environmental assessment: critical reflections on 15 years of research. Environmental Impact Assessment Review 28: 415–428.

Song, G., Zhou, L., & Zhang, L. (2011). Institutional design for strategic environmental assessment on urban economic and social development planning in China. Environmental Impact Assessment Review, 31(6), 582-586.

Stead, D. and Meijers, E. (2009). Spatial planning and policy integration: concepts, facilitators and inhibitors. Planning Theory and Practice, 10(3), 317–332.

Stoeglehner, G. (2010). Enhancing SEA effectiveness: Lessons learnt from Austrian experiences in spatial planning. Impact Assessment and Project Appraisal, 28, 217-231.

Stoeglehner, G., and Wegerer, G. (2006). The SEA-directive and the SEA-protocol adopted to spatial planning-similarities and differences. Environmental Impact Assessment Review, 26(6), 586-599.

Stoeglehner, G., Brown, A., and Kørnøv, L. (2009). SEA and planning: 'Ownership' of strategic environmental assessment by the planners is the key to its effectiveness. Impact Assessment and Project Appraisal, 27(2), 111-120.

Tang, Z. (2008). Integrating the principles of strategic environmental assessment into local comprehensive land use planning. Journal of Environmental Assessment Policy and Management, 10(2), 143-171.

Turnpenny, J., Nilsson, M., Russel, D., Jordan, A., Hertin, J., and Nykvist, B. (2008). Why is integrating policy assessment so hard? A comparative analysis of the institutional capacities and constraints. *Journal of environmental planning and management*, 51(6), 759-775.

Tyden, T. (1996). The contribution of longitudinal studies for understanding science and communication and research utilization. Science Communication 18(1), 29-48.

Van Buuren, A., and Nooteboom, S. (2010). The success of SEA in the Dutch planning practice. How formal assessments can contribute to collaborative governance. Environmental Impact Assessment Review, 30(2), 127-135.

Weber, M., Krogman, N., and Antoniuk, T. (2012). Cumulative effects assessment: Linking social, ecological, and governance dimensions. Ecology and Society, 17(2), 22. http://www.ecologyandsociety.org/vol17/iss2/art22/

Wondolleck, J. and Yaffee, S. (2000). *Making Collaboration Work: Lessons from Innovation in Natural Resource Management*. Washington, DC: Island Press.

Zar, J. (2005). Spearman Rank Correlation. Encyclopedia of Biostatistics. 7.

Zhang, J., Christensen, P., and Kørnøv, L. (2013). Review of critical factors for SEA implementation. *Environmental Impact Assessment Review,* 38, 88–98.

CHAPTER FOUR

Towards an Environmental Governance Agenda in Regional Environmental Assessment: A Case Study

Abstract:

In the last decade, the emphasis of regional environmental assessment (EA) has shifted away from simply project approval toward facilitating environmental governance by accommodating heterogeneous stakeholders, incorporating regional environmental science, and emphasizing relationship building among the network of multi-dimensional governments and institutions involved in the process for improved outcomes. However, there are very few advanced regional EA cases that may be studied to understand how practice has evolved, how participants have overcome disciplinary and institutional 'siloes' as barriers to cooperation, and the implications of this 'new' model for regional environmental governance. This paper characterizes and assesses interactions among the members of the Crown of the Continent Managers Partnership (CMP), one of the few mature cases of regional EA in North America, whereby individuals with planning, policy-making, and EA roles attempted to implement an adaptive approach to regional cumulative effects assessment. Twelve in-depth, semi-structured interviews with key stakeholders provide data used in the investigation. The analysis demonstrates opportunities for an approach to regional EA that facilitates environmental governance through collective visioning, strong leadership, learning from failure, and collaborative science and management. Lessons from the CMP are relevant internationally to jurisdictions seeking to implement regional EA via multi-disciplinary, multi-jurisdictional partnerships. The paper has been submitted to *Journal of Environmental Assessment Policy and Management* and is currently under review[12].

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4.1 Introduction: New trajectory in regional EA practice

From the inception of environmental assessment (EA) in the 1970s, researchers and practitioners have been interested in regional approaches to environmental impact evaluation, in part as a means to address the concerns of heterogeneous stakeholders, incorporate regional environmental science into predictions, and network the multi-dimensional governments and institutions implicated in the process. Early on, interest focused simply on expanding the physical boundaries of project EA to the scale of a region and increasing scientific validation of the process (Gunn and Noble 2009; Parkins 2011). Many studies since then, however, have argued that this is not enough to promote effectiveness in regional EA, nor the sustained interaction among key actors necessary for successful implementation of recommendations; particularly non-EA actors involved in the process (Nitz and Brown 2001; Monteiro and Partidario 2012; Kristensen et al. 2013). Early approaches to regional EA were premised on the technical-scientific paradigm in which EA is rooted (Cashmore 2004; Parkins 2011): this de-emphasized the synergistic interactions among collaborating institutions and often ignored practices and strategies that could facilitate effective outputs and outcomes over the long term (Nitz and Brown 2001; Gunn and Noble 2009), once the regional EA was completed.

Furthermore, there now is recognition that to address regional sustainability in general—arguably an explicit or latent focus of all EA, planning, and policy-making exercises, (e.g. Counsell and Haughton 2006; Cashmore et al. 2007; Jay et al. 2007; Greig and Duinker 2007; Gibson, 2013)—the sustained cooperation of all parties engaged in regional resource management and land use planning, beyond those involved in EA is non-negotiable (Gunn and Noble 2011; Folkeson et al. 2013). Success and efficacy in regional EA are being explicitly tied to how well the process is integrated with regional plan making and policy-making (e.g. Gunn and Noble 2009; Duinker et al. 2013; Kristensen et al. 2013), and how much 'buy-in' there is from the planning and policy-making domains into its process and outcomes (Innes and Booher 1999; Mandarano 2008). For this reason, the focus of regional EA, and the processes and institutional arrangements that shape it, are increasingly taking into consideration land use planning and policy-making imperatives in order to deliver net positive benefits to a much wider variety of stakeholders than ever before (Nitz and Brown 2001; Kristensen et al. 2013).

Viewed from this perspective, regional EA is becoming an interesting experiment in progressive institutional arrangements to facilitate environmental governance. However, governance and stakeholder relationships are in and of themselves challenging; arguably even moreso in the context of regional EA where the 'silo effect' is easily registered (Sheate et al. 2003; Richardson 2005; Parkins 2011). The 'silo effect' is a real or perceived understanding of agency mandates or boundaries as borders that are difficult to cross or cannot be crossed (Mitchell 2005). Parkins (2011), for instance, argues that assessments at this scale are not just a process of scientific analysis, but also that of social choice and public policy development of which linkages are less than transparent and muddled with issues of power and control. Not only are disciplinary divisions normal in environmental science and governance, but also in regional EA, where the divides exist at a greater, institutional level among planning, policy-making, and EA domains. All three of these domains must be effectively integrated, not just science and scientific disciplines (see Stead and Meijers 2009; Stoeglehner et al. 2009; Olagunju and Gunn 2016). Proactive consideration is needed around how interaction and integration can be created and sustained to reduce the silo effect, and increase institutional commitment to shared regional environmental governance goals (Parkins 2011; Weber et al. 2012).

Despite this mounting body of scholarly works suggesting that facilitation of environmental governance is now an important aspect of regional EA effectiveness (e.g. Jackson and Illsley 2006; van Buuren and Nooteboom 2010; Carmichael et al. 2012), there is still much to unravel about how this is actually achieved in practice. Specifically, little is known about the challenges to enhanced regional governance in cases of regional EA—what is working and what is not from the perspective of involved parties—and how silo effects and other challenges are being overcome. In other words: (i) in what ways is regional EA being used to facilitate environmental governance and/or regional sustainable development goals? and (ii) are there insights from practice that could be transferred elsewhere to advance environmental governance discourse in regional EA?

To help bridge these knowledge gaps, this study engages in an in-depth investigation of environmental governance through the lens of a mature regional EA, the participants of which specifically set out to undertake a cumulative effects assessment of a large regional landscape. Their goal was to ensure the long-term environmental sustainability of the region through

cooperative environmental management and governance. The case study—the Crown of the Continent Regional Cumulative Effects Study—is a multi-sector, multi-stakeholder assessment traversing the provinces of Alberta and British Columbia in Canada and the state of Montana in the United States, and brings together planners, policy-makers, and EA practitioners operating at different scales. The lessons from the case study are important to help other participants of similar assessments to 'get the experiment of regional EA right', and thus to increase the effectiveness of regional EA, and make real contributions to managing cumulative effects issues and ensuring sustainable regional environments.

In the next section, academic literature regarding environmental governance is reviewed, elaborating on its key concepts and relevance to regional EA discourse. Section 4.3 provides an overview of the study methods and the case study. Subsequently, in Sections 4.4 and 4.5 respectively, results are presented and discussed. Finally, in Section 4.6, conclusions and implications of the study for both regional EA practice and environmental governance concepts are conferred, as well as recommendations for future research.

4.2 Environmental governance in regional EA research

Environmental governance is a broad concept with varying definitions, depending on the discipline and context of environmental discourse. According to Lemos and Agrawal (2006), environmental governance entails the process through which actors—both state and non-state—influence environmental actions and outcomes: it encompasses environment-related incentives, knowledge, institutions, decision making, and behaviors. Successful environmental governance requires recognition of the interconnected nature of resources; and the need for science and policy integration; knowledge co-creation; innovative management approaches; strategic partnerships; collaboration; and political commitments usually involving large numbers of stakeholders (Mwima 2014; Stoessel et al. 2014; Frantzeskakia and Kabisch 2016). There have been questions regarding what the overall goal of environmental governance is (e.g. Durant et al. 2004), however, there is a consensus on its value as a catalyst to sustainable development, particularly in resolving conflicts over the use and protection of environmental resources (Paavola 2004; Janicke and Jorgens 2006; Davis et al. 2009). Environmental governance has become an attractive vehicle for

shaping environmental sustainability discourse, particularly how the roles and capacities of key actors and institutions ideally might be configured in environmental management processes (Lemos and Agrawal 2006; Ali-Khan and Mulvihill 2008; de Loe 2009).

In recognition of the plurality of perspectives on the concept of environmental governance, this paper takes an eclectic approach to its definition, in particular, to align with the multi-institutional dimension of regional EA. In doing so, it focuses on the definition offered by (Komori 2010) i.e. "the formal and informal processes of coordinating mechanisms, involving public and private actors, that effectively guide and regulate human activities in the pursuit of collective goals of managing natural resources and mitigating environmental damages at the regional level" (p. 4). It is often viewed as part of an environmental governance architecture spanning the local and global levels, where assessments at regional level complement, rather than substitute for, the policies and efforts at higher or lower scales of institutions (Esty 1999; Lian and Robinson 2002). This approach is also implied in the normative literature on integration in regional EA, with its conscious efforts at re-imagining scales and levels of assessment, the distribution of actors' roles, and perspectives on how these roles should be distributed in ways quite different from existing socio-political boundaries (e.g. Geneletti et al. 2007; Fischer et al. 2009; Franks et al. 2010; Elvin and Fraser 2012).

Regardless of whether a formal arrangement is in place, and often they are not, environmental governance arrangements are naturally part of planning, policy-making and, EA processes. The increasing need to understand, develop, and apply appropriate environmental governance frameworks has triggered a large number of studies on its nature, and the challenges associated with implementing its tenets (e.g. Ali-Khan and Mulvihill 2008; de Loë et al. 2008; Marshall 2008; Reed and Bruyneel 2010; Wyborna and Bixler 2013). To date, there is little consensus about what a successful environmental governance process ultimately entails. However, based on the authors' examination of what has been commonly emphasized in the literature, environmental governance is comprised of five distinct but interrelated concepts, namely: scale and level; social capital; subsidiarity and capacity; conformity; and leadership (see Table 1 for the description of the key concepts). These concepts are always part and parcel of every proposed framework for environmental governance regardless of the label, whether it be: adaptive governance (Innes and Booher 1999; Theberge et al. 2006); co-management (Bryan 2004;

Plummer et al. 2011); multi-level governance (Reed and Bruyneel 2010); polycentric governance (Pahl-Wostl 2009; Bakker and Morinville 2013); nested governance (Marshall 2008; Wyborna and Bixler 2013); and so on. Mainstreaming environmental governance is becoming a normative expectation of regional EA and a measure of an effective process (e.g. Bina 2007; Jackson and Illsley 2007). The five concepts are inextricably linked, and they combine to provide understanding of the role of different actors and institutions, the nature and locus of leadership, and the relationships possible across space and time scales.

Table 4.1: Key Concepts in Environmental Governance

Concept	Description	Sample References
Scale and Level:	Functional interdependence of connected systems where the assessment takes place; while *scale* refers to the temporal, spatial, and analytical units used in studying an environmental phenomenon, *level* is the unit of analysis located at different positions on a given scale	Lemos and Agrawal, 2006; Marshall 2008; de Loe 2009; Reed & Bruyneel 2010
Social Capital:	Shared norms, values, and understanding, and a mutual investment in interactions that facilitate cooperation within and among actors and agencies; what Putnam (1995) and Szreter and Woolcock (2004) describe as *bonding* (connection within a group's network); *bridging* (connections among dissimilar groups' networks); and *linking* (interaction between individuals and formal institutions).	Adger 2000; Folke et al. 2005; Ali-Khan and Mulvihill 2008; Mandarano 2008; Hawkins and Maurer 2010
Subsidiarity:	The idea that interventions or tasks to be performed in the assessment, except such tasks as might fall within the exclusive competence of a central authority, should be devolved to the lowest level of governance with capacity to execute it satisfactorily	Janicke and Jorgens 2006; Blanes 2008; Bakker and Cook 2011; Bakker and Morinville 2013
Conformity:	Reconciliation of political decision-making and the planning blueprints, guidance, policy standards, rules, or laws that give legitimacy to the processes, without sacrificing empowerment of stakeholders	Faludi 1989; Elling 2000; Laurian et al. 2004; Berke et al. 2006;
Strong Leadership:	The existence of a coordinating hub for enabling region-wide synergy among actors and to leverage existing fragmented institutional reporting lines at every phase to facilitate success	Andresen 2007; Clark 2008; Hidle and Normann 2013; Sotarauta and Beer 2016

In the EA literature, environmental governance discourse is scant and scholarship is still developing, despite experts' assumptions that: "[w]hen EA was introduced, it was seen as an innovation in environmental governance" (Arts et al. 2012, p. 3). Much of the discussion with respect to governance has focused primarily on its legal context and emphasis on public participation (Unalan and Cowell 2009) as well as the role of power and politics in EA decision-making (Richardson and Cashmore 2011; Fagan and Sircar 2010) within the existing regulatory context of EA and strategic EA practice (e.g. Jackson and Illsey 2006; Arts et al. 2012). Most research is also tied to project-based EA, either examining the role of non-governmental organizations (e.g. Fagan and Sircar 2010), or analyzing governance-related skills and values that EA practitioners are expected to demonstrate in such a context (e.g. Arts 2012; Cashmore et al. 2015). Apart from Marsden (2011), whose study addresses political and legal considerations associated with transboundary environmental effects in the Pearl River Delta Region (China) and the potential role for a strategic EA approach, no study has specifically investigated the environmental governance dimensions of regional EA.

Some progress of the normative role of EA with respect to governance has been made (e.g. Cashmore 2004; Arts et al. 2012; Cashmore et al. 2015), and these works are often tied to discussions of EA effectiveness. Cashmore (2004) characterizes broadly models or ways of thinking about the function of EA and what it is meant to deliver from an environmental governance perspective, but does not necessarily shed light on how to navigate the complex governance and institutional relationships (or silos) that need to be addressed for effective regional EA. Several recent studies have argued the need for changes in institutional arrangements to address the problems of coordination (e.g. Chilima et al. 2013; Kristensen et al. 2013; Sheelanere et al. 2013) in order for regional EA to feed into overall planning and decision-making contexts. And so this study is unique in that there has been attention to the science of regional EA lately (e.g. Dubé 2003; Duinker et al. 2013) and improving regional EA methodology (e.g. Quinn et al. 2004; Gunn and Noble 2009) but very little scholarly attention invested in exploring the potential of regional EA as a tool for environmental governance—which does seem to be a hallmark of recent practice examples.

On the whole, environmental governance in EA has largely been described as reflective of the decision-oriented emphasis of its regulatory context (Cashmore 2004). For example, with

respect to environmental governance thought in EA, Cashmore states: “Science is employed in EA not by the (technical) elite for the (political) elite, but to empower all stakeholders; that is, to ensure all stakeholders are treated respectfully and sincerely in a process of purposeful deliberation” (p. 414). Ideally, EA as a model of environmental governance would be premised on the empowerment of heterogeneous stakeholders and institutions involved, and would shift from its predictive focus of practice toward practice that emphasizes the value-added of EA to the communities it serves (Cashmore 2004).

Studies have shown that regional EAs are currently less successful than they could be at influencing regional environmental governance and sustainable development outcomes, partly due to lack of a governance perspective in their design and implementation. For instance, in the case of the Great Sand Hills (Canada) regional EA (see: Noble 2008), realization of the project’s goals and objectives has been inhibited in part by lack of a real mechanism to sustain the assessment as an integral part of a broader environmental governance framework (Olagunju and Gunn 2016). In a more extensive investigation of four Canadian regional EA studies, Gunn and Noble (2009) observed that while regional EAs are "helping to set an appropriate pace for regional development…based on knowledge of ecological, social, and economic thresholds, values, and capacities” (p. 284), practice is not paying enough attention to important connections and relationships that can facilitate a more holistic view of regional environmental governance.

In addition, most regional EAs are ‘one-off’ assessments, i.e. focused on arriving at a “pass or fail decision,” which, in itself, mirrors EA’s positivist emphasis and precludes opportunities for integration, capacity building, and partnership (Gunn and Noble 2009; Parkins 2011; Folkeson et al. 2013) as well as multiple-loop learning which can result in individual and organisational changes in attitudes, perceptions and routines (Visser, 2003; Allan and Stankey 2008; Fischer et al. 2009; Che et al. 2011). As argued by Kørnøv and Thissen (2000, p. 196): “concentration on subjective, scientific, and ‘objective’ aspects of a policy issue, such as the range of alternatives and their impacts, does not address the core issues of many policy debates.” In other words, beyond scientific-technical rational, the contextual conditions of a regional assessment, particularly where differences in norms and interests exist, must take into consideration the style and culture of actors. Thus, there is a pressing need to encourage the evolution of EA toward becoming an effective tool

for regional environmental governance, particularly in the interest of ensuring the long-term sustainability of resource-rich ecosystems.

4.3 Study Methods

Data for the study were generated using in-depth, semi-structured interviews conducted with 12 senior environmental managers and researchers involved in the CMP. The interviews were between 30 and 70 minutes in length each, and were conducted via telephone between October and December 2014. The interviewees represented 11 agencies and institutions from the three socio-political jurisdictions: Alberta (n=7)[13]; British Columbia (n=1), and Montana (n=4). Informants were selected on the basis of their experience in the CMP: i.e., each of them has been involved for at least seven years in the assessment and seven interviewees had served or were serving as members of the steering committee at the time of the interview.

An interview schedule was developed by the authors and pilot-tested with selected experts to ensure questions asked were both sufficient and adequate to address the research questions. Themes addressed in the interview schedule include: the evolution of the regional EA; frameworks or approaches that have shaped the process over the years; specific outputs and outcomes of the regional EA; and challenges and the success factors from an environmental governance perspective. All interviews were audiotaped and transcribed verbatim and later analyzed with the aid of Nvivo® software to gain a rich understanding and context of important themes. An inductive, thematic approach to coding was employed to identify data trends.

The case study (CMP) is a partnership that began in 2001 as a joint management assessment involving over 20 government agencies with a focus on the sprawling Crown of the Continent ecosystem. The ecosystem traverses the provinces of Alberta and British Columbia (Canada) and the state of Montana in the United States (Figure 1), covering an area of 72,000 square-kilometers that is ecologically distinct. Its diverse Rocky Mountain setting is recognized for its rich biodiversity and varied landscapes. However, in governance terms, it is fragmented along three

[13] By physical location: 3 people work on transboundary issues and so do not necessarily represent Alberta's interests in the CMP

quite distinct socio-political boundaries, including the international boundary between Canada and the United States. For more than a decade, and in recent years particularly, the region has been experiencing a dramatic level of human perturbation triggered by population growth and expansion of industrial activities, with their attendant issues of wildlife habitat fragmentation, wildlife loss, and air and water pollution. In response, the CMP was formed with the following objectives in mind: to address the cumulative effects of human activity within the ecosystem; to respond to increased public interest in land use management and decision-making for the region; to check increased recreational demands and increased visitation; to build collaborative relationships to facilitate data sharing and standardized assessment and monitoring methodologies; and to encourage the maintenance and sustainability of shared wildlife populations.

In contrast to many other regional EA studies that are often 'one-off', the CMP has, over the past decade, experimented with more than one approach to regional EA, and has adopted a systematic structure for continuous review of several assessments that drive the process. The CMP's case is especially valuable given that there are very few regional EA processes in Canada that have persisted a decade past initiation and whose members are still very active, and as such, lessons from the CMP are beneficial in examining concepts and issues applicable to regional environmental governance in similar settings.

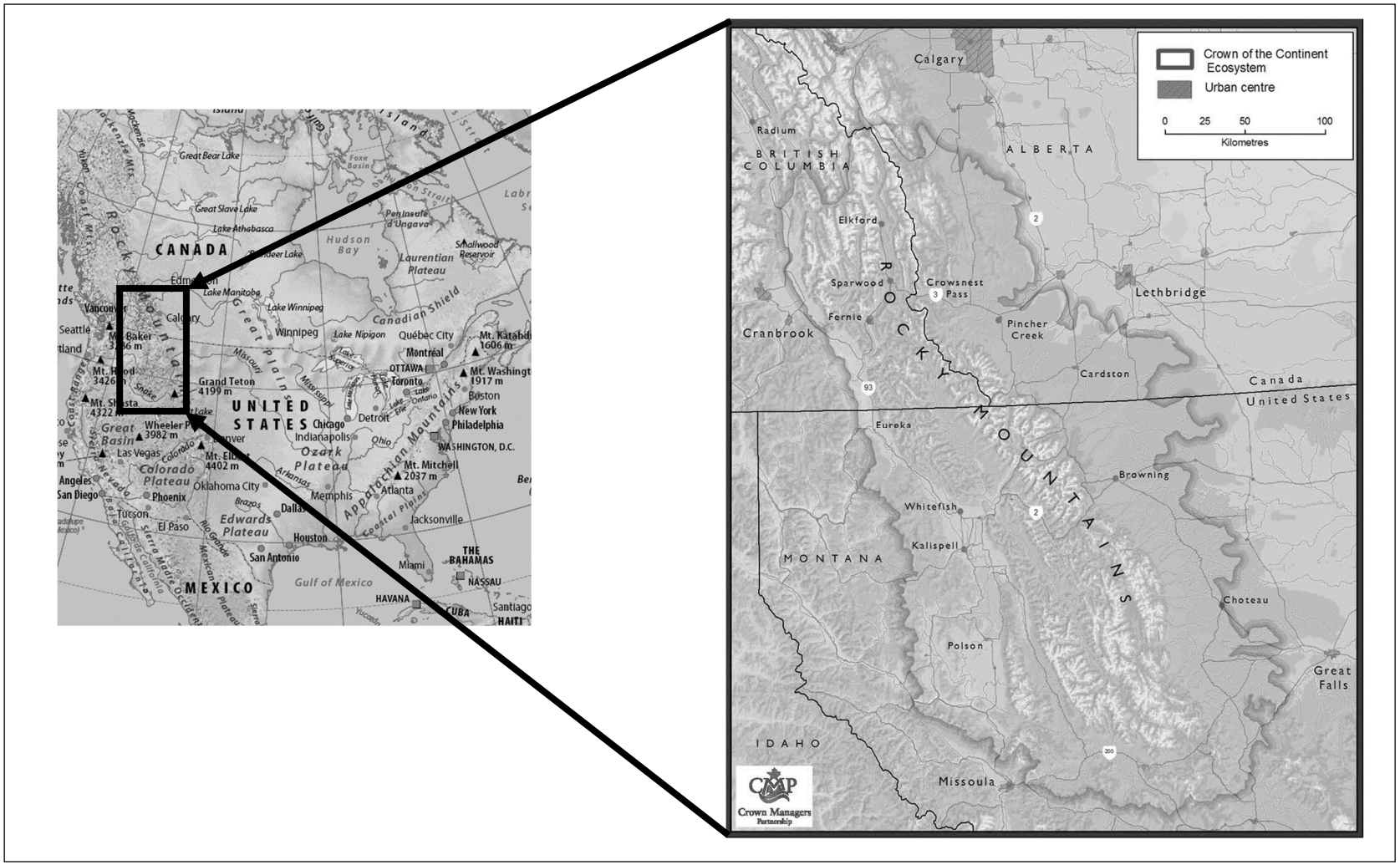

Figure 4.1: Map of the Crown of the Continent Ecosystem region

Source: http://crownmanagers.org/

4.4 Environmental Governance Dynamics in the CMP

4.4.1 Regional EA: From a Strategic to a Reductionist Approach

4.4.1.1 ALCES® Model: Strategic Beginnings

In 2001, stakeholders in the CMP adopted the ALCES® (A Landscape Cumulative Effects Simulator) model developed by Forem Technologies as a landscape management tool to support the understanding and management of cumulative effects in the Crown of the Continent. The ALCES® involved the tracking and simulation of all relevant land uses (forestry, energy, agriculture, transportation, residential, etc.) using computer models. It was the first time that the model would be applied to such a large, jurisdictionally complex region and required the assembly and aggregation of large volumes of data across different sectors, levels, and scales that make up the Crown of the Continent ecosystem management area. In general, important decisions made in the CMP are devolved to the Steering Committee, which is composed of senior environmental managers across the three socio-political jurisdictions and researchers from the academic institutions (particularly University of Montana and University of Calgary). However, following the initial ALCES® modelling exercise, it was clear that a better understanding of the data and technical requirements was required on the part of Steering Committee members. To address this concern, a Technical Advisory Committee was set up with members selected from different agencies in the region (Broberg 2003). Despite significant investment of time and resources, operationalizing the ALCES® still proved to be very challenging due to several issues.

Some immediate evidence of the difficulties associated with using the model as a strategic approach to cumulative effects management in the region emerged from the interviews. At least nine respondents explicitly stated that resource constraints—both human and financial—were responsible for the discontinuation of the ALCES® assessment. But resource constraints were implied in the comments of all participants, as the amount and extent of data required for ALCES® outputs to be meaningful and reliable are so great, and this was often discussed. To illustrate, there were instances in the interviews in which it was asserted that the model was "inappropriate" and "notoriously difficult" because amassing data for regional EA across three different political jurisdictions, multiple landscapes, and activities, and synthesizing that into a single outlook is "almost impossible." Relatedly, seven interviewees raised the issue of credibility of the modelling

exercise, stemming from "too much emphasis" on analytical aspects of regional EA and not enough emphasis on the governance aspects of success. The argument made was that cumulative effects assessment at a regional scale goes beyond collecting a "fantastic amount of analytical information;" and that ALCES® does not provide for an integration of the management perspectives that would be required to advance regional ecosystem health and sustainability outcomes.

The issue of familiarity was raised by a couple of respondents, one of whom remarked that as of 2001 when the model was adopted, "managers in Canada were comfortably familiar with it, whereas some managers in the US portion of the Crown were not." ALCES® is a Canadian-made model that as of then had only been applied to the southwest Alberta axis of the Crown. As well, there were notable challenges with semantics and motive: each of these issues was explicitly mentioned by five interviewees, and raised implicitly in many other responses. Regarding semantics, several interviewees observed that the use of the term "cumulative effects" was a strong "turn-off" for some agencies operating in the US, particularly the US Forest Services. One interviewee explained: "This [cumulative effects] is a very challenging area for them; they have been subjected to litigation issues [regarding cumulative effects studies] and they have, in many instances, been found wanting in this area by the court." The particular concern of US agencies was the potential conflict with existing legal requirements for cumulative effects analysis under the US National Environmental Policy Act, and possibly engendering further legal issues.

Similarly, there were reported misconceptions regarding the overall environmental objectives or motives of the CMP. For example, an interviewee from British Columbia shared that there was a "perception that the CMP wanted to increase the amount of protected areas in the province", referring to the demand by some environmental societies in the province for increase in allocation of lands for park purposes. Another interviewee from Montana linked this lack of clarity to the early, nebulous objectives of the CMP: "I think they've really being lacking in clear articulation of project goals and objectives. I think it's one of the big problems; they search for ideas that produce things but it's not clear why and what will be done with it; the objectives are unclear." The challenge of inadequate resources for the ALCES® cumulative effects modelling exercise thus became exacerbated by other non-technical issues such as credibility, familiarity, and semantics (i.e. developing a shared vocabulary), which consequently led to a discontinuation of

use of the model as a strategic approach to regional EA. The need for a new approach to the CMP became evident.

4.4.1.2 Ecological Health Project: Reductionist Endings

The failure of the ALCES® model to provide a locus for the CMP triggered a search for an alternative approach that could effectively support the CMP's strategic goal: building collective institutional capacity across agencies to effectively manage the cumulative effects of human development activities in the region. The idea of a Regional Landscape Analysis Project (RLAP)[14] of which ALCES® is a component was soon jettisoned in favour of a more piecemeal approach to regional cumulative effects assessment on the landscape. This approach was called the Ecological Health Project (EHP). The reason for this change is not evident in the interview data, however, there is a consensus among the interviewees that members of the CMP believed the EHP had the potential to overcome many of the challenges associated with the ALCES® model.

The EHP involves the CMP sorting all regional landscape issues according to a set of seven key indicators of ecosystem health based on concerns expressed by stakeholders in the CMP. These indicators are: landscapes; biodiversity; water quantity and quality; air quality; climate change; aquatic and terrestrial invasive species; and lastly, culture, which was recently added to address the concerns of the First Nations and Native American tribes regarding indigenous resource use in the region. The EHP is based on the assumption that when each indicator has been dealt with independently, and its related issues analysed and understood in relation to the landscape features of the Crown of the Continent, effective, outcomes-based cumulative effects management arrangements can easily be operationalized. In other words, contributions to a desired environmental output for any given indicator could be easily expressed by a single jurisdiction, and/or compared across jurisdictions (and coordinated or integrated) to generate a strategic understanding of the entire landscape management scenario.

[14] RLAP is regional landscape analytical framework that involves data collection, base case modelling, scenario modelling, and decision-making. ALCES® was expected to guide the modelling aspect of the process which involved the collection and analysis of full range of spatial, metric, and trend data required for the model.

Reportedly, the objectives and parameters for the EHP are the same as those used for the ALCES® model. However, the EHP was perceived by interviewees to be less data-intensive as emphasis is placed on utilizing data the stakeholders "felt was key in understanding overall health of the ecosystem." Once a specialist committee for each of the indicators was set up, e.g. for landscape and for climate change indicators, the EHP assessment commenced with consideration of the Aquatic Invasive Species (AIS) indicator (see Section 4.4.1.3). Depending on availability of funding and progress made on studies underway, members of the CMP negotiate which indicator should next receive priority attention. Taking this 'reductionist' approach to regional cumulative effects management, as indicated by interviewees across all the jurisdictions, was found to be more time-efficient and cost-effective. As well, inter-jurisdictional siloes became less pronounced while institutional capacities were better communicated and managed. This led to enhanced outputs, including more and stronger management partnerships. Unlike ALCES®, the EHP has reportedly had more success and attracted a high degree of institutional support, including support from high-level senior administrators across all jurisdictions.

4.4.1.3 Aquatic Invasive Species (AIS) as a Signature Project

From the interview data, the AIS was generally perceived as the most successful project that the CMP has embarked upon since its inception. For example, a member of the Steering Committee from Montana remarked: "our biggest success has been the aquatic invasive species transboundary management protocol that was designed to set up a response plan for the region." The project was highly relevant to most stakeholders in the region, which, understandably, contributed to its success. In this project, three invasive species were targeted for joint management including zebra mussels, quagga mussels, and Eurasian water-milfoil; but primary attention was given to managing mussel infestation.

The possibility of mussel infestation spreading throughout the Crown of the Continent aquatic ecosystem was a huge concern to stakeholders at the time. Study participants reported that the continued absence of a mitigation plan could be costly, both socially and financially, especially if irrigation reservoirs were infested with the mussels. Alberta was chosen to host a pilot project for mussel management because it had availability of funds and institutional capacity, while much

of the needed science was contributed by Montana. Monitoring protocols were jointly designed by the CMP stakeholders, the research community, and existing policy and planning institutions in Alberta. Key agreements were reached on the inspection stations; outreach and educational programs; legislative policies; and planning controls necessary to achieve the desired ecosystem management outcomes.

The AIS project, piloted in southwest Alberta, is now adopted as a province-wide program and considered an integral part of many regional plans including the South Saskatchewan Regional Planning assessment in the province of Alberta. Learning derived from the EHP approach to regional cumulative effects management is now being up-scaled to much larger regional assessments such as the Great Northern Landscape Conservation Cooperative— a binational North American landscape covering nearly 300 million acres and includes Alberta and British Columbia on the Canadian side, and the five states of Idaho, Montana, Oregon, Washington, and Wyoming on the US side.

4.4.2 Governance Challenges in the CMP Regional EA

4.4.2.1 Reconciling Disparate Management Scales Amid Conflicting Institutional Priorities

Despite the success reported with the AIS project, there was a general consensus among interviewees that conflicting institutional priorities remained a big challenge among the CMP stakeholders to full involvement in the regional EA. The conflicting priorities are specifically linked to the issue of scale. Two types of scalar issues emerged from the interviews. One, which was most frequently highlighted by respondents, is the *socio-political or decision scale*. Many interviewees indicated institutional challenges exist at the highest levels of decision-making such as the budgetary and electoral cycles, which obviously do not always align across provincial or international boundaries. An interviewee from one of the government institutions in Alberta, for instance, remarked: “Every jurisdiction goes through different electoral cycle, they work on just a small portion of the larger regional scale, and so the economic situations of those jurisdictions also vary broadly.” This disparity requires a better understanding and definition of the decision scale for the CMP assessments. Another issue related to the socio-political context is the fact that

environmental regulations vary across jurisdictions e.g. the US agencies involved must comply with the National Environmental Policy Act while Canadian agencies are guided by several provincial and federal environmental laws such as the Species At Risk Act, Canadian Environmental Assessment Act, and Canada National Parks Act.

Analytical scales were also reported as problematic. There was a general consensus that having a region-wide, strategic assessment scale is desirable, however, factors such as incongruent data sets and dissimilar environmental management priorities of each jurisdiction do get in the way of project goals. Some interviewees suggested that while a Crown-wide assessment scale may help capture important inter-relationships, the application of information gleaned at this scale may be missed if not "tailored to the reality of the place", i.e. take the form of place-based, outcomes-based landscape management directives that affect individual institutions and jurisdictions. Many of the interviewees were of the opinion that both the decision and assessment scales adopted for the EHP encourage better outcomes. An interviewee from British Columbia explained it this way: "The scale we are working at is appropriate; it can be implemented at the scale of the Crown, even though each jurisdiction has more detailed information for more scalable projects."

4.4.2.2 Challenges with Practicing Subsidiarity

The challenge in harnessing existing management capacity in the various jurisdictions was another theme that emerged from the interviews. Most interviewees expressed that diversity in terms of jurisdictional participation in the CMP adds great value with respect to 'on-the-ground' management capacity, particularly related to collaborative science and landscape-level activities. For instance, respondents indicated that much of the science needed for cumulative effects management assessments often originates from Montana, while institutional support has been stronger from Canadian partners, particularly in Alberta. One interviewee, for instance, mentioned that "the EHP addresses the major issues related to capacity of each jurisdiction" which has resulted in "a more matured conversation; they have assembled better data, they understand their landscape better, there is a better appreciation for the roles of different land use practices."

Notwithstanding progress made with respect to capacity building, interviewees identified one major issue that consistently undermines the CMP's ability to maximize the potential capacity available within the partnership, that is, the incessant restructuring of agencies. For example, as stated by one of the managers from Alberta, "the Alberta Environment and AESRD [Alberta Environment and Sustainable Resource Development] were separate institutions; Alberta Environment was brought into this partnership but AESRD wouldn't come to the table."[15] This is also the case in the British Columbia where ministry responsible for the environment has been re-organized and many of the initial CMP members are either retired or have moved to other agencies that preclude their involvement in the activities of the partnership.

There was also the inability to devolve authority to the lowest possible tier where the CMP assessment can be executed. While the incessant restructuring of agencies may be a leading contributory factor, operational divide at different levels of governance posed perhaps the greatest challenge to this principle of subsidiarity. From the responses of a majority of the interviewees, problems often arose since implementation is often a discretionary decision of each agency: "every jurisdiction is independent… and that is going to always be the biggest challenge and it's never going to be implemented across the board the same way across every jurisdiction because they are independent," The question then becomes whether the CMP has sufficient governance arrangement to be a worthy platform to devolve the tasks to be performed in the assessment to the appropriate level of competence below the steering committee. This is a debate that occurred across all interviewees, but the aggregate data suggested that the CMP has demonstrated some efficiency within current realities of their operations to harness existing capacity towards the realization of its objectives.

4.4.2.3 Building Social Capital: Closed versus Open Partnership

There was a consensus among the interviewees that strong *bonding* exists within the group. As reported in Section 4.4.1.3, the dimension of *linking* has also been largely responsible for high-

[15] Over the past years, the ministry responsible for environment in Alberta has undergone several restructurings. In 2012, Alberta Sustainable Resource Development was merged with Alberta Environment to form the Alberta Environment and Sustainable Resource Development (AESRD). Following the change of government in 2015, AESRD was restructured and renamed Alberta Environment and Parks.

level conformity achieved in the Crown. Among the three dimensions of social capital, *bridging* seemed to be the weakest in the CMP case. Nine interviewees highlighted issues that inhibit effective bridging with other group networks via the regional assessment, which made the process less transactional in nature. For example, there were disparate perceptions regarding the precise composition of the CMP. One group of interviewees understood the partnership to be an exclusive forum for some sort of bonding i.e. a forum "for exchange of information among and between government managers." Three interviewees suggested that the partnership should remain this way to avoid "clouding" its goals and objectives. Conversely, most interviewees agreed that meaningful, more effective regional EA requires a "coalition of the willing", including industry and indigenous communities, to facilitate effective social and environmental processes and outcomes in the Crown. This suggests that participation within the CMP should evolve toward being more inclusive of other stakeholders and interests. Currently, the representation of these kinds of additional stakeholders, beyond government and science (a form of epistemic community, Haas 1992), is almost non-existent within the CMP and the EHP, although participants indicated that most meetings of the CMP are open to the public.

There have been attempts at formalizing the inclusion of these groups in the CMP via different memoranda of understanding e.g. between Montana and Alberta[16]. However, according to some interviewees, the emergence of the Crown Roundtable—a forum that brings all categories of stakeholders to the table, including managers, industry leaders, academics, indigenous communities etc. to mobilize resources across the region—limits the development of a multi-directional communication network required in the CMP. Such network is necessary to achieving a full understanding of the landscape-wide issues and the capacity to address them. Despite this clear need to better define the scope of participation in CMP activities, interviewees emphasized that this does not diminish progress made by the CMP with respect to environmental assessment in the region.

[16] See: for the Memorandum of Understanding and Cooperation between the Government of the State of Montana, Unites States and the Government of the Province of Alberta, Canada Respecting the Crown Managers' Partnership. URL: http://static1.1.sqspcdn.com/static/f/808688/12375499/1406940719123/Final+CMP+MoU.pdf?token=LAtkQrWHMkuqa8TkCJXl%2BsPbiFs%3D

4.4.2.4 Achieving Conformity via High-level Support

As reported earlier, the AIS project received high-level support at the provincial scale, especially in Alberta, meaning that there is a buy-in at the executive level among key planning and policy institutions. This has had measurable influence on regional plans in Alberta. For example, as reported in section 4.4.1.3, the AIS findings are now an integral part of the South Saskatchewan Regional Plan, which is a provincial plan to establish a long-term vision for the region and facilitate understanding of the growing pressure of land use developments on the environment, economics, and society (Government of Alberta 2014). The CMP was able to leverage an existing MOU between the Alberta and Montana governments to improve data sharing, data collection and standardization of methodologies across borders to achieve the desired ecological health outcomes. Many respondents indicated that Alberta's success with the AIS project was closely tied to the high-level administrative 'buy-in' stemming from the MOU.

There was no evidence from the interviews, however, to suggest that such high-level institutional support exists in other collaborating jurisdictions in the Crown of the Continent. In fact, respondents identified a number of bureaucratic issues including the imposition of travel bans and lack of institutional commitment to implementation, which served to attenuate the level of conformity that could have been achieved in each jurisdiction. As remarked by one interviewee from Alberta: "There is hardly ever a time when at least one of the jurisdictions doesn't have a travel ban in place." In addition to extant issue of staff turnover and conflicting regional priorities, this travel ban decreases participation, create knowledge gaps, and reduced the potential to comfortably integrate new knowledge across jurisdictions.

4.4.2.5 The Need for Strong Leadership

Distributed leadership has been the preferred approach in the CMP—which implies leadership is seen as a collective responsibility of the steering committee. This type of arrangement, while offering opportunities for 'inclusive governance', also comes with some shortcomings: (i) the absence of strong coordination to facilitate effective governance, and (ii) concern over succession planning and sustainability of the partnership. Regarding the latter, some

interviewees suggested that the initial lack of clarity with respect to the goals, expected outcomes, clear measurement of outcomes, and roles and responsibilities of different partners was a "weak area" of the CMP assessment. For example, there is a consensus among study participants that the comparatively low participation of British Columbia in the CMP can be explained by this lack of clarity which led to a misconception around the original intents of the CMP as earlier described. Nevertheless, a majority of the participants indicated that as the CMP evolved, the objectives as well as the outcomes become much clearer and better organized, especially with respect to the EHP approach. Two respondents suggested the need for CMP to be even "more deliberate" in clearly defining "its niche" through explicit leadership arrangements, especially with the emergence of the Crown Roundtable forum which is more diverse in terms of stakeholders' composition.

The second concern about leadership centers on sustainability of the CMP. A majority of interviewees expressed concern about the fact that the CMP is a voluntary partnership that does not "exist in the eyes of the law." The dominant narrative is that "the partnership itself has no governing team per se." The partnership is built on the vision, motivation, commitment, and credibility of a "few individuals" sharing a common vision but operating at different scales (federal, state/provincial), with different lead agencies, and different regional priorities that often do not align, but all of which are nearing professional retirement. Six respondents expressed strong concern around the sustainability of the partnership, with leadership succession flagged as a particularly serious challenge. There is a need to retain the strong 'institutional memory' that has developed and now resides with these individuals and is thought to be critical to the credibility and sustainability of the partnership. There is a general perception that grooming "new blood" through deliberate inclusion on the Steering Committee is necessary to avert the collapse of the CMP in the future. The next section synthesizes the lessons learned from the CMP from a governance perspective.

4.5 Discussion: Lessons Learned from the CMP

The CMP assessment offers some unique insights on the subject of environmental governance via regional EA. One interviewee captured this in a statement: "You can look at it as

a glass half-full or glass half-empty. The fact that the CMP continues to exist, however, indicates that they are doing some things right because often these things are borne out of the commitment of a few individuals and don't last as long as the CMP has." The findings point toward a number of lessons that we feel are crucial to fostering success in regional EA and multi-jurisdictional cumulative effects management assessments.

4.5.1 Adoption of tools and techniques should be sensitive to the institutional context

Our study indicates that a strategic approach to regional EA has significant potential benefits but also carries the risk of being abandoned if its techniques are not sensitive to the capacities and preferences of collaborating agencies. Managing the trade-offs between technical sophistication, on the one hand, and institutional needs and capabilities on the other hand, is a key challenge in many complex regional environmental studies (Elling 2000), and this is apparently no different in regional EA. The strategic approach adopted at the beginning of the CMP emphasized the application of a complex computer model. Although it offered more reliability from a technical standpoint, it required the collection and simulation of a large volume of data that were often not stored in similar formats or required high-level clearances to obtain. In addition, an on-going, dedicated expertise is required to maintain and refine the simulations as new data are obtained. In many regional EA studies, technical sophistication has been equated with credibility and rigour, resulting in the collection of a huge amount of data to justify use of the model and modeling outputs (Buckley 2000; Podhora et al. 2013). Consequently, non-technical aspects of successful regional EA such as trust, semantics, and clarity of intentions are often neglected by facilitators of the assessments, who tend to focus on the quantitative dimensions of success such as the precision and accuracy of impact prediction.

Any computer models adopted to perform regional EA should enhance the capability of its stakeholders to adapt both the process and outputs of the model to individual, localized stakeholders' circumstances when used (Thiel 2009). This is critical, especially as ALCES® is just a tool and a decision-support one at best, which ideally should be applied within a process that defines how its outputs can be useful to addressing regional goals and objectives. As we learned in the CMP case, notable obstacles to the application of a computer-based strategic approach to

regional EA and understanding cumulative effects are: (i) potentially limited understanding of the methods that support the tool (i.e. ALCES®) by certain stakeholders, possibly causing disenfranchisement of certain stakeholders; and (ii) potential litigation that could arise based on the terminology used in the regional EA (i.e. the use of the term "cumulative effects" in the study) which, again, provides little motivation for the involvement of certain stakeholders. In the alternative EHP reductionist approach, an issue-based perspective was adopted to support cumulative effects management in the region and help collaborating agencies to focus on a mutually beneficial, systematic exploration of key indicators of regional health.

Adopting tools and techniques sensitive to the institutional context of a regional EA has two broad implications for environmental governance discourse. The first is scale-oriented: analyses of region-wide environmental impact must be pursued within a longer timeframe, particularly within timeframes that allow insights into the changing roles of actors (Reed and Bruyneel 2010). While the role of state actors is minimal in the CMP, the longer timeframe allows for a meaningful adoption of an approach that transcends political and disciplinary borders. The second implication is on the principle of subsidiarity. The results identify barriers to full operationalization of subsidiarity in the CMP assessment, particularly from an institutional context (e.g. travel ban, commitment etc.). However, the decision to focus only on data and issues that are key to understanding environmental impacts on the landscape, and consequently, results that are relevant and useful to majority of the stakeholders was valuable in conserving capacity—a dimension of subsidiarity (Janicke and Jorgens 2006). This EHP reductionist, issue-based approach helped in harmonizing the analytical and decision scales and facilitated representation and involvement of key agencies that had hitherto not been active in the CMP.

4.5.2 A performance-based approach should drive the process

The results of this study also show that for regional EA to reach its full potential, it should be connected with land use planning and high-level policy processes in a way that emphasizes shared regional problems and goals as well as mutually beneficial outcomes. As noted above, the initial strategic approach was driven by methodological concerns (e.g. data aggregation, modeling etc.). This approach is similar to that taken in other techno-centric regional EA processes, for

example, the Great Sand Hills regional EA reported by Noble (2008). In contrast, the EHP approach emphasizes connecting social, environmental, and economic data (modeling or other technical outputs), with the required institutional support for implementation, and consequently an arrangement for conformity through planning instruments and ultimately collaborative resource management activities. As argued by Faludi (1989, p. 136): "actions deemed to be rational do not always turn out to be so," which suggests the need for a 'performance-based approach' that reconciles the assessment goals and processes with planning and policy realities within the landscape. In other words, a regional EA is meaningless unless it influences decision-making and fulfill the specific purpose for which it is designed.

In addition, defining an assessment in terms of what works in a specific context is the cornerstone of effectiveness, so it is only fair that an assessment quality should be determined by its performance and how it facilitates conformity across collaborating institutions (Faludi 1989). This performance-based approach to regional EA therefore stresses the importance of adapting regional EA processes to, not only the needs of internal stakeholders (i.e. CMP environmental managers), but also to the context and capacity of the decision-making authorities (particularly planners and policy-makers) who have responsibilities for implementation as reported in other studies (e.g. Nitz and Brown 2001). Thus the CMP case typifies the qualities of a reflective and performance-oriented plan-making process that are recommended in previous works (e.g. Laurian et al. 2004; Berke et al. 2006).

4.5.3 An adaptive approach is acceptable to identify a 'best fit' strategy

The CMP case study suggests that, over time, uncertainty and learning from failure are more likely to result in the adoption of best-fit approach to regional EA processes. Our data confirm that the implicit propensity to embrace change and openness to learning are two fundamental adaptive factors that shaped the success of the CMP's case (reductionist vs. strategic approach) and allowed it to persist long term. As noted by Allan and Stankey (2008), actors in new environmental assessments often have limited understanding of the procedural and methodological challenges involved, and thus experimentation with different approaches can increase awareness of best-fit strategies that can promote understanding and management of the landscape. Equally,

engaging a heterogeneous group of stakeholders, often with varying levels and scales of operations, institutional priorities, and socio-political traditions, on a landscape-wide decision-making is an on-going challenge (Innes and Booher 1999; Healey 2003; Kato and Ahern 2008; Folkeson et al. 2013) which requires multiple-loop learning, i.e. the simultaneous learning about the outcomes of an action and the context within which it occurs (Visser, 2003; Allan and Stankey 2008).

The evolution of the CMP over the past 15 years has allowed its stakeholders, not only to agree on mutually beneficial outcomes, but also to gradually and adaptively develop skills and build knowledge important to managing uncertain, complex environmental systems, and enhance internal capacity for cumulative effects management through experimentation with different ideas and approaches. A previous study by Kwasniak (2010) emphasized that an EA, especially at the regional scale, is not locked in a "fixed rules and standards" position but rather, takes place in an experimentalist context. Our findings, coupled with the literature, suggest that regional EA is a complex phenomenon that will benefit from an explicitly adaptive approach that emphasizes learning. Recent works in regional EA is beginning to specify how learning is at the heart of the process (Sinclair et al. 2008; Jha-Thakur et al. 2009; Morrison-Saunders et al. 2015), but also show how difficult it is to divorce learning from other indices of social capital such as trust, intra-domain partnership, and inter-domain partnership (Olagunju and Gunn 2016). Even though these factors are intertwined, it is worthwhile to observe how openness to learning has shaped the regional EA processes in the CMP.

4.5.4 Strong leadership as a necessary factor to long-term regional EA partnerships

Strong leadership is a necessary condition for any successful environmental management assessment (Clark 2008; Olsson et al. 2006). Olsson et al. (2006) stress the importance of leadership in "connecting people, developing and communicating a vision…and building trust and broad support for change" (p. 5). They argue that significant changes are most likely when leaders align, motivate, and inspire people to invest in an alternative approach through:

> trust-building, sense-making, managing conflict, linking key individuals and initiating partnerships among actor groups, compiling and generating knowledge, developing and communicating vision, mobilizing broad support for change, and gaining and maintaining the momentum needed to navigate the transitions and institutionalize new approaches (Olsson et al. 2006, p. 14).

The CMP case demonstrates that strong leadership has been shown by the various institutions involved in regional EA, and that this was an important factor to the sustained partnership that formed around the original regional EA exercise. As described in the results, the CMP adopts a distributed form of leadership; which defers from previous findings that emphasized a need for a single leadership hub to facilitate better coordination and outcomes (Sheelanere et al. 2013). Where our findings support those of Sheelanere et al. (2013) is with respect to the accumulation of knowledge of region-wide actions and development plans through strong leadership arrangement that can facilitate the understanding and effective management of cumulative effects in a region. Their study argued for the need for a modification of current institutional policies to take into account the holistic needs of regional planning and management assessments in the region. We also found this to be important in sustaining the institutional memory in the CMP in terms of visions, tools and technique, and networks developed to support the sustainability of the assessment.

Another key lesson from the CMP's case is that innovative leadership is not always about a single individual; rather, a few committed individuals can make significant difference to regional quality and performance. The administration of the CMP partnership involves the annual rotation of the chair as well as membership on the steering committee among its members, thus ensuring that each jurisdiction and sector is fairly and adequately represented. In our view, this is a form of collaborative, shared leadership among partners. Interviewees were in agreement that this leadership arrangement promotes inclusiveness, enhances confidence, and allows fringe members to gradually become integrated into workings of the partnership, and most importantly, it allays the fears about succession expressed by some interviewees, thus engendering trust and confidence across socio-political jurisdictions. Our findings confirm that this form of leadership can be

instrumental in building social capital in regional assessments. For example, Ali-Khan and Mulvihill (2008, p. 1987) observed that on a general level, most successful regional-scale assessments often attribute their effectiveness to the engagement of "a few key leaders," who create enough social capital to facilitate multi-agency assessments. While distributed leadership may appear suitable to the context, findings from recent studies however show that identification of one lead agency may be important for effective regional EA governance, particularly for the purpose of coordination and sustainability (e.g. Chilima et al. 2013; Kristensen et al. 2013; Sheelanere et al. 2013).

4.6 Conclusion

This paper investigates environmental governance dynamics through the lens of a mature regional EA in North America and examines how the experience of key stakeholders involved in the CMP could enhance the effectiveness of regional EA practice. Participants in the study had mixed perceptions of how effective the governance arrangements in the CMP have been, but agree that substantial progress has been made via adaptation, innovation, and building of strong networks. The results demonstrate it is important in regional EA to make its objectives, design, and process adaptable to both internal stakeholders' realities and relevant external decision-making authorities, particularly planners and policy-makers. The study also shows that the success of regional EAs depends on shared, positive perception of many interests, and that political and scientific uncertainties should be explicitly acknowledged and addressed to bridge the gap between what is desirable and what is practicable in a given context.

However, the success with the EHP approach (reductionist, issues-based) does not imply that a strategic approach to regional EA—which has been heavily promoted in recent literature and has been proven to be valuable in many respects (e.g. Gunn and Noble 2009; Elvin 2012; Kørnøv et al. 2014)—is ill-advised. The implication is rather that regional environmental problems are context specific and as such regional EA should be flexible in adopting a best-fit strategy to facilitate effective management strategies and environmental governance. As Faludi (1989) observed, such flexibility may result in some decisions or results being delayed but the deliberate integration of delays and uncertainties into a multi-institutional environmental assessment should

be a key measure of its effectiveness. He argued that "[t]o seek to remove uncertainty once and for all, is like the search for the Holy Grail: inspired by noble sentiment but detracting from what can be done here and now" (p. 148). The CMP has made a significant stride in this regard (though not in a deliberate fashion) and presents a useful template for regions seeking to manage cumulative effects issues on continuous basis.

Furthermore, an important implication of the study is that the participants of regional EAs could benefit from paying attention to key governance issues. Rather than focusing on technical sophistication of the regional assessment only—which is very fundamental—, assessments can and should also pay closer attention to non-technical factors such as trust, clarity of goals and objectives, legal context, and relevance to collaborating institutions. Regional EA processes, methodologies, and potential outcomes should not be conceived solely in terms of the worldview, knowledge, and experience of a narrow segment of stakeholders. It must be envisioned as a multi-institutional arrangement that integrates different interests, perceptions, and scales (both analytical and decision). At the same time, the importance of building external, high-level capacity under which regional EA strategies may be expected to work cannot be overemphasized. These are tasks that require innovation in terms of leadership, trust, and openness to learning. In this way, both scientific and institutional sophistications can play their part in ensuring effectiveness and efficacy.

Our study thus lays groundwork for improving environmental governance discourse as it applies to regional EA by moving its scholarship beyond procedural and methodological effectiveness, to examining key governance concepts that can help facilitate integration of both scientific and institutional realities through building social capital, flexibility of strategies, and strong leadership. The study does have some limitations. One, the qualitative method limits our ability to conclusively establish causality between success factors and socio-environmental outputs of the CMP. Two, the findings are based on the perspective of internal stakeholders many of which are members of the steering committee, and thus may have underemphasized contested issues in the partnership. Three, it should be noted that the case study is a transboundary assessment between the Canadian and United States' stakeholders, which in itself adds some complexity to the nature and extent of silo effects that may not be applicable elsewhere. It is also necessary to note that the focus of this paper is on attributes of environmental governance that have direct bearing on regional EA effectiveness such as leadership, subsidiarity, scale and level, social capital, and

conformity. However, other influential decision-making variables such as the forms and strategies of governance adopted as well as the role of and interaction with the private sector are not addressed. These issues are beyond the scope of this paper but offer very promising direction for further research in the context of regional EA effectiveness.

This study has looked at regional EA from a new perspective that offers an excellent opportunity to reflect on the role of regional EA process in facilitating environmental governance. This study has raised many issues that contribute to improving understanding of the relationship of regional EA and environmental governance, which so far has not been extensively addressed in previous scholarship. Our paper has shown that regional EA initiators need to be aware of all these potential institutional barriers and attempt to address them *ex ante*. Despite some of the noted deficiencies, the CMP approach is an example of how a reductionist, issues-based approach to regional EA can work well and seems suitable for other regions characterized by similarly complex dynamics of interaction and integration. It demonstrates that the success of regional EA in the long-term depends heavily on its connection with environmental governance, via those responsible for coordinating and enacting management directives. Given this, we are hopeful that the insights offered in this paper will stimulate and guide further research into the growing role of regional EA in facilitating environmental governance.

4.7 References

Adger, W. (2000). Social and ecological resilience: are they related? *Progress in Human Geography*, 24(3), 347-364.

Ali-Khan, F. and Mulvihill, P. (2008). Exploring collaborative environmental governance: perspectives on bridging and actor agency. *Geography Compass,* 2(6): 1974–1994.

Allan, C. and Stankey, G. (eds.) (2008). *Adaptive Environmental Management: A Practitioner's Guide*. Collingwood: Springer.

Andresen, S. (2007). Key actors in UN environmental governance: influence, reform and leadership. International Environmental Agreements: Politics, Law and Economics, 7(4), 457-468.

Arts, J., Runhaar, H., Fischer T., Jha-Thakur, U., Laerhoven, F., Driessen, P., and Onyango, V. (2012). The effectiveness of EIA as an instrument for environmental governance: Reflecting on 25 years of EIA practice in the Netherlands and the UK. *Journal of Environmental Assessment Policy and Management*, 14(3): DOI: 10.1142/S1464333212500251.

Bakker, K. and Cook, C. (2011). Water governance in Canada: innovation and fragmentation. *International Journal of Water Resources Development*, 27(2): 275-289.

Bakker, K. and Morinville, C. (2013). The governance dimensions of water security: a review. *Philosophical Transactions of the Royal Society A*, 371: 20130116.

Berke, P., Backhurst, M., Day, M., Ericksen, N., Laurian, L., Crawford, J., and Dixon, J. (2006). What makes plan implementation successful? An evaluation of local plans and implementation practices in New Zealand. *Environment and Planning B: Planning and Design*, 33(4): 581–600.

Bina, O. (2007). A critical review of the dominant lines of argumentation on the need for strategic environmental assessment. *Environmental Impact Assessment Review*, 27, 585–606.

Blanes, J. (2008). Key governance principles underpinning urban sustainable development planning and management. *WIT Transactions on Ecology and the Environment*, 117: 55-65.

Broberg, L. (2003). Glacier National Park – Cooperative Ecosystems Studies Unit Glacier National Park Crown Managers Partnership. CESU Cooperative Agreement Number CA-1200-99-007, Final Report. Missoula, MT: University of Montana.

Bryan, T. (2004). Tragedy averted: The promise of collaboration. *Society & Natural Resources*, 17(10): 881-896.

Buckley, R. (2000). Strategic environmental assessment of policies and plans: legislation and implementation. *Impact Assessment and Project Appraisal*, 18(3):209-215.

Carmichael, L., Barton, H., Gray, S., Lease, H., and Pilkington, P. (2012). Integration of health into urban spatial planning through impact assessment: Identifying governance and policy barriers and facilitators. Environmental Impact Assessment Review, 32(1), 187-194.

Cashmore, M. (2004). The role of science in environmental impact assessment: Process and procedure versus purpose in the development of theory. *Environmental Impact Assessment Review*, 24(4): 403-426.

Cashmore, M., Bond, A., and Cobb, D. (2007). The Contribution of Environmental Assessment to Sustainable Development: Toward a Richer Empirical Understanding. *Environmental Management*, 40:516–530.

Cashmore, M., Richardson, T., Rozema, J., and Lyhne, I. (2015). Environmental governance through guidance: The 'making up' of expert practitioners. *Geoforum*, 62, 84-95.

Chilima, J., Gunn, J., Noble, F., and Patrick, J. (2013). Institutional considerations in watershed cumulative effects assessment and management. *Impact Assessment and Project Appraisal*, 31(1), 74-84.

Clark, S. (2008). *Ensuring Greater Yellowstone's Future: Choices for Leaders and Citizens.* New Haven, CT: Yale University Press.

Counsell, D. and Haughton, G. (2006). Sustainable development in regional planning: The search for new tools and renewed legitimacy. *Geoforum*, 37(6), 921-931.

Davis, J., Hossain, K., and Koivurova, T. (2009). Canadian arctic offshore oil and natural gas and European Union energy diversification: towards a new perspective? In: Koivurova et al. (eds.), *Understanding and Strengthening European Union-Canada Relations in Law of the Sea and Ocean Governance*, *Juridica Lapponica 35*, pp. 227-264.

De Loë, R., Armitage, D., Plummer, R., Davidson, S. and Moraru, L. (2009). *From Government to Governance: A State-of-the-Art Review of Environmental Governance*. Final Report. Prepared for Alberta Environment, Environmental Stewardship, Environmental Relations. Guelph, ON: Rob de Loë Consulting Services.

Dubé, M. (2003). Cumulative effects assessment in Canada: a regional framework for aquatic ecosystems. *Environmental Impact Assessment Review*, 23(6): 723-745.

Duinker, P. and Greig, L. (2006). The impotence of cumulative effects assessment in Canada: Ailments and ideas for redeployment. *Environmental Management*, 37(2): 153-161.

Duinker, P., Burbidge, E., Boardley, S., and Greig, L. (2013). Scientific dimensions of cumulative effects assessment: Toward improvements in guidance for practice. *Environmental Reviews*, 21(1), 40-52.

Elling, B. (2000). Integration of strategic environmental assessment into regional spatial planning. *Impact Assessment and Project Appraisal*, 18(3): 233-243.

Elvin, S. and Fraser, G. (2012). Advancing a national strategic environmental assessment for the Canadian offshore oil and gas industry with special emphasis on cumulative effects. *Journal of Environmental Assessment Policy and Management*, 14(3): DOI: 10.1142/S1464333212500159.

Fagan, A. and Sircar, I. (2010). Compliance without governance: the role of NGOs in environmental impact assessment processes in Bosnia–Herzegovina. *Environmental Politics*, 19(4), 599-616.

Faludi, A. (1989). Conformance vs. performance: implications for evaluation. *Impact Assessment*, 7(2-3): 135-151.

Fischer, T., Kidd, S., Jha-Thakur, U., Gazzola, P., and Peel, D. (2009). Learning through EC directive based SEA in spatial planning? Evidence from the Brunswick region in Germany. *Environmental Impact Assessment Review*, 29(6), 421-428.

Folke, C., Hahn, T., Olsoon, P., and Norberg, J. (2005). Adaptive governance of social-ecological systems. *Annual Review of Environmental Resources,* 30: 441–473.

Folkeson, L., Antonson, H., and Helldin, J. (2013). Planners' views on cumulative effects. A focus-group study concerning transport infrastructure planning in Sweden. *Land Use Policy*, 30: 243-253.

Franks, D., Brereton, D., and Moran, C. (2010). Managing the cumulative impacts of coal mining on regional communities and environments in Australia. *Impact Assessment and Project Appraisal, 28*(4), 299-312.

Frantzeskaki, N. and Kabisch, N. (2016). Designing a knowledge co-production operating space for urban environmental governance—Lessons from Rotterdam, Netherlands and Berlin, Germany, *Environ. Sci. Policy*, http://dx.doi.org/10.1016/j.envsci.2016.01.010

Geneletti, D., Bagli, S., Napolitano, P., and Pistocchi, A. (2007). Spatial decision support for strategic environmental assessment of land use plans. A case study in southern Italy. Environmental Impact Assessment Review, 27(5), 408-423.

Gibson, R. (2013). Avoiding sustainability trade-offs in environmental assessment. *Impact Assessment and Project Appraisal, 31*(1), 2-12.

Government of Alberta (2014). An Alberta Land-use Framework Integrated Plan: South Saskatchewan Regional Plan, 2014-2024. URL: https://landuse.alberta.ca/LandUse%20Documents/South%20Saskatchewan%20Regional%20Plan_2014-07.pdf.

Greig, L. and Duinker, P. (2011). A proposal for further strengthening science in environmental impact assessment in Canada. *Impact Assessment and Project Appraisal,* 29(2), 159–165.

Gunn, J. and Noble, B. (2009). Integrating cumulative effects in regional strategic environmental assessment frameworks: lessons from practice. *Journal of Environmental Assessment Policy and Managem*ent, 11(3): 267-290.

Gunn, J. and Noble, B. (2011). Conceptual and methodological challenges to integrating SEA and cumulative effects assessment. *Environmental Impact Assessment Review*, 31: 154-160.

Haas, P. (1992). Introduction: epistemic communities and international policy coordination. *International Organization*, 46(1), 1-35.

Hawkins, R. and Maurer, K. (2010). Bonding, bridging and linking: How social capital operated in New Orleans following Hurricane Katrina. *British Journal of Social Work*, 40, 1777–1793.

Healey, P. (2003). Collaborative planning in perspective. *Planning Theory,* 2(2), 101-123.

Hidle, K. and Normann, H. (2013). Who can govern? Comparing network governance leadership in two Norwegian city regions. *European Planning Studies*, 21(2), 115-130.

Innes, J. and Booher, D. (1999). Consensus building and complex adaptive systems: a framework for evaluating collaborative planning. *Journal of the American Planning Association*, 65(4): 412-423.

Jackson, J. and Illsley, B. (2006). Strategic environmental assessment as a tool of environmental governance: Scotland's extension of the European Union SEA Directive. *Environmental Impact Assessment Review*, 27, 607–623.

Jackson, J. and Illsley, B. (2007). An analysis of the theoretical rationale for using strategic environmental assessment to deliver environmental justice in the light of the Scottish Environmental Assessment Act. *Journal of Environmental Planning and Management*, 49, 361-383.

Janicke, M. and Jorgens, H. (2006). New Approaches to Environmental Governance. In: M. Janicke and K. Jacob (eds.) *Environmental Governance in Global Perspective: New Approaches to Ecological Modernisation*. Berlin: Freie Universität Berlin.

Jay, S., Jones, C., Slinn, P., and Wood, C. (2007). Environmental impact assessment: Retrospect and prospect. *Environmental Impact Assessment Review, 27*(4), 287-300.

Jha-Thakur, U., Gazzola, P., Peel, D., Fischer, T. and S. Kidd (2009). Effectiveness of strategic environmental assessment - the significance of learning. *Impact Assessment and Project Appraisal*, 27(2):133-144.

Kato, S. and Ahern, J. (2008). 'Learning by doing': adaptive planning as a strategy to address uncertainty in planning. *Journal of Environmental Planning and Management*, 51(4): 543-559.

Kørnøv, L. and Thissen, W. 2000). Rationality in decision and policy-making: implications for strategic environmental assessment. *Impact Assessment and Project Appraisal*, 18 3): 191-200

Kørnøv, L., Zhang, J., and Christensen, P. (2014). The influence of street level bureaucracy on the implementation of strategic environmental assessment. *Journal of Environmental Planning and Management*, DOI: 10.1080/09640568.2013.873711.

Kristensen, S., Noble, B., and Patrick R (2013). Capacity for watershed cumulative effects assessment and management: lessons from the Lower Fraser River Basin, Canada. *Environmental Management*, 51(5): 360–373.

Kwasniak, A. (2010). Use and abuse of adaptive management in environmental assessment law and practice: a Canadian example and general lessons. Journal of Environmental Assessment Policy and Managemen, 12(4), 425-468.

Laurian, L., Day, M., Berke, P., Ericksen, N., Backhurst, M., Crawford, J., and Dixon, J. (2004). Evaluating plan implementation: a conformance-based methodology. *Journal of the American Planning Association*, 70(4): 471-480.

Lemos, M. and Agrawal, A. (2006). Environmental governance. *Annual Review of Environment and Resources,* 31: 297-325.

Mandarano, L. (2008). Evaluating collaborative environmental planning outputs and outcomes: Restoring and protecting habitat and the New York New Jersey Harbor Estuary Program. *Journal of Planning Education and Research*, 27: 456-468.

Marsden, S. (2011). Assessment of transboundary environmental effects in the Pearl River Delta Region: Is there a role for strategic environmental assessment? *Environmental Impact Assessment Review*, 31(6), 593–601.

Marshall, G. (2008). Nesting, subsidiarity, and community-based environmental governance beyond the local level. *International Journal of the Commons*, 2(1): 75-97.

Mitchell, B. (2005). Integrated water resource management, institutional arrangements, and land-use planning. *Environment and Planning A*, 37, 1335-1352.

Monteiro, M. and Partidario, M. (2012). Perceptions on SEA: not all that glitters is gold. Paper presented at the 32nd Annual Conference of the International Association for Impact Assessment, Porto, May 27 –June1.

Mwima, H. (2014). Environmental governance dimensions and perspectives for three transboundary African lakes. *Aquatic Ecosystem Health & Management*, 17(1): 97-102.

Nitz, T. and Brown A. (2001). SEA must learn how Policy Making Works. *Journal of Environmental Assessment Policy and Management*, 3(3): 329-342.

Noble, B. (2008). Strategic approaches to regional cumulative effects assessment: a case study of the Great Sand Hills, Canada. *Impact Assessment and Project Appraisal*, 26(2): 78–90.

Olagunju, A. and Gunn, J. (2016). Challenges to integrating planning and policy-making with environmental assessment on a regional scale—a multi-institutional perspective. *Impact Assessment and Project Appraisal*, *in press*.

Paavola, J. (2004). Protected areas governance and justice: theory and the European Union's Habitats Directive. *Environmental Sciences*, 1(1): 59–77.

Pahl-Wostl, C. (2009). A conceptual framework for analyzing adaptive capacity and multi-level learning processes in resource governance regimes. *Global Environmental Change,* 18: 354–365.

Parkins, J. (2011). Deliberative democracy, institution building, and the pragmatics of cumulative effects assessment. *Ecology and Society* 16(3): 20. http://dx.doi.org/10.5751/ES-04236-160320.

Plummer, R., De Grosbois, D., De Loë, R., and Velaniškis, J. (2011). Probing the integration of land use and watershed planning in a shifting governance regime. *Water Resources Research*, 47(9): doi: 10.1029/2010WR010213.

Podhora, A., Helming, K., Adenäuer, L., Heckelei, T., Kautto, P., Reidsma, P., Jansen, J. (2013). The policy-relevancy of impact assessment tools: Evaluating nine years of European research funding. *Environmental Science and Policy*, 31, 85-95.

Quinn, M., Greenaway, G., Duke, D., and Lee, T. (2004). *A Collaborative Approach to Assessing Regional Cumulative Effects in the Transboundary Crown of the Continent*. Research supported by the Canadian Environmental Assessment Agency's Research and Development Program. Ottawa, ON: Canadian Environmental Assessment Agency.

Reed, M. and Bruyneel, S. (2010). Rescaling environmental governance, rethinking the state: a three-dimensional review. *Progress in Human Geography, 34*(5): 646-653.

Richardson, T. (2005). Environmental assessment and planning theory: four short stories about power, multiple rationality, and ethics. *Environmental Impact Assessment Review*, 25: 341–365.

Richardson, T. and Cashmore, M. (2011). Power, knowledge and environmental assessment: the World Bank's pursuit of 'good governance.' *Journal of Political Power*, 4(1), 105-125.

Runhaar, H., Driessen, P., and Uittenbroek, C. (2014). Towards a systematic framework for the analysis of environmental policy integration. *Environmental Policy and Governance*, DOI: 10.1002/eet.164.

Sheate, W., Dagg, S., Richardson, J., Aschemann, R., Palerm, J., and Steen, U. (2003). Integrating the environment into strategic decision-making: conceptualizing policy SEA. *European Environment*, 13: 1-18.

Sheelanere, P., Noble, B., and Patrick, R. (2013). Institutional requirements for watershed cumulative effects assessment and management: lessons from a Canadian trans-boundary watershed. *Land Use Policy*, 30, 67-75.

Sinclair, J., Diduck, A. and P. Fitzpatrick (2008). Conceptualizing learning for sustainability through environmental assessment: critical reflections on 15 years of research. *Environmental Impact Assessment Review,* 28: 415–428.

Sotarauta, M. and Beer, A. (2016). Governance, agency and place leadership: lessons from a cross-national analysis. *Regional Studies*, DOI:10.1080/00343404.2015.1119265.

Stead, D. and Meijers, E. (2009). Spatial planning and policy integration: concepts, facilitators and inhibitors. *Planning Theory and Practice*, 10(3), 317–332.

Stoeglehner, G., Brown, A., and Kørnøv, L. (2009). SEA and planning: 'Ownership' of strategic environmental assessment by the planners is the key to its effectiveness. *Impact Assessment and Project Appraisal, 27*(2), 111-120.

Stoessel, S., Tedsen, E., Cavalieri, S. and Riedel, A. (2014). Environmental governance in the marine arctic. In: E. Tedsen et al. (eds.): *Arctic Marine Governance*, pp. 45-69.

Theberge, J., Theberge, M., Vucetich, J., and Paquet, P. (2006). Pitfalls of applying adaptive management to a wolf population in Algonquin Provincial Park, Ontario. *Environmental Management*, 37(4): 451-60.

Therivel, R. and Ross, W. (2007). Cumulative effects assessment: does scale matter? *Environmental Impact Assessment Review*, 27(5): 365-385.

Thiel, A. (2009). The use of ex-ante modelling tools in European impact assessment: What role does land use play? *Land use Policy*, 26(4), 1138-1148.

Unalan, D. and Cowell2, R. (2009). Europeanization, strategic environmental assessment and the impacts on environmental governance. *Environmental Policy and Governance*, 19(1), 32–43.

Van Buuren, A., and Nooteboom, S. (2010). The success of SEA in the Dutch planning practice. How formal assessments can contribute to collaborative governance. *Environmental Impact Assessment Review*, 30(2), 127-135.

Weber, M., Krogman, N., and Antoniuk, T. (2012). Cumulative effects assessment: Linking social, ecological, and governance dimensions. *Ecology and Society*, 17(2): 22. http://www.ecologyandsociety.org/vol17/iss2/art22/

Szreter, S. and Woolcock, M., (2004). Health by association? Social capital, social theory, and the political economy of public health. *International Journal of Epidemiology*, 33(4), 650-667.

Wyborna, C. and Bixler, P. (2013). Collaboration and nested environmental governance: Scale dependency, scale framing, and cross-scale interactions in collaborative conservation. Journal of *Environmental Management*, 123: 58-67.

CHAPTER FIVE

Conclusion: Ameliorating Silo Effects in Regional Environmental Assessment—The Way Forward

5.1 Introduction: Revisiting the Research Intentions

This research takes the viewpoint that regional environmental assessment (EA) is a complex, multi-institutional process that requires the integration of planning and policy-making imperatives to facilitate a more substantive impact on regional environmental sustainability. It was premised on the assumption that regional EA stakeholders are interested in improving practice and want to create an inclusive environment for multi-scalar partnership and integration; that purposeful reflection on existing practice will serve as a catalyst for such improvements; and that perceptions of institutional actors are valuable in the analytical efforts to understand the process. Furthermore, the research was founded on the recognition that the 'silo effect' is a complex phenomenon affecting regional EA effectiveness and therefore warrants an investigation of its dimensions and institutional context. In addition, this thesis examined environmental governance concepts that could improve regional EA and its ability to better manage diverse epistemic, often heterogeneous, communities of actors involved in the process.

The research adopted a multi-method design to examine how the process and results of regional EA can be better integrated with regional planning and policy making, particularly to address cumulative effects issues and inform the sustainable development of a region. The first method was a systematic content analysis of scholarly, peer reviewed works that have sought to consider integration of the three domains (EA, planning, and policy-making) in a period in which

repeated calls for planning-policy-assessment integration became persistent, with specific emphasis on the direct and indirect benefits and impacts of integration (e.g. Lawrence 2000; Fuggle 2005; Cashmore 2004; Richardson 2005; Harriman and Noble 2008). The second method, a web-based survey, gauged the perceptions of planners, policy-makers, and EA practitioners previously involved in selected mature regional EA cases on barriers to and facilitators of cross-domain integration. The third method, semi-structured interviews with key informants investigated the ways in which members of the Crown Managers' Partnership worked together to plan, guide, and implement strategies for regional EA improvement, and what their approach and the lessons learned offer to other jurisdictions seeking to implement similar regional EAs via multi-disciplinary, multi-jurisdictional partnerships.

In the content analysis, a total of 164 peer-reviewed works on regional EA research were collected across 17 journal titles and 33 countries. The analysis focused on the rationale, dimensions and timing, conceptual approaches, and key facilitators of cross-domain integration in regional EA. For the web-based survey, both quantitative and qualitative data were collected from 38 individuals across four regional EA cases over a period of four months. These data were used to evaluate nineteen key elements identified from a systematic review of literature on cross-domain integration. The results of this analysis were used to characterize the nature of silo effects and additional insights into how cross-domain integration may be facilitated to enable better regional EA outcomes.

Finally, for the semi-structured interviews, twelve senior environmental managers from the Crown Managers' Partnership, representing three socio-political jurisdictions (Alberta and British Columbia in Canada, and Montana, United States) provided data that were analyzed to explore the ways in which regional environmental governance is facilitated via multi-institutional regional assessments in the management of the North America's Crown of the Continent Ecosystem. Results from these three methods, along with other evidence gleaned from grey literature including several CMP publications, were used to identify important lessons about facilitating cross-domain integration in regional EA, and strengthening the overall contribution of EA to environmental governance and environmental sustainability. In the rest of this chapter, a synthesis of the research findings across all three manuscripts is presented, in light of the research purpose and objectives,

and major implications of the research findings are explored. Finally, a future research agenda is proposed.

5.2 Synthesis of Key Findings: What Has Been Learned?

5.2.1 There is a Mixed State-of-Research

Analysis of the 164 papers on integration of EA with planning and policy, indicated that cross-domain scholarship is limited, and still in its infancy; scholarship is primarily practice-focused, rather than also focused on establishing shared theoretical or conceptual frameworks. Theoretical works on the subject of cross-domain integration are non-existent. A closer examination of the research trajectory also revealed that scholarship is still largely 'inward focused' in each of the three domains, and in practice, regional planners and policy-makers often support regional EAs but that this consideration is often secondary to other purposes and mandates. Despite this, a number of insights were evident from the identified body of scholarship on the subject.

First, the data provided regional EA stakeholders with valuable insights about how practice should be proactive and communicative in order to facilitate a transactive environment and maximize the outcomes of the EA and any associated regional studies. The design, and all other activities that shape the EA process, must be planned in ways that are meaningful to and reflective of the context of the specific institutional actors, especially in the way the scale, timing, and tasks of assessment are defined, as well as credibility and legitimacy of the knowledge guiding decision-making. These findings are supported by past research that suggests actors may be passive about engaging when regional EA goals and other planning or policy objectives are not well aligned within such institutions (e.g. Nitz and Brown 2001; Franks et al. 2010). Regional EA actors have an important role to play in creating effective communication protocols across the domains, and a functional leadership arrangement, or at least the identification of shared goals that are coherent with existing regional planning and environmental policy regimes operating within the socio-political geography of the assessment. According to Morrison-Saunders and Retief (2012), providing actors with information on the value-added and resource (human and financial)

implications of their involvement early in the decision-making process is a fundamental component of an effective EA.

Second, while a good number of works on conceptual approaches to facilitate integration in regional EA exist, there is no consensus about an explicit way to go about it. Perspectives range from those that emphasize adherence to explicit concepts/protocols such as tiering, adaptive management, and system thinking, to those that argue for more opportunistic arrangements such as decision or policy windows. Nevertheless, the concept of 'tiering' featured most prominently among these various perspectives. Many studies considered tiering to be very important as, both conceptually and practically, it helps support the hierarchical integration of decision-making processes in EA, planning, and policy-making, and aid in the allocation of tasks and resources to different actors at different tiers of decision making and environmental management (Fischer 2006; Sánchez and Silva-Sánchez 2008; Lyhne 2011; Fidler and Noble 2012). Despite that tiering is a relatively familiar and utilized tool across the three domains, this study also highlighted the need to pay careful attention to decision windows, democratic governance, changes in political constellation, as well as empowerment of all actors; all of which are core to integration, and relevant to theory and practice across all three domains.

5.2.2 There is a Need to Anticipate and Address Silo Effects in Regional EA

The second objective of the research focused on evaluation of regional EA effectiveness from the perspective of cross-domain integration. Evidence suggests that the attributes of cross-domain integration were not uniformly perceived among actors from different domains in the sample. Aggregate results show that the background, roles, and perceptions of individuals are central in enabling or inhibiting effective cross-domain integration in regional EAs, particularly as there were variations in the responses provided by respondents across the domains. The nature of the silos, their characteristics, and factors they affect in regional EA are shown in Figure 5.1. The figure shows that transactional silo is embedded in disciplinary silo, and both are embedded in institutional silo. In other words, all issues affected by transactional silo such as trust, learning, motivation, and ownership are also evident in the disciplinary type of silo, but in addition, issues such as legitimacy, credibility, communication, and data sharing are also affected due to epistemic

divide across domains. At the institutional silo, leadership, implementation, capacity, resources, and coordination are additional silo effects that could become evident.

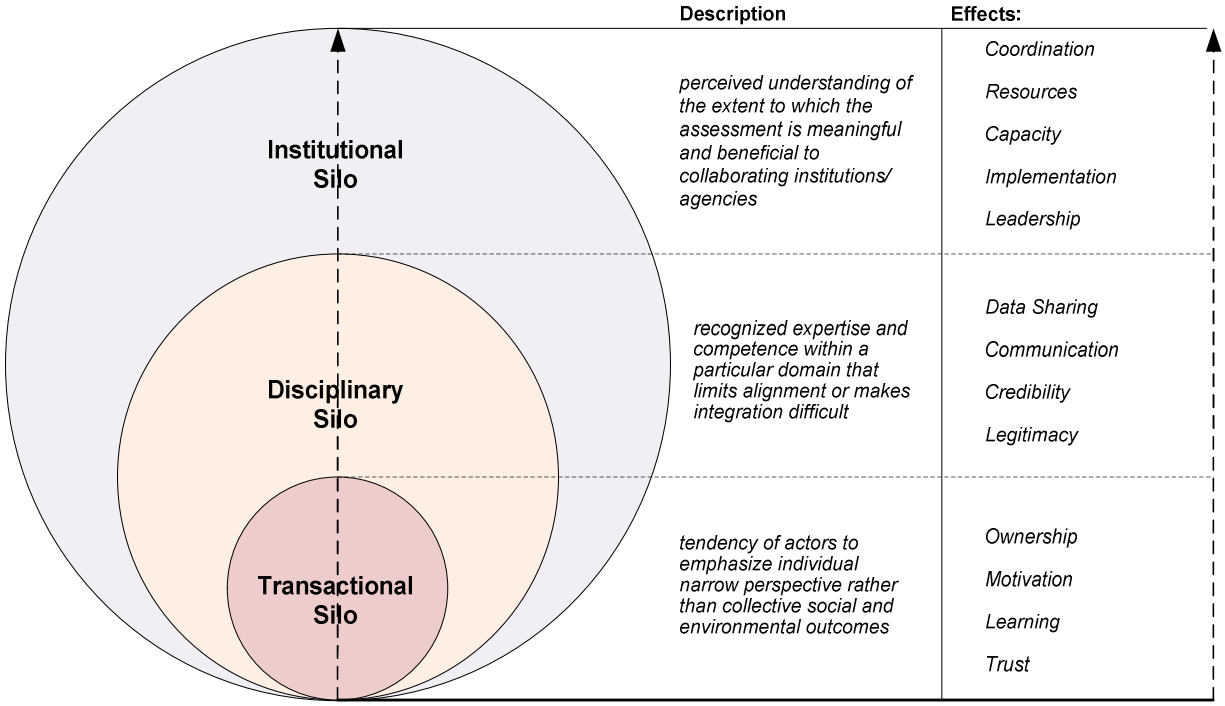

Figure 5.1: Silo effects on regional EA processes

While the existence of silo effects was widely detected in the research results, institutional silo effects seemed to be the most dominant (Figure 5.1) and was revealed in the low perception of coordination across the domains. Respondents also reported lack of clarity, limited capacity, politicization of leadership, and poor funding, which are all tied to institutional challenges. These findings are consistent with past studies that identified similar issues as institutional challenges in regional EA (Keysar and Steinemann 2002; Gunn and Noble 2011; Elvin and Fraser 2012), but in addition, this study identified the issues of disciplinary and transactional silos, which have received little attention in regional EA studies to date. While the former (disciplinary silo) reinforces what

has been a long-term challenge to practice i.e. the tendency of EA actors to idealize current practice as effective without given due consideration to the perception of planning and policy stakeholders, the latter (transactional silo) is embedded in the nature of benefits accruing to individuals and institutions in relation to the time and resources invested into the process (e.g. Nitz and Brown 2001; Morrison-Saunders and Retief 2012). These findings prompt the need to pay closer attention to the nuances and attributes of silo effects in regional EA, and whether and how they interfere with achieving desired outputs and outcomes, and regional sustainable development objectives.

There were two other very interesting findings that emerged from the evaluation of practice that moves scholarship on integration forward. First, the research revealed there is a correlation of learning in regional EA with enhanced perceptions of trust, intra-domain partnership, and inter-domain partnership among institutional actors. This confirms earlier observations that EA is an important conduit to learning (e.g. Sinclair et al. 2008; Jha-Thakur et al. 2009; Morrison-Saunders et al. 2015). It is the act of *out-scaling* (i.e. replicating elsewhere) and *up-scaling* (i.e. improving current processes) the lessons learned in a particular regional EA that enhances cross-domain integration which, in turn, results in "profound changes" in the institutional and/or socio-political dimensions of the actors involved (Sinclair et al. 2008). Second, the perception of actors with multiple domain expertise revealed that they are likely to be more engaged, communicate better, and demonstrate better commitment to implementation, which was perhaps why this category of regional EA actors rank many of the evaluative elements very high. Multiple domain expertise is, therefore, very valuable for effective cross-domain integration and may help reduce the extent of silo effects, especially those related to disciplinary and institutional silos.

5.2.3 Adopting an Environmental Governance Approach Helps Ameliorate Silo Effects

The third objective of the research was premised on the notion that regional EA is fast becoming an experiment in progressive institutional arrangements to facilitate environmental governance, and that scholarship needs to turn to successful case studies to draw insights that could be used to advance both theory and practice of regional EA, and environmental governance itself. The research results have prompted new understandings on these subjects that are transformational in nature primarily because all along, the CMP process has been sensitive and adaptive to the needs

and learnings of collaborating agencies. The CMP encouraged mutually beneficial outcomes; anticipated uncertainty and learning from failure; embraced collective ownership and strong leadership; and engendered knowledge co-creation and practitioner-researcher collaboration. A unique insight from the CMP case is how openness to learning has influenced the issues of scale, subsidiarity, conformity, leadership, and social capital —which were identified as fundamental concepts needed to mainstream regional EA as an environmental governance tool (e.g. Jackson and Illsley 2006; van Buuren and Nooteboom 2010; Carmichael et al. 2012). Despite any observed deficiencies, the CMP approach offers a model of a successful reductionist approach to regional EA, especially regarding how to strengthen institutional capacity via an environmental governance approach.

5.3 Study Implications and Recommendations

This research advances existing knowledge of cross-domain integration in EA, which has hitherto failed to engage its complex, multi-institutional dimensions in the context of regional environmental governance. The findings of this research indicated that regional EA actors, who are wont to utilize resources—knowledge, methods, and tools—from planning and policy institutions, need to understand the dynamics and dimensions of silo effects and the approach to bridging those siloes. Through an evaluation of their authentic experiences in being involved in regional EA, the study provided powerful learning opportunity to understand these issues from the perspectives of actors in all three domains.

The research has two key conceptual contributions. The first contribution is the development and application of a new set of evaluative criteria to explore the subject of cross-domain integration in regional EA (see Table 3.1). These evaluative criteria have the potential to provide valuable insight to EA practitioners by encouraging reflection about the nature and desired approach to cross-domain integration during the different phases of a regional EA. Existing evaluative frameworks of regional EA have tended to focus on procedural and methodological elements (e.g. Donnelly et al. 2006; Noble and Harriman-Gunn 2009), while discounting some other important aspects such as relationships and output-outcome elements in regional EA processes. Therefore, it is significant that the research developed this set of evaluative criteria that

identifies the main building blocks in the context of regional EA, which became a valuable tool in conceptualizing how different interests and decision-making processes can be effectively bridged in a regional EA process.

The second conceptual contribution is the identification of key concepts that are germane to regional EA effectiveness, and successfully employing these in an investigation of the evolution of the Crown Managers' Partnership regional EA study. Five key governance concepts (i.e. scale, subsidiarity, conformity, leadership, and social capital) were identified based on a review of environmental governance literature and were used to inductively investigate the way actors tacitly implicated environmental governance factors in regional EA. Despite the past assertion that "[w]hen EA was introduced, it was seen as an innovation in environmental governance" (Arts et al. 2012, p. 3), studies previous to this have not attempted to provide insight into how the environmental governance concepts could be applied to better understand the phenomenon of regional EA, nor how regional EA could be improved or better integrated with planning and policy-making. The key governance concepts identified in this research led to a greater depth of understanding of the link between regional EA and improved environmental governance. The research has also provided an example of how studies of regional EA can be more fully leveraged to advance cross-domain integration discourse.

On a practical level, the results of this research advanced regional EA practice in four areas. One, it offers a characterization of literature that integrates EA with planning and policy-making in order to understand its goals, dimensions, and frameworks for cross-domain integration, particularly in regional EA scholarship. An understanding of the state of knowledge at the international scale is helpful for the EA research and practice community. It allows researchers and practitioners to recognize knowledge and practice gaps and, practitioners to consider factors that are relevant for operationalizing best-practice cross-domain integration when developing regional EAs and better align with planning and policy interests and inputs.

Two, and very importantly, the research speaks to the need to conceive and design regional EA that incorporates the needs of institutionally, transactionally, and disciplinarily diverse collaborating institutions and actors. Three, and relatedly, not all actors have the necessary skills to facilitate cooperation and collaboration among such diverse set of institutions, therefore

signalling the need for a leader or leadership team; ideally, one with multiple domain expertise and innovative ideas to manage the diverse interests, and identify and bridge the various silo effects at play. This is generally lacking in practice but it is an aspect that requires urgent attention in order to foster an arrangement that balances diverse perspectives and interests for maximum results. Four, this research underscores the value of social learning that is facilitated via regional EA processes. It suggests that learning—particularly social learning—cannot be considered in isolation of other social capital indices such as trust, intra-domain, and inter-domain partnerships. Yet, social learning has little influence on institutions unless it leads to transformative learning—i.e. "profound changes" in the institutional and/or socio-political dimensions of the actors involved (Sinclair et al. 2008). To develop a culture of learning that is both personal and institutional in nature, regional EA frameworks may require deliberately embedding social learning opportunities and deliberate mechanisms to upscale these connections and their transformative power to the level of the institution. For example, in the CMP, deliberation across institutional and political boundaries fostered social learning on individual basis, but in addition, generated useful knowledge for development of policy and planning frameworks at the regional level, particularly for the Aquatic Invasive Species project.

The evolution of the CMP case also offers additional insights relevant to regional EA practice and the overall goals of this research. One, a strategic approach to regional EA, despite offering significant potential benefits, may on its own, not lead to the best level of integration and success on a practical basis. A conceptually strategic approach to regional EA can and should ideally be combined with a reductionist approach to environmental management issue identification and determining ground-level operations and assessments. Two, explicitly identifying shared problems and goals is the first step toward achieving cross-domain integration across all interests—EA, planning, and policy-making—as observed from the Ecological Health Project. Three, regional EA should not take place as a one-off, pass-fail, decision-oriented exercise. Rather, explicitly anticipating uncertainty and learning from failure are more likely to lead to better outcomes in the long run. In other words, experimentation with different approaches can increase awareness of best-fit strategies that can promote understanding and management of the landscape as observed in the CMP case. Four, regional EA stakeholders need to pay attention to collective ownership of environmental management problems and processes by demonstrating a willingness to play out their role within the entire network and lifespan of the assessment. Lastly,

knowledge co-creation and practitioner-researcher collaborations are instrumental to addressing unexpected challenges that arise throughout the regional EA process, including continuing to clarify goals, objectives, and manage expectations about outcomes. Based on the aggregate results of this study, Table 5.1 recommends ways to further overcome silo effects in regional EA and the type of silo effect each recommendation will address.

Table 5.1: Recommendations to bridge silo effects in regional EA through an environmental governance lens

Recommendation	**Type of Silo**		
	I	**T**	**D**
■ Regional problems are framed in a way that is sensitive to all collaborating institutions.	X	X	X
■ Explanatory theories or models are available to shape the process and decision-making	X	X	X
■ There is an understanding of potential silo effects and deliberate effort at addressing them early in the assessment process	X	X	X
■ Assessment tasks are deliberately set up in an interdisciplinary way that integrates knowledge across domains	X	X	X
■ Creation of effective, networked communication protocols adopted across domains	X	X	X
■ Decision-making processes encourage active multiple-loop learning i.e. social, technical, and transformative	X	X	
■ Dedicated resources—financial and human—across the domains to sustain the regional EA	X	X	
■ Anticipation of failure even if the assessment is not set up based on an adaptive framework	X	X	
■ There is a leadership hub, or individuals, that possess the skills to facilitate multi-institutional stakeholders engagement	X		X
■ Flexibility of approach to the design and implementation of assessment i.e. reductionist, strategic, or mixed	X		
■ Connecting assessment to high-level decision-making processes in the region	X		
■ A clear understanding of the social and political dynamics within a region	X		

[*Note: I=Institutional silo; T=Transactional silo; D=Disciplinary silo]*

It is the author's belief that this research will inform regional environmental governance as more government institutions continue to adopt regional EA as a tool of choice to understand natural and anthropogenic changes on landscapes and to project future development scenarios, especially in resource-rich regions in Canada and elsewhere. In any regional EA, there will always be a demand for EA practitioners to work closely with planning and policy institutions and to mainstream regional EA outputs into the routine processes of these institutions. This study therefore speaks to the need to appreciate the existence of silo effects and direct resources to issues that will have a positive effect on institutional integration and ultimately, better social and environmental outputs and outcomes. In addition, the findings from the research suggest that dedicating resources to regional EA can play a significant role in enhancing cross-domain integration and regional environmental governance generally.

5.4 Future Research

One of the objectives of this research was to develop understanding and identification of the nature, dimensions, challenges, and overall progress made in regional EA scholarship to date, particularly from the perspective of cross-domain integration and environmental governance. Despite the significant additions this study has made to the existing body of knowledge, there are a number of important questions that are yet unanswered. EA research needs to better engage environmental governance scholarship in order to better improve cross-domain integration and ameliorate silo effects in practice. A hope for the immediate future is research to develop an explanatory theory of EA integration with planning and policy-making. As highlighted in chapter 2, the development of theory seems to be the weakest aspect of current literature. Cashmore (2004) points out "an imperative for more theory-led and purposeful research, conducted within a broader framework of an integrative and connective research strategy focused on theory advancement" (p. 422). Such research would help to identify appropriate causal mechanisms, which can be used to address perceived institutional, transactional, or procedural silos in regional EA practice.

Regional EA includes more than activities of institutional actors; it incorporates the perspectives of non-institutional actors such as the local communities, not-for-profit organizations, and civil society, depending on how controversial development in the region is. The focus of this

study, and that of many others, has been on institutions or actors with institutional roles. Research that includes different perspectives (other than institutional) should be part of the larger research agenda and discourse on integration. Empirical studies would be very valuable in this regard and would contribute a unique angle in the body of scholarship on cross-domain integration in regional EA. Perhaps the most complex issue facing regional EA and integration is the meaningful inclusion of Aboriginal governments and rights in the process. It will be useful to both practice and research to investigate how this perspective can contribute an understanding into the subject of environmental governance in regional EA.

Finally, there is always a clash between what is ideal versus what is practical and useful, as suggested by the need to jettison a purely strategic approach to regional EA in favour of a more reductionist one in the CMP. What works best and under what conditions? More exploratory case study works are needed to understand this. Research questions in this vein could include: (i) what are the contextual characteristics that make an approach effective in a particular context?; (ii) are there ways of detecting these characteristics in the process design phase so that the need for major retroactive corrective action is reduced?; (iii) are assessments that adopt a reductionist approach to issue identification and environmental management operations still able to address strategic issues while yielding better integration?; (iv) lastly, to what extent does level of integration depend upon the state of the regional ecosystem? In other words, how much does the potential for successful integration depend upon the galvanizing nature of environmental issues themselves? For all of these research questions, more attention to models of integration that exist outside the field of EA could provide a wealth of new insights and help direct much of the desired empirical work. As the popularity of regional EA continues to rise in Canada and elsewhere, this research helps illuminate the opportunities and challenges to integration of EA with planning and policy-making on a regional scale.

5.5 References

Arts, J., Runhaar, H., Fischer T., Jha-Thakur, U., Laerhoven, F., Driessen, P., and Onyango, V. (2012). The effectiveness of EIA as an instrument for environmental governance: Reflecting on 25 years of EIA practice in the Netherlands and the UK. *Journal of Environmental Assessment Policy and Management*, 14(3), DOI: 10.1142/S1464333212500251.

Carmichael, L., Barton, H., Gray, S., Lease, H., and Pilkington, P. (2012). Integration of health into urban spatial planning through impact assessment: Identifying governance and policy barriers and facilitators. *Environmental Impact Assessment Review, 32*(1), 187-194.

Cashmore, M. (2004). The role of science in environmental impact assessment: Process and procedure versus purpose in the development of theory. *Environmental Impact Assessment Review*, 24(4), 403-426.

Donnelly, A., Jones, M., O'Mahony, T., and Byrne, G. (2006). Decision-support framework for establishing objectives, targets and indicators for use in strategic environmental assessment. *Impact Assessment and Project Appraisal*, 24(2), 151–157.

Elvin, S. and Fraser, G. (2012). Advancing a national strategic environmental assessment for the Canadian offshore oil and gas industry with special emphasis on cumulative effects. J*ournal of Environmental Assessment Policy and Management*, 14(3), DOI: 10.1142/S1464333212500159.

Fidler, C., and Noble, B. (2012). Advancing strategic environmental assessment in the offshore oil and gas sector: Lessons from Norway, Canada, and the United Kingdom. *Environmental Impact Assessment Review*, 34, 12-21.

Fischer, T. (2006). Strategic environmental assessment and transport planning: Towards a generic framework for evaluating practice and developing guidance. *Impact Assessment and Project Appraisal*, 24(3), 183-197.

Fischer, T. and Onyango, V. (2012). Strategic environmental assessment-related research projects and journal articles: An overview of the past 20 years. *Impact Assessment and Project Appraisal*, 30(4), 253-263.

Franks, D., Brereton, D., and Moran, C. (2010). Managing the cumulative impacts of coal mining on regional communities and environments in Australia. *Impact Assessment and Project Appraisal, 28*(4), 299-312.

Fuggle, R. (2005). Have impact assessments passed their "sell by" date? *International Association for Impact Assessment Newsletter*, 16(3), 1-6.

Gunn, J. and Noble, B. (2011). Conceptual and Methodological Challenges to Integrating SEA and Cumulative Effects Assessment. *Environmental Impact Assessment Review*, 31, 154-160.

Harriman, J. and Noble, B. (2008). Characterizing project and strategic approaches to regional cumulative effects assessment in Canada. *Journal of Environmental Assessment Policy and Management*, 10(1), 25-50.

Jackson, T. and Illsley, B. (2006). Strategic environmental assessment as a tool of environmental governance: Scotland's extension of the European union SEA directive. *Environmental Impact Assessment Review*, 49(3), 361-383.

Jha-Thakur, U., Gazzola, P., Peel, D., Fischer, T. and S. Kidd (2009). Effectiveness of strategic environmental assessment - the significance of learning. *Impact Assessment and Project Appraisal*, 27(2), 133-144.

Keysar, E., and Steinemann, A. (2002). Integrating environmental impact assessment with master planning: Lessons from the US army. *Environmental Impact Assessment Review*, 22(6), 583-609.

Lawrence, D. (2000). Planning theories and environmental impact assessment. *Environmental Impact Assessment Review*, 20(6), 607-625.

Lyhne, I. (2011). Between policy-making and planning: SEA and strategic decision-making in the Danish energy sector. *Journal of Environmental Assessment Policy and Management*, 13(3), 319-341.

Morrison-Saunders, A. and Retief, F. (2012). Walking the sustainability assessment talk — progressing the practice of environmental impact assessment (EIA). Environmental Impact Assessment Review**,** 36, 34–41.

Morrison-Saunders, A., Bond, B., Pope, J., and Retief, F. (2015). Demonstrating the benefits of impact assessment for proponents. *Impact Assessment and Project Appraisal*, 33(2), 108-115.

Nitz, T. and Brown A. (2001). SEA must learn how Policy Making Works. *Journal of Environmental Assessment Policy and Management*, 3(3), 329-342.

Noble, B. and Harriman-Gunn, J. (2009). Strategic environmental assessment. In: Hanna KS (ed.): *Environmental impact assessment: practice and participation*. 2nd ed. Don Mills: Oxford University Press; p. 103– 130.

Richardson, T. (2005). Environmental assessment and planning theory: four short stories about power, multiple rationality, and ethics. *Environmental Impact Assessment Review*, 25, 341–365.

Sánchez, L., and Silva-Sánchez, S. (2008). Tiering strategic environmental assessment and project environmental impact assessment in highway planning in São Paulo, Brazil. *Environmental Impact Assessment Review*, 28 (7), 515-522.

Sinclair, J., Diduck, A. and P. Fitzpatrick (2008). Conceptualizing learning for sustainability through environmental assessment: critical reflections on 15 years of research. *Environmental Impact Assessment Review*, 28, 415–428.

Van Buuren, A., and Nooteboom, S. (2010). The success of SEA in the Dutch planning practice. How formal assessments can contribute to collaborative governance. *Environmental Impact Assessment Review*, 30 (2), 127-135.

APPENDIX I

SURVEY QUESTIONNAIRE

**Administered With University Of Saskatchewan Fluidsurvey®

AYODELE OLAGUNJU
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University of Saskatchewan, Saskatoon, Canada

WELCOME!

Thank-you for agreeing to participate in this survey. The goal of this study is to examine how the results of regional CEA can be better integrated with regional planning and policy making to address specific cumulative effects issues and inform the sustainable development of a region. An important objective of the research is to perform a survey to explore whether or not a 'silo effect' (communication and management divide) exists among the regional environmental assessment, planning, and policy-making domains, as the process unfolds. The intent is to determine what conditions are needed for effective integration across the professional domains that take part in regional environmental assessment. Survey participants have been selected based on past or ongoing involvement in a specific regional environmental assessment (e.g. regional cumulative effects assessment, regional environmental monitoring, regional strategic environmental assessment, etc.) that involves a multidisciplinary, collaborative approach. The survey includes mostly closed ended questions and a few open-ended ones, and should take approximately 40 minutes to complete. It is designed in such a way that you can save and continue to work at a later time. Once the 'submit' button is clicked at the end of the survey, your responses will be transmitted to the administrator and analyzed along with other responses received. The confidentiality and anonymity of respondents are assured in any subsequent reporting. Thank-you once again for your time and valuable contribution. If you have any questions or concerns, please contact the survey administrator at: ayodele.olagunju@usask.ca.

I. BACKGROUND

Your current organization:	
Job Title:	
Highest educational qualification:	

Years of post-graduation work experience:

○	less than 5 years
○	5-10 years
○	11-15 years
○	16-20 years
○	over 20 years

Which of the following best describes your affiliation?

○	Academic/University	
○	Community Group	
○	Government Agency	
○	Industry/Consulting	
○	Non-Governmental Organization	
○	Other, please specify	

Which of the following best describes your organization's geographical scope of operation?

○	Local/Municipal/Community	
○	Provincial	
○	Regional (inter-provincial, or other region)	
○	National	
○	International	
○	Other, please specify	

Which of the following best describes your organization's primary function/role/expertise?

○	Policy-making	
○	Land use planning/Land use management	
○	Environmental assessment	
○	Other, please specify	

Please briefly describe the regional environmental assessment(s) you or your organization was involved with and the role you played in that assessment(s) [e.g. title, date, geographical scope etc.].

II. POTENTIALS OF REGIONAL ENVIRONMENTAL ASSESSMENT:

Please provide your opinion about the potential usefulness of regional environmental assessment. Kindly provide a brief rationale for choice in the space provided for each item.

To what extent do you agree with the following statements regarding the potentials of regional environmental assessment as a tool to:

	Very Ineffective	Ineffective	Uncertain	Effective	Very Effective	*Please provide a brief rationale for your choice*
Address cumulative environmental effects	○	○	○	○	○	
Reduce task duplication among agencies	○	○	○	○	○	
Influence regional planning	○	○	○	○	○	
Achieve regional policy coordination	○	○	○	○	○	
Capture impacts outside the regulatory environmental assessment process	○	○	○	○	○	
Promote regional sustainable development	○	○	○	○	○	

Keeping in mind the regional environmental assessment you were involved in, please indicate the option that appropriately reflects your opinion about the statements below:

	Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree	*Please provide a brief rationale for your choice*
Methods – scientific, technical, and modelling tools – used to generate the results were credible	○	○	○	○	○	
The assessment process/scope is/was broad enough	○	○	○	○	○	
The assessment process is/was all-inclusive in terms of participation	○	○	○	○	○	

The assessment process is/was very transparent	○	○	○	○	○	
The assessment report influenced/will influence our organization's environmental management goals/programs	○	○	○	○	○	

III. POTENTIALS OF REGIONAL ENVIRONMENTAL ASSESSMENT:

A synthesis of literature reveals four key dimensions to successful cross-domain integration in regional environmental assessments. In this section you are asked to indicate your level of agreement with certain statements based on your personal opinion in the regional environmental assessment(s) you were involved with.

Part I

	Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree	*Please provide a brief rationale for your choice*
The regional environmental assessment(s) was/is relevant to my organization	○	○	○	○	○	
The geographic scope of the regional environmental assessment(s) was/is appropriate	○	○	○	○	○	
The assessment is/was well-researched and well-documented	○	○	○	○	○	
The final report of the regional environmental assessment proved to be useful to my organization	○	○	○	○	○	
I trust in the results of the regional environmental assessment process	○	○	○	○	○	
I have better understanding of regional environmental issues through the process	○	○	○	○	○	

My scope of contacts in the domain of environmental assessment expanded as a result of participating in the regional environmental assessment	○	○	○	○	○	
My scope of contacts in the domain of land use planning expanded as a result of participating in the regional environmental assessment	○	○	○	○	○	
My scope of contacts in the domain of policy-making expanded as a result of participating in the regional environmental assessment	○	○	○	○	○	

Part II

	Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree	*Please provide a brief rationale for your choice*
With respect to implementation, the role of my organization was clearly defined in the regional environmental assessment final report	○	○	○	○	○	
My organization has the capacity to carry out its role as defined in the environmental assessment final report	○	○	○	○	○	
My organization has begun to carry out its role	○	○	○	○	○	
The final report of the regional environmental assessment proved to be useful to my organization	○	○	○	○	○	
My organization understands how our role connects with, or supports, the roles of other organizations	○	○	○	○	○	
We know who is responsible to us and who we are responsible to with	○	○	○	○	○	

respect to task implementation						
My scope of contacts in the domain of environmental assessment expanded as a result of participating in the regional environmental assessment	○	○	○	○	○	
We have created or strengthened partnerships internally as a result of the regional environmental assessment	○	○	○	○	○	
We have created or strengthened partnerships externally as a result of the regional environmental assessment	○	○	○	○	○	
Our role overlaps/conflicts with the roles of other organizations	○	○	○	○	○	

Part III

	Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree	*Please provide a brief rationale for your choice*
The success of the regional environmental assessment significantly depends on our organization	○	○	○	○	○	
My organization has equal responsibility as the others in ensuring the success of the regional environmental assessment	○	○	○	○	○	
My organization has little role to play in ensuring the success of the regional environmental assessment	○	○	○	○	○	
Our role is to delegate responsibilities to other agencies	○	○	○	○	○	
Our role in the regional environmental assessment is to enhance the	○	○	○	○	○	

effectiveness of other organizations						
Participating in the regional environmental assessment provides little or no direct benefit to our agency	○	○	○	○	○	
My organization only provides expert advice/support during the process and/or for its implementation	○	○	○	○	○	

Part IV

	Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree	*Please provide a brief rationale for your choice*
Methods and tools provided by our agency were regarded as useful in the regional environmental assessment	○	○	○	○	○	
Methods and tools used in our agency were/are being used in the regional environmental assessment	○	○	○	○	○	
Methods and tools used in our agency are accessible to other agencies	○	○	○	○	○	
Data generated in our agency were regarded as useful in the regional environmental assessment	○	○	○	○	○	
Data generated in our agency were/are being used in the regional environmental assessment	○	○	○	○	○	
Data generated in our agency are accessible to other agencies	○	○	○	○	○	

Kindly list **methods and tools** used in your agency that were/are being contributed to the regional environmental assessment (Please indicate, if none applicable)

Kindly list **data sets** used in your agency that were/are being contributed to the regional environmental assessment (Please indicate, if none applicable)

IV. INFLUENCE OF THE REGIONAL ENVIRONMENTAL ASSESSMENT:

This section asks questions about specific influence of the regional environmental assessment on the activities and operations of your organization.

Please indicate if any of the results or recommendations of the regional environmental assessment have been incorporated into any of the following (tick all that apply):

- ☐ My organization's strategic plans/policies
- ☐ My organization's operational (field level) plans/policies
- ☐ My organization's budgetary plans/policies
- ☐ My organization's sustainability plans/policies
- ☐ Other, please specify _____
- ☐ None of the above

In what other specific ways did the regional environmental assessment affect the mandates and operations of your agency? Please list as many as possible, or please indicate if none.

	Yes	No	*Please elaborate on your response here*
Do you think the outcomes of the regional environmental assessment met with the expectations of your organization as a valuable tool to achieve regional sustainability, or otherwise?	○	○	
Would your answer to the above question be different if your organization has been more involved?	○	○	

	Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree	*Please provide a brief rationale for your choice*
After the regional environmental assessment, the level of interest in your organization has in similar future assessments could be best characterized as:	○	○	○	○	○	

V. INHIBITORS AND FACILITATORS OF CROSS-DOMAIN INTEGRATION

This section asks you to consider what inhibits and what facilitates effective cross-domain integration in regional environmental assessment.

What would you say are the two biggest inhibitors and facilitators of cross-domain integration with respect to the following?

Overall engagement of professional/agency stakeholders (i.e. relevant government and non-government organizations) involved in the regional environmental assessment process:	*Inhibitors*	
	Facilitators	
Your organization's engagement with the other domains (outside your area of expertise) also involved in the regional environmental assessment process:	*Inhibitors*	
	Facilitators	
Exchange of methods and data among various organizations involved in the assessment:	*Inhibitors*	
	Facilitators	
Performing task(s) assigned to your organization during and after the assessment:	*Inhibitors*	
	Facilitators	

Overall implementation of the results and recommendations of the regional environmental assessment:	*Inhibitors*	
	Facilitators	

VI. COMMENTS ON SILO EFFECTS

Silo effects are described as real or perceived understanding of hierarchical, geographical, or expertise boundaries as borders that are difficult to cross or cannot be crossed. It is akin to the epistemic communities described by (Haas 1992:3) as "a network of professionals with recognized expertise and competence in a particular domain and an authoritative claim to policy-relevant knowledge within that domain or issue-area." Keeping in mind this description, kindly provide your answers to the following questions.

1	Do you feel there was a 'silo effect' in the regional environmental assessment that you were involved in? If so, please describe the nature of the 'silo effects' that you observed.
2	Did you or your organization take any steps to address the 'silo effect' that you described? Provide an example or two if you can.
3	Did you perceive other organizations taking steps to address the 'silo effect' that you described? Provide an example or two if you can.
4	What can be done to reduce silo effects among environmental assessment, planning, and policy-making domains, to better support environmental sustainability?

VII. REFLECTIONS AND RECOMMENDATIONS

Kindly provide your answers to the following questions

1	Specifically, if there were just three things that could be done to encourage future success with respect to cross-domain integration in regional environmental assessment, what would those three things be? 1. 2. 3.
2	If you are approached to participate in cross-domain, regional environmental assessment in the future, what do you see as the **pros and cons** for agreeing to participate?
	Pros:
	Cons:
3	Is there anything else you would like to say about the regional environmental assessment process you were involved in and effective cross-domain integration that has not already been addressed?

Thank-you

Thank-you for your participation in this survey. Your time and input are greatly appreciated. Again, your confidentiality and anonymity as a participant are assured. If you have any questions or concerns about the survey, kindly contact the survey administrator at: ayodele.olagunju@usask.ca

APPENDIX 2

INTERVIEW GUIDE

**Conducted over the phone

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CASE STUDY: CROWN MANAGERS' PARTNERSHIP

I. BACKGROUND

1 Please tell me about the work you do, your role in the CMP, and how long you have been involved in the Partnership.

2 At what stage of the Partnership were you or your organization involved and what phase were you/your organization most active?

3 Are the goals of the partnership clear to you or your organization from the beginning?

4 How would you describe your knowledge/experience with respect to the issues of importance in the Crown of the Continent region, especially from regional environmental assessment perspective?

5 Were you aware of any governance arrangement put in place for the Partnership from the beginning? [e.g. in terms of coordination, representation/participation, conflict management, resource management, implementation etc.]

6 Would you agree that all affected and relevant stakeholders were consulted and involved in the Partnership?

2. PROCESS:

1 What is your perception of the decision-making process in terms of objectivity and transparency? [i.e. has any concern/tension been observed among stakeholders/managers, what happened, and how was the situation managed?]

2 Do you think all views were/are being listened to during the process?

3 What is your perception of the scientific or technical studies, including tools and techniques used, for predicting and managing the regional ecosystem? [i.e. are they credible, why or why not?]

4 Has there been any controversy related to the science or management arrangements put in place for any of the assessment approaches that have been/are being proposed by the Partnership e.g. regional CEA, ecosystem health framework etc.? Please explain.

MANAGING OUTCOMES/OUTPUTS:

In a 2002 report prepared by Michael Quinn, Guy Greenaway, Danah Duke, and Tracy Lee, titled: "A Collaborative Approach to Assessing Regional Cumulative Effects in the Transboundary Crown of the Continent," section 7.2 of the report highlights seven "Recommendations for Sustainability and Improvement to the Regional Cumulative Environmental Effects Project." These recommendations are summarized in the table below:

No	Assessments	Specifics
1	Higher Level Support	- a subcommittee to explore the topic further
2	Clear Articulation of Project Goals and Objectives	- a small delegation that would visit participating agencies to discuss and describe the project in more detail
3	Shared Approach to Dedicated Resource Allocation	- the Miistakis Institute, to seek matching contributions from other government and private sector sources
4	Development of Internal Communication Products	- Individual agency representatives should be contacted to develop a list of targets to receive communications pieces
5	Development of External Communication Products	- communicate the ideals and benefits beyond the current participants
6	Monitoring, Feedback and Continuous Improvement	- well-established mechanisms to evaluate the regional CEA framework and outcomes, improvement of the ALCES® model
7.	Explicit Incorporation of Results into Agency Activities	- to use the modeling results in planning exercises; - to use the regional cumulative effects process to provide a better context for the evaluation of local development proposals

1 Which of the assessments are still operational, which are not, and why?

2 Are there any factors or forces that restrict or promote these the implementation of these recommendations? Please briefly explain.

3 Do you feel that other initiatives could have been included? Please give example, if any.

MEASURING OUTCOMES:

1 Who is responsible and accountable for process and implementation success or failure of the CMP assessments?

2 Were there any discussions about the criteria that would be used for evaluating the success of the regional assessments? Any conflicts over what those criteria should be?

3 In your own opinion, have events moved toward or away from the initial goals of the Partnership?

CRITICAL SUCCESS FACTORS:

1 Do you think the Partnership is meeting your expectations of a successful integrated approach to regional environmental assessment and management?

2 In what specific ways has the CMP assessments benefitted the Crown of the Continent regional ecosystem management?

3 Specifically from the governance context, if there were just 3 things that could be done to encourage better performance and future success, what would those 3 things be?

FINAL REMARKS:

1 What is your overall impression of the Partnership in terms of governance?

2 Is there anything else you would like to say about the Partnership processes and implementation arrangements that has not been addressed?

THANK-YOU