

Building Bridges in the Backcountry: A case study of design in the headwaters region of the
Oldman watershed

by

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A Thesis submitted to the Faculty of Graduate Studies
of The University of Manitoba
in partial fulfillment of the requirements of the degree of

MASTER OF NATURAL RESOURCES MANAGEMENT

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Abstract

Increasing pressures on the Eastern Slopes in Southern Alberta are leading to escalated tensions and debates of sustainable public land use, access, and management for the region. This research project was a case study of the bridge building design project initiated by the Crowsnest Pass Quad Squad. The purpose of this research was to investigate the bridge building design process to discover applications that can be taken from this practical design approach to the concept of biocultural design. Opportunities for learning and changed perspectives were also observed through participant observation, interviews, and design workshops as the ATV users seek to mitigate their own impact.

Research findings suggest the importance of a biocultural design team and explicit guiding coordinates, or key values, that will guide the design process the team implements. The bridge building program provides lessons that can be considered in the practice of biocultural design; namely, innovations have led to stronger and more efficient bridges, opportunities for collaboration and participation have yielded platforms for learning to occur, and collective social action has taken place as participants seek to mitigate their impact within the Eastern Slopes.

Acknowledgments

The completion of this thesis has been far too long a process that has challenged me to grow and to continue learning about my research project and about myself. I have certainly made mistakes along the way but it has been through the unwavering support I have received that I am now happy to have completed this thesis.

I would like to thank all those who participated in this research as these individuals shared their knowledge and passion for the wilderness spaces that are Southern Alberta's public lands. Through interviews, opportunities for observation, and invitations to explore and share in the backcountry surrounding the Crowsnest Pass the local community of the region made this research project possible.

I would also like to thank my advisor, Dr. Iain Davidson-Hunt, for his constant support and insightful improvements contributing to this project every step of the way. I have appreciated you and all of the work you have put into this process very much. Also, to my committee members, Dr. John Sinclair and Professor Jean Trottier. Thank you very for your valuable input and questions challenging this thesis to be the best possible product at the end of this journey.

For guidance and support in all things relating to university paper work I also owe a great thank you to the administrative staff at the NRI, for often going beyond the call of duty to help keep tabs on my academic progress and the various documents and approvals needed along the way.

Finally, I thank my friends and family for supporting me through this degree. Particularly I thank my wife, Kathleen, for her love, her support, her patience, and for so often being the motivation that I needed many times along the way.

Table of Contents

1.0 Introduction

1.1 Background.....	1
1.2 Research Purpose and Objectives.....	10
1.3 Methodology.....	11
1.4 Study Significance and Limitations.....	12

2.0 Literature Review

2.1 Biocultural Design.....	13
2.2 Transformative Learning Theory.....	18
2.3 Riparian Areas.....	23
2.4 Ecological Restoration.....	28

3.0 Methods

3.1 Pragmatic Worldview.....	34
3.2 Research Design.....	34
3.3 Strategy of Inquiry.....	35
3.4 Methodology.....	40
3.5 Data Collection	
3.5.1 Semi- Structured Interviews.....	41
3.5.2 Participant Observation.....	43
3.5.3 Design Workshops.....	46
3.5.4 Data Analysis.....	47
3.6 Chapter Conclusion.....	49

4.0 The Eastern Slopes

4.1 Introduction.....	50
4.2 Background.....	50
4.3 Culture of OHV use in the Eastern Slopes.....	57
4.4 Chapter Summary.....	66

5.0 Bridge Building and Design

5.1 Introduction.....	67
5.2 Design.....	67
5.2.1 Inspiration.....	69
5.2.2 Ideation.....	72
5.2.3 Implementation.....	74
5.2.3.1 CPQS Bridges and Innovation.....	75
5.3 Chapter Summary.....	84

6.0 Learning through Design

6.1 Introduction.....	85
6.2 Transformative Learning Theory.....	86
6.2.1 Instrumental Learning.....	87
6.2.2 Communicative Learning.....	92
6.2.3 Transformation.....	96
6.3 Collective Social Action.....	99
6.3.1 Individual Social Action.....	99
6.3.2 Interpersonal Social Action.....	100

6.3.3 Collective Social Action.....	102
6.4 Chapter Summary.....	104
7.0 Conclusions, Discussion, and Recommendations	
7.1 Introduction.....	105
7.2 Discussion of Design.....	106
7.3 CPQS and Biocultural Design.....	111
7.4 Transformative Learning Theory and Collective Social Action.....	114
7.5 Knowledge of riparian health and impact from ATV use.....	117
7.6 Recommendations.....	118
7.7 Concluding Statements.....	121
8.0 References.....	123
9.0 Appendix – Interview Schedule	129

List of Figures

Figure 1.1 Alberta Public Lands.....	2
Figure 1.2 Oldman Watershed in Southern Alberta.....	3
Figure 1.3 Map of Oldman Watershed.....	4
Figure 1.4 What is Riparian.....	5
Figure 4.2 Diagram of Riparian Areas.....	5

List of Tables

Table 3.1 Example of themes, coding, and nodes in Nvivo.....	48
Table 6.1 Instrumental and Communicative Learning Outcomes	87
Table 7.1 Guiding Coordinates for CPQS.....	119

CH.1 Introduction

This research project was a case study of the bridge building design project initiated in Southern Alberta by the Crowsnest Pass Quad Squad (CPQS). The main focus of the research was guided by Brown's (2009) work on the phases of design and the creative process and innovations required by participants during design projects. In analyzing an everyday design process the experience of the CPQS in building bridges and iteratively overcoming obstacles provides ideas for projects that use a biocultural design approach. Another strand in the thesis is an examination of the learning opportunities facilitated through this design process, the learning platforms that have resulted, and the collective social action that has arisen as the result of learning. This first chapter of this thesis outlines the project itself, provides a brief introduction to relevant concepts and literature, and states the purpose and objectives of the research project. It concludes with a brief overview of the methodology, an overview of the study's significance, and a quick nod to some of the limitations of this research.

The Crowsnest Pass Quad Squad (CPQS) is a local recreational ATV (all-terrain vehicle) club based out of Blairmore, AB, located just outside the southern boundary of the Eastern Slopes. The Eastern Slopes are a large stretch of land set aside for public recreational use located just north of the Crowsnest Pass, visible in Figure 1.1 on the following page. The CPQS has been working to mitigate the negative environmental impacts from recreational All-terrain vehicle (ATV) use on public lands in south western Alberta. Their focus, and the focus for this thesis, is upon the damage that ATV's have upon riparian areas and waterways that are so abundant in the mountainous regions where they ride and the current work building bridges on trails to mitigate this impact. Through bridge building efforts, community involvement, and education about safe responsible ATV use the club hopes to improve the ecological health of Alberta's backcountry while maintaining their access to these wild places.

Concerns over proper use for Alberta's public lands have been long debated in the province, and most recently these debates in the Crowsnest Pass have revolved around concerns for water quality of the Oldman River. The Oldman watershed is located in a semi-arid ecosystem that is heavily dependent upon spring melts in the mountains, resulting in the snow-fed headwaters that sustain the Oldman River. This watershed extends from its northernmost point of High River to Crowsnest Pass in the West, just below the Canada/US border in the south, and eastward to Grassy Lake. This provides the Oldman River with a drainage area of just over 26,700 square kilometers ("About the Watershed." Oldman Watershed Council, oldmanwatershed.ca/about-the-watershed, accessed Dec. 14, 2018).

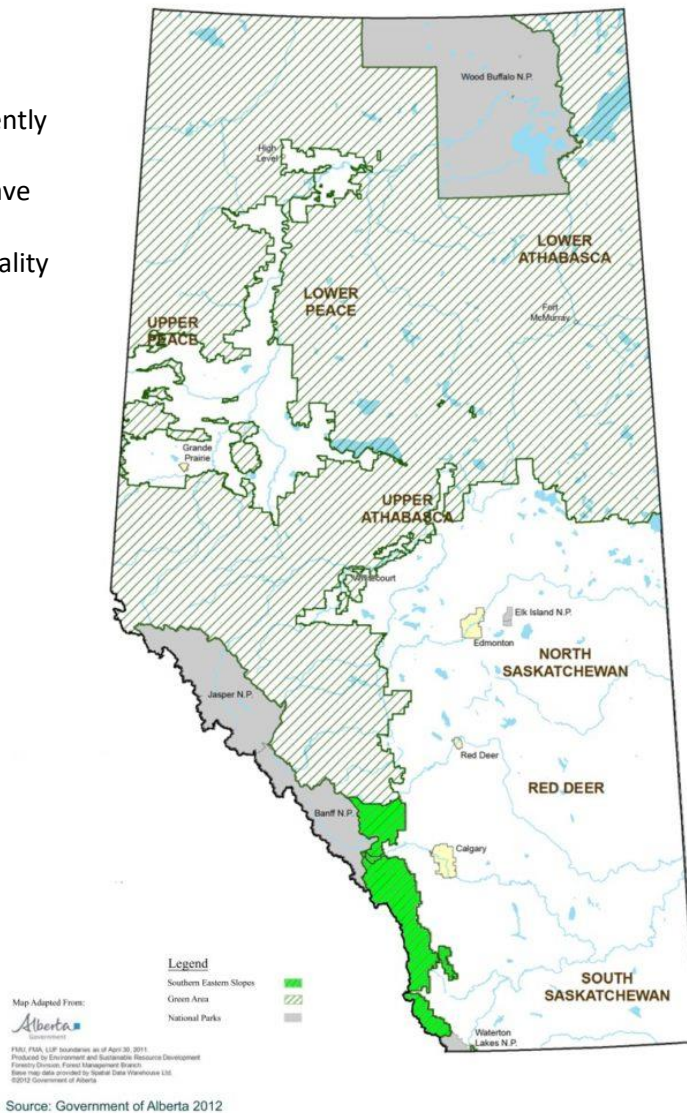


Figure 1.1 Alberta's public lands
<https://cpaws-southernalberta.org/forest-planning-and-management-on-albertas-southern-eastern-slopes/>

The snow-fed headwaters of the Oldman River are the source for much of the destruction that has been bestowed upon this river system. The landscape surrounding these headwaters is a destination hotspot for recreational All-Terrain Vehicles (ATVs) owners and operators. In 2007, the Canadian Off-Highway Vehicle Distributors Council (COHV) reported that in 2005 alone an estimated

\$3.3 billion was spent directly relating to the activities of 975,000 ATVs in the country, and the use of these ATV's was essential for the generation of 123,000 jobs. Roughly 66% of these ATVs were used primarily for recreational activities across the nation (COHV 2007). This massive industry is visibly present in the foothills and mountain passes of the Oldman River headwaters. Although providing an economic boost to the region this concentration of ATV users has had significant detrimental impacts upon the riparian areas of the Oldman headwaters. The impoverishment of the headwaters has impacted riparian life, both terrestrial and aquatic, and threatens the vitality of the entire watershed. Below are two maps of the Oldman Watershed, one which highlights the extent of the Oldman watershed and its placement within Southern Alberta (figure 1.2) and the other which portrays some of the geological variety found across this watershed (figure 1.3)



Figure 1.2 Oldman Watershed in Southern Alberta.

<http://oldmanbasin.org/files/7613/1232/3397/Map.jpg>

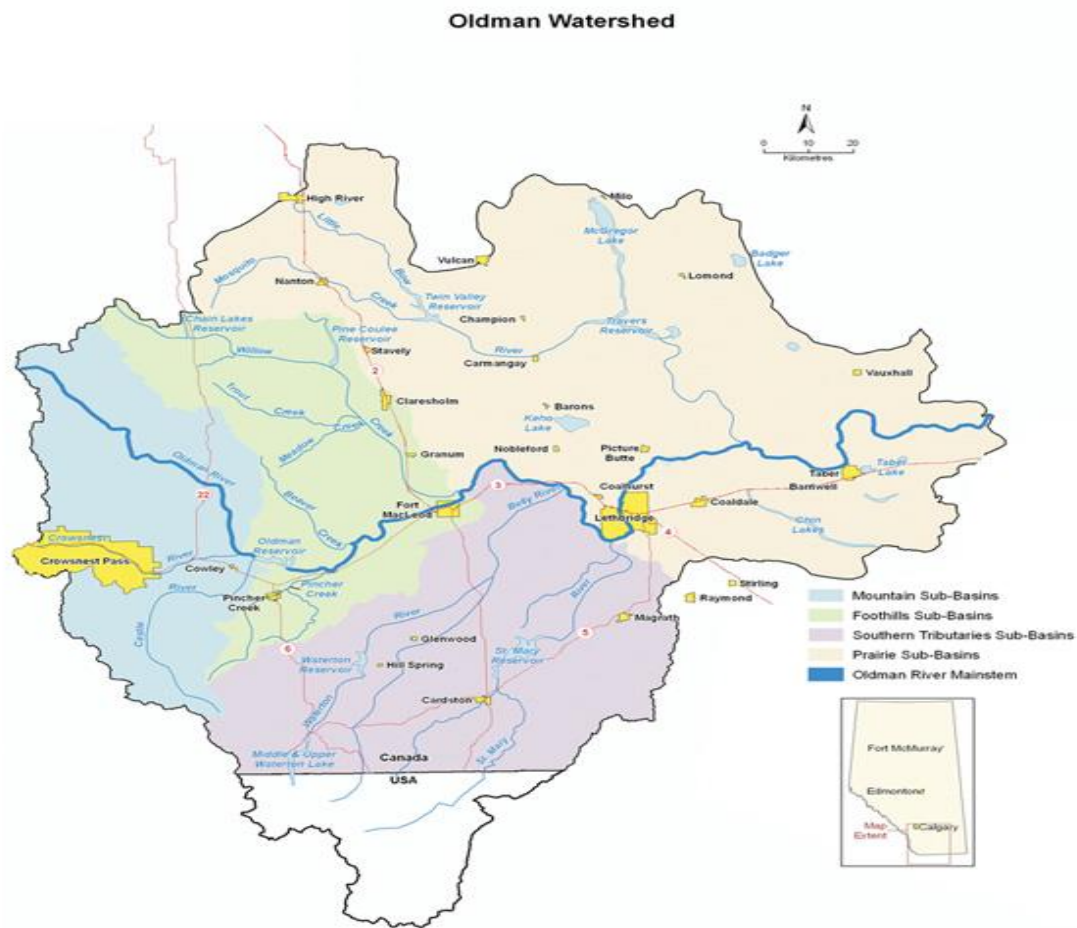


Figure 1.3 Map of the Oldman watershed, including river and stream systems.
http://oldmanbasin.org/files/7613/1232/3432/map_Oldman_subbasin.jpg

Realizing these concerns for the ecological integrity of the region, the negative impact and perception of their sport, and yet entertaining hopes for even greater freedom and access to the Albertan backcountry the CPQS began a design program to address all of these concerns and hopes for the future enjoyment of their sport. This process has resulted in the bridge building program that the club has been managing for nearly 20 years. One of the easiest ways for ATV users to protect the watershed, and even to begin the process of ecological restoration, is simply to stay out of waterways by making use of bridges and recreational infrastructure and to avoid the destruction of the vital riparian areas that surround water systems.

Riparian areas are the “green zones” (Fitch and Ambrose 2003) which surround lakes and wetlands, see figures 1.4 and 1.5 below. These narrow strips of thriving vegetation which border aquatic ecosystems are crucial components of the overall ecological functioning of the environment. Working as natural buffer zones riparian areas ensure the protection of aquatic ecosystems within lakes, streams, and wetlands from possible contaminants draining from the surrounding terrestrial environment. Riparian areas are transition zones which can be used as an indicator of terrestrial and aquatic health, healthy riparian areas are essential to healthy ecosystem health as well as for the social, ecological, and economic benefits which result from the proper ecological functionings of riparian areas (Alberta Water Council 2013).

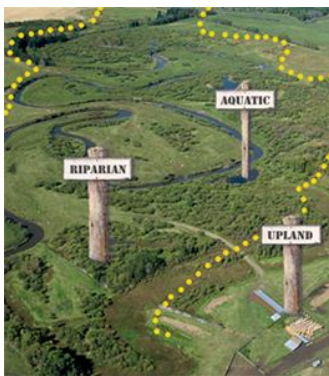


Figure 1.4 What is Riparian?
<http://cowsandfish.org/images/riparian.jpg>

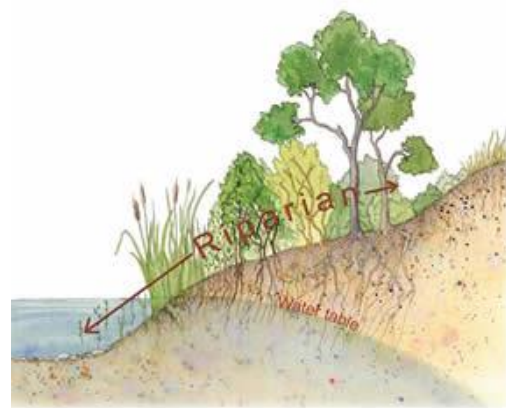


Figure 1.5 Diagram of riparian areas.
<http://cowsandfish.org/riparian/images/crosssectionriparianlowres.jpg>

The benefits from maintaining healthy riparian areas far surpass the fractional representation within the environment that riparian areas actually make up. Despite this minute spatial allocation that riparian zones represent within an ecosystem they provide vital ecological services upon the landscapes they accompany which are far more important than their size would suggest (Fitch and Ambrose 2003). Riparian areas are vital to ecosystems as they maintain human and non-human life through invaluable ecosystem services and ecological functions.

In essence, healthy riparian areas sustain us (Fitch and Ambrose 2003). Valuable social, economic, and ecological opportunities and benefits arise in light of healthy riparian areas. This reality

requires that riparian areas remain healthy and effective in their functionings. It is only when riparian areas remain healthy that they can provide the benefits which are required by human and non-human life alike. As the importance of riparian areas is being realized, so too is the importance for riparian area conservation and management (Seavy et al. 2009). Fitch et al. (2003, pg. 4) claim that only 11% of riparian areas in all of Alberta are completely healthy, 49% are healthy with problems, and 40% are unhealthy. These statistics portray a very poor state of riparian areas within Alberta, and this is one major concern that the CPQS bridge building program is working to rectify. By placing bridges on the various waterway crossings of the established trail system in the Eastern Slopes, and surrounding area, the club is providing an alternative to the destructive activities that have become a defining characteristic for ATV use in the region. These bridges do not ensure that all ATV users will adhere to this healthy alternative and there are still many who fail to realize these concerns. They give priority to their own enjoyment of riding directly through waterways and riparian areas over the ecological health of the region. In spite of this, bridges provide the basis for an ongoing effort towards the ecological restoration of the Eastern Slopes. The Society for Ecological Restoration (SER) defines ecological restoration as, "the process of assisting the recovery of an ecosystem that has been damaged, degraded, or destroyed (SER 2004)". The definition provided by SER has been broadened to describe ecological restoration as an attempt to mediate past mistakes and to re-establish the ecological integrity of an ecosystem, while protecting human interests (Kim and Hjerpe 2011). This understanding places ecological restoration at the feet of humanity as it is through anthropogenic action that ecosystems can be recovered, while also making the implicit reference to human actions of the past as having necessitated the need for restoration in the first place. The fundamental assumption of ecological restoration is that humanity is ultimately responsible for the environmental degradation and damage that we are witnessing today, but there is hope here too. Just as humanity is responsible for destruction

there is an equal realization within ecological restoration that humanity has the responsibility to answer for past mistakes (Egan et al. 2011).

Restoration practices have taken many forms throughout the years, but recent literature is suggesting that the process of restoration can result in no real positive change without the involvement of local populations (Reyes 2011). Without local participation changes can only occur at a superficial level as the root of the problem lies unaltered and unaddressed. To bring about positive, sustainable change for the future people must buy in to the efforts, and realize the need for change. This is the only way to repair impaired and impoverished ecosystems as a whole (Reyes 2011). This is, however, easier said than done. Ecological restoration is a complex, long and frustrating endeavor which requires patience and dedication to the process (Clewett and Aronson 2013). The involvement of many groups and individual actors within the process requires mass cooperation and understanding from all participants involved that is not easily achieved, and yet it is through this process that ecological restoration provides a hope for a sustainable future through the collective efforts of those willing to participate (Egan et al. 2011).

This need for cooperation has become clear to those actively engaged in protecting and maintaining the Eastern Slopes. Through their bridge building initiative the CPQS has been making partnerships, agreements, and alliances with other recreational clubs, government agencies, and environmental organizations in order to increase their scope and positive impact in the region. One of these important connections was with the Oldman Watershed Council (OWC), a not-for-profit organization working in cooperation with communities and residents to improve the Oldman watershed. The OWC is based in Lethbridge, Alberta, and was established in September of 2004 through the merger of the Oldman River Basin Water Quality Initiative and the Oldman Basin Advisory Council. Since this time the OWC has worked to maintain and improve the Oldman watershed through partnerships,

knowledge, and the implementation and integration of sustainable water management and land use practices (Alberta Agriculture and Rural Development 2015).

In response to the need for the protection of these headwaters the OWC initiated the Headwaters Action Plan (HAP) in 2012. The goal of this program is to maintain and protect the headwaters, the source of water for the entire Oldman watershed basin as well as many other river systems downstream across the prairies. The HAP process moved through several steps before its official launch. The first step was a scientific assessment of the state of the headwaters which allowed the OWC to identify the issues within the headwaters, confirm local knowledge, and educate both the OWC and the general public upon the state of the watershed. This knowledge was then used as a basis for 17 community meetings to again assess local knowledge and willingness to participate in restoration activities. These meetings resulted in the formation of the Partnership Advisory Network, a panel of local stakeholders interested in advancing stewardship action for the headwaters. This network has been fundamental in producing action plans for assessing the health of the headwaters. The plans developed by this network underwent public review and secondary revisions before initiation of the project, in the summer of 2015. Recommendations by the PAN for assessing headwaters health include initiatives to determine where native populations of fish are within the headwaters, develop an engagement and education program in relation to the health of the watershed, and to explore options for recreational ATV user fees to help fund enforcement, education, and stewardship programs within the headwaters (OWC website).

This pilot project was initiated by the OWC in 2015 and served as an aid for this study by providing greater context for ATV use in the Eastern Slopes in the form of the Engaging Recreationists Report (2015), developed based on the study's findings. My opportunity to work as an Outreach Assistant for the OWC in this endeavor was an important aspect for my study of OHV culture in the

Eastern slopes in relation to this research project. While investigating the bridge building design process of the CPQS, working alongside the OWC program in the headwaters provided the opportunity to observe ATV users in the region and hear from them about their concerns, appreciation, and value for the region. This collaboration with the OWC provided valuable insight to the ecological condition of the Eastern Slopes and the strong ties that people have made with this region regardless of the specific recreational use they enjoy in these wilderness spaces. The findings from the OWC report, *Engaging Recreationists* (2015), will be studied more in-depth later on in this thesis.

It is important here to again reiterate that the bridge building design project of the CPQS is not an ongoing biocultural design project. Yet, this design project does provide valuable insights towards the conceptual framework of biocultural design and applications for future biocultural design projects. Biocultural design is “an intentional, collective, and collaborative process by which individuals with a diversity of knowledge and skill sets engage in a creative process of designing products and or services (Davidson-Hunt et al. 2012). This framework is founded on the premise that people are agents of creativity who have at their disposal capabilities of knowledge, values, and skills which allow them to shape their own lives (Davidson-Hunt et al. 2012). The goal of this process is to utilize design thinking so as to facilitate endogenous approaches to innovations rooted in the materials, values, and creativity of Indigenous and rural communities working towards sustainable livelihoods (Davidson-Hunt et al. 2012). Biocultural design is thus an approach which supports individuals as they draw upon the capacities and creativity available to them. This framework complements the ecological restoration of the headwaters very well as biocultural design inherently encourages the participation, interaction, and engagement of participants with different values, knowledge, and skill sets. This collaborative process reflects the call for community participation that is emerging within ecological restoration literature (Reyes 2011), as well as the call towards collective social action that has become apparent through the bridge building efforts of the CPQS.

Another objective of this research project was to observe and document learning opportunities as presented to participants. Learning was investigated through the theoretical framework of Transformative Learning Theory (TLT). This type of individual transformative learning occurs based on participant's reflecting upon their own capabilities and coming to deeper understandings of meaning (Mezirow 2008). A learning approach to natural resource management allows researchers to treat all interventions as learning processes through the interactions between people and the environment (Keen and Mahanty 2006). I will draw upon TLT and will use the example of the CPQS to investigate the critique that the learning theory does not provide adequate linkages to collective action, this thesis considers whether bridge building could be considered a collective action outcome of transformative learning by members of the CPQS.

Research Purpose and Objectives

The primary purpose for this research project was to investigate and engage in the locally based process of design embedded within the bridge building projects of the CPQS. The process of bridge building design undertaken by the CPQS provided a case that could be analyzed through a frame derived from key concepts of biocultural design and transformative learning theory. The specific objectives for this study were to:

- Document the bridge building programme of the CPQS
- Identify learning and collective action that occurred through the bridge building programme

Methodology

The bridge building design process of the CPQS was selected for instrumental reasons as it was a location with which I was familiar and because an opportunity emerged for an internship with the OWC to actively engage with ATV recreationists in the region. Other relevant criteria for the selection of the bridge building programme became apparent as I started to work with CPQS and learned more about their design process. The bridge building fit criteria from biocultural design in that it was initiated by the group themselves, drew upon knowledge, skills and values of the group, and utilized, in the beginning primarily local materials.

This research project used a qualitative research approach and was designed as an instrumental case study. The methodology for this study was defined in reference to the biocultural design framework mentioned above. Data collected for this thesis was primarily obtained through semi-structured interviews. These interviews were utilized so as to gain a greater understanding of the bridge building design history and current practices as well as to document participant perceptions, values, meanings, and local knowledge of riparian areas. Interviews were also used to identify instances of learning outcomes as they were made relevant through the design process. Participant observation was also used, providing a valuable tool for establishing relationships with participants, a means for obtaining information about recreational activities and practices in the Eastern Slopes, as well as for obtaining data from public engagement and educational events. The interactions between participants themselves or with community members were observed during any bridge or trail maintenance and construction days that I could attend. These work days took place within the Eastern Slopes and the mountainous region surrounding the Crowsnest Pass, bringing volunteers from the CPQS, other recreational groups, government employees, as well as interested community members. Participant observation also was a valuable tool for simply observing the OHV culture within the Eastern Slopes

while camping in the region in order to complete a survey with recreationists as part of my internship with the OWC. This provided firsthand experience witnessing the recreation and some of the remote wilderness locations that participants spoke of so highly.

Study Significance and Limitations

This research project contributes to current literature pertaining to biocultural design, transformative learning theory, as well as the importance of public engagement and education in relation to issues of natural resource management. This study sought to investigate and identify learning as it occurred in all of its forms within the CPQS as well as public participants involved in the bridge building design project. Of particular interest were the instances of interaction between individual transformative learning and the resulting collective social action. This research study also provides a practical investigation of design practice focusing on participation of users within the design team and process; a key component of biocultural design.

One primary limitation of this study was the fact that the CPQS had been building bridges to mitigate their own impact for many years already. This study was only able to take an in depth look at design from the perspective of current participants and their understanding of earlier phases of the bridge building programme. It would have been very interesting to have firsthand knowledge and observation of the earliest stages of this project's design phases. While limited on first hand knowledge of the initial phase of bridge building, the current participants were able to share how the techniques, materials, and collaborative processes have changed over time.

Chapter 2: Literature Review

This chapter will hold all relevant literature review that the research and writing of this thesis relied upon. Concepts of biocultural design and transformative learning theory hold a place of primary significance as these two concepts are directly related to the objectives for this research, as defined in the previous chapter. Also included within this literature review are sections pertaining to riparian areas and ecological restoration. Riparian areas have a fundamental place within this literature review as it is these spaces that the CPQS is working most to protect through their bridge building project. Riparian areas place a fundamental role in maintaining clean and healthy waterways and aquatic ecosystems. Ecological restoration also is developed within this chapter as the restoration of the Eastern Slopes was a driving factor leading the CPQS to realize the need and to invest themselves in the bridge building work to mitigate their own impact, improve perceptions of ATV use, and increase their own access to the backcountry.

Biocultural Design

This study of the bridge building design project by the CPQS was investigated through the conceptual framework of biocultural design developed by Davidson-Hunt et al. (2012). The basic premise of biocultural design is that “people are creative agents with knowledge, values, and skills that allow them to shape their everyday lives (Davidson-Hunt et al. 2012, pg. 9)”. As such, the goal of biocultural design is to utilize design thinking so as to propose an endogenous approach to innovations rooted in the materials, values, and creativity of local communities as they endeavor towards sustainable livelihoods. As defined in the work of Apgar et al. (2011, pg. 557) “endogenous development is an approach that takes place complementary to the ongoing global processes, and can thus be seen as an effort to bring together global and local knowledge”. As such this development is not

simply an examination of local or indigenous knowledge and management practices, but a means to coordinate this rural knowledge with the larger management knowledge of governance institutions and government.

Biocultural design is a framework informed through concepts of biocultural diversity and heritage, as well as a design thinking approach applied to innovation. The intention of this design process is to provide local communities with the opportunity to pursue aspirations of self-determination and endogenous development so as to explicitly meet the needs and objectives of each community (Davidson-Hunt et al. 2012). Historically, and often still predominantly, approaches to development have limited rural regions as simply sources for natural resources, labor, and environmental services (Davidson-Hunt et al. 2012). This perception results only in disenfranchised populations and diminished environments. As such, many indigenous and local rural communities have begun to propose alternatives to this destructive perception. These alternatives are rooted in the distinct cultural identities of the communities and seek claims for greater local control over land, identity, and development for the future (Davidson-Hunt et al. 2012). Davidson-Hunt and colleagues propose biocultural design as a framework through which this endogenous development can be realized. Biocultural design is “an intentional, collective, and collaborative process by which individuals with a diversity of knowledge and skill sets engage in a creative process of designing products and/or services (Davidson-Hunt et al. 2012, pg. 9).”

The conceptualization of biocultural diversity draws from a number of disciplinary roots, always maintaining an investigation of the relationships between biological, linguistic, and cultural diversity (Davidson-Hunt et al. 2012). Biocultural diversity originates as a metric through which to compare these interacting facets over measures of time and space. It was in this comparison that the correlations of decline between biodiversity, language, and culture were first realized. The loss of biodiversity as the

natural world has degraded has been accompanied by a loss of biocultural human diversity (Apgar et al. 2011). Through exercises of mapping it became apparent that instances of biocultural “hot spots”, areas rich in biological as well as linguistic and cultural diversity, were seen to be located within indigenous regions (Davidson-Hunt et al. 2012). As such it would appear that indigenous and endogenous means of development and management have a significant impact upon preserving biocultural diversity (Apgar et al. 2011). This biocultural diversity is strongly linked to notions of biocultural heritage. Biocultural heritage refers to the knowledge, innovations, and practices of indigenous or local communities which are linked to traditional resources, territories, local economies, as well as the diversity of genes, species, ecosystems, and cultural or spiritual values (Davidson-Hunt et al. 2012). It is the mobilization of this heritage which provides indigenous and rural communities with the means of innovation to achieve self-determination (Davidson-Hunt et al. 2012). The innovation and actualization of biocultural heritage may provide rural communities with economic opportunities that can be justified with goals of social, ecological, and cultural as well. Economic development, when brought about in relation to all of the goals of the local community, does not have to provide a threatening situation to biological, cultural, or linguistic diversity.

Design is the process by which an idea is conceived, then given a structure and form (Davidson-Hunt et al. 2012). However, design may also become a practice of inquiry and action that includes both creativity in the production of new ideas and innovation as a means to make those ideas into reality (Buchanan 2001). Design is also understood as a way of being and doing that brings together networks of material and people into an intentional exercise of creative agency to respond to the changing environments that create design challenges (Nelson and Stolterman 2002). Design aims to create a particular working solution using available capital in all its forms (financial, social, ecological, etc.). But, perhaps design is not simply about producing solutions. Design also provides the opportunity for the facilitation of capabilities and functionings of people within diverse societies as they participate in

processes of design together (Oosterlaken 2009). This understanding largely draws from the writings and capability approach produced by Amartya Sen (1999). For Sen (1999, pg. 3) development is “a process of expanding the real freedoms people enjoy” and that this freedom occurs as people expand their own capabilities to pursue the types of lives that they have reason to value. Within this capability approach to development is the realization that human life is surrounded by the existence of immense human diversity. Each individual, family, and community is engrained in this social context of boundless possibilities (Oosterlaken 2009). Capabilities thus encompass all the possibilities of what one’s life could entail (what one could be being and doing), while functionings are the actual realities of life (that actual being and doing of an individual based on their life decisions) (Oosterlaken 2009). As new functionings are encountered, new capabilities become available as well (Davidson-Hunt et al. 2009).

With this understanding of a capability approach and of processes of design individuals and human agency can be realized as the starting point of the entire process, centrally endowed beings who act as aspects within a complex social network (Davidson-Hunt et al. 2012). Human beings are all gifted with capacities and the ways in which they act upon these capacities determine the functionings which are present within their life. The ways in which individuals act upon their capacities are largely guided by social and cultural factors (Davidson-Hunt et al. 2012). The goal of this capacity approach to design is then to support individuals as they draw on the capacities available to them so as to improve their functionings for the future (Davidson-Hunt 2012).

Biocultural design relies upon the formation of a biocultural design team (Davidson-Hunt et al. 2012). This team is composed of individuals who hold relevant knowledge to the particular design challenge and are familiar with concepts of place based learning and communities of practice. One of the primary advantages to this design team is that a variety of individuals can be utilized with diverse skill sets and wide ranges of knowledge relating to the design challenge (Davidson-Hunt et al. 2012).

This “plurality of knowledge enhances the creative process of the team” (Davidson-Hunt et al. 2012, pg. 13). Each member of this team will bring different capabilities and values to the design process, the success of the team facilitator will rely upon their ability to bring together the participants required for the kinds of partnerships and networks that can produce products or services that can meet the goals of the group for the present and the future (Davidson-Hunt et al. 2012). It is through this intentional engagement with challenges of design that the process of biocultural design can facilitate the creation of products or services which will meet the values, needs, and desires of communities through the use of biocultural heritage and endogenous innovation.

Tim Brown (2009) talks about the design process as being best described metaphorically as a system of overlapping spaces, as opposed to a specific series of steps. These spaces of design are different stages in the process which make use of and facilitate different sorts of activities, which as a whole make up the continuum of design. Once a design brief has been established, a concise document establishing the aim and boundaries of a design project, the design project is begun (Brown, 2009). Design projects involve three spaces that all design processes must pass through. The first space is that of Inspiration. This space involves the circumstances, whether they are a problem or an opportunity, which motivate the search for solutions or new interpretations. Secondly, design must pass through Ideation. It is here that the process of generating, developing, and testing ideas towards solutions is undergone. Finally, processes of design must pass through Implementation, which is the charting of paths towards a market with the solutions that have been developed and can now be utilized. Projects of design will ultimately loop back through each of these spaces multiple times, particularly the first two spaces, before a solution can be found (Brown 2009).

With this understanding of the different spaces of design, this research project was somewhat limited to the spaces of Ideation and Implementation. The project initiated by the CPQS in the

headwaters of the Oldman River is an endeavor that has already stretched over a nearly 20 year span, developing from inspiration, to ideation, and currently implementation as bridges have been installed as the response to environmental damage and the hope for increased sustainable access for the future. This research project was a study of a design project that has very much left its infancy and the design room behind to be tested in the real world setting of a challenging dilemma that has been realized by the CPQS.

Transformative Learning Theory

Transformative learning theory has been greatly influenced and expanded since its inception through an abundance of academic works produced by a variety of scholars. Yet, one of these scholars influencing the theory has established himself within this literature so fully as to almost make the theory his own (Howie and Bagnall 2013). This scholar is Jack Mezirow, and it was he who first introduced the theory of transformative learning (at the time termed perspective transformation) back in 1978 (Howie and Bagnall 2013). Throughout the design project of the CPQS Transformative learning theory was used as the lens through which learning was observed in all its forms.

This above mentioned article from Mezirow (1978), which first introduced the concept of transformative learning, sought to stimulate educational processes to recognize the critical dimension of learning that becomes available in adulthood through which individuals are able to reassess their structure of assumptions and expectations used to frame thoughts, feelings, and actions (Mezirow 2008). The reflective nature of transformative learning theory is based on the statement from Mezirow that there are no fixed truths or totally definitive articles of knowledge (Mezirow 2012). The human condition can best be understood as a continuous effort to negotiate contested meanings and to find our own individual interpretations based on this reflection. In this rapidly changing world

interpretations and opinions are constantly being called into question by those critically reflecting upon their values and actions. Those interpretations which perhaps served us as children can no longer adequately fulfill this role (Mezirow 2012). In adulthood we are more clearly able to understand our own experiences and know under what specific conditions a belief is true or justified. Within this framework from Mezirow, learning is understood as the process of using a prior interpretation to construe a new or revised interpretation of an experience to be used as a guide for future action (Mezirow 2012). The emphasis from this theory is upon how we learn to negotiate and act upon our own purposes, values, feelings, and meanings rather than simply continuing to accept those we have uncritically, and perhaps unknowingly, assimilated from those around us. The goal is to gain greater control over our own lives as socially responsible autonomous decision makers (Mezirow 2012). Mezirow admits that this can be an “intensely threatening emotional experience” (Mezirow 2012, pg. 75) as we become aware of both the assumptions buttressing our own ideas as well as those involved in supporting our emotional responses when we realize a change must occur. Mezirow claims that these changes are made to our individual frames of reference.

Frames of reference “are the structures of culture and language through which we construe meaning by attributing coherence and significance to our experience. They selectively shape and delimit our perception, cognition, and feelings by predisposing our intentions, beliefs, expectations, and purposes (Mezirow 2008, pg.27)”. These frames of reference are composed of two parts: habits of mind and points of view. Habits of mind are the broad sweeping abstract notions which orient our ways of being and thinking. Points of view are the resulting actions based on our habit of mind (Mezirow 2008). Each person’s values and sense of self are anchored directly within their individual frames of reference. They provide us with stability and identity, as such these frames are often emotionally charged and strongly defended (Mezirow 2012).

Learning occurs in four ways: by elaborating existing frames of reference; by learning new frames of reference; by transforming points of view' or; by transforming habits of mind (Mezirow 2012). Learning transformations may occur in a sudden and dramatic reorienting fashion, termed epochal transformations, or changes may involve a more progressive series of transformations happening slowly over time to points of view which eventually culminate in a transformed habit of mind, incremental transformations (Mezirow 2012). However these transformations occur, within this theory Mezirow remains consistent that a mindful transformative learning experience requires that the learner make an informed and reflective decision to act on his or her own reflective insight, learning does not happen without critical reflection (Mezirow 2012). This type of reflection, resulting in an intellectual and emotional grasp of a particular frame of reference, results in a willingness and openness of mind which allows individuals to become aware of, accept, and act upon other frames of reference. This type of reflective maturity allows individuals to view the same experience from a variety of points of view and see that actions and feelings depend upon the perspective through which they occur (Mezirow 2012).

Mezirow develops two different types of learning within transformative learning theory: communicative learning and instrumental learning. Habermas (1984) makes the important distinction between these two strains of learning, and this distinction is maintained in transformative learning theory. Instrumental learning is that which pertains to controlling or manipulating the environment (Mezirow 2008), this is task oriented problem solving learning in order to improve performance (Mezirow 2012). Instrumental learning is skill based and can be empirically tested for validity (Mezirow 2008). Communicative learning, on the other hand, pertains to understanding what someone means when they communicate with you, verbally or non-verbally such as through art, dance, or music (Mezirow 2008). This type of learning delves into the realm of feelings, intuition, values, or moral issues and requires an assessment of meaning behind the words (Mezirow 2012). Within this type of learning in order to ensure validity of the learning individuals must be critically reflective not only of what is

being learned but also the assumptions, intent, qualifications, and truthfulness of the person communicating that learning (Mezirow 2012, Mezirow 2008).

Habermas (1984) claims that discourse leading to consensus can establish the validity of belief. Mezirow uses the terms communicative (2008) and rational (2012) discourse as a means by establishing validity through communicative learning. This rational discourse is not an assessment of a truth claim which can be tested, as in instrumental learning, but is rather a basis for forming a “best judgement” (Mezirow 2008, pg.25). In order to achieve this best judgement it is necessary to understand, intellectually and empathetically, all of the frames of reference present within the dialogue. The effort is to seek consensus, a goal that can only be achieved when a basic understanding of the different perspectives is established, or at the very least an understanding of the contexts for disagreement (Mezirow 2008). The depth of reflection involved within this type of discourse requires an “emotional maturity” (Mezirow 2012, pg.79) as this is not simply a debate presenting polarized opinions of an issue. Discourse is not about winning or losing, it fundamentally requires an attempt at agreement, a welcoming of differences, and being willing to accept and make use of other’s perspectives and points of view (Mezirow 2012).

Habermas developed a number of optimal conditions for human learning and education, Mezirow makes use of these conditions as a basis for participants to freely and fully engage in rational discourse. These conditions are as follows (Mezirow 2008, pg. 25-26):

- Have accurate and complete information;
- Be free from coercion, distorting self deception or immobilizing anxiety;
- Be open to alternative points of view – empathic, caring about how other think and feel, withholding judgement;
- Be able to understand, to weigh evidence and to assess arguments objectively;

- Be able to become aware of the context of ideas and critically reflect on assumptions, including your own;
- Have equal opportunity to participate in the various roles of discourse;
- Have a test of validity until new perspectives, evidence or arguments are encountered and validated through discourse as yielding a better judgement.

These conditions provide an idealistic principle through which individuals could participate in discourse and ultimately reach consensus (Mezirow 2012). That being said, Mezirow goes on to admit that these ideals are never fully realized in practice, but they provide the framework for the goals that educators and managers should strive for in facilitating transformative learning. This

Mezirow (2012, pg. 76) defines transformative learning as, “the process by which we transform our taken-for-granted frames of reference ... to make them more inclusive, discriminating, open, emotionally capable of change, and reflective so that they may generate beliefs and opinions that will prove more true or justified to guide action.” This understanding of transformative learning requires that individuals participate and interact so as to use the experiences frames of reference of others to assess assumptions and make decisions based on the communal insight. As such, Transformative learning, along with the ideal conditions for discourse, provide a very fine complementation to the framework for any design project.

One of the most ongoing criticisms of TLT is the claim that Mezirow failed to sufficiently acknowledge through this learning theory the link between learning and action (Collard and Law 1989, Cranton 2006). Transformative learning is often critiqued particularly for underemphasizing the role of collective social action. Transformative learning is an individualistic approach to learning that emphasizes the role of critical reflection and the production of new frames of reference (Mezirow 2012). Collard and Law (1989) provided the first vocalization of this critique to transformative learning and

resulting collective action as they claimed the need for social action to be the primary goal of any transformative or emancipatory learning experience. Mezirow (1989) provided the response that indeed social action may be a happy outcome of transformative learning but that it is not the only, or the primary, goal of this individual learning. The central concept of transformative learning is the role that individual meaning construction plays within learning and education (Mezirow 1989). Aiding this defense for the theory recent studies involving TLT have been strengthening the direct link of individual reflection leading to collective social action (Moyer et. Al 2016) and this linkage of individual learning and collective action was again made present in this study of the CPQS bridge building design project appearing to concur with and validate these claims.

Riparian Areas

In order to effectively discuss many aspects which were important components for this study it is important to first come to an understanding of the riparian areas which provided the basis for the CPQS to begin their design project in the first place. Fitch and Ambrose (2003) refer to riparian areas as the “green zones” (foreword pg. iii) which surround lake and wetlands, they are the “emerald threads of vegetation that border rivers and streams and the lush fringe in valleys (pg. 4)”. These emerald threads provide valuable service for both human and non-human life in the environment and it was the health of the Oldman watershed and the overarching Eastern Slopes that caused the CPQS to seek solutions removing ATV’s from these valuable ecological areas.

Riparian areas are inherently transitional, they exist between the surface waters of a river, stream, or lake and the drier uplands (Fitch and Ambrose 2003). This transitional nature works to reflect and accumulate inputs, impacts, and changes occurring within both riparian and upland areas (Clare and Sass 2012). These impacts and inputs vary greatly from one environment to the next and each individual

riparian area will appear slightly different than another. This variation has produced a variety of ecosystems, with varying names, that are in reality all riparian areas in one form or another. Fitch and Ambrose (2003) explain the distinction between lentic riparian areas – the green zones around still water systems such as lakes and wetlands – and lotic riparian areas – the emerald threads of vegetation which accompany flowing water systems like streams and rivers. Yet, throughout this variation of appearance what is common to all riparian areas is the interaction of water, soil, and vegetation (Fitch and Ambrose 2003), and it is precisely from the interaction of these three vital and dynamic factors that the services, functions, and values of riparian areas stems.

Despite the relatively small fraction of space that riparian areas represent in an environment these lush green zones are key functional aspects of the landscape they accompany (Fitch and Ambrose 2003). Riparian areas act as environmental buffers, they are the edge and the border between upland and aquatic zones acting to protect aquatic life and water quality from possible contaminants travelling down off of the uplands (Fitch et al. 2003). Aside from this essential buffering function provided by riparian areas, these portions of the environment also provide other essential ecosystem services and valuable functions for both human and non-human life. Just to name a few of these services, riparian areas provide the opportunity to fish, graze livestock, provide shelter, provide access to clean and clear water, ensure a strong and resilient water supply, provide a source of habitat for fish and wildlife, increase property value through aesthetics, and provide an attractive environment for recreation (Fitch and Ambrose 2003, pg. 10-11). These valuable benefits of riparian areas largely produced through the key ecological functionings that healthy riparian areas actively participate in. These key ecological functions, as determined by Fitch and Ambrose (2003, pg. 8-9) are provided below:

1. Trap and store sediment – through the capture of sediment, soil is built up in healthy riparian areas. This increased volume of soil enhances the capacity of riparian areas to absorb and retain moisture for future dry seasons.
2. Build and maintain stream banks and shorelines – the erosion which occurs through natural processes of stream flow are balanced as riparian areas produce soil through sediment capture.
3. Store water and energy – healthy riparian areas provide a watershed safety valve by trapping and storing enormous volumes of water during flood periods. This reduces flood damage to uplands and the riparian area itself by slowing water flow and reducing erosion.
4. Recharge aquifers – riparian areas store and slowly release water, maintaining a high, and stable, water table.
5. Filter and buffer water – riparian areas work to filter contaminants, nutrients, and pathogens before water quality can be reduced.
6. Reduce and dissipate energy – healthy stream banks and vegetation help to reduce water velocity, reducing erosion and sediment transport.
7. Maintain Biodiversity – habitat for fish, wildlife, invertebrates, and plants is produced and maintained within healthy riparian areas. Connectivity of riparian areas also provides corridors for species movement between habitats and dispersal processes.
8. Create Primary Productivity – vegetation diversity and aged environmental structures creates links to other riparian functions, such as high forage and shelter values of heavily vegetated riparian areas.

In essence, healthy riparian areas sustain us (Fitch and Ambrose 2003). This is especially visible in relation to abilities for storing, filtering, and buffering water as well as ecological values of increased

biodiversity and habitat creation. Riparian lands enrich the quality of human life through spiritual, aesthetic, and cultural connections to the natural environment (Clare and Sass 2012). Valuable social, economic, and ecological opportunities and benefits arise in light of healthy riparian areas, but this requires that riparian areas remain healthy and effective in their functionings. Healthy, well-functioning riparian areas are much more resilient when facing environmental stressors and natural or human disturbances (Clare and Sass 2012). Sustaining future human and environment health will require healthy riparian areas and the restoration of many riparian habitats that have dramatically declined in health and number (Fitch and Ambrose 2003). This effort of riparian restoration requires significant input and commitment from individual actors, but ultimately this process of maintaining or restoring a riparian area, and the larger watershed associated with this area, has to be an integrated collection of individual efforts (Fitch and Ambrose 2003).

This collective effort has been recognized and implemented by the Izaak Walton League of America (IWLA) since its inception in 1922. This organization began with 54 sportsmen and conservationists who were concerned about the degrading water quality, and resulting fish populations, in the top fishing streams within the United States (Middleton 2001). The mission of this organization has been to combat water pollution and other environmental abuses. From the very beginning this organization, composed of over 50,000 members associated with 350 local chapters across the US (Middleton 2001), recognized that the protection and conservation of natural resources called for broad based citizen education and participation in order to be successful. This recognition is made visible in the Save Our Streams (SOS) program, initiated in 1969 by the IWLA as a means to involve citizens in the monitoring and enhancement of freshwater streams across the nation (Middleton 2001). The goal of this program is to aid communities in achieving sustainable water resources through education and technical support. This is done through the creation of “citizen stewards” (Middleton 2001, pg. 293) who are local participants who gain knowledge about stream conservation so as to pursue more

sustainable futures of resource use. The SOS program recognizes the vital role that each individual plays in the recovery of stream systems and their correlating riparian areas (Middleton 2001). This important role of local participants can only be realized when actions are taken to facilitate the cooperation of professional and scientific communities with the knowledge and momentum for conservation from local people, the SOS program works to encourage this interaction by translating the technical scientific jargon into terms that the local community can understand, appreciate, and find accessible enough to encourage participation (Middleton 2001).

The importance of riparian areas is being realized as research proves the worth of these socially and ecologically significant environments, solidifying the need for managing and conserving these spaces. Yet, over the next century impacts from climate change are expected to drastically alter processes and expectations of natural resource management (Seavy et al. 2009). Riparian area restoration may provide ecological systems with the capacities to counter the threats of global climate change (Seavy et al. 2009). Riparian systems are naturally resilient, provide habitat connectivity, link aquatic and terrestrial ecosystems, and create thermal refuges for fish and wildlife (Fitch and Ambrose 2003, Seavy et al. 2009). These inherent characteristics of healthy riparian areas all contribute to a systems adaptive capacity in responding to environmental changes, including changes to climate. Society is becoming more aware of the need for mitigation and adaptation for addressing adverse impacts of climate changes (Seavey et al. 2009). Seavy et al. (2009) reference the need for this adaptive capacity particularly in relation to climate change but this resilience is beneficial for ecological, and societal, systems in response to impacts from much more broadly defined sources of change as well. Healthy riparian areas are important for situating ecological resilience not only within the riparian area, but in larger ecosystems as well Seavy et al. (2009).

Riparian areas are important components of landscapes, providing social, ecological, and economic benefits (Clare and Sass 2012). These areas are simply too important, too productive, and too valuable to go unrecognized and unmanaged (Fitch et al. 2003). These strong callings for riparian management are the driving force for this research as it was this very call that necessitated the need for the CPQS to remove themselves and their ATV's from valuable ecologically sensitive spaces. The design process of the club encourages endogenous innovation towards the problem of degrading riparian health and also encourages the collective interaction of many participants and actors as is required for effective riparian restoration (Fitch and Ambrose 2003, Middleton 2001).

Ecological Restoration

The Society for Ecological Restoration (SER) was founded in 1988 with the mission to promote ecological restoration as a means for sustaining the diversity of life on Earth and reestablishing a healthy relationship between nature and culture (Egan et al. 2011). This organization has gone on to become a leading international, nonprofit, organization defining processes and practices of ecological restoration around the globe. It is from this organization that ecological restoration shall be defined for use in this study as, "the process of assisting the recovery of an ecosystem that has been degraded, damaged, or destroyed (SER 2004)". This appears to be a definitive understanding for ecological restoration and has emerged on numerous occasions within the literature reviewed from this study. Although not cited specifically as an ecological restoration project the bridge building program of the CPQS shares many of the defining features for ecological restoration. Ecological restoration has been further described as an attempt to mediate past mistakes and to reestablish the ecological integrity of an ecosystem while protection human interests (Kim and Hjerpe 2011). This is precisely the desire of the CPQS as they seek

to improve the ecological health of the Eastern Slopes and to mitigate instances of negative impact that their recreation has inflicted upon the environment, as such ecological restoration and ecological restoration practices served to initiate the need for bridges in Eastern Slopes.

Clewell and Aronson (2013), while observing to the above definition from SER, frame ecological restoration as a process that cannot be limited to simply one field of study claiming that this is truly a multi-faceted approach for interventions in the natural world. From an ecological perspective, ecological restoration is an intentional activity which reinitiates ecological processes back into an environment to carry on as a functional environment as before interruption. Within the framing of conservation, ecological restoration recovers lost biodiversity. As a socioeconomic phenomenon, ecological restoration recovers ecosystem functions and services from which we benefit. Ecological restoration also allows individuals to reconnect with nature through the restoration of an impaired ecosystem (Clewell and Aronson 2013). All of these facets of ecological restoration boil down to one simple truth according to Clewell and Aronson (2013): nature sustains us, therefore, when we participate in ecological restoration we are benefiting not only impaired ecosystems but ourselves as well.

The fundamental assumption of ecological restoration is that human interference is ultimately responsible for the impoverished natural systems which we find in our world today, as such humanity also has the responsibility to take action in the restoration of the natural world (Egan et al. 2011). According to David Brunckhorst (2011) humanity has a key role to play in the future viability of the biosphere. Only by managing ourselves, our consumption of resources, the waste we produce, and our environment as a whole can we ever hope to truly “manage” with any effectiveness the natural world and resources towards a sustainable, healthy, and restorative future (Brunckhorst 2011). The impoverished environments which surround us are the evidence of the quickened global pace of

degradation which we can credit only to the uninformed and callous actions of past generations and those of us who indiscriminately transform landscapes, pollute the environment, and deplete resources around the world (Clewell and Aronson 2013). But this degradation of the past does not have to be the path for the future.

It is becoming increasingly apparent that areas of high environmental value cannot be properly conserved or provided with sustainable developments without the effective participation of the local population within the decision making and management of their resources (Reyes 2011). This observation becomes even more apparent in ecologically and environmentally degraded ecosystems where attempts at ecological restoration are under way. Without local involvement the only effective change will be superficial in nature, surface changes may very well occur as environments are bandaged on the surface while the problem lies unaltered at its roots. Only with the participation of local populations can comprehensive and regenerative changes be made to impoverished and impaired ecosystems as a whole (Reyes 2011). This involvement is no easier here than in any other system which involves multi-stakeholder participatory interaction, but can be made more achievable if restoration goals mirror the values of local populations (Christoffersen 2011). Aligning goals of restoration with local benefits works to foster community engagement, creative problem solving, and also sustains interest and dedication for achieving a positive result through restorative action (Christoffersen 2011). Through active participation with local populations these goals can be established in such a way as to serve ecological and social systems most effectively. Of course everyone involved within the ecological restoration will be present based upon their own personal perspectives, and naturally each individual will be acting upon their own particular set of values in relation to the ecosystem (Clewell and Aronson 2013). Regardless of personal perspectives and resulting values the essential aspect for effective involvement will be that all stake holders are aware of the values from different perspectives, because with this understanding each individual may be opened up to a new way of viewing the environment

which they may not have previously realized, providing them with the opportunity for gaining one more reason to value the ecosystem which they are working to restore (Clewell and Aronson 2013). It is through this collective action that ecological restoration moves beyond the vision of the individual and control of individuals to situate itself within the broader community based goals, aspirations, and values of many people (Egan et al. 2011).

Within the work of ecological restoration human beings are simply playing the role of facilitators to a system which we cannot fully understand, and certainly cannot fix simply because we will it to be so (Clewell and Aronson 2013). Ecosystems are not static, they evolve in response to both natural and anthropogenic modifications upon the environment (Clewell and Aronson 2013). Human actors cannot simply intervene and create desired outcomes directly. Instead, humanity plays the role of facilitators, manipulating biophysical properties of an impaired ecosystem so as to bring about the revival of processes which can only be performed by the living organisms making up the ecosystem (Clewell and Aronson 2013). By relinquishing anthropogenic presumptions of control the natural system is enabled to revitalize itself beyond the narrow limitations of human understanding. Once ecological restoration activities are complete the ecosystem self-organizes and becomes increasingly self-sustaining. The system becomes resilient, a term defined by Berkes (2002) as the ability of a system to absorb stresses and perturbations without undergoing a flip from one state of equilibrium to another. The intent is to reestablish the resilience of a system as if it had never been disturbed or altered from its trajectory of initial equilibrium (Clewell and Aronson 2013). It is important to note here that the goal is not to recreate the exact conditions of a system before its interruption, this is a goal that can never be fully achieved. At best, the goal is to emulate the past in efforts of recovery. Life does not move backwards, and as ecosystems are composed of life they will never be perfectly as they once were, but this is not entirely a loss as the system can be fully restored to ecological functioning and resilience for current equilibrium trajectories (Clewell and Aronson 2013).

This notion of ecological restoration seeking to emulate, but not become, the past is taken up by Jackson and Hobbs (2009). Ecological restoration is rooted in ecological history. In order to facilitate the recovery of degraded or damaged ecosystems knowledge of the ecosystem's original state and what happened to the ecosystem to cause a change is invaluable (Jackson and Hobbs 2009). Ecological restoration looks to ecological history as the means to identify appropriate restoration targets, the state of the system before disruption, and identifying sources of damage (Jackson and Hobbs 2009). Yet, a complete restoration to these historical conditions may in fact be means to further ecosystem degradation. Ecosystems are in a constant state of fluctuation and gradual evolutionary processes (Jackson and Hobbs 2009) and as such a restoration of historical conditions may in fact be the death sentence for an ecosystem by reestablishing conditions which are no longer viable for the particular environment. Yet, ecological history remains helpful for understanding ecosystem functions and structure, both in the past and for the future. Ecological history provides the information needed to understand ecosystem goods, function within the larger environment, and services which may be beneficial to social and ecological systems (Jackson and Hobbs 2009).

Ecological restoration is risky, complex, and frustrating long-term work that requires patience and dedication (Clewett and Aronson 2013). But it is also a practice of hope (Egan et al. 2011). Ecological restoration provides the vision of a better future as a result of the collective efforts of those willing to participate in this risky, complex, and frustrating process. This process requires faith in the face of uncertainty and change, love in the work for a better future for both human and non-human lives alike, and collaboration within a system that must go beyond the individual to restore ecological and social systems (Egan et al. 2011). The vision of ecological restoration provides hope that through human effort the complexity of ecosystems can be recovered and the personal, cultural, ecological, and economic benefits of functional ecosystems can once again be enjoyed by all. The CPQS has entered into this process of hope for the future through their bridge building. This design project, being driven

by concepts akin to ecological restoration, provided the foundation for this case study and as such it was important for context to include this chapter in the literature review.

Chapter 3: Methods

Pragmatic worldview

This research project was shaped and guided through a pragmatic philosophical worldview. As defined by John Creswell (2014) this worldview,

“arises out of actions, situations, and consequences rather than antecedent conditions (as in post positivism). There is a concern with applications – what works – and solutions to problems. Instead of focusing on methods, researchers emphasize the research problem and use all approaches available to understand the problem (Creswell 2012, pg. 10)”.

The very nature of the bridge building design project began by the CPQS, which was used as a case study to further the conceptual framework of biocultural design, required local participation as a necessity to the success of the project. As such this research endeavour, as well as correlating methods and research techniques, required an adaptive nature that would not remain fixed but could change and adapt to the needs of the project as defined by those intimately involved in this work. A pragmatic worldview implies that individual researchers have a freedom of choice (Creswell 2014). This choice allowed the research for this project to make use of research methods, techniques, and procedures which were most effective for their particular use. It is for this very reason that a pragmatic worldview was so helpful for this research which required broad based participation from many different actors.

Research Design

This research project relied upon a qualitative research approach. According to Creswell (2014) qualitative research most often, and most effectively, occurs in a field setting. Researchers must take themselves into the setting where the phenomenon they are interested in is actually taking place. Participants are not brought into a laboratory setting, nor are instruments often sent out to be

completed at individuals' homes (Creswell 2014). This close-up, on the scene interaction and data collection was exactly the approach used for this thesis and this approach provided the opportunity to observe and speak with participants in their own natural setting. Because of this direct contact, it is important to highlight the fact that researchers themselves become key instruments for data collection through this qualitative approach. Being physically involved with the data collection for this research project allowed for the project to be conducted through interactions directly with participants, providing great opportunities for participation and observation in bridge building and maintenance. This in depth immersion in the data collection was influential in determining that this project provided the opportunity to rely upon a variety of sources for data collection. Through interaction with participants it was essential to utilize the method of data collection that was most effective for the setting, and this most effective method had the possibility of varying with each location of research or even with each individual involved (Creswell 2014).

Qualitative researchers attempt to develop a holistic account of the complex problems or issues under study (Creswell 2014). This large scale, and broad based, account of a problem or issue involves reporting upon the many factors and perspectives relating to the study subject, as well as focusing on the individual meanings that any particular subject may hold for the participants. The goal of this research project was to provide a holistic account, using a qualitative approach, of the bridge building initiative of the CPQS as they sought to improve riparian health, increase access, and address the negative stigma that has been attached to ATV use on Alberta public lands. This case study was then used to address the objectives defined for the research project in chapter one.

Strategy of Inquiry

This research project was conducted under the categorization of a case study strategy of inquiry, coming out of a qualitative research design. The use of case studies has a "long and distinguished"

(Creswell 2007) history within many disciplines of research including law, medicine, psychology, and political sciences. In their study, Hamel et al. (1993) trace the origin of the case study, a term they claim is linked to case histories. Hamel et al. (1993) determine that a case study is a sociological approach to research, in which an attempt is made to highlight the features or attributes of social life within a specific contextualization. These authors trace case studies back to Frédéric Le Play (1806-1882). Le Play began the quest for a deeper understanding of the movements within society by observing social reality (Hamel et al. 1993). This type of curiosity about the world has developed over time and produced the research inquiry strategy of the case study.

Since its foundation so many years ago this strategy of inquiry has developed in different directions through many fields of study, and the actual use of case studies has varied greatly (Glesne and Peshkin 1992). Although there have been variations in the use of case studies the common denominator of all these studies is the investigation of a particular case (whether this be a person, community, event, or program) through an analytical approach within a contextual context (Creswell 2007). This setting requires clearly defined boundaries so that what shall be, and shall not be, included within the study is explicitly understood. This “bounding” of the system takes into account not simply the physical boundaries of the system but also the cultural, temporal, ecological, and economic dimensions as well (Cousin 2005). Case studies attempt to provide a holistic portrayal while advancing understanding of the research setting (Cousin 2005). Making use of a case study research method allowed for the ability to focus on the complexity within the case, on its uniqueness, and its linkages to the social setting by which it is engulfed (Glesne and Peshkin 1992). It is precisely this complexity that aids case study research through the notion that no knowledge is permanently fixed and our own understanding of the case may never be completely whole (Stake 1994). This is a distinctive strength of case study research as the research itself is understood as a means to advancing understanding. This

newly learned understanding, when fitted with our previously held understanding, helps us to gain a fresh appreciation and interpretation of the studied case (Stake 1994).

Case Studies have been differentiated as having three categories: intrinsic, instrumental, and collective. Within an instrumental case study the researcher focuses on a particular issue or problem, selecting one case which illustrates this issue particularly well (Creswell 2007). The selection of an issue or problem to be investigated within the case is often determined through the emergence of the issue within relevant literature (Stewart 2012). The case study itself becomes instrumental to the issue, it greatly enhances the probing of the issue or problem (Stake 1994). A collective case study can be viewed as involving multiple instrumental cases. Again, the researcher investigates a particular problem or issue, but in this study multiple cases are selected as a means for comparison between these individual settings and the problem at hand (Creswell 2007). Finally, an intrinsic case study simply seeks to understand the case at hand because of a strong attachment or interest that the researcher may hold towards the case itself (Cousin 2005). An intrinsic case study is a research project that is based directly upon the case in question because this particular case presents an unusual or unique situation (Creswell 2007).

In its effort to provide a holistic understanding of a particular phenomenon case studies are a broad church and can be conducted through a range of research methods, both qualitative and quantitative (Cousin 2005). Within case studies, data is gathered through a nearly any-means-necessary approach so as to provide the greatest holistic understanding of the case in question. Generally though, data gathering techniques associated with the case study strategy of inquiry include; participant observation, document collection and analysis, and open ended question interviews (Creswell 2007; Gillham 2000; Glesne 2011). Participant observation can be a very appropriate method for research of almost every aspect of human existence (Jorgensen 1989). Through this observation it is possible to

describe events, actors involved in the problem or issue, as well as perceptions for why things happen as they do. This methodology is “exceptional for studying processes, relationships among people and events ... and patterns” (Jorgensen 1989, 12). Along with participant observation, literature reviews and document analysis can be very informative as this work provides the researcher with the current relevant trends in other work being done around the issue of study. Along with these two previous methods, interviews making use of open ended questions provide the opportunity for researchers to fill gaps in knowledge that other methods are unable to bridge effectively (Dunn, in Hay ed., 2005). Interviews can also be beneficial for investigating complex behaviours and motivations or to collect a diversity of interpretations of meanings, opinions, and experiences (Dunn 2005). All three of these methods were utilized for this case study and allowed this investigation to deeply delve into the bridge building design project of the CPQS. Also, by using a multi-method approach to case study data collection researchers are able to achieve triangulation, and verification, of their data (Gillham 2000).

This research project was conducted as an instrumental case study of a recreational ATV club in Southwestern Alberta. The Crowsnest Pass Quad Squad (CPQS) “is a family based organization enjoying year round rides throughout the Rocky Mountains of Southwest Alberta” (<http://quadsquad.ca/about/>). This particular case was chosen for a number of reasons as the subject of study to be investigated through lenses of biocultural design and TLT so as to address the objectives for this thesis.

The CPQS is a recreational club of ATV enthusiasts who have realized the negative impact that their sport can have upon the natural landscapes where they ride. As such, this club has entered into a design process of nearly 20 years to mitigate their own impact and begin a program of ecological restoration around the Crowsnest Pass. The club realized a problem within their own recreation and is working towards riparian area restoration, a more responsible and safe culture of OHV use in the Eastern Slopes, and continued sustainable access to the wild places that they have come to love.

It is important to note once again that this design project was not initiated as a biocultural design project, but because of a number of characteristics of the CPQS design project this case provided a viable case for providing insights upon the conceptual framework of biocultural design.

- The first of these characteristics is the fact that the CPQS design project is endogenously based in local people. Recreational ATV users in the region realized the need to mitigate their own impact upon riparian areas and waterways in the areas that they ride and as such they drew upon their own capabilities and opportunities entering into a design process to address concerns over ecological integrity and restoration.
- Secondly, this design project provided the basis for studying all stages of design as presented by Brown (2009). Having gone through inspiration, ideation, and now implementation this design project had a long history of working through phases of design and the innovations required to address design problems as they were encountered by the club.
- Thirdly, this case also provided an interesting perspective on the culture of ATV use in southern Alberta and the impact that this culture of motorized recreation has had upon the biological diversity and health of the region.

As a case that provided a design process with a long history, there were signs of innovations and change over the years it could also provide insights to how learning unfolded through a design process. In particular, the iterative process of action-reflection-action as well as how engagement with other perspectives influenced this process.

The location of this case also presented the opportunity to participate in an internship with the Oldman Watershed Council (OWC) while conducting research. This proved beneficial as the OWC internship was created in order to seek a better understanding of motorized recreationists and their

needs as public users within the land base of the Oldman Watershed. This work aided the research project by broadening my own understanding of the culture of OHV recreation that is present within the western boundaries of the Oldman watershed where the CPQS is most active.

This selection of this case was also based upon the fact that the watershed of the Oldman River covers an expansive area of southern Alberta including a number of areas that are destination hotspots for motorcycle, quad, and other off-road motorized vehicles. Through the use of all three of the above mentioned methods for data collection, each of which will be further expanded below, I provide a holistic presentation of the bridge building design project initiated by the CPQS, the culture that this design process finds itself immersed in, relevant insights towards biocultural design that can be gleaned from this project, and instances of learning made present in the lives of participants through self-reflection and critical engagement. By working closely with the CPQS I actively engaged in participant observation through conscientious observation of their practices, role in management systems, and interactions with those making use of the watershed for recreational purposes. I conducted interviews with individuals active in bridge building activities and was able to benefit from the research by the OWC towards values and perceptions of the OHV culture present within the Eastern Slopes. These various factors allowed me to gain a greater sense of the issue and how preconceptions of impact and best management practices for riparian zone health are viewed in the region.

Methodology

The methodology for this study was informed through the process of biocultural design (Davidson-Hunt et al. 2012), as outlined in depth through the literature review of chapter two. A biocultural design process fundamentally requires the formation of a biocultural design team (Davidson-Hunt et al. 2012). As this research was focused on a design process that has been active already for many years and is not a biocultural design project, the design team responsible for CPQS bridge building

was used as a substitute for this role. This design team has changed through the years as various club members have served in more and less active roles in implementing the bridge building project, working with the potential collaborative organizations, and organizing community volunteers and CPQS members for required construction and maintenance tasks. This collaboration has created for the CPQS a “two way conversation”, to borrow terminology from biocultural design (Davidson-Hunt et al. 2012, pg. 12), that has allowed participants to become engaged in a meaningful and empowering dialogue. Within the CPQS design team, divergent thinking has allowed members to approach the design problem from a variety of angles and perspectives, although the formation of the CPQS design team as being entirely composed of ATV enthusiasts resulted in fewer angles and perspectives here than likely would have been present in a truly biocultural design team and this will be discussed more at length later on. The goal of design team thinking is to become increasingly convergent as potential opportunities for improved bridge building products or services emerged and were considered by the design team. This team continues to be composed of quad squad members with a variety of perceptions, skills, knowledge, and values pertaining to riparian areas, bridge building, and community engagement.

Data Collection

Semi-Structured Interviews

Semi-structured interviews are those which maintain some degree of predetermined order but also retain the necessary flexibility to address issues as they are brought up by the informant (Creswell 2014). As noted above, interviews are particularly beneficial for investigating complex behaviours or motivations, and also work to collect a diversity of interpretations, meanings, opinions, and experiences relating to the subject of study (Dunn 2005). Interviews within this research project were used as a means to get personal insight about riparian restoration, learning opportunities, the bridge building design process, and the culture of OHV use present in the southern regions of the Eastern Slopes. As a broad sweep of perceptions and opinions pertaining to all of these topics were obtained the complex

dynamic of restoration activities and the conflicting narratives of public lands use in Alberta were untangled to present a variety of participant values and perceptions.

Creswell (2014) highlights the importance of purposively selected sites and individuals for the use of qualitative research studies. Interviews for this research project were conducted in Blairmore at spaces most comfortable for the participants, usually occurring in the participants own office or the boardroom space made available at the CPQS headquarters. Initial interviews were conducted under the assumption that purposively selected individuals would have the knowledge of bridge building design, riparian areas, as well as public participation and engagement. Interviews were conducted with those most associated with current bridge building efforts in the region to share their perspectives and experiences with the design project. I was able to connect with four participants directly relating to bridge building activities in the Eastern Slopes, three of whom were currently or had served in various board positions including the role as president of the CPQS and a fourth who was not a quad squad member but was working with the government flood rehabilitation program installing and repairing bridges and trails that had been damaged in a particularly bad spring melt and flooding a few years prior. These four participants provided interviews that lasted between 45 – 90 minutes based on their experiences constructing, repairing, and making use of bridges in the region. The three CPQS participants were able to share specifically on the design process of the quad squad bridge building history, financing, and innovations while the final participant working with government bridge construction shared from a different perspective about bridge installation but with the same enthusiasm and conviction for the need for these spaces and the proper infrastructure to ensure continued sustainable recreation for all.

The interviews conducted throughout this study provided data in direct correlation to all three of the defined objectives defined in chapter one for this research. Through semi-structured interviews

participants had the opportunity to share their knowledge of riparian health, OHV culture in the Eastern Slopes, opportunities and instances of learning facilitated through restoration processes, and their perceptions on the best ways to protect Alberta's public lands for sustainable future use. Interviews were conducted using the interview guide attached in the appendix of this thesis. These interviews were recorded with participant permission and these transcriptions were later typed into a data processing program for analysis.

Alongside these interviews directly relating to bridge building design projects in the Eastern Slopes I was able to benefit from the internship with the OWC by participating in 9 more interviews that provided the basis for the Engaging Recreationists report, a significant document for establishing a greater understanding for ATV culture and recreation within the Eastern Slopes. These interviews were conducted prior to the ethics approval being completed for this research project, and as such the actual interview transcripts cannot be used in relation to this thesis but the information resulting from these interviews culminating in the public report was used as document review greatly aiding this research project. These interviews were conducted in a very informal and loosely structured manner allowing participants to share their perspectives, values, concerns, and hopes for the Eastern Slopes and the Oldman headwaters region. These interviews lasted around an hour each and provided the platform for ATV users to share their experiences and the impacts that they saw as most significant for future sustainability and increased ecological health for the region.

Participant Observation

Participant observation offered an exceptional tool for this research project to study processes, relationships between people or events, the organization of those relationships, patterns, of the immediate sociocultural contexts from which human experience unfolds (Jorgensen 1989). Participant observation allowed the opportunity to access the everyday life of participants, within the setting of

their common experiences. Jorgensen (1989) describes the world of everyday life as being made up by the ordinary, the usual or typical, the routine, and natural environments of human existence. This everyday setting is very different than the created or manipulated environments of laboratory experiments or survey instruments so very naturally the conversations, reactions, experiences, and observable events within the participants everyday lives were certainly very different than those from an unnatural setting to the participants.

For this research project participant observation was used as a tool for establishing, and maintaining, relationships with bridge building participants. Jorgensen (1989) highlights that the character of relationships established in the field by researchers are critical to the researcher's ability to collect accurate and truthful information from participants. As such, the tool of participant observation was used heavily at the beginning of this study project so that a rapport could be established, and then strengthened throughout the project, with many of the participants in this study.

During this research project I was able to actively participate in bridge installation, construction, and maintenance. By helping with the installation of wooden decking, transportation of tools and materials, and enjoying the activity of working alongside CPQS members, government employees, and community volunteers I was provided with an insight into what it takes to physically put a bridge in place and the vast amount of work required not only in the physical labour but the organization of tasks and people who do not all see eye to eye on the best way to protect, preserve, and enjoy the backcountry.

Case studies attempt to provide a holistic examination of a particular phenomenon. A holistic presentation avoids the separation of components of interest and as such observable events relating to the research topic may be observed within "culture, society, community, subculture, organizations, groups, or phenomenon such as beliefs, practices, or interactions, as well as almost any other aspect of

human existence” (Jorgensen 1989, pg. 12). I was granted a glimpse of ATV culture in the Eastern slopes through interviews and participants sharing of their experiences. It was another whole realm of understanding when I was invited along to join CPQS members as they decided after a work day installing wooden decking on a bridge to take their machines and ride the trails deeper into the wilderness of the Eastern Slopes. Joining these men and women as a passenger in a four seater side-by-side as we made our way deeper into the mountains provided me with the opportunity to just sit back, enjoy the ride, and take in the scenery that for many people is simply out of reach. It became very easy to understand why ATV recreationists have created such a strong bond with the wild places they are working to preserve, and in some cases working even harder to maintain their access.

Finally, through the internship with the OWC I was able to gain another perspective of the many recreationists that make use of “random” camping within the public lands of the Eastern Slopes. “Random” camping refers to the many people who make their way into the public lands available to them and set up camp to live and enjoy the remote wilderness spaces for a while. The word random is used because on these public lands people can set up camps randomly, and for free, wherever they can find space for themselves and the trailers, campers, tents, and ATV’s that usually accompany them as opposed to making use of designated paid camping sites. Part of the work for the OWC internship was to spend time camping along Dutch Creek, one of the many tributaries flowing out of the Eastern Slopes to become part of the Oldman River, because this is a particularly popular area and to survey and interact with campers making use of this space. Spending weekends camping along Dutch Creek interacting with anglers, hunters, people camping simply to get away from the city for a few days, and of course the ever present ATV recreationists was yet again another way I was able to connect with the culture of ATV use in the region and to gain an even greater understanding of the dialogue occurring about the proper use and preservation for these spaces.

Participant observation throughout this research project was essential for providing valuable information pertaining to each of the objectives for the study. Through participant observation and the data recorded in field journals local knowledge of riparian health, practices of restoration, bridge building techniques and design, and public land management practices became visible. Participant observation became a valuable tool during community engagement events, bridge building and maintenance, as well as during collaborative meetings with the design team.

Design Workshops

I connected with the CPQS design team shortly after arrival in the field. This group was already participating in regular spaces for design collaboration and dialogue as standard practice in their design process. As such, these workshops and meetings were attended but were not changed in any way for the purposes of this study. Design workshops, although participants just labelled these times as ‘meetings about bridge building’, were already providing the time and environment for members to actively engage in dialogue over design problems as they arose through various bridge building design changes, challenges of collaboration, and the means for effective community engagement. These meetings allowed for the divergent and consecutively convergent thinking to occur as approaches to design problems were negotiated. Meetings were not held on any specific schedule but were implemented as needed, with more frequency when a work day for any particular bridge was approaching. The meetings were informal and often didn’t take very long as participants were quick to realize what had to be done and simply volunteer to perform the task at hand, although the general conversation about riding conditions, new areas for exploration, and discussion about the machines being used for mountain adventures almost always lengthened meetings significantly.

While participating in these meetings design members worked to adhere to guidelines of their own making that were very similar to the ideal conditions for discourse as presented by Mezirow (2012,

pg. 80) and included in the literature review of chapter two. Mezirow (2012) freely admits that these conditions are idealistic principles that are never fully realized in practice but that these are conditions under which participants are provided the opportunity to reach consensus, even in difficult situations. This was very much the case of the CPQS as they worked to collaborate in an effective and respectful manner. Meetings proceeded with the full understanding that these ideals would most likely never be fully realized, and even that consensus was not always possible during dialogue within these meetings. However, the intentional effort from each member to work towards these idealistic conditions during the meetings did present an environment that could facilitate the discussion essential to creative design, as well as the environment that stimulates learning for all participants involved.

The creative interaction throughout these workshops provided the basis for the first and second objectives of the study. The workshops themselves allowed for participants to engage and involve all others members of the design team. It was also through these meetings that plans for broader community engagement were occasionally drawn up and implemented. The workshops provided a platform for learning to occur for all members of the design team and also became an environment for sharing knowledge and expertise relating to riparian health, management, and restoration. As such, the design workshops provided an opportunity towards the realization for all objectives relating to this study.

Data Analysis

Data analysis for this research project was conducted in relation to Creswell's (2014) guidelines. Data was collected and underwent analysis simultaneously while conducting field research. Interviews were then transcribed and verified with participants to ensure that the information and transcription was correct. Following field research all data and interview transcripts were investigated under further detail and coded making use of Nvivo software. The Nvivo program provides quantitative researchers

with a platform to enter raw data, in this case the transcripts for all conducted interviews, and to then highlight and narrow in on particular pieces of information. Highlighted information is saved under specific headings, labelled as nodes, which can then be selected to access valuable bits of information quickly without having to search an entire interview transcript for the data.

It was by using this software that emerging and recurring themes could be properly identified and organized from the raw data that had been collected. Initially very broad themes, developed from the literature review for the study or through their reoccurring presence during interviews, were used to separate data into sections relating to specific objectives for the study, as identified in chapter one. From these broad based themes containing large amounts of raw data increasingly specific themes were developed to narrow data into manageable selections of increasingly specific headings pertaining to certain aspects of the research. Below in table 3.1 I have provided an example for what this narrowing selection of data through themes and nodes looked like during data analysis.

Bridge Building Design	Phases of Design	Inspiration	
		Ideation	Bridges
			Education Program
		Implementation	Site Selection
			Approvals
			Financing
	Innovations	Material	
		Financing	
		Collaboration	
	History		

Table 3.1 Example of themes, coding, and nodes in Nvivo.

In this case I have looked at the theme of bridge building design. Within this general theme I found that information could be further narrowed down into categories relating to Brown's (2009) phases of

design, innovations made use of through the design process, and one node to organize general information about the history of the CPQS's bridge building project. Under the phases of design information could be organized for each of the three stages and then further distinguished by including data storage for all information relating to bridge site selection, the approval process for a bridge and the way that bridges are then financed once approved.

As data was analyzed and the actual writing of this thesis began quotes being drawn from participant interviews were once again verified with participants to ensure that information was not being taken out of context or misconstrued to fit my own opinions or writing style.

Chapter conclusion

With the above chapter defining how data was obtained for this research project the rest of this thesis shall reflect upon the findings that were actually collected during field work. Moving next into a chapter expanding upon the developing culture of ATV use in the Eastern Slopes data was collected to shape the narrative for recreation on these public lands and to provide insight into some of the conflicting views towards a sustainable future for recreation in the region.

Chapter 4 – The Eastern Slopes

Introduction

This chapter will provide a history and context for the setting of the research for this study. Land use management has a long history in Alberta, but this history has not been without difficulty or challenges. Public lands in the province provide a wonderful and unique opportunity for people to connect with the natural world within which they find themselves. But, by the very nature of our entrance to these wild places we have a lasting impact on the environment we seek. In the mountains and foothills of southwestern Alberta a debate has been escalating as to who should participate in this wilderness, and how they can do so without causing extensive damage. This chapter will seek to understand the conflicting claims to Alberta public lands as this discussion relates to recreational All-Terrain Vehicle (ATV) use in the region. ATV's have the potential to pose serious threats to this region when they are used in a destructive or thoughtless manner, and it is this very destructive use that recreational ATV clubs in the region are seeking to mitigate or even remove altogether through ATV education and proper behaviour.

Background

This research project took place in the southern most stretches of Alberta's Eastern Slopes. The eastern slopes are a narrow stretch of land with a northern boundary just south of the Red Deer River, stretching along the eastern edge of the Rocky Mountains all the way to the United States border. The eastern slopes encompasses approximately 90,000 square kilometers of forested mountains, grassy foothills, and rich riparian habitats in the south western corner of the province. This large geographic area provides the eastern slopes with a variety of ecosystems resulting in the bountiful biodiversity of the region, including some small areas with the richest biodiversity that the province has to offer (CPAWS, 2014). A map depicting the location of this region can be found in the first chapter, figure 1.1 on page 2, with the research for this project being conducted in the south in an area known as the Crowsnest Pass, named for the largest town in the region.

The eastern slopes are home to a wealth of both renewable and non-renewable resources, as well as providing great opportunities for recreation and tourism for those desiring to immerse themselves in the wild beauty of this scenic region. Perhaps most importantly though, the eastern slopes are home to the headwaters for a number of watersheds providing sustenance to the ecological, agricultural, and municipal water needs of the southern half of the province (Water Matters, accessed 06/2016 from <http://www.water-matters.org/topic/eastern-slopes>). With so many depending on the water quality of these headwaters the protection of the eastern slopes is not simply an environmental concern but holds implications for public health and the Albertan economy as well (Water Matters, <http://www.water-matters.org/topic/eastern-slopes>).

With all of these opportunities, resources, and demands upon the eastern slopes the management and land use planning of this area has become a topic of hot debate within Alberta. Demands for extended land use allocations and increased resource extraction have been escalating steadily in the eastern slopes since the 1970's (Government of Alberta, 1984). As such, the protection of these valuable headwaters has become a concern for many downstream Albertans as debates heat up over the proper management and protection of this region and the valuable water supply that flows down from its snow-capped peaks. Although the eastern slopes have had a spotlight in recent years, land use planning difficulties and controversy is not a unique problem to this region of the province alone. Planning for public land usage in Alberta dates back to 1948 as the province's oil and gas industry was born with the discovery of oil near Leduc (Roth and Howie, 2011). With the discovery of this oil, and the hopes of aiding in land use planning across Alberta, the province was divided into two colour coded categories: green and white regions. This distinction was put in place so as to help with the land use planning in the province, a principle being guided by the understanding that some activities or land usages were better suited to different types of land. Green lands represented the public lands within the province, and land use planning in these areas was to be directed towards resource usage, water

and wildlife management, and recreation (Roth and Howie, 2011). White lands were those that had been largely settled areas in the central and southern regions of the province. Here land use planning focused more on agriculture, as well as soil, water, and wildlife conservation (Roth and Howie, 2011). This broad sweeping categorization has remained in place to the present day and is still largely influential for land usage organization in the province.

This division of green and white lands are visible in figure 1.1, with the addition that this map has also provided grey zones for national parks within the province. The eastern slopes make up the largest southern green lands within the province, and with a large population base surrounding these public lands they are heavily relied upon by many southern Albertans as an outlet for recreational activities such as hunting, fishing, and camping. In recent years one of the newest additions to this recreational list for the region has been an exponential growth in all-terrain vehicle (ATV) or off-highway vehicle (OHV) use. These recreationists are permitted access to these wild spaces through the land use management planning put in place by the Alberta government explained above. However, with increasing pressures this access is being questioned and a strong negative image for ATV use has been established as impacts from recreation are being realized, particularly upon the vulnerable riparian areas and waterways in the Eastern Slopes providing the headwaters for a number of river systems. The bridges of the CPQS therefore are not necessarily a means for access to these spaces, as this access is already ensured through land use planning, but provide a means to address the negative perception of detrimental ATV use in the region.

The differentiation between ATV's and OHV's is a very slight one but is important to clarify as both of these terms will be used throughout this thesis. Through conversations with Quad Squad members and other motorized recreationists in the region I found that ATV's refer to motorized vehicles that are typically built by motorcycle manufacturers and are used to traverse difficult terrain; a quad or

a dirt bike would be considered an ATV. OHV is more of an all-encompassing term that can describe any vehicles that are used on non-traditional roads, this classification could be used to describe a quad but also includes jeeps and trucks that have been designed for backcountry use. OHV is a more broad sweeping generalization that places all vehicles designed for use on trails or dirt roads into the same category. By the nature of the CPQS bridge building efforts and trail maintenance they catered towards ATV use in the backcountry, as opposed to OHV, because the bridges that the club installs and the trails that they have maintained are not built large enough for trucks to make use of, even the largest of side-by-side machines have posed a problem as becoming too large and heavy for the recreational infrastructure in place (Q02).

The long traditions of forestry, mining, as well as oil and natural gas explorations have opened up access to the eastern slopes in ways that recreationists could never have previously imagined. Access roads can now be found crisscrossing the hillsides and valleys of this mountainous region, all of which can be accessed and travelled with OHV's. A recent study of the Castle Area Forest Land use zone, a land use zone within the eastern slopes just south of the Crowsnest Pass, found that there are nearly twice the recommended number of linear disturbance access points being utilized by motorized vehicles than is authorized for the region by the Alberta government (Lee and Hanneman 2011). Linear disturbances refer to the cumulative effects of roads, seismic and power lines, railroads, and OHV trails that break up the natural environment (Nelson 2013). The impacts of these disturbances upon soil, water, and habitat quality have major implications for the overall health of the eastern slopes ecosystem.

All of these linear disturbance access points provide a means of entry to the backcountry for OHV recreationists in ways that were previously unavailable to them. As such, recreational activity both motorized and non-motorized alike has grown tremendously in southern Alberta as this access has been

realized. As of yet, there does not appear to be a large body of literature studying OHV use specifically in Alberta or the Rocky Mountains but a study by Smith and Burr (2011) found that over the past 4 decades OHV use has become one of the most rapidly growing outdoor activities in the United States. This has resulted in a huge demand upon land managers to learn what they can about motorized recreation so as to meet the new recreational demands of these motorized outdoor enthusiasts, while still minimizing environmental and resource degradation. Although there does not appear to be a similar study in regards to yearly ATV growth in Canada the Canadian Off Highway Vehicle Distributors Council (COHV) has released an annual report on the sales and trends within the Canadian ATV market for 2015.

In 2015 alone retail estimates placed the sale of new ATV's at six hundred forty four million dollars in Canada, with just over fifty thousand new units being sold in the country (COHV, 2015). Since 2009, there has only been one year, 2011, where less than six hundred million dollars was spent on new ATV's in Canada (COHV, table 2.1 2015). Market estimates specifically for Alberta show that of these 50,186 ATV's sold in the country 7,472 were purchased in Alberta, roughly 15% of the national average (COHV, tables 2.3 and 2.4 2015). Recent trends in COHV reports are showing a gradual slight decline in national ATV sales in Canada, so the national trend of ATV use in Canada is not the same as the exponential growth being analyzed by Smith and Burr (2011) in the United States. But according to Q03 this decline is not the trend that recreationists are feeling in the backcountry around the Crowsnest Pass,

“Well the big thing that's changed is the multitude of people. When I started 40, I would say 45 years ago, camping and stuff in Dutch, in the Oldman, and up here you could spend a whole week and never see a soul. Now, every half hour there are 20 people going by and motoring around.”

What is clear from this account, and remains consistent with COHV reports, is that this off-roading industry in Canada remains significant and that there are many thousands of Canadians making use of OHV's in some capacity, whether for work or for play. Rapid growth and economic development in the eastern slopes has dramatically changed the face of this landscape (Prato and Fagre 2010). Population growth and shifts in economic activity from resource extraction to service oriented recreation and tourism industries in this scenic region make it even more desirable as a place live, work, and play (Prato and Fagre 2010). This was precisely the case of Q02 as he transitioned to a life out in the Crowsnest Pass,

"We came quading and sledding here all the time ... I fell in love with it, I went back and told my wife. We had been looking at land for a while and we went up the next week and bought our lot and decided... So, basically quading and sledding is what brought us to the Pass, and not to mention we just love the scenery out here."

It is ironic that the very natural amenities that are drawing people to the eastern slopes are also those that are most threatened by this growth and increased recreational OHV traffic. OHV use is on the rise in southern Alberta and demands for access to public lands are likely only to increase in future years (Lee and Hanneman 2011). In the past, research involving OHV use has primarily been interested simply in the numbers of people involved in this activity and how the cumulative presence of these recreationists will impact the environment and landscape where their activities are taking place (Smith and Burr 2011). According to Smith and Burr (2011) this trend has been changing as studies into OHV use have become more interested in the OHV users themselves: why they participate in this outdoor activity, what their needs are for this type of recreation, and what kinds of things do these OHV users value within the landscape? These were precisely the questions that the Oldman Watershed Council

(OWC) was asking as this organization began to research more deeply the impact of OHV use in the Oldman watershed specifically.

The OWC “is a not-for-profit organization that is working in partnership with communities and residents to improve the Oldman River Watershed” (obtained from <http://oldmanwatershed.ca/>). This work towards improved watershed health is primarily occurring through learning and sharing knowledge as the council works to build and strengthen relationships with the many different stakeholders found within the watershed. During my time in Southern Alberta I undertook a summer internship with the OWC with the primary goal of building relationships with the various recreational OHV stakeholder groups and clubs that make use of public lands within the watershed of the Oldman River, this internship had me working very closely with the Crowsnest Pass Quad Squad (CPQS) as deeper and stronger relationships were being established between these two groups as they worked together finding ways to preserve the Oldman watershed.

The OWC had a keen interest in learning about OHV recreationists in the eastern slopes because the Oldman is one of the rivers whose headwaters are found in this region. These headwaters, although only composing 24% of the total land coverage of the watershed, are responsible for 90% of the total water in the Oldman River (Oldman Watershed Council 2014). Southern Alberta, and beyond, depend on the ecological integrity of the eastern slopes for fresh, clean water but OHV use within the riparian areas of the eastern slopes as well, as traffic through waterways, provide the potential for serious damage to this watershed and the quality of water flowing from within its boundaries. In order to protect this water supply, and to better understand the needs of OHV enthusiasts in the region, the OWC began a research project to find common values with OHV users in the eastern slopes and to determine how the OWC could work together with these recreationists to preserve the eastern slopes in future endeavors.

Culture of OHV use in the Eastern Slopes

This research project culminated in the report *Engaging Recreationists* (2015) and it very quickly became clear that the most immediate commonality between the OHV users and the OWC is a shared value for the eastern slopes themselves. Participants in this OWC research project shared passionately about their concerns for the backcountry in the eastern slopes, around topics of environmental damage and safety concerns stemming from OHV recreation. They shared stories of their experiences and the places that they have come to know and love within this headwaters region through their OHV recreation. In all cases the OHV users that were consulted through this OWC program were unwilling to give up their recreation and their connection to the public lands of the eastern slopes, but they were deeply committed to finding solutions so that all may continue to use these places. During conversations with OHV recreationists through my research and this summer internship it became clear that OHV use in the eastern slopes is not just a pastime for those involved. OHV use on these public lands has become a valuable tradition for these people, they have developed a culture of OHV recreation and an appreciation for the public lands of the eastern slopes that I was not anticipating as I entered into this research.

I had hoped to make use of these OWC interviews in their entirety but due to complications with ethics approval I was unable to use the interview transcripts from the OWC research investigation of OHV use in the Oldman watershed as I had hoped. I am however able to make use of the report which compiled the findings of this research and for the remainder of this chapter I will use this report in addition to my own interviews to take a deeper look at the culture of OHV use in the Eastern Slopes. I will use the report and my interviews to focus on the ways that recreationists are connecting to the land, the difficulties they see with their sport, as well as some of the suggestions that these folks had to share as options that they see as viable solutions to the controversy of OHV use on public land in the backcountry.

One of the greatest fears for OHV users in the eastern slopes is the potential for losing access to the public lands that they have come to value so highly. When describing their OHV use and experiences within the eastern slopes this fear of access seems to be the defining narrative for many OHV users (Engaging Recreationists 2015). These fears of losing access are often verbalized as a polarized debate between OHV users hoping to open up access, or at the very least maintain the access that they currently have, against all other stakeholders (environmental groups, government, or industry) who are viewed as wanting to limit OHV use and access (Engaging Recreationists 2015).

Today, we've got a whole movement that says shut it down and let's have a virtual tour. Except for the scientist who can go back in and study how much the grizzly bear population has increased or the Yellowstone to Yukon or the nature conservancy or tied lands...or any number of US foundations that are funding everything from local trail groups to native communities to try and shut down not only access but industry. (James, Engaging Recreationists)

Some of these environmental groups, I think, are on the other extreme side where they don't want anybody going in the forest, and just leave nature as it is. Well, that's fine, but the only way you can view that wonderful nature is from a helicopter. That's one of the reasons we love quadding is to go up on the top of a mountain and look around and just be awed. (Bob, Engaging Recreationists)

This view of the situation has resulted in many OHV users having very negative perceptions of environmentalists, scientists, and government employees as these people are all seen as enemies to OHV recreation. A very strong us verses them mentality can be found in the backcountry of the eastern slopes (Engaging Recreationists 2015). OHV users feel like they are in a constant state of defending their passion for the backcountry against enemies to their recreation on all sides. Q04 summed this up in our interview, "Yeah, you know, we don't see a lot of stuff in the paper saying that we did a really good job

on a bridge or a trail but if one fool goes and does something stupid and gets caught. Well, boom, front page right there.” It’s not as if there are no positive actions being taken by OHV users and clubs, or that OHV users are the sole stakeholders contributing to the environmental problems of the region, but these are not the actions that catch headlines. For many southern Albertans this OHV recreation and public land use represents a particular way of life that they value. Many OHV users are modeling positive behaviours, such as picking up waste that they come across on trails or donating time and money to improve and maintain the backcountry, but again these aren’t the headlines about OHV use that are presented in local papers or within larger discussions about the management of southern Alberta’s public land (Engaging Recreationists 2015).

Because a lot of people have misgivings about the quadders and stuff that they’re always responsible for messes, but I’ve seen a lot of people that are just hiking. You go up the trail they’re hiking and there’s beer cans or pop cans laying on the side of the trail. (Brian, Engaging Recreationists)

The problem I have is that the environmental groups often, their answer, their solution to everything is just to shut everything down. And my answer to that is, if you shut everything down what’s the point of having it because no one can go back there to look at the beauty of it. You know, well then they say that hikers can go in, well sorry but that’s only one user group that can view that beauty. The other thing is, I mean we have a member of our club that was injured in an industrial accident, who barely has use of his legs. And he loves the outdoors, he loves the backcountry. And the way he gets out there is through his quad. (Q02)

Another way that this polarized discussion plays itself out in the narratives of OHV users in the eastern slopes is by scapegoating other stakeholders for environmental degradation. OHV users feel the need to defend their recreation and presence in the backcountry, and one of the easiest ways to change

the conversation away from OHV impacts is to look at the impacts from the many other stakeholders that are present within the eastern slopes. As mentioned earlier in this chapter, the eastern slopes have a history of resource exploration and extraction. Perhaps the most noticeable resource industry in the region has been the harvesting of lumber, the forestry industry has altered the backcountry around the Crowsnest Pass with many vast expanses of clear cut patches breaking up the natural landscape.

I went up to Allison Creek a couple years ago and I looked at our camping areas and I looked at our riding, where we used to go and what we used to do. I just about cried. It was so sad what I saw, and that had nothing to do with ATVs. That had nothing to do with side-by-sides. That had nothing to do with cattle. It was just, our camping was gone. Our nice areas were gone. It had nothing to do with a forest fire, but because big business came in and clear-cut. It was sad to see. It really was. My grandchildren will never get to see that. (Donald, Engaging Recreationists)

In this case big business is seen as responsible for the loss of areas that were special and valued by OHV users, and as such industry becomes viewed as a threat to the backcountry and to OHV futures in the region. Paul from the Engaging Recreationists report echoes these sentiments about clear cut logging in the region, “Like I said, the most damaging thing I saw was the logging guys, by far, every year.” OHV users have established deep connections to the land where they ride, and this recreation has become much more than simply letting off steam with a powerful motorized vehicle. This experience of loss is all the more powerful, not only for the loss of valuable land for camping or riding, but because this was an area that has been lost to the traditions and history of this family. A place that was special to this family, a place that they hoped to share with family members yet to come, will not be available to them. This touches on another important aspect of OHV use in the Eastern Slopes. The

connection between motorized recreation and family values and time spent together was a topic of much discussion for study participants.

And it's a good quality of life, it's a good family experience and today I think we could use that more than anything. We need these experiences to help mould families, whole families, make strong memories. Good memories. (Matthew, Engaging Recreationists)

Wow, we love quadding. We love being out in nature – just the astounding beauty of this area and stuff. That's why we moved here actually.... We got our family involved in quadding, and then we introduced other people to it. (Q02)

These kinds of strong connections that OHV users have made with the land seem to be the motivation that is pushing many of them to take a new look at the way that their presence within the eastern slopes impacts the landscape. Participants from my interviews identified on many occasions how a clearer set of rules and regulations about OHV use on public land would have a significantly positive influence on OHV impacts in the backcountry, and these sentiments were strongly echoed during the investigation by the OWC. Even with all of the recent efforts towards consultation, stakeholder engagement, and land use planning within the eastern slopes there are no formal trail plans, policies, or education programs in place (Engaging Recreationists 2015). Of course, there are rules for OHV use in the eastern slopes that work to regulate and mitigate damage but there remains no official “rule book” for OHV on these public lands.

We need a set of rules and the set of rules shouldn't change from government to government. That should be basically a permanent set of rules that you can put in now and should be good for another 40 years. It can be adopted or adapted as it needs to be for new requirements but it shouldn't be thrown out and back to square one. I mean they could have a lot more cooperation I think with clubs like ourselves. (Q01)

They've got to make the fines enough to hurt, otherwise it doesn't affect them at all. Because I know for myself, if I had a thousand dollar fine, I'd be a little upset and my wife would be more so. (Brian, Engaging Recreationists)

If you're looking at running a trail system and actually having respect for the environment, then surely you need a set of base rules, you need enforcement, and that enforcement should have an education component to it. (James, Engaging Recreationists)

As far as riding goes, yeah, I'm telling you, there probably should be some rules set in place. If you were to tell me this ten years ago I would've said, "Nah, not a chance. We're going to go out there and do what we want to do," but as I go out there and I see what's going on, yes, there has to be some rules put into place. Certainly, putting everybody in one area is not the answer. (Donald, Engaging Recreationists)

It has to come from the government. To say, you shouldn't be doing that, give ya a fine and call it a day. The fines are pathetic and that's really unfortunate. You hit a guy hard enough in the pocket book and he will think about it. But if it is only \$75 or \$100, well I've heard the statement "hell, I've drank more beer than that this weekend". They really don't care much. And we find it very frustrating. (Q01)

Yet, there does appear to be a commonly held understanding of what is acceptable behaviour and what is not, at least the participants for this study seemed to believe so. Yet, even though people do seem to have an understanding of what is unacceptable behaviour there are many barriers to their actual following of these unspoken laws. And this intentional disregard for the rules is exactly the point brought up by Q02 as he shared a story highlighting the problems around regulations for OHV use around the Crowsnest Pass.

... that bridge over at McGillivray going over the creek right at the staging area there. We were camping out there last weekend and it is just rutted out on the front boards. They had been taken out for firewood or whatever...And we noticed too, there were a lot of people who weren't taking the bridge heading west because of that. You know they were all going through the creek instead. And just an interesting side note to that, I was talking to the conservation, district conservation officer of Pincher Creek... So he stopped by and I wanted to talk to him about riding quads on the road ... anyways he was there for about two and a half hours and while we were there, before he arrived I bet you 95% of people went through the creek and 5% took the bridge. Ironically enough, while his truck was parked there 100% of people took the bridge. So it's not like they don't have the knowledge that, oh I'm not supposed to go through there. You know, how do you change that?

Even though there are no formal guide lines for OHV use in the eastern slopes it is common knowledge that when a bridge is present you use it, yet so many choose to disregard this regulation. However, as soon as the Conservation Officer becomes a presence near the bridge, this whole mentality changes and riders stuck to the rules. Q02 asks a great question, how do you change this dominant culture of riding through the waterway? There cannot be conservation officers at every waterway encouraging OHV users to do the things that they already know that they should. It would appear that in the debate over sticks or carrots as being the most effective means for changing behaviour in the Easter Slopes many ATV users are calling for the stick. They see the danger of environmental damage removing their sport from them and they are willing to work through new legislation and more serious fines in the effort to preserve their access to the backcountry.

This style of riding with no regard for regulated trails and bridges is a very serious reality for the health and sustainability of the eastern slopes. From my time spent with OHV recreationists in the

Crowsnest Pass and particularly the opinions expressed by the interview participants for this study, I have come to believe that this culture of disregard is held perhaps by the minority of OHV recreationists making use of Southern Alberta's public lands, but their actions are enough to cause a serious threat to the recreation of all others in the region. Just as was highlighted earlier the actions of these destructive OHV users are ones that are extremely visible to other stakeholders making use of this public land, and it is by this minority that the entire OHV community is being defined. This mentality of disregard has created a negative perception of OHV users as a whole. Q03 shared that her "opinion is that there are a lot of really good respectful riders. But then there are always a few out there that just like to destroy stuff, and they give everyone a bad name."

The Engaging Recreationists report (2015) termed these destructive OHV users as Bad Apples. "Bad Apples are seen to be young, destructive men that are out for adventure and adrenaline. They are reported to engage in behaviours such as 'mud-bogging' and 'high-marking' and are largely blamed for ruining it for everyone else" (Engaging Recreationists, pg. 19). Based on the reporting of participants in the OWC interviews many shared about particularly off-putting experiences with bad apples who ruined family outings or rides in the backcountry through destructive and disrespectful behaviour. These destructive ATV users are usually characterized as young people who haven't learned yet the consequences of their actions and the impact that they can have on the environment. The "bad apples" ride for their own enjoyment, they don't respect others on the trails, and they are not willing to be shown or taught an alternate way of enjoying the backcountry. In the quote above the term high-marking refers to instances where OHV users will push their machines to climb extremely steep, off trail, slopes of the mountainous region to see who can make the highest mark on the face of the mountain. This practice is detrimental for many reasons, including the necessity for leaving marked trails, creating scars on the mountainside enhancing erosion and runoff, as well as the general safety concerns for riding high powered and heavy machines up slopes that they have no real business in climbing. Mud-

bugging is a more familiar term that refers to OHV riders who like to get wet and dirty by searching out muddy areas for spinning tires and sliding machines. Both of these practices are highly detrimental to the environment and are highly visible activities that bad apples participate in giving all OHV users a very negative image.

One approach that has been suggested in the Eastern Slopes as a means for addressing the negligent behaviours that can be witnessed on public lands is that the OHV community itself would have to be responsible for their own. While it would appear that this kind of participant accountability could be a positive way to address destructive behaviours, a number of participants pointed out some of the serious failings of this approach. Not everyone is as self-reflective of their actions on public lands and they may not be entirely susceptible to the good natured suggestions of their fellow OHV recreationists.

Yeah people tell us as the club we should be out there and that is our responsibility. But I've only got so many teeth left I'm not going to lose them all over stuff like this. You know, it's just not practical. At least if you've got a uniform something like 90% of the people will at least respect that to start with. But if you are just out there with a t-shirt and a hat like this one (a hat with a Quad Squad logo), they are gonna tell you where you can go real quick. (Q03)

Although OHV users are readily able to identify difficulties and frustrations regarding their experiences with public lands usage in the eastern slopes the reality of OHV use is not one that is limited to these negative perceptions and hardship. Time spent in the eastern slopes presents many opportunities to those who are actively participating in this OHV culture. OHV use provides recreationists with a new and unique way to experience public lands that they may never have realized without the motorized assistance offered to them through their ATV's. Q01 shared that through the use of an ATV "people can get into the backcountry and see something that they never ever saw when they were growing up. You know, I mean, if you take the scenery back there it's phenomenal." For some,

more traditional means of accessing this beauty in the backcountry such as horseback, canoeing, biking, or even simply hiking are not possibilities.

The use of ATV's provide the man identified earlier in this chapter by Q02 as having mobility issues with his only real option for experiencing the remote places of the eastern slopes that he has come to love. The use of an ATV is facilitating this person's connection with the beautiful natural world that they have found in the eastern slopes. For many OHV users the primary motivation for their recreation is exactly the above point, finding ways to connect with and enjoy the "natural scenery" of these remote locations (Smith and Burr 2010, Engaging Recreationists 2015). The realization of this motivation begins to unravel the dichotomy of an us versus them mentality in the backcountry. OHV users are not the destructive recreationists, disconnected from the landscape that they make use of, that many would describe them to be. From all users of these wild and public lands there appears to be a significant desire for riparian health, ecological restoration, and a sustainable future. These factors and hopes for secured future access are providing the driving force for the bridge building design project of the CPQS.

Chapter Summary

This chapter provided a view of the Eastern Slopes in its current state and historical designation for recreational use. These public lands have been provided for the benefit of all and participants from this thesis stated many times that this is precisely one of the factors making this region so unique. Yet, having so many people participating in various forms of recreation is a recipe for increased impact and environmental degradation. Having become aware of this reality and the culture of OHV use that has become established in the region the CPQS has entered into the efforts of mitigating impact with the hopes to ensure a sustainable future for the region and their own recreation upon it while combating the negative perception towards all ATV use.

Chapter 5 – Bridge Building and Design

Introduction

Chapter 4 provided the context for ATV use in the Eastern Slopes. A history and culture of recreational ATV use has been established in this region as people have continually sought ways of creating a deeper connection with the natural world surrounding them. Many who participate in this recreation have begun to realize the difficult situation that their own actions have contributed to cultivating in the region. Many ATV recreationists are respectful and conscious of the impact that their sport has had upon the environment that they so enjoy, but there still remain many who have not reflected on the damage that they can cause to ecological health of any area that they choose to bring their machine. It is this very damage that the Crowsnest Pass Quad Squad (CPQS) has been working to remediate since very near the earliest history of the club. Realizing the potential for damage through ATV's, as well as hoping to increase responsible access to even greater regions of the Eastern Slopes, the CPQS began building bridges and maintaining trails to mitigate the impact of their own sport upon the backcountry. This chapter will be an investigation of their design process as they have continued this bridge building program, observed through the lens of biocultural design so that insights from the CPQS design process may be applied to the conceptual framework of biocultural design.

Design

In his book, *Change by Design*, Tim Brown (2009) provides a thoroughly insightful narrative of design thinking and further develops the process of design. Through the use of stories Brown is able to illustrate the holistic and interdisciplinary nature of a world view defined by design thinking. Design thinking is a process that taps into the inherent capacities available to all people, capacities that are often overlooked in favor of more conventional problem solving methods (Brown 2009). This approach relies upon the capacities of all people involved in the process, “design thinking is not only human-centered; it is deeply human in and of itself” (Brown 2009, pg. 4). When design thinking is utilized to its

full potential it not only results in an entirely new way of doing business, stimulating innovation, or problem solving but can lead to changes in the very way that we look at the world around us (Brown 2009). Brown's concepts of design thinking completely reform traditional linear understandings of design, no longer being limited by a definition of determining problems and solutions. Designers and problem solvers have to shift from this classical design perspective of problems and solutions, turning instead to a project based understanding of design (Brown 2009). Design projects are continuums of innovation that are "best thought of as a system of overlapping spaces rather than a sequence of orderly steps" (Brown 2009, pg. 16). Brown throws out the historical linear steps of design and instead proposes three overlapping spaces of design; inspiration, ideation, and implementation.

This chapter will be structured based on Brown's (2009) framework for the overlapping spaces of design and working through each of these spaces as the CPQS navigated each phase of design. The primary phase of study for this research was on the implementation stage of design as this is the space that the CPQS find themselves in today. The initial inspiration and ideation for this project occurred many years ago, with many of the current club membership not having even been involved in these discussions. What really came out during my interviews with club members were the many innovations that have been required throughout this process as the bridges installed by the CPQS have changed and been adapted to various conditions.

One of the most important realizations arising from this study was that people who are riding ATV's in the Eastern Slopes are very rarely doing so alone. ATV recreation provides an opportunity for a shared experience of the wild scenery found in Alberta's remote public lands. The recreation itself, enjoyable and memorable as it may be, is less important for many recreationists that is the opportunity to share this wilderness with others. This is a defining belief of the CPQS. The quad squad "is a non-profit organization that manages over 1300km's of trails in the Rocky Mountains of Southern Alberta"

(<http://quadsquad.ca/>). This message taken from the club's website is followed very quickly with the invitation for any and all to come ride with them. The club works to bring ATV enthusiasts together through organized rides, family events, education about ATV use and safety, as well as by working to maintain trails and bridges in the backcountry. The club began in 1998 (Q03) and at that time it consisted simply of ATV adventurers who looked to ride their machines and camp together.

Since this time the CPQS has grown, having as many as 600 members at their peak (Q02). The club membership base is composed primarily of Albertans but has also included people from British Columbia and Saskatchewan throughout the years as well. The club no longer boasts the massive membership it once had but as the only active ATV club in the southern most region of the Eastern Slopes they have worked to take on a larger role in their local communities as they “promote responsible use of Alberta’s Southern Rockies, and to ensure the conservation and preservation of our wilderness areas for the continued use by those who come after us” (<http://quadsquad.ca/>). In order to work towards this mission the CPQS began their bridge building program in efforts to mitigate the negative impacts of ATV use on the valuable riparian habitats and wildlife of the region.

Inspiration

Chapter 4 provided the context for the inspiration leading the CPQS to begin a design project mitigating their own impact as well as increasing their amount of responsible access to the backcountry. Inspiration is the “problem or opportunity that motivates the search for solutions” (Brown 2009, pg.16). This is the design space that kick starts the entire project. Inspiration always involves an “element of chance” (Brown 2009, pg.16). Any aspect of the world around us has the potential to provide the minds of designers with a truly exceptional breakthrough. Sometimes it can be the most mundane of objects, the ones within our natural surroundings, that by our very familiarity and intimacy with them they are all but dismissed as having any real meaning in our lives (Ingold 2012). We can take these objects or

moments that are so ingrained in our lives for granted precisely because of the routine nature that we use and witness them (Ingold 2012). Yet, even these, the most common of moments and items have the potential to provide extraordinary opportunities. It is precisely for this world of possibilities that Brown (2009) declares inspiration as the most exciting space of design, because you never know when inspiration may hit.

This was precisely the case for members of the quad squad when they decided to begin building bridges in the early 2000's. Debates were beginning to heat up over land use management in the eastern slopes, with many determining that ATV use in the region was one of the things that had to be stopped. Q01 shared that this is often the feeling that ATV users have when they try to participate in management meetings or public forums. "We have gone, like I say, I can't remember how many meetings we have gone to of those and you sort of feel like the enemy. Cause you have ranchers and their people, and power people, and they just say that you ***holes are wrecking everything." This was the context of the quad squad directly before they began building bridges, and in many cases these stigmas have stuck around regardless of bridge building or trail maintenance efforts. Understanding that the eastern slopes are a critical habitat for threatened fish species, as well as realizing that a lot of the hatred towards ATV use was due to the damage done to waterways and riparian areas, the quad squad was completely transformed by an entirely mundane and common place experience for them. This common place experience was the reality that when out riding you drove through all of the waterways in your path. At the time, bridges on quad trails were fairly uncommon. ATV's are designed to be able to take what the backcountry has to throw at them, and to just keep on going. This mentality is encouraged and even glorified through manufacturer advertisements and media. This head on, go-get-wet approach to off-road driving through waterways has long been a characteristic of OHV use. Driving through water was simply a part of riding an ATV, "when I first started riding I had no clue you couldn't go through the streams, it was fun to go through the streams." (Q02).

In the very earliest days of the club, bridges were seen as ways to improve access to the remote scenic regions of the public lands around the Crowsnest Pass, to make the journey further into the backcountry safer and less difficult. However, these bridges soon became much more than just a means of access. Q03 talked about the initial decision to start building bridges and also of this transition as bridges became more important than the club had initially anticipated,

Really it was a bull session just like this. And we thought well geez, if we start putting bridges across some of these things that are really difficult to cross. And then once we got the tough ones more or less, that's about the time we started running into a little bit of fish habitat and stuff like that. And they said well if we put every fish stream that is a valuable stream well we'll put a bridge on it too. It gives us, it allows us access and it also preserves the fish and wildlife and everything. So we said, well let's kind of work together on it.

This decision to build bridges has elevated the image of the quad squad in the eastern slopes regions surrounding the Crowsnest Pass. ATV recreationists have come to know and appreciate the work that this club has managed to achieve in the backcountry.

Well, from what I know when I first started, they were building bridges before I got into it, so I would probably say for about 15 years. 15-20 years they have been, you know when the club first started they were just a bunch of guys who liked riding. They got organized and said look, the concern back then was the same thing. Driving through creeks, driving through creeks. And the clubs mandate back then was, and it still is a mandate, that for every creek there is a trail on the goal is to put a bridge in there. (Q01)

This mandate has become widely known by the many ATV recreationists that are making use of the public lands around the Crowsnest Pass. This project has become the means by which the quad squad battles the negative perceptions of ATV use in the eastern slopes.

Ideation

The reality for ATV recreationists in Alberta's eastern slopes was that not everyone cared to ride safely or sustainably for future use, and sadly this remains the case even today. Yet, for early members of the quad squad who were seeking to ride responsibly and to find ways to continue their sport, this was the very worldview that they decided to tackle. And it was in the most common of experiences that they found the inspiration for how to go about this process. The members of the quad squad were inspired by the natural world that they had come to value so deeply, and this inspiration led them to the second of Brown's (2009) spaces of design, ideation. In order to address the damage that ATV's were responsible for upon the valuable waterways and riparian habitats of the eastern slopes the quad squad decided one course of action could be to get the quads up and out of the water. It was becoming shockingly clear that the current cultural norms for ATV use were not providing a sustainable future for their sport or the public lands that they relied upon. Ideation is the space for "generating, developing, and testing ideas" (Brown 2009, pg.16) and it is of utmost importance that those involved in this space have "the capacity...and disposition for collaboration across disciplines" (Brown 2009, pg.27). This interdisciplinary work allows the design team to collectively hold ownership over their ideas and for each member to be further invested in the process through their shared responsibility.

Without even realizing it at the time the CPQS participated in this interdisciplinary approach that Brown (2009) describes as being so essential for the design process. The general membership meetings of the CPQS are open to all members and interested non-members from the community (Q02). This discussion then included many people from a variety of backgrounds and perspectives, though most would have a general bias towards ATV use as those attending CPQS events and meetings are most likely connected in some way to ATV recreation. According to concepts of biocultural design a team composed of unique individuals who hold relevant knowledge to the particular design challenge, and are familiar with the values and needs of the community involved, provide the most effective means for

developing services or products that fill the design need. This “plurality of knowledge enhances the creative process of the team” (Davidson-Hunt et al. 2012, pg. 13). Each member of this ideation phase of design provides different capabilities and values to the process, bolstering the overall diversity of the group. This was the case for the CPQS as they approached the dilemma that they had realized through their recreation. During the ideation space of design during these membership meetings two courses of action were decided upon. The CPQS would begin an education program to encourage safe responsible ATV use and the club would begin constructing bridges so as to get ATV’s out of the waterways and the rich riparian vegetation along stream banks (Q03). Over time the education program was ended as the program was no longer an adequate solution to the problems that the club was addressing. I will speak about this program and its eventual end later, because there are some interesting points to be made through this program in relation to the design process that the CPQS has undergone, but the majority of the research for this thesis focused on the bridge building program of the CPQS and that is where the majority of the findings and discussion will be directed for this chapter.

One of the important benefits of the bridge building program, as described by Q02 below, relies on the comradery and collaborative nature of this work. The program began with an interdisciplinary approach and has continued with this mission to the present day, seeking to use these bridges not only as means for making ATV’s more sustainable in the region but also to strengthen the relationships of all the organizations involved in ensuring the ongoing health of the Eastern Slopes.

I think the biggest strength to bridge building is, there’s a lot of strengths to it, but one is the comradery of doing it. Actually doing it with people. The other thing is the image issue, like you mentioned, the quad squad builds bridges. So that’s a good positive PR image to have. The number one strength of it is that we are protecting the fish. I mean that’s why we’re doing it. We’re not doing it so the quads don’t get wet. You know, we’re doing it to try and protect the

fish. And not only the fish but also the river banks itself, plant life the riparian isn't being damaged by people going through it. So yeah, I would say that those are the three biggest strengths to the bridges. (Q02)

Yeah, and getting people engaged as well is a huge thing. So, I think it is very important for people to feel connected to what is going on out there. And we could easily do a lot of the work out there just on our own, cause it doesn't take that long, any ways we could do it but I think it is important to get other people involved. And it is great to get people out there. It is nice that the OWC comes out, the Quad Squad comes out, the government comes out. It's a nice little, it's relationship building and who knows what is going to happen. (Q03)

Implementation

Finally, the products or services being designed must be transferred from the sketch boards and plans of the designers to a practical application in the real world (Brown 2009). This is implementation, the third of Brown's (2009) spaces of design. It is here that the best ideas are put forward and given form in the everyday lives of the community members, this is the "path that leads from the project room to the market" (Brown 2009, pg.16). This is the time for flaws and unforeseen obstacles to be made known, for plans to be shifted and revamped so as to be most efficient towards the goal. This is precisely the place that I found the CPQS in as I carried out my research in the Eastern Slopes. The planning has been made a reality as roughly 44 bridges have been installed since this project began (Q03). It is here within this stage of implementation that the most creative innovations have been realized in the design process. As bridges have been installed over the years the CPQS has developed a more efficient and effective process. Bridges have been improved, the installation process has been streamlined and adapted, new materials have been utilized, and the overall bridges have been made

stronger. All of these changes, which will be further developed below in more detail, have been made possible through implementation.

CPQS Bridges and Innovation

The most recent of these 44 bridges, however, would have very little in common with their predecessors. It has been during this implementation space of design that the designers of the CPQS bridge building project have been most innovative. Innovation is a concept that applies universally, but the way that innovation comes about and the products that it produces are highly diverse. Innovations do not have to be novel or tremendous new revelations. Innovations are the comprising mixtures of insights, practices, and material products/artifacts generated by groups working cooperatively, or in competition (Dutfield 2014). Thus, an innovation can come from ideas, practices, or products that have been in use for a very long time but are now being adapted for a slightly different use, or use in a different way. Thereby, innovations can come from anywhere and provide a solution to a particular design problem, but these new ideas or products are not considered innovations until they have been adopted for use by society (Dutfield 2014). The rest of this chapter will look at how the bridges have been built by the Quad Squad, how these bridges have changed over the years, as well as how the bridges have been funded throughout this process.

When the CPQS first began building bridges in the Eastern Slopes the bridges were crude compared to the engineered design that they install today. “At first they were just building wood bridges, in the old days you just hauled a couple of trees, you cleaned them up, and you put boards across them. So that was a bridge (Q04)”. These original bridges put in by the quad squad were built entirely by quad squad members who were willing to volunteer their time to come out and help put a bridge in place. The quad squad director in charge of the bridge building would simply work down the list making phone calls to all of the usual members who were willing to come out and help put a bridge in place until a large enough work crew had dedicated themselves to come out and help (Q03). They

would let everyone know when and where to meet and then whoever showed up would go out and build the bridge. This volunteer basis for bridge work has served the quad squad well through the years.

“We have had as many as 30 [volunteers]. You know, they are tripping over each other cause they all want to help and they all want to have the access. They use the trails so why not help out to get them there?” (Q01). All of these volunteers also help transport all of the tools and materials needed for the job to the chosen site by strapping whatever is needed to the quad they will be using to reach the site, or if possible a truck may be taken to the work site with materials and tools (Q01). It has been touched on earlier but the nature of using volunteers for this work plays a valuable role in the sense of ownership that the CPQS members feel for the trails and the bridges where they have been influential in the installation. The hope is that this sense of ownership truly instills the conservation and environmentally conscious attitudes of safe responsible ATV use throughout the region. Staying on the trails that they have helped to maintain and making use of the bridges that they have personally installed creates a sense of pride for CPQS members (Q02), and by being involved in the installation or maintenance the volunteers also have the opportunity to learn a little bit more about the ecological health of the region and why it is that using the bridge make such a difference in the Eastern Slopes.

Over the years the bridges that the quad squad are installing, as well as the process of installing these bridges, has gone through a number of changes. Wooden bridges were replaced by pipe bridges, built using two large metal pipes instead of trees as the base for the bridge (Q03). These pipe bridges have also become obsolete and this design was replaced by an engineered steel bridge. These steel bridges were yet again replaced by a new bridge design. The most recent bridges being installed by the quad squad are steel component bridges (Q02). These bridges are an innovative design that has made the installation and transportation of the bridge to a work site much more convenient. The previous steel bridges the quad squad installed were built as one solid unit and could reach a maximum length of

60 feet. This made for some interesting stories as these bridges were very inconvenient for transportation to the various sites where they were to be installed. One of these stories was shared by Q03 as he spoke about a particularly narrow trail with a bend that made bringing a bridge into the area a major complication.

In one particular case the trail came around a corner ... so I took the truck around as far as I could go and then a high-ho came up behind me, picked it [the steel bridge to be installed] up and walked it over. And then it was a matter of, I have built a lot of stuff for the club so we could use it. We had a winch that we had on a trailer that you could bring in with a quad. Tie it to a tree and then you could winch these across.

The bridges have to be maneuvered down narrow quad trails and then winched across the waterway once it was in place (Q04). The quote above shows the ingenuity and adaptability of the volunteer work crews that have installed bridges for the CPQS over the years, in this particular case one member even had to bring a large front end loader, what Q03 calls a hi-ho in the quote, just to make possible lifting the bridge and winching it around the difficult corner involved. The component bridges, however, come in a number of sections that are then bolted together at the work site. This makes them much easier to transport down the various roads and trails to get to the chosen location. Q01 shared about the transitions to better bridge designs over the years,

I think the big thing is we're building better bridges now. We're building bridges that are gonna last for 100 years. Versus, you know, some of the bridges we replace where we've taken a wood bridge out and set a metal bridge in over top of it. You know, I mean, wood bridges are only gonna last for so long. They might last 10 years, and in 10 years you're gonna be back to fix it.

Steel component bridges are not only longer lasting, they are also an improvement on previous bridge designs in relation to their impact on the riparian areas surrounding the creek as well. With a bridge

that can span a 90 foot gap each end of the bridge can actually be further from the creek bed and away from the vulnerable riparian vegetation. “A lot of our bridges now, we want the bridges out of the creeks. We want the bridges up on the banks now. It’s less hassle to get them in, you're not interfering with the bank (Q01)”. The previous bridge design did not provide the length necessary to provide this buffer between the bridge ends and the banks of the waterway.

Another important aspect of new component bridges is that the frame may be all steel, but the entire metal surface of the bridge is now powder coated to remove the threats of rust. These bridges are installed and then left to the elements and whatever weather the Eastern Slopes can throw at them. While surviving the elements these bridges must also maintain their structural integrity and provide safe crossings for many thousands of OHV recreationists every year. The powder coating helps to ensure that the elements and the resulting rust cannot take as much of a toll on the bridges once they are put in place. A final innovation that represents the cooperative nature of these bridges is that the actual decking of the bridge is always done with wooden planks. Where it would be easier to have a full metal bridge, as was the practice in the past, and acknowledging that this wooden decking will need to be replaced over the years it is important to remember that the trails that these bridges are being installed on are actually designated as multi-use trails. They are not established solely as trails for motorized recreational vehicles and are used often for other forms of recreation as well. Trails are used for hiking, mountain biking, horseback riding, etc. Q01 shared that many quad squad members are very protective of the trails because they put so much work into maintaining them, but they all understand that the trails are in place for everyone’s use and have to be designed with that in mind. “The reason we went to wood was the simple fact, for guys with horses can use them. A horse will not go across a steel bridge. So on our side the guys who have thought about this stuff have thought about the people that you know might be going back there on a trail ride with their horses (Q01).”

Bridges have also been forced to change throughout the years to accommodate larger and larger ATV's. Originally, quad bridges were only built to be 48" wide because the bridge only had to be wide enough for these smaller machines (Q04). As OHV recreation has developed not only have quads gotten larger and wider, but the introduction of side-by-sides has completely revolutionized the market. Side-by-sides are large two, four, or even six seater machines that are built to be able to travel many of the same environments as their smaller quad counterparts. With the introduction of these larger machines the quad squad has gone back and worked to widen many of their original bridges, which were only built to absolute maximum widths around 60". All of the new bridges installed now have a width of 70" and are engineered to manage a maximum load of 1600lbs, specifications that will accommodate these new machines being used by ATV recreationists (Q01). All of these many changes to the bridge design represent the numerous times that the CPQS has had to go back to the drawing board, looping back into the design stage of ideation, as new opportunities or complications were realized. The CPQS has been involved in a continual process of design since the very beginning of this project as fresh ideas were brought in by new members or outside influences to improve the bridges and the overall work that the club participates in.

These new and improved bridges, although much better than their predecessors, are also much more expensive than the original fallen tree and two-by-four design. Q04 talks about the increased costs and the money that the quad squad has spent since his joining of the club roughly 15 years ago, "since I started, at least a million and a half dollars on trail infrastructure I guess you'd call it. And then every, well every year you try and go fix up spots where you know it's needed". A large portion of this money has been spent in recent years with better, and more expensive, new bridges being installed. "I mean we pay to have that bridge built. It's quite interesting because it is our design, we design the bridge, we had it engineered but we pay to have it built. So roughly, we're looking at probably \$30,000

for a bridge (Q01)". Having installed over 44 bridges in the public lands surrounding the Crowsnest Pass these expenses really begin adding up for the club.

In order to continue their efforts the quad squad relies on a few primary income sources to cover the costs for trail infrastructure. The first avenue for funding that the club applies for are government grants and funding. These grants have dried up in recent years, however, and are not as large a part of the clubs income as they once were (Q01). Although these grants can still provide valuable funding when they can be secured,

We have this grant for Spoon Valley, half of it comes from the Off-Highway Vehicle Association and the other half is coming from the national trails commission, a federally funded program. So it's a matching grant and that money is being used to repair three bridges in Spoon Valley and to repair the roads, the trail system that were damaged mainly to the flood of 2013. (Q02)

In the past federal grants were used to pay the salary for the only paid employee of the club, the office administrator, but this funding is also no longer available as it once was (Q01). This is a large part of the reason why all of the other positions within the club are all volunteer based, members are passionate enough about the club and the bridge and trail maintenance that they are willing to put in their time for free. Q02 talked a little bit about all of the voluntary time that he happily dedicates to the club, "I just love the club, I love the idea of what the club does and yeah I just wanted to keep it going." This volunteer basis for work within the club goes to show the commitment and the passion that these ATV enthusiasts have for the work that the club is involved in and the ways that they are working to improve the backcountry around the Crowsnest Pass.

The quad squad also relies on money obtained by volunteering to run the casino for a night whenever they are able. Q01 shared how this process works,

The casino is every three years now, it used to be every two years, but non-profit groups can put in an application to run, do the cashiering at the casino. So you get a percentage of what, you're all in a pot for that month. So there might be 10 groups or 20 groups in that month, that pot. And then at the end of every quarter the casino pays so much to non-profit groups. Well I mean an average casino, and it's sad cause the casino we do down here, we get roughly \$38,000 or \$39,000, where in Calgary, groups are getting \$150,000 – 200,000.

From Q01's statement it is clear that this casino money is extremely valuable to the club but is only available once every three years. Also, the casino nearest to the club in the Crowsnest Pass does not see nearly as much patronage as the larger casinos in Calgary, which is why recreational clubs in Calgary are benefiting so much more from their applications at the casino then the quad squad. These better casino nights in Calgary are only available to the quad squad once every six years, all other years they have to stick to casinos closer to home.

Finally, the quad squad also hosts a raffle every year. The prizes for the raffle vary year by year but usually include a quad, a side-by-side, and a third prize that is not quite as significant as the first two but would still be valuable for ATV recreationists, such as a truck tool box or a winch kit. Tickets for this raffle are sold for \$5 each all across the southern half of Alberta, as well as in some of the towns just across the BC border. The raffle works as a fantastic fund raiser for the quad squad, but also serves a secondary function as a means to increase the publicity of the club's work within the backcountry. This increased awareness serves the clubs goal of education on ATV issues on these public lands and also provides an opportunity for possible corporate sponsors to make donations to this work.

Alongside economic difficulties associated with this bridge building program, the actual process of obtaining approval for each bridge has also developed and become more thorough since the early years of the quad squad's work. "Yeah, we can't just say we want to put a bridge on there and go out

and put a bridge on. We have to get permission to do it, we have to organize work parties and maybe even the building of the bridge. (Q02)” It was not as if the quad squad could install bridges wherever they pleased in the past, but the number of people in the backcountry when they started building bridges was significantly less and there were also less OHV’s present. Now with increased pressures and demands for public lands use the obtaining of bridge approvals has developed into a more in-depth process, and this increased scrutiny is often perceived as a hindrance by the quad squad as they seek to continue their work.

Well we have to get what they call a TFA, which is a temporary forest access. And depending on, you have to go get a GPS of the site, you have to have the forest guy. He has to have a look at it and try to see if it’s a valuable site or whatever. And then they have to go through their own paper process which can take anywhere from 2 weeks to 2 months. It’s actually, in a lot of cases, it has held us up a lot. Because it seems that the local guys can’t do it, they have to go through somebody in I guess Edmonton or wherever. (Q04)

Like I say, in the very early days when we first started, the guys here that were working seemed to have a little more autonomous authority. You could work with them and they would tell us yeah go ahead you can do that and yeah you can do that. But now, as time went along, everything is more up and down based and no one here can make a decision before they text the 10 guys up above them. It just slows things down, big time. (Q04)

The lack of an official designated trail plan in the eastern slopes plays a considerable role in the frustrations experienced by the quad squad as they work to continue installing bridges on this public land. Without a designated trail plan in the eastern slopes, and constant promises of one to come, the approval of bridges is often halted because the ESRD lands officers cannot even be sure if the trails where a bridge is being requested will continue to be designated trails once a regulatory system comes

into place. So why approve a bridge in an area where in a year or two OHV use may be prohibited? This means that any areas that are controversial as to whether they will remain in the system or not will be very difficult to obtain approval for a bridge, even if the location is in a drastic state of disrepair and desperately needs a bridge to keep OHV users out of the water. Q03 spoke of hoping for more information about future recreation land use plans so as to know where work would be most valuable, "I'm hoping that a little bit more information will be out there on what trails are going to be designated, so that I'm not putting a bunch of money into a trail that's not going to be a trail a year later."

Alongside these hindrances the quad squad is also currently feeling understaffed when it comes to bridge work. Bridges aren't simply fallen trees with some lumber nailed across them anymore. The bridges that are being built and installed now require some previous knowledge that the first bridges had no need for. This is not to say that these bridges are so much more complex, and any of the quad squad members I spoke with were very quick to point out that any and all are welcome to come along and help with the bridge work, but these bridges do require some the people with the necessary understandings to direct and teach others as the day work proceeds.

Probably the biggest challenge is getting people that are knowledgeable how to build the bridges. You know, we have [quad squad member] who you just met, and Q04. But, I mean they are getting on and we really need some young people to come into the club to learn how to build the bridges... We need welders, people with welding skills, we need someone who has some time that can do that stuff as well. That's the problem, when you are younger you are probably working so you don't have the time to do it. You know, we got one welder that works at Precision Welding that comes out on the weekends and helps us and stuff with that. But we really need some younger people to take it on and say, hey we want to be members of this club and we want to focus on getting bridges built and putting bridges in place.

In the above quotation Q02 sheds some light on another issue that the quad squad is facing with their bridge building program. They are bringing in less and less young people who want to be as passionately involved with this work as members were in the past. Both Q01 and Q04 were drawn to the quad squad because of the bridge building that was going on through the club and the mission to put a bridge on every trail that crossed paths with a waterway. Lately, Q02 claims that there have been less people showing up who are looking to become members so as to carry on this valuable work. Yet, even with the difficulties around this project these individuals that I spoke with are proud of the bridge building work that they have done and they are hopeful for the future. In all cases the participants for this research project believed very strongly in the work that they were doing and they passionately hoped for the improved health and continued use of the Eastern Slopes. Obviously, building bridges cannot fix all of the problems of OHV use in the eastern slopes and it certainly doesn't mitigate the impacts of those people who choose to ignore the bridge and continue their habits of driving through waterways on trails. Building bridges is an action, a step in the right direction. "It's a solution. Shutting a trail down is not a solution. (Q01)"

Chapter Summary

In efforts to mitigate their own impact and increase access to the backcountry the CPQS has entered into the bridge building design project and have been actively engaging in seeking to improve the landscape of the Eastern Slopes for nearly 20 years. This process has developed over time and has very visibly moved through the spaces of design as designated by Brown (2009). Innovations have improved the process by which bridges are funded, installed, and have even lead to an ever improving bridge design. Building bridges is an action, a step in the right direction. "It's a solution. Shutting a trail down is not a solution." (Q01)

Chapter 6 – Learning through Design

Introduction

Investigating learning instances and opportunities made available through the bridge building design process of the CPQS was an important objective to this research project, and it was through participant involvement in bridge building design projects that TLT was actually observed. Cundill and Rodela (2012) make the claim that it has become increasingly difficult to find research within the natural resource field that does not in some way address tangible evidence of learning, or opportunities for learning, resulting from resource intervention. The expectation of learning outcomes has become a central fixture within natural resource management. Studying the program implemented by the CPQS provided the opportunity for research within a large social network where participants regularly interact with one another not only through bridge building or trail maintenance efforts but also as fellow riders enjoying the outdoors while participating in the same recreation that brought them together in the first place. This varied dynamic of social and individual recreation, mitigation efforts, and resulting collective action allowed for individual learning outcomes for participants in this study.

Making use of Mezirow's framework of instrumental and communicative learning, as established in the literature review, this chapter highlights and develops the learning outcomes of participants found through the research project. Learning was identified as the result of self-examination and reflection through the lens of TLT. This made for a very interesting study of these learning instances as it was often difficult to determine precisely which form of learning was best being exemplified in each case. There are certainly arguments that can be made for where certain aspects of learning and identified outcomes from this study cannot simply be labelled into one category and could in fact fit into a number of places within these results. Nevertheless, the resulting learning outcomes identified by participants and the social action initiate as a result of this learning is explored in this chapter. Individual learning, based on the intentional critical reflection designated essential by Mezirow

(2012), will be examined through the lens of TLT. Table 6.1 below presents the learning outcomes experienced by participants using the lens of instrumental and communicative learning, both domains of transformative learning established by Mezirow and expanded upon in the literature review of Chapter two.

This chapter concludes with space for a discussion on the ways that individual reflection and learning was the stimulus for collective social action, based on the framework established by Moyer et al. (2016), and the ways that this social action arose directly based on the individual learning that participants experienced.

Transformative Learning Theory

TLT focuses upon the learning that occurs as a result of individual reflection and the questioning of previously held beliefs and values. Mezirow (1997) claims that transformative learning can be the result of adults critically reflecting upon the world around themselves, and that through this critical reflection upon one's values or beliefs adults are able to become more autonomous and responsible thinkers. Transformative learning has two distinct domains; instrumental and communicative learning and the outcomes of learning in these domains can lead to transformations. As defined in chapter 2, instrumental learning focuses on the testing and validating of judgements through problem solving abilities and physical interaction with environment (Mezirow, 2000). Communicative learning involves the understanding of others and making oneself understood by navigating language, values, and beliefs (Mezirow 1991). Table 6.1, on the next page, displays the instrumental and communicative learning outcomes revealed in the data.

Learning Outcomes	
Instrumental	Communicative
Bridge building techniques	Collaboration with others
Construction Skills	Community Involvement
Material Innovation	Networking and Learning other Points of View
Project Financing	
Regulatory Frameworks and Laws	
Ecological and Biological Knowledge	

Table 6.1 Instrumental and Communicative Learning Outcomes

Instrumental Learning

As participants responded about the learning outcomes provided through participation in bridge building activities it was often the physical ongoing knowledge of constructing the bridges that was first mentioned. The construction skills necessary for installing bridges in remote areas of the Eastern slopes was a very important aspect of this project for participants. The skills and knowledge for construction and installation of OHV infrastructure were viewed as absolutely necessary for the future success of bridge building efforts and fostering a more sustainable culture of OHV use in the Eastern Slopes.

"Probably the biggest challenge is getting people that are knowledgeable how to build the bridges. You know, we have some members. But, I mean they are getting on and we really need some young people to come into the club to learn how to build the bridges. I mean, I've gone out and helped build bridges and done the decking and stuff. And we split our metal bridges up the center... to weld on a 12 inch piece of metal to make them wider for the razors to go through. So all that is something that's gotta be learned. We need welders, people with

welding skills, we need someone who has some time that can do that stuff as well. That's the problem, when you are younger you are probably working so you don't have the time to do it. You know, we got one welder ... that comes out on the weekends and helps us and stuff with that. But we really need some younger people to take it on and say, hey we want to be members of this club and we want to focus on getting bridges built and putting bridges in place." (Q02)

"Building a trail, learning about building a trail has been a little bit more new to me than knowing what to do in a riparian area." (Q04)

Alongside the skills and knowledge for bridge or trail building was the need to learn about innovation in materials for building the most effective bridges. As more and more bridges or trails have been installed in the Eastern Slopes the process through which this infrastructure is constructed and the materials used have changed greatly. Through experience participants have found various materials to be better or worse in terms of how they endure the elements in this mountainous region as well as the heavy OHV traffic that takes a toll on the many bridges scattered throughout the region. Not only have materials undergone this trial and error testing but also the very process by which bridges are installed and the location that they are installed has come under question. The changes that have been implemented to bridge design over the years through this learning were stimulated not only by the desire to increase bridge strength and lifespan, but also as a means to open backcountry access to an even wider spectrum of recreational users.

"By putting these bridges up on the bank, we are trying to put them 10 feet up on the bank, that way they are not going to go. If there's a flood they're gonna stand there. They are gonna withstand wind, and most of the work then is just maintaining. Like taking off the old wood and putting new wood back on the decks. And the reason we went to wood was the simple fact, for

guys with horses can use them. A horse will not go across a steel bridge. So on our side the guys who have thought about this stuff have thought about the people that you know might be going back there on a trail ride with their horses” (Q01)

“Well they are getting bigger, and improving. Installation and security. We actually started out with, we called it a pipe bridge. It was just basically like this, two pipes welded together with 4x4’s on the sides, which eventually we found out wasn’t practical because we can knock them off pretty easy. So then we went to solid bridges with sides, and an engineered design. Like that black one there.” (Q03)

“We’re building bridges that are gonna last for 100 years. Versus, you know, some of the bridges we replace where we’ve taken a wood bridge out and set a metal bridge in over top of it. You know, I mean, wood bridges are only gonna last for so long. They might last 10 years, and in 10 years you're gonna be back to fix it. Put a steel bridge in, steel is gonna be there till it gets washed down the river again.” (Q01)

The bridges that are being installed now in the Eastern Slopes have undergone a 20 year process of learning and innovation, all culminating in bridges that represent the best product and practices resulting from that work. They have come a long way from, “we used to just put logs across and nail a bunch of boards across” (Q02). This outcome instills much pride in those involved in the project and many of the volunteers helping with OHV infrastructure, whether members of the CPQS or not, have taken a particular ownership over these trail systems. Q03 highlighted this during his interview, “I call them our trails because we work on them, but they are actually multiuse trails. So we like it for hiking, biking, quads, horseback and stuff like that.” Recognizing that these trails are a gift to many different kinds of recreationists in the Eastern slopes did nothing to minimize the importance of these trails to himself and the many hours he had put into their existence.

While the physical construction and installation of bridge or trails in the Eastern Slopes provided many learning outcomes for volunteers the planning that goes into this infrastructure was also a source for learning among interview participants for this study. The logistical and financial planning for work in the Eastern Slopes led to some interesting unforeseen learning opportunities and outcomes as the CPQS members had to become familiar with government grant applications as well as fundraising opportunities both within the local community and further abroad.

“And sometimes we can scrounge some from government agencies as well... All of that money is part of the trail maintenance that we can raffle, and casino money. I mean that’s a big part of our income, we do get some government grants that we apply for. Like we have this grant for Spoon Valley, half of it comes from the Off-Highway Vehicle Association and the other half is coming from the national trails commission, a federally funded program.” (Q02)

“Well we have to get what they call a TFA, which is a temporary forest access. And depending you have to go get a GPS of the site, you have to have the forest guy. He has to have a look at it and try to see if it’s a valuable site. And then they have to go through their own paper process which can take anywhere from 2 weeks to 2 months. It’s actually, in a lot of cases, it has held us up a lot.” (Q03)

This same lengthy process is one that Q04 speaks about as well. Even though she works within provincial government and had a slight advantage of having previous understanding of the process required for a temporary forest access she must go through the same specifications as the representatives from the CPQS.

“So this is what happens when a user group submits for a TFA. It would go to the lands officer, and then they go out and they talk to the fish biologist and the wildlife biologist and aboriginal consultations, possibly water act. They go and do a lot of that. So for my requests I just go and

do all of that. So I will go and talk to the lands officer cause they are the ones managing the land, and so I will see if they have any concerns. See if wildlife biologist, fish biologist, or aboriginal consultations, I will go through the water act stuff and see if anyone has any issues with what I am doing. And usually I will just, I will have a big meeting at the beginning of the winter just to let people know, do you have any issues? If you do what are they, how do we solve them? And then we kind of have the winter to work it through and work on it, then I will go to the public and have a consultation in the winter as well. And say these are what I have proposed ... and are there any concerns? So that's how I do it."

Participants also acknowledged an increased knowledge of biological life, environmental systems, and the direct impact that their bridges and the recreation they allow has on the land where they ride their ATVs. This realization and increased ecological knowledge has led participants to question the way that many ATVs are used in the backcountry and even the way that they themselves participate.

"I think I've learned more now that I did, say over the last 10 years before. I mean, I look at areas now and say you know like, there's a swamp here so why are you guys racing through this swamp? You know, here's the trail or we can put a rig pad down onto an area where you can ride across that spot and stay on the bridge. I mean, I can think of half a dozen swamps and it's totally destroyed. You look at these guys and go, why are you even trying to go through there because you are not going to get through. I mean some guys have gone in and built a bridge but somebody goes in there and just rips it all apart. You can't even get a truck through there now."
(Q01)

"Well, fish habitat, saving these areas is a big one...whenever you go through the stream you disturb the silt, the silt then goes down, covers the eggs, and then they don't hatch. So if the bridge is there that mud and stuff isn't going to be disturbed." (Q03)

“The number one strength of it is that we are protecting the fish. I mean that’s why we’re doing it. We’re not doing it so the quads don’t get wet. You know, we’re doing it to try and protect the fish. And not only the fish but also the river banks itself, plant life, the riparian isn’t being damaged by people going through it.” (Q02)

Communicative Learning

Mezirow (2008) portrays communicative learning as pertaining to understanding what someone means when they communicate with you. Communicative learning explores the realm of feelings, intuition, values, and/or moral issues and requires an assessment of meaning behind the words spoken (Mezirow 2012). This form of learning presented itself as those participating within bridge building efforts began to work with volunteers from a variety of other organizations all seeking to improve the ecological health of the Eastern Slopes. These partnerships provided great opportunities for learning as beliefs, values, and hopes for the future of the Eastern Slopes were shared. This was identified as a benefit for many who participated in bridge building efforts, but this kind of discourse also provided a tension to efforts as sometimes conflicting values and beliefs became apparent. However, Mezirow (2012) states that discourse is not about winning or losing but requires a fundamental attempt at agreement and a willingness to accept or at least make the effort to understand a perspective in contrast with our own.

“I mean if we can get support from other groups, Watershed for example, to us that’s a win-win situation for everybody. So, yeah, we are all for that. And of course work very closely with ... the flood rehabilitation. I mean, I have nothing but respect for all of those guys, they work hard and they get the job done.” (Q02)

“Having so many people involved sometimes. That is definitely a challenge. Or having a lot of different users on one trail. That makes it challenging for me. Yeah, it is almost sometimes

when there are more people you almost get those that do want something and those that don't want something. So it is hard to please everyone" (Q04)

Through the bridge building efforts of the CPQS the club has been building relationships with government agencies, environmental NGO's like the Oldman Watershed Council, and has increased their presence in the local community as well. These strengthened relationships increased the pool that could be drawn upon for volunteers to work on bridge building or any other restoration type projects that any of these groups participate in. This improved network for bridge building efforts has also been significant for participants as they learn to further understand various, and sometimes conflicting, points of view.

I attended one particular work day replacing wooden decking on a bridge installed by the government run flood rehabilitation program where volunteers were drawn from OWC staff, CPQS members, community members, and government employees. These volunteers came together to work towards their commonly shared goal of mitigating ATV impact in the Eastern Slopes, even though they may not have all held the same values or beliefs about the best way to go about achieving this goal, or may not even had any real interest in participating in motorized recreation of any kind. This cooperation has been a benefit for many who participated in bridge building efforts, but this kind of discourse also provided a tension to efforts as sometimes conflicting values and beliefs became apparent. And it is through some of these contrasting views over ATV use in the backcountry and the resulting dialogue that one of my interview participants reflected on learning something new about why certain places can or cannot have an ATV trail.

"See I really like the attitude of environment and parks when we had that meeting. ..that comment about thinking of closing down the pipelines and powerlines to motorized vehicles. I'm thinking, really, why? Cause that pipeline must be buried ten feet underground. But I was

talking to [local forestry officer] and he says to me no, I have seen pipelines that are literally inches under the ground. You know, so I really liked her attitude when she said if that is the case we want look to build a parallel trail to it. So, that's why I said I have nothing but respect for environment and parks. Lot of guys don't, they think that they are just out to close it down or you know they don't want you out there. I disagree, I just think they are doing a great job.”
(Q02)

Through this discourse Q02 was able to understand exactly where another perspective was coming from, thought about this new perspective, and completely agreed with the result. For many ATV users, just as the quote above suggests, the environmental side of discourse often represents the enemy and this characterization makes both parties in the conversation unwilling to see the other point of view. This is not the case with the participants that I interviewed, all of whom expressed a desire to continue their efforts in strengthening cooperation through the CPQS bridge building program.

These relationships that have been built through bridge building projects have provided many opportunities for participants to share knowledge and perspectives with someone who may see things very different than themselves.

“I mean people complain about the logging and stuff, but I don't have a problem with the logging. Well you go on top of the mountain and you can see where it has been logged and yet you see the new growth coming back ... Not to mention the fact that the mining and logging is the basis of what our trail systems are. They actually built a lot of roads to get in there, and that's what we're using as trails.” (Q02)

The CPQS has even made efforts outside of the bridge building program and their trail maintenance efforts to address perspectives other than their own and to make a positive impact in the community.

“See, we had an education program for years. A guy went to the schools, grades six or seven stuff like that. And he taught them quad safety, environmental safety, and responsible riding. The quad squad paid for all that. And I’m only hoping that those grades, cause they were doing that for about 10 years, I’m hoping that at least those grades will come up and that will at least stick in their minds when they get out to the field and they realize that they have to take care of it.” (Q03)

Through this program the CPQS has worked to share their values, beliefs, and appreciation for the outdoors. The goal of this education program was to encourage this same appreciation for nature while maintaining quad safety and the mitigation of impact through responsible ATV use. The reflection that led CPQS members to understand their impact upon and responsibility for the backcountry has further pushed their own individual learning to become a segment of their recreation that they have chosen to passionately share with others in their community. This program has unfortunately ended as the CPQS member who offered up their time no longer had the time to do so, but the idea for this kind of community leadership and participation was one that the members I spoke with hoped could begin anew in the future.

The involvement of CPQS members in community events and dialogues surrounding their own bridge building efforts has greatly increased their understanding of the impact that quadding has not only on the environment but also on the economy and the many businesses that have found their place servicing the tourism and outdoor recreation that the region is known for.

“I mean it’s a billion dollar per year industry. You go out to McGillivray or Atlas any weekend, let alone a long weekend, and start adding up the money that is invested out there it is incredible...then there’s fuel which is supporting the government, making money off of the fuel that is being used. The fuel used not only for the quadding but to get here, and back. You

know, some people hotel it. Lot of people go out for restaurant food and stuff. It's just huge dollars it's brought in here." (Q02)

Through community involvement, volunteer opportunities provided through bridge building or trail maintenance efforts, and simple conversations with other recreational groups or business owners the real impact of recreational tourism has become apparent in the Eastern Slopes. As was discussed in chapter 4 the Eastern Slopes provide the largest section of public lands in southern Alberta, and this space is made us of by many not only from Alberta but from far beyond. Through their work the CPQS is working to maintain this region and ensure its responsible continued use.

Transformation

According to Mezirow (2003) the transformations with the most significant impact on an individual occur through what he terms a disorienting dilemma, an event or a series of events which cause individuals to question their previously held beliefs, values, or assumptions through critical self-reflection. This disorienting dilemma is therefore a very significant catalyst for learning and transformation to occur, but this powerful catalyst does not have to happen all at once or result in an immediate change of attitude or behaviour (Mezirow 2003). This process is evident in the participants of this study as they have been slowly changing their perspectives, meanings, and values for the backcountry and their sport as they participate within the CPQS.

Through the instrumental and communicative instances of learning expanded above these individuals have all come to see their efforts building bridges and trails, as well as their own recreation in the Eastern slopes, in a different light. They indicated that they now focus on the mitigation of their impact on the landscape around them and they are willing, even enthusiastic, to participate in discourse with those holding contrasting or conflicting value and belief systems to their own. All of this has led to

a permanent change for the way that these recreationists participate in the use of their ATV's in the backcountry.

This is expressed most clearly in a statement by Q02 as he shared about the ways that his involvement in the CPQS and the discourse associated with bridge and trail maintenance, and how his perception has changed over time.

“When I first started riding I had no clue you couldn't go through the streams, it was fun to go through the streams. Find a mud bog and tear it up, you know, and just start thinking afterwards, geez that can't be very good for the environment. Yeah, actually I think the club has, since we joined the club getting their newsletters and stuff like that, definitely has upped our intelligence I think about what we can and cannot be doing” (Q02)

The impact of understanding the affects of what he was doing lead Q02 towards a drastically different way of participating in the Eastern Slopes over time. He is not alone in these changes in thinking and is working through the CPQS to encourage this responsible, and much more sustainable, approach to ATV recreation. Q02 also shared how his appreciation to quadding and the outdoors ultimately led him and his wife to move into the Crowsnest Pass. They have used this new location to extend their love for ATV recreation and the outdoors to others as friends and family have come to visit them and have been invited to participate in events with the CPQS or just to go out for a ride. Through these interactions Q02 is now extending his passion and his learning with those he invites out into the backcountry. By riding responsibly, and teaching others to do so, he is passing on his own learning and encouraging others to do the same.

Efforts like those of Q02 are seeming to have significant success as many members of the CPQS are taking to heart this message of keeping machines dry and on the designated trails for their use. The very way that the CPQS is alerted to areas that need attention for restoration work or are in need of a

bridge to protect a particular stream or waterway relies heavily on information gathered by club members.

“Yeah, we have had members of the club send us pictures for example of a bridge that needs to be repaired. Or if we are out on our own, or if some other board members are out riding on their own that type of thing.” (Q02)

The convictions held about more sustainable recreational riding are beginning to take hold within the entirety of the club as they work together to address areas of concern. The very nature of the bridge building program and the maintenance of ATV trails throughout the vast region has created a sense of pride and ownership for many community and CPQS members. They are willing to put in their own time and sweat to see these areas protected and kept available to them. Learning has been said to become transformative when,

“a holistic and enduring change in how a person affectively experiences and conceptually frames his or her experience of the world in order to apply new actions in life contexts that are personally developmental, socially controversial, or require social or personal healing” (Kasl and Yorks, 2012, pg. 509).

The transformations that have occurred for individuals of the CPQS are leading this club to greater social action and community engagement. Through their efforts they hope to address the negative stigma that has been used to criticize recreational ATV use in the region. They work to remedy the areas that have been damaged by those people who have refused to learn and fit all of the negative characterizations of disrespectful ATV users that all too often even the respectful riders find themselves lumped in with. These ‘bad apples’, as discussed in chapter 4, have created a culture of negative characterization within the Eastern slopes and this has been a source of lasting frustration for

participants as they perform the practical work to mitigate these impacts, but still find themselves lumped into the general 'bad apple' category.

Collective Social Action

From the very beginning this bridge building project of the CPQS was the result of individuals realizing that they had to act in order to mitigate their own impact on the environment if they were to have access to the wilderness that they so enjoyed. Collective social action is framed here in relation to the recent work by Moyer et al. (2016) in a paper which addresses the critique of TLT that the link between learning and action has not been made strongly enough in the theory. Despite this critique Mezirow (1991) makes the assertion that action and learning are intricately linked with the ultimate goal of learning to often be a guide for action. Yet, TLT is a comprehensive theory of adult learning and not all learning has to lead directly to social action (Mezirow 1989, 1996). TLT is most focused upon the evolution of individual internal thought processes. The resulting action is an important aspect of learning, but for TLT this does not have to be the ultimate goal.

Although TLT focuses on individual adult learning, which as stated above does not always have to lead to social action, there have been increasing connections and research being made between learning theory and collective social action (Moyer et al. 2016). Social action refers to the "informed and intentional action taken by an individual or collective for the purpose of protecting or enhancing the welfare of humans, the environment, and/or other species" (Moyer et al. 2016, pg 317). Using this definition Moyer et al. (2016) distinguish three different forms of social action: individual, interpersonal, and collective social action. Each of these is discussed in relation to my data below.

Individual Social Action

Individual social action is characterized by a single person acting on something they have learned (Moyer et al. 2016). The individual learning outcomes that resulted in the sorts of action that best exemplify individual social action is the ways that they have altered their riding habits and ATV use

on Alberta public lands. This is directly related to the quotes above by Q02 as he described his transition from enjoying riding through waterways to understanding now how important it is to actively avoid these areas with his machine, and to advocate for others to do the same. By advocating for a more responsible ATV user the CPQS has also benefited from members buying into this process and providing the initial concern for any and all areas of environmental damage that they come across. This is entirely the way that new bridge installation site are chosen and how areas requiring maintenance are identified. CPQS members or other concerned community members make note of an area while out riding their machines and contact the CPQS office, an activity that may never have even crossed their mind before learning of the importance for healthy riparian areas, biodiversity, and the damage that an ATV can do to a stream bed and downstream water quality.

Interpersonal Social Action

Interpersonal social action is defined as characterize the way that individuals can transfer their learning to others (Moyer et al. 2016). Participants indicated that the bridge building design program has been an effort to transfer knowledge from its very inception so many years ago. One of the most important ways that this transfer of knowledge has been done is through communicative learning, as participants in the bridge building have sought to share their understandings with others and have in turn attempted to understand the various conflicting world views and perceptions they have come across.

As participants shared about their experiences working within the bridge building context of the CPQS it rarely took them long to reflect upon the ways that collaboration in this project has left lasting impacts upon the way they think about and participate within Southern Alberta's backcountry. Participation in efforts to improve trail systems and mitigate negative recreational impacts in the region caused recreational users of the area to really stop and think about their own lasting footprint upon the

wild places they so enjoy. The entire bridge building enterprise of the CPQS arose out of the discussion at one of the general member's meetings early in the life span of the club. From the beginning this project was the result of individual members sharing their perceptions and understandings of the backcountry and acting to further their access to the wilderness that they so enjoy by mitigating their own impact

"Well the club actually started in, I believe, '98.... So a couple of guys said, well if we put a bridge across zoom you're across, you're nice and easy going. So it kind of started that way and as the years went by the forestry guys got into it cause of the fish hatcheries. They said well we have got special fish in this creek, we got special fish in that creek, we don't want people driving through it. So we said well that's great, we will put a bridge across every one that we can come to. And we have put in 44 so far." (Q03)

"15-20 years they have been going. You know when the club first started they were just a bunch of guys who liked riding. They got organized and said look, the concern back then was the same thing. Driving through creeks! Driving through creeks! And the clubs mandate back then was, and it still is a mandate, that for every creek there is a trail on is to put a bridge in there." (Q01)

It becomes clear through these quotes that bridges, although significant to ATV users for the access they allow, are also important ways for protecting the natural habitat that the CPQS enjoys through recreation. Bridges help to protect fish populations, encourage healthy riparian areas, and can have a significant impact on water quality downstream. Yet, bridge building is not the only way that the CPQS has worked to share learning. The previously mentioned education program is a fine example for a platform to share learning. Through this education program future ATV enthusiasts in the community were presented with a new model for ATV use that promotes safety, responsibility, and sustainability as the club attempted to teach youth from an early age about the importance of proper ATV use on

Alberta's public lands. Although this program is no longer in place this education initiative provides a positive example of the kinds of ways that the CPQS is actively working to transfer the learning that has been occurring within individual members to the broader community.

Collective Social Action

Moyer et al. (2016) describe collective social action as that which is undertaken by groups of people applying their learning together. This collective action builds upon the individual and interpersonal action described above and further extends the influence and opportunity for learning. Moyer et al. (2016) describe this collective social action as the least commonly mentioned and portrayed in the studies for their paper, but in the case of the CPQS social action is present in the bridge building design project. One of the greatest benefits that participants attributed to the program was essentially the collective nature of the work.

"I think the biggest strength to bridge building is, well there's a lot of strengths to it, but one is the comradery of doing it. Actually doing it with people. The other thing is the image issue, like you mentioned, the quad squad builds bridges. So that's a good positive PR image to have"

(Q02)

When the decisions were first made to begin a bridge building project an open discussion led those attending club meetings to realize the long history of conflict and the negative image that had developed as the direct result of destructive recreational use of the Eastern Slopes. It was this image of recreational ATV use that stimulated the members of the CPQS to seek alternatives and ways of mitigating their impact without having to give up their highly valued recreational access to the region. Current club members' perspective of those early discussions was that through the sharing of knowledge and ideas the club decided the best course of action was to implement a program of mitigation and work towards the ecological restoration of riparian areas, and trail surroundings, which

had been damaged. The bridge building work of the CPQS has been successful and very popular since its beginnings, with many volunteers still arriving to work on bridges when the club organizes work days.

“We have had as many as 30. You know, they are tripping over each other cause they all want to help and they all want to have the access. They use the trails so why not help out to get them there?” (Q03)

The many volunteers that show up and trip over each other in their eagerness to find ways to help out provides a strong example of the collective social action formed through the bridge building programme. The learning of better ways for recreation on public lands, and the ways to best preserve and protect these spaces, has led the members of the CPQS to participate in action that better represents their new found understandings and perceptions of their sport. Yet, these work days and the required organizing with the various volunteers and other community groups are only one outlet of action that has been provided through the club’s work. Alongside the opportunities for interaction through impact mitigation the club, as an organization, provides a network for social action and the sharing of new ideas and commonly held values. The club has even made intentional efforts to provide a safe and educational riding atmosphere for any members, or anyone else, who would like to join for a ride.

“And we actually made, what we call, it is a family trail. If you want to take little Suzie on her little 50 she can make that loop. I think if I can remember, it’s about 5km long, in a circle. And it’s perfectly safe, there are three bridges and a nice smooth trail. Stuff like that and that way they can go out, they can learn.” (Q03)

The CPQS provides large events where recreational ATV users can come together to share in their common interests and work together to advocate for alternatives to the common image of destructive and damaging recreational use of the Eastern Slopes. The club hosts season kick offs, wrap ups, as well

as camp outs and organized rides open to all as the dates for these events can all be found on the club website (<http://quadsquad.ca/>). It is through these events that the club hopes to provide a positive example and begin to change the narrative of how ATV use is labelled in the region. It is through these efforts to change riding behaviours that the CPQS acts collectively to build bridges, hold events and shift the image and culture of ATV use in the region.

Chapter Summary

Learning is fundamentally about change (Keen and Mahanty 2006). Change became visible through transformative learning as participants reflected upon their previous understandings of restoration, riparian areas, OHV use, or community involvement as they actively engaged in the design project of building bridges in the backcountry. This reflection has aided participants to come to new ways of understanding the natural world as they make meaning out of their own experiences. This individual transformative learning experience also moved beyond the individual so as to become situated within the wider community through interactions in social networks, a larger program of collective social action beginning first with an individual instance of learning.

The bridge building design project of the CPQS has resulted in learning relevant for club members. Learning has been iterative as action undertaken first required club members to gain skills installing and maintaining bridges, but as they learned why bridges were important to riparian areas, and continued access they began to communicate this understanding to the larger ATV community. This also led to finding ways to cooperate and understand the perceptions of those who are active in the region who may not have the same point of view on ATV use in the Eastern Slopes. Through individual transformations CPQS members have become actively engaged in social action as they seek to better their biological environment, the social perceptions of ATV use on Alberta public lands, and ultimately aid the sustainable future that they hope to bring about for the wild places of Southern Alberta.

Chapter 7 – Conclusions, Discussion, and Recommendations

Introduction

This research project was the study of the bridge building design project entered into by the Crowsnest Pass Quad Squad. In efforts to increase the ease of access to the backcountry, mitigate their own recreational impact and work against the negative perception of ATV use, in addition to restoring the riparian and overall environmental health of the region the Crowsnest Pass Quad Squad has been building bridges on recreational trails in Southwestern Alberta for nearly 20 years. By observing this design project through the lenses of TLT and biocultural design this bridge building enterprise was used as a case study to find insights that can be applied to biocultural design and the resulting learning opportunities inherent through participation in processes of design. This final chapter provides discussion on the concepts of biocultural design and learning, relating these concepts directly to the bridge building project, the research objectives, and will share conclusions and recommendations based on the results and findings highlighted in chapters four through six. The objectives for this study defined in chapter one are as follows:

- Document the bridge building programme of the CPQS
- Identify learning and collective action that occurred through the bridge building programme

Each objective was addressed through interviews with participants, participant observation during work days maintaining and installing bridges, as well as through the literature review of chapter two providing a background and context for the themes, topics, and insights provided by participants. Each of these objectives will be discussed in turn followed by recommendations and conclusions.

Discussion of Design

The following discussion will seek to create a dialogue with the concepts of design and the specific phases of design as they applied to the bridge building project of the CPQS. The bridge building design project provided the basis for this case study and it was through this design process that each of the objectives for this research project could be addressed. As such this discussion will seek to establish the bridge building design project of the CPQS within the literature of biocultural design as well as highlight the opportunities for learning that were presented through this process.

Design is the process by which an idea is conceived and then given form, structure and function (Davidson-Hunt et al. 2012). Design is also a wildly unique and creative process that includes both inquiry and action in the conception of new ideas and innovation as these ideas are made reality in everyday life (Buchanan 2001). Through their bridge building program the members of the Crowsnest Pass Quad Squad have entered into an endogenous process of design to implement their ideas, and their hopes, for continued sustainable use of Southern Alberta's public lands. The participants interviewed for this study would never have labelled themselves designers, they would state instead that they are simply working to improve their relationships with the landscape that they have come to value and are working to find ways that they can continue to use these areas. Yet, even without their direct acknowledgement this bridge building project can be viewed through the lens of design as they are taking their ideas and turning them into physical structures, bridges. The CPQS has been utilizing a design thinking approach to their dilemma ever since they began discussing ways for improving their relationships with fellow outdoors enthusiasts, mitigating their own impact upon the public lands around them, and improving their immediate environment.

In this thesis I drew from two central discussions within the design literature. The first relates to the movement in design from a positivist view that relied on a determinate world that could be

predicted to one in which the world's complexity required a processual understanding of design (Buchanan 1992, Oosterlaken 2009, Jensen 2014). The second was recent work by Brown (2009) that laid out a process of design as moving from inspiration through to ideation allowing for implementation of a design solution.

Designers are now finding themselves combining theory and practice towards new and productive purposes as they explore interpretations of knowledge that were previously considered outside of the domain of design (Buchanan 1992). Current design conversations suggest that the previous narrow scope of design was rooted in the modernist philosophy of determinism (Buchanan 1992). Possibilities of design are everywhere, all around us, and they have been proven to develop in ways that are completely unpredictable and beyond our anticipation beforehand (Escobar 2013). Before the concept of wicked problems emerged, design was considered to be a process that could be fully determined as designers identified all of the required elements for a design solution. As understandings of the relationships and interactions within our world developed it became clear that in no process could designers fully determine all of the elements involved. The world's indeterminacy implies that there can be no definitive conditions or limits set to design problems or solutions, there is simply no possible way that we can identify all of the factors in play throughout a design process (Buchanan 1992). An all-encompassing list of elements in the design process is, to be put simply, entirely unattainable. This is the understanding of design that must be utilized when applied to the bridge building efforts of the quad squad; it became an emergent process that unfolded and developed as they built bridges.

Considering design as a process of inspiration, ideations and implementation was one contribution from Brown's (2009) work on design thinking. Inspiration is the phase of design where a problem or opportunity sparks the search for solutions. Drawing on this work biocultural design proposes, that human beings are creative agents with the ability to shape their everyday lives

(Davidson-Hunt et al. 2012), and it is during this inspiration space of design that this opportunity is realized. Inspiration always involves an “element of chance” (Brown 2009, pg.16). Any aspect of the world around us has the potential to provide the minds of designers with a truly exceptional breakthrough. Sometimes it can be the most mundane of objects, the ones within our natural surroundings, that by our very familiarity and intimacy with them they are all but dismissed as having any real meaning in our lives (Ingold 2012). We can take these objects or moments that are so ingrained in our lives for granted precisely because of the routine way by which that we use and witness them (Ingold 2012). Yet, even these, the most common of moments and items have the potential to provide extraordinary opportunities. It is precisely for this world of possibilities that Brown (2009) declares inspiration as the most exciting space of design, because you never know when inspiration may hit.

Ideation is the time spent on the white board actively participating in the search for creative solutions. This is the space for “generating, developing, and testing ideas” (Brown 2009, pg.16) and it is of utmost importance that those involved in this space have “the capacity...and disposition for collaboration across disciplines” (Brown 2009, pg.27). This interdisciplinary work allows the design team to collectively hold ownership over their ideas and for each member to be further invested in the process through their shared responsibility. According to participants this collaboration has most often provided the platforms for learning to occur. This interaction with others seeking solutions to the complex problem of damage to the backcountry and ways to restore these wild spaces to ecological sustainability has created the space for participants with varying backgrounds, motivations, and values to share their perspectives and knowledge with the larger group. This sharing of knowledge creates opportunity for reflection and dialogue which has allowed participants to learn about the natural world and the impact of their recreational pursuits.

Finally, implementation is the phase where a design project actually leaves the workshop and is tested in the real world. This is the primary stage that this research project was able to study through the bridge building project of the CPQS, as the club has been actively building bridges for nearly 20 years. This has led to many innovations as the design process had to be adapted and changed as new obstacles and opportunities have been encountered. Graham Dutfield (2014) speaks of innovation in a similar light to Brown's implementation phase of design. Any great idea, even a revolutionary idea that has the potential to change human ways of life, cannot be considered an innovation if it never leaves the laboratory or working group where it was developed (Dutfield 2014)

The bridge building project in the Crowsnest Pass has certainly left the design room. The quad squad has installed more than 44 bridges since they have entered this space of design. Yet, not all of these bridges are the same. I explained in chapter 5 how the bridges installed by the CPQS have gone through a number of design changes through the years. The bridges have come a long way from their felled trees and basic lumber beginnings. Now bridges are engineered, can be built in sections at the desired location, and are powder coated to prevent rust. Alongside these improvements to the design structure, the actual installation of the bridges has also improved. From a group of recreational ATV users with their machines and maybe a pickup truck or two dragging logs into place for a bridge the quad squad now has a very sophisticated method for bridge placement that has zero impact on the waters and riparian areas below. One of the very requirements for the TFA to install a bridge is that the waters and stream banks will not be impacted (Q04) so the CPQS has adapted their original methods for bridge installation and now make use of the existing older bridge or fallen trees as tools to slide the new bridge into place. Through the use of high powered winches and pulley systems the bridge installation is both faster and more efficient than the original bridges, even though the new bridges are in many cases larger and heavier than the original wooden bridges.

Throughout this implementation space of design the quad squad has made use of innovation to adjust and improve this process so as to make this solution work best in relation to their values and goals. These bridges have been a working solution that resulted from the design process, but they are not in and of themselves the ultimate final solution. These bridges, as a solution, must be viewed as the best solution put forward by the design team in the here and now, but this solution within a design process must be reassessed, revised, and re-designed according to changing variables relevant to the design project. Perhaps there will be a time when the bridges are no longer an acceptable solution, and at that time the design team will need to go back and begin the process of ideation again looking for another solution.

Even, if the bridges were to no longer remain an effective design solution, and the design process was to be renewed with another source of inspiration, it is important to remember that this process would not be considered a failure or loss. Design processes sometimes need a renewal of energy and a change of direction. As alluded to before, design is best not to be thought of in relation to a problem but as a process instead (Brown 2009). In regards to a problem, the desired outcome is most certainly a solution. But, if design is to be a process, and not solely perceived as a singular solution to a problem, then there are other outcomes that are equally as important. This leaves room for the tremendous opportunity made available to designers through the capability approach of Amartya Sen (1999), an approach that provides a foundation for biocultural design. For Sen (1999, pg.3) development is “a process of expanding the real freedoms that people enjoy” and this freedom becomes a reality for people as they expand their own capabilities to pursue the types of lives that they have reason to value. With this understanding, every individual, family, and community is engrained in a social system of boundless possibilities (Oosterlaken 2009). This is the kind of approach utilized through biocultural design and as such the goal of biocultural design is to utilize design thinking so as to propose

an endogenous approach to innovations rooted in the materials, values, and creativity of local communities as they endeavor towards sustainable livelihoods (Davidson-Hunt et al. 2012).

The capability approach to design understands individuals as the starting point of the entire process, resourceful and innovative beings who are constantly acting within a larger social context (Davidson-Hunt et al. 2012). Human beings are gifted with capabilities and the ways they make use of them will determine the functionings that will be present in their life. The ways that individuals act upon the capabilities available to them are largely guided by social and cultural values (Davidson-Hunt et al. 2012). Biocultural design is thus an approach to support individuals as they draw on their own capacities to seek the futures they desire. The bridge building efforts in the Crowsnest Pass, when viewed through this lens, are a means by which ATV recreationists building bridges in the Eastern Slopes have attempted to continue their recreational activities. Bridges provide access, bridges represent an attempt to mitigate destructive impacts, and bridges provide hope for ATV futures in the region. Each one of the participants in this study spoke at some point about the beauty of the public lands that they visit, they spoke of wildlife and of seeing something that they may have never seen before, and they talked about the freedom that they feel having the opportunity to enter these remote and wild areas. These are areas that they have come to know and value, and they want to ensure that these valued spaces are available in the future. By drawing on the capabilities available to them now, they hope to ensure the continued use of the backcountry in the future for themselves and others.

CPQS and Biocultural design

The first objective listed for this research project was to view bridge building through the lens of biocultural design and see what lessons could be applied to the conceptual framework, as well as to explore the process of design through Brown's (2009) inspiration, ideations and implementation. It

becomes clear from the discussion above that although the CPQS did not intentionally enter into a biocultural design process their own design project made many connections to biocultural design. The bridge building of the CPQS followed very closely the prescribed phases of design utilized in a biocultural process. The bridge building of the CPQS relied upon innovation and creative solutions to complex problems. And finally, the bridge building project was conceptualized and brought into reality by local people seeking to improve their own livelihoods through collective action.

When considering this bridge building process there is one significant lesson that emerged. The formation of a design team was a critical component of the bridge building process. Participants in this study emphasized that this team approach created a network of relevant knowledge from a vast breadth of interests and backgrounds with individuals holding a variety of skill sets and knowledge bases relating to the design brief. However, along with the diversity of the team, and what they brought to the project, the process was enhanced through new information being provided to the CQPS bridge builders related to the conservation of the biodiversity of riparian areas.

Biodiversity is increasingly being recognized as an essential resource for the sustainability, and even the survival, of communities, nations, and future generations (Cocks 2006). Biodiversity provides humanity with different ways of understanding and interacting with the natural world, and as such provides endless possibilities for human futures. These endless opportunities, however, only remain possible if biodiversity can be maintained (Cocks 2006). While the CQPS began simply as a bridge building project, over time it became more of a process through which members learned about the connection between biodiversity and riparian areas and this began to inform their perspective as to why bridges were important. While biodiversity entered through the backdoor, in this case, biocultural design by its very nature is informed through dialogue over decreased biocultural diversity (Davidson-Hunt et al. 2012). As such, the design team needs a person who can bring this perspective to the design

process during the inspiration phase so that the ideas which emerge reflect biological diversity as well as cultural diversity. A biocultural design approach would recognize the cultural values of rural communities and by including them in the design process, as shown in this work, this can lead to solutions that respect both the values of the rural community and the biological values that are being considered in the process. Instead of simply viewing these rural regions as resource stock piles with little value aside what can be taken away, the community is empowered and brought into the ownership of solutions created for their region, for their home (Dutfield 2014).

This is one space that the bridge building efforts of the CPQS could have perhaps benefited from prior knowledge of biocultural design at the outset of their own design project, and a significant lesson for future biocultural design projects. The club invited any and all of their members to participate in this program, and have most certainly worked with others as well when another perspective or expertise was needed. For the most part, however, the design team that was formed for this project was one made up of people from different backgrounds certainly, but these individuals were all ATV recreationists and held a singular value of access to the backcountry. As this bridge building project has expanded and developed over the years the club has begun to work much more closely with government, non-government, and environmental organizations to best continue installing bridges on recreational trails. Although this collaboration has resulted in creative ideas and a powerful sense of ownership for participants who then make use of these bridges and trails, this collaboration has also been one of the greatest challenges of this project in recent years.

Even as participants have found a shared passionate interest for Southern Alberta's public lands, or perhaps because of this very passion for the region, they have managed to occasionally offer extremely conflicting means for achieving their goals. In some cases this has led to disagreements and conflict as people have had difficulty adjusting to new designers in the system. The management of

public lands in southern Alberta has become a controversial issue, and with so many different opinions about the best way to approach this issue there have been difficulties between some groups as they attempt to work together. While conducting research for this project it was very clear that even though various organizations were working together to improve the health of the Eastern Slopes these groups did not all agree on what their ideal future for this region would look like. There was a definite lack of trust that would have been less prevalent with the formation of a biocultural design team at the project's outset. These individuals then could have spent the time working together towards a common goal and building the trust that is essential for a successful cooperative project.

Oosterlaken (2009) makes the assertion that design is not solely an exercise in producing solutions. The process of design provides an unlimited opportunity for the expansion of capabilities and functionings for people within diverse societies as they participate in the process together. Design is not simply an equation of solutions and problems but presents an opportunity to expand ones world just by participating in the process. By exposing ourselves to a cooperative practice of creativity we expand the possibilities for our own future.

Transformative Learning Theory and Collective Action

The second objective of this research project was to identify instances of learning that were facilitated or made visible through this bridge building design project. Through this research project it became clear that participants had certainly engaged in the critical reflection that Mezirow calls for in relation to TLT. It could be seen in the new perspectives on proper ATV use and riding practices, ways for these perspectives to be shared, and the increase in understanding of perspectives different than their own.

In some cases learning is identified based on the resulting collective action which can be a clear indicator of change and learning. Although I would argue, and will do so a little later in this chapter, that a significant change in behaviour is present within the participants of this study as demonstrated by the way that they ride on public trails with their ATV's. This is not, however, the only indication of learning present within this research. The bridge building process of the CPQS is a form of collective action also indicative of learning. Through their efforts volunteering time, donating fuel for vehicles and machines, and contributing their knowledge, the members of the CPQS have been actively working together through their own capabilities to address a significant problem caused by the recreation they so enjoy.

Mezirow (2012) claims that the human experience can be best defined as the continuous exercise of negotiating the many preconceived notions that we have based our understandings upon, and then finding our own personal interpretations as we critically reflect on our own values and actions. Based on these reflections we are then able to produce a guide for our own future actions. Through their reflections the participants from this research project were able to explain the ways that they have created new guides for their own actions and ATV recreation. In relation to instrumental learning, participants discussed the skills they have gained through the physical construction of the bridges, their increased knowledge of biodiversity, as well as negotiating red tape for the approval and funding processes involved in this project. The communicative learning outcomes that participants shared was related to the ways that the CPQS has worked to share their message of a more sustainable future for ATV recreation. This have done this by hosting ride events for club and community members, working to educate school aged children about safe and responsible quad use, and by entering into dialogue with others who are also passionate about the outdoors and public lands of Southern Alberta. They have persisted in these activities even when dialogue was difficult and others viewed ATV users as the most direct problem for riparian areas, biodiversity, and the broader ecological health of the region.

A major emphasis of Transformative learning theory focuses on how we as individuals learn to negotiate and act upon our own feelings, values, and actions rather than simply continuing to accept those preconceived notions that we have uncritically, and sometimes even unknowingly, adopted from those around us. This lack of reflection was evident in the ways by which participants discussed ATV cultures and true also of their own perspectives when they first began to be involved with the CPQS. While there are rules and regulations for ATV use on public trails the enforcement of these rules can be somewhat non-existent made increasingly difficult due the vastness and remoteness of the region. This has resulted in participants, despite the rules, self-regulating their choice of whether or not to use the bridges available to them when crossing waterways. Everyone knows that there are fines for not using bridges and that machines are supposed to stay out of the streams, but riding through creeks and boggy areas is just too enjoyable for some, and worth the marginal risk of a fine for others. Participants from this research project concurred that in the past they viewed these same activities as fun and exciting, especially when getting into new areas that they may have not been before. This is perhaps the greatest change in perspective and behaviour of club members as they now actively working to remedy this culture of riparian destruction caused by ATV use in the region.

Mezirow (2012) claims that learning cannot occur without critical reflection. The mindful transformation of an individual requires the learner to make a conscious informed decision to act upon their reflections. Based on the understandings shared by participants it would appear that the theme for most of these ATV users was one of incremental transformations as they have over time come to slowly change their perceptions of responsible and sustainable ATV use. As participants watched the way those around them participated in ATV recreation, engaged in dialogue with those of other opinions about ATV use, and improved their own understandings of the ecological importance for riparian areas in the region they used all of this information to build for themselves a new framework for action.

Knowledge of riparian health and impact from ATV use

Although, not listed as a specific objective for this research it was very interesting to document participant knowledge of riparian health in the region and the impact that the culture of OHV use in the region may have upon the overall environment. Through their participation in the bridge building design process as well as through their own personal experiences with wildlife and the environment participants have learned much about the natural world where they ride their ATV's. As was presented in the literature review the Society of Ecological Restoration defines ecological restoration as "the process of assisting the recovery of an ecosystem that has been degraded, damaged, or destroyed (SER 2004)". This is taken one step further by Kim and Hjerpe (2011) as they describe ecological restoration as the effort to remedy mistakes from the past and to renew the ecological integrity within an ecosystem while maintaining the protection of human interests. These two definitions provide a foundation for the efforts of the CPQS and their bridge building efforts. It is through this work that CPQS members have been able to reconnect with the natural world they value so highly as they work to restore and heal some of the damage that they have been a part of creating. Through participation in this process interviewees were able to share how they have gained a deeper understanding of natural systems, fish habitats and life cycles, as well as impacts of ATV use in the region that are contributing, not only to the negative health of the region, but also validating the negative stigma of ATV users.

This last insight was certainly the one that caused the most discomfort for participants. At least in the case of participants for this research project, ATV users are beginning to accept the impact from irresponsible ATV use in the region. Nonetheless, they are still uncomfortable and apologetic about ATV use as they realize they themselves are a part of this problem. Chapter four introduced the notions of 'bad apples' coming out of the Engaging Recreationists report (2015) from the OWC, and the realities of these ATV users destructive riding habits that were shared as participants described the causes for concern in Alberta's backcountry. Participants realized the destruction that irresponsible and reckless

ATV use in the region was doing not only to the environment but to the positive work that they were trying to accomplish. This was clearly one of the greatest sources of frustration for those deeply committed to a future of sustainable use of the Eastern Slopes.

Recommendations

Based on the literature review, participant interviews, and participatory observation work days of bridge building and maintenance it is clear that the Crowsnest Pass Quad Squad has entered into an effective and innovative design project that they have successfully managed for nearly 20 years. Witnessing firsthand the passion that participants in this process have developed for their recreation, their work, and the environment that they have dedicated themselves to was a powerful message to the impact that this program is having in the region. Yet, while witnessing the positives of this program participants were also able to share their frustrations and the shortcomings that they have realized in this bridge building project. The lack of trust between various cooperating organizations, the occasional conflict based on various points of view and agendas for the region, and the lack of guiding principles for resolving these conflicts have proved to be very difficult obstacles for this project.

Davidson-Hunt et al. (2012) describe biocultural design as a conceptual framework that, although it may not be beneficial to all communities in all situations, could perhaps provide a useful framework for communities engaged in pursuing self-determination, autonomy and sustainable economic development. I believe that drawing upon biocultural design could provide, among others, one essential tool to the bridge building project of the CPQS; namely, the use of a properly constructed biocultural design team. This is the primary lesson coming out of research findings from the process of the quad squad towards the framework of biocultural design and future biocultural design projects. The formation of this biocultural team could have perhaps addressed many of the difficulties that the bridge building program in Southern Alberta has encountered. As prescribed by biocultural design, the

composition of a biocultural design team would then be accompanied by a set of guiding coordinates, used to help designers navigate their way through the design process. In their paper Davidson-Hunt et al. (2012, pg. 42) provide a table that could provide a starting point for creating the guiding coordinates at the inception of a biocultural design project. Below this table has been adapted, as Davidson et al. (2012) suggest it could be, to provide direct relation to the bridge building design project of the CPQS.

Guiding Coordinates for Crowsnest Pass Quad Squad

Design Team Composition: Does the team provide balance between knowledgeable club members and complimentary expertise from government, NGO, community, or scientific sources? Participation: How will community members, members from the CPQS / other recreational clubs, and even non-motorized recreationists on public lands be involved in the design process? Design Team Operational Principles: Have the roles and responsibilities for design team members been clearly defined? Do these principles consider self-reflexivity, equity, respect and compromise, as part of strengthening the foundations of collaborative design? Cultural Identity: Is the design process guided by local cultural values / traditions / identity? Does the culture being reflected resonate with those outside of the OHV culture familiar to CPQS members? Local Materials: How will bridges be built, installed, and maintained using local resources / capabilities? Foundation and Building Blocks: Are existing capabilities, capital, and rights amongst the design team clearly understood? Have links been made to connect with local institutions for the duration of this project? Subsidiarity Principle: Has the role that can be played by community organizations, such as other recreational clubs or environmental agencies, been considered? Are the long term goals of consistent with the CPQS bridge building project? Network of Beneficiaries: Who will most benefit by this project? Are there opportunities for other beneficiaries to become partners in time? Do the relevant responsible authorities support and provide adequate resources for bridge building? Who could be harmed by this process, and are there steps for mitigation of future harm? Cultures of Innovation Does the design process lead to a culture of innovation that builds upon itself over time?
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Table 7.1 Guiding Coordinates for Biocultural Design Team (Davidson-Hunt et al. 2012, pg. 42)

A design team composed in this manner, with clearly defined guiding principles, would help to mitigate some of the mistrust and creative differences that have become obstacles through the design process of the CPQS. With these guiding coordinates the design team of the CPQS bridge building project would be required to make explicit and negotiate the values and goals of bridge building projects so that they are done in a way that is desirable to participants and are feasible and viable given current levels of political

support and resources. This design team would also have to tackle questions about the future sustainability of the project, whether indicators of success have been defined, and also whether the network included in the design team include all of best potential contributors to the project. This approach towards the design team would bring a more intentional purpose to the design process that was not inherent within the CPQS bridge building programme. By ensuring that various perspectives are all at the design table the best possible product will be produced towards sustainable futures.

While there are many things the CPQS can do, participants were clear about the fact that enforcement is not within their scope of action. Continually participants called for increased legislation and enforcement upon Alberta's public lands as the means to address irresponsible and damaging ATV use in the region. In every interview of this research project, interviewees spoke to the lack of enforcement and the need for improved legislation. They saw this as a solution to the 'bad apples' mentioned in chapter four, who continue to ride ATV's in a fashion that destroys streams and riparian areas. While viewing increased enforcement as a detriment to destructive ATV riders, participants also saw the increased presence of law enforcement as additionally providing more readily available emergency services if needed. Participants spoke of changing laws for camping, motorized recreation, waste disposal, as well as wildlife and livestock management on public lands as a means for revitalizing the region and bringing greater awareness to the environmental, societal, and cultural needs of the backcountry. As such, I would recommend that further enforcement be considered to enhance the benefits being created through the bridge building efforts of the CPQS.

Although participants called for greater regulation they always made these assertions with the hope that plans for the Eastern Slopes and surrounding public lands would include their interests as viable, noteworthy, and valuable to the planning for the region. These hopes have recently been crushed as plans for Southern Alberta have been released and the intention is to close much of the areas

and the trails that these recreationists have worked so hard to improve and maintain. Many of the trails that are being removed from access include bridges funded, donated, and installed by the CPQS.

Although, no new research for this project has been conducted on the outcomes from this legislation it would appear through postings that can be found on the CPQS website as well as online Albertan OHV and ATV forums that the outcry from motorized recreationists would imply that the trust that was being built in the region has been significantly impacted. This may make the above recommendation of a properly formed biocultural design team with a greater variety of perspectives and influences even more difficult to achieve, but it would appear that recent events have made the need for the formation of such a team and a strategic approach even more relevant than before.

Concluding Statements

The bridge building project of the CPQS began simply as a way for ATV recreationists to continue the sport that they love, mitigate their own negative impact, and to provide a hope for their future on the public lands of Southwestern Alberta. This project has over time become a unique and creative enterprise that is indicative of design (Brown 2009). From simple beginnings of fallen trees, hammers and nails the bridges of the CPQS have been developed through innovations to become the durable, engineer stamped, powder coated creations of today.

This design project has created opportunities for participants to learn about their environment, their impact upon it, and the community that passionately calls this place a home away from home. Participants in the project have expanded their own understandings through social interactions, critical reflection, and collective action initiatives. Through community engagement and education the club has worked to share these new found understandings and to create a healthy dialogue about what ATV use could look like in Southern Alberta and the hope for a more sustainable future in the region. These hopes have been brought into question over recent years as changing legislation has developed in the

direction that members of the CPQS and all other motorized recreationists have long feared. With large sections of land being closed to ATV use in southern Alberta it would appear that a significant opportunity for collaboration and cooperation has been squandered. The CPQS has been working relentlessly in the Crowsnest Pass to mitigate negative impacts from ATV use while also attempting to improve public perception of ATV use and increase awareness towards safe and sustainable use of the backcountry. With significant land closures the potential for positive relationships between recreational groups and government has taken a very large step backwards. This makes the intentional process of design called for above through collaboration all the less likely and increasingly difficult as trust is once again being lost through management of Alberta's public lands. Instead of working with a grassroots recreational group working towards a more sustainable future in a way that strengthen ownership of the problem of riparian degradation caused by ATVs a sense of greater distrust and opposition has been created. The discussion of sustainable public lands use in Alberta is long from over and it will be the role of policy makers, governments, local communities, and passionate individuals to find ways of making legislation fit the values, traditions, diversity, and heritage of all Albertans in the future.

All of the work that the CPQS has done they have seen as steps in the right direction. This is not to say that bridges are the only steps that are needed in the Eastern Slopes, or even that bridges will continue to serve as the best possible solution in the future, but this entire design process has been a collaborative grassroots effort by local people to preserve and enjoy the backcountry in a way that has deepened and strengthened their connection to this region. "It's a solution. Shutting a trail down is not a solution." (Q01)

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Appendix A

Interview Schedule for Research Participants

Introduction

1. Can you start by simply telling me a little bit about yourself? (Name? What you do for a living? How long you have lived in the area?)

Riparian Areas of the Oldman Headwaters

2. Why is it that you spend time in the headwaters region of the Oldman/ have an interest in riparian health? (Work? Recreation? Both?)
3. How much time do you spend in the headwaters region?
4. Is there any specific place in the headwaters where you spend most of your time?
How long have you been going there?
5. Since you first began your visits to the headwaters, have you noticed any changes in the region?
If so, what factors do you think have played a role in causing these changes?
6. How have these factors influenced your own experiences/work in the region?
7. Do you know of any ways that those responsible for these factors have addressed the issue?
8. In your opinion, what are some of the ways that these influencing factors could be addressed?
Do they need to be addressed?
9. Are there things that you do specifically to work against some of these problematic factors that you have noticed?
10. Do you do this as part of a group? Or individually?
How long have you been doing this? Why?
11. Do you know anything about management or conservation activities that have been going on in the headwaters region over the past couple of years?
If so, what are your opinions about the activities you know about?
12. Have you been involved in any of these activities?
If so, can you tell me a little bit about that experience? What worked? What didn't?
Would you participate again?
13. What do you think are the biggest factors standing in the way of these management or conservation activities?
14. Many people are happy to point out the ways that management programs and conservation efforts are not working, can you name any strengths of the recent efforts in the headwaters?
What seems to be the best way to have a positive impact in the region?

Learning in the Headwaters

15. What sorts of things have you learned about riparian areas, restoration or management practices, and sensitive species while spending time in the headwaters or working towards their management?

16. What sources were most helpful stimulating that learning? (newspaper articles, reports about headwaters health, posters, neighbours...)
17. Since you began your visits to the headwaters region have any of your perceptions of values of the area changed?
Have you shared any of your new perceptions?
18. In your opinion, are current activities in the headwaters and present efforts to maintain this area enough to ensure that it will continue to benefit people for recreation and industry in the future? How about sensitive non-human species?
Why?

Closing

19. Thank you so much for your time and your valuable input today. Is there anything you would like to add that you didn't have the opportunity to share during this interview? Or a question that you thought I should ask?
20. Is there anyone else that you could recommend as a potentially valuable participant for this study?

Interview Schedule for OHV users in the Headwaters

1. Can you start by telling your name and a little bit about yourself?
Where you are from?
How often you visit the headwaters region?
2. Why do you come out to this region for your recreation and time away? Are there specific things about this place that you value and appreciate?
3. Since you have been coming out here have you noticed any major changes to the region?
4. Have these changes had any impact, positive or negative, upon your own experience in the area?
5. Have these changes caused you to change in any way how you enjoy this area?
Where did you learn about these changes?
6. In your opinion, what are some of the ways to address some of the changes that you have identified? Do they even need to be addressed?
7. While you spend time out in this region are there things that you do specifically in the effort to reduce your own impact and ensure that this place remains healthy and beneficial for many years to come?
How long have you been doing these things? Why did you start?
8. Thank you so much for your time and your valuable input. Is there anything else you would like to add about your experiences here in the headwaters? Or any questions that you think I should have asked?
9. Is there anyone else that you could recommend as a potentially valuable participant for this study who might be willing to share about their experiences in the headwaters?