

Human Dimensions of Natural Resource Management

October 6–7, 2010
Revelstoke, British Columbia
Canada

Columbia Mountains Institute of Applied Ecology

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We are appreciative of the work of our conference organizing committee, and others who contributed expertise as the conference developed. The members of the organizing committee were:

- **Dr. Jenny Feick**, BC Ministry of Environment, Victoria
- **Jennifer Smith**, BC Ministry of Environment, Victoria
- **Dr. Ajit Krishnaswamy**, FORREX, Burnaby
- **Dr. Kathy Rettie**, Parks Canada, Banff
- **Jackie Morris**, Columbia Mountains Institute of Applied Ecology

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Conference description

Integrating data from the natural sciences with information about social values and human behaviours increases the effectiveness of natural resource management. Natural resource practitioners are accustomed to integrating biological and other natural science and technical factors into their decision-making. At this conference, they will learn how addressing human dimensions can make their decisions more robust and their plans more likely to be implemented successfully.

The conference steering committee put out a call for papers and posters and selected the presentations from the resulting offers. The call for papers included the following themes.

Understanding and addressing different value systems and cultures

- What are the differences and how do we bridge them?
- What can the different social sciences contribute?
- What does First Nations engagement mean and why is it important for natural resource management?

Resolving issues

- How can social science inform natural resource management decisions?
- How can managers better integrate risk considerations to also reflect stakeholder and societal values and interests?
- How can we tackle and resolve complex and controversial issues in a world of changing climate, changing demographics, and changing paradigms?

Managing natural resource conflicts

- Wildlife– human interactions: principles, what works and what doesn't?
- Resource allocation: how to manage for conflicting demands
- Conflict within and among different user groups: how to manage expectations successfully.

Fostering shared stewardship

- How should natural resource practitioners engage and consult “the public”, stakeholders, and First Nations?

- What methods have been successful in fostering shared stewardship of natural resources through collaboration, partnerships, and outreach?
- How do we include and involve the public in natural resource management?

Through 1.5 days of presentations, a keynote speaker, a poster session, field trips, and opportunities for informal dialogue, participants learned how considering the human dimension would make their decisions more robust, and their plans more likely to be implemented successfully.

Our event included nineteen presentations, ten posters, and three field trips. About 50 people attended the conference. Participants were a multidisciplinary group of people, including: resource managers, public interest groups, consultants, researchers, and academics. We were joined by a Biology 11 class from Revelstoke Secondary School for some of the presentations.

The conference was held at the Revelstoke Community Centre, 600 Campbell Avenue, next to the Columbia River, on October 6–7, 2010.

The summaries of presentations in this document were provided by the speakers. Apart from small edits to create consistency in layout and style, the text appears as submitted by the speakers.

The information presented in this document has not been peer reviewed.

About the Columbia Mountains Institute of Applied Ecology

www.cmiae.org

The Columbia Mountains Institute of Applied Ecology (CMI) is a non-profit society based in Revelstoke, British Columbia. The CMI is known for hosting balanced, science-driven events that bring together managers, researchers, educators, and natural resource practitioners from across southeastern British Columbia. CMI members include resource managers, consultants, government staff, public interest groups, and academics, who share an interest in improving the management of ecosystems in southeastern British Columbia. Our website offers many resources, including conference summaries for all of our past events. Non-members can sign up to receive notifications about our events.

Summaries of presentations

1. Social science in Canada's mountain national parks

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The Parks Canada Agency recently launched a comprehensive program for building strong personal connections to national parks through visitor experience and education. The vision reads:

Canada's treasured natural and historic places will be a living legacy, connecting hearts and minds to a stronger, deeper understanding of the very essence of Canada.

Parks Canada will pursue this vision and accomplish its strategic outcome by ensuring Agency activities are relevant to Canadians and thus strengthen and deepen Canadians' understanding and appreciation of their national heritage places. This will, in turn, build a strong sense of connection to these places in the hearts and minds of Canadians.¹

This important shift in focus initiated a call for sound scientific information to guide decisions linked to re-investment in park facilities and programs that will promote positive visitor experience and enhance public awareness of the values and benefits of national parks. Since 2005, over 70 undergraduate and postgraduate students at Canadian universities have conducted social science research in the mountain national parks². Through research methods courses in the Department of Geography at the University of Calgary, students gain research and fieldwork experience and make a discernible contribution towards addressing practical management-based questions. Undergraduate research projects to date have looked at backcountry day-use patterns; visitor perceptions of area closures; commercial tours on the Columbia Icefields Parkway; trends in camping; and trail users' levels of bear awareness. Postgraduate research has studied under-represented social groups such as new Canadians; the effectiveness of interpretive programming; wildlife

¹ <http://www.tbs-sct.gc.ca/rpp/2010-2011/inst/cap/cap01-eng.asp>

² The "mountain national parks" are: Jasper, Yoho, Kootenay, Banff, Waterton Lakes, Mount Revelstoke and Glacier national parks.

watching; environmental education on the Parkway; and winter backcountry day-use.

In 2007, social science data on backcountry day-use activity was identified as one of the most important data information gaps in the mountain national parks. Data on levels of use by people who visit the mountain national parks and venture off-pavement for some type of backcountry experience on the parks' 3,500+ km of trails was not sufficient to meet park management planning or State of the Park reporting requirements; nor was it sufficient to facilitate the integration of natural and social science to achieve Agency objectives for ecological integrity.

Since the summer of 2008, all the mountain national parks have been involved in social science research that employs both quantitative and qualitative methodologies designed to collect data on levels and types of day-use on trails and learn more about trail users' expectations and experiences. A two-pronged approach to research was developed. One prong addresses broader planning and reporting needs and long-term monitoring while the second prong addresses site-specific issues linked to public safety and infrastructure reinvestment. Park managers and backcountry specialists identified which trails would be included in the research based on this approach.

Quantitative trail data on levels and types of use were collected using infrared trail counters, cameras, and GPS units. Data were collected year round at some sites; however the bulk of the data were collected during the annual summer field seasons of June to October.

TRAFx³ brand of infrared trail counters were installed along trails to record the number of users. A sensor within the counters' small cigar-shaped scope is designed to detect human body radiation. When the infrared sensor is triggered, a date/time stamp count is documented in the base unit memory. Counter data does not differentiate between different radiation sources (i.e. people, horses, or wildlife). Counters were checked and data downloaded approximately every month onsite using a Pocket PC. Data was then transferred to a computer for processing and analysis using Microsoft Notepad, Access, Excel, and TRAFx Reporter 6 software. Factors including the counter location (close to the trailhead *vs* further along); the type of trail use (day hikes *vs* backpacking); the trail's level of interconnectedness with

³ TRAFx Research Ltd., Canmore, AB, Canada

other trails; temporary or seasonal restrictions on use; and the counter setup all affected the applicability of the trail counter data.

RECONYX⁴ cameras were installed on trails where data on levels of different types of use was requested. Using MapView Image Management software, cameras were programmed to take one picture after each infrared trigger. CF cards were removed and replaced every three to six weeks, and pictures for the period were downloaded to a computer. Downloaded pictures were viewed and sorted according to camera location. Data on the user type, group size, and direction of travel were attached to a picture in an Access database. Data was then transferred to Microsoft Excel, Microsoft Notepad, and TRAFx Reporter software for analysis. Descriptive statistics were used to illustrate trail activity temporally (by hour, week and month) and spatially (by counter/trail segment). Wildlife activity captured on the cameras was shared with wildlife specialists; it is interesting to note that the shortest time recorded between a grizzly and a human on the same trail was 6 seconds.

From the 113 counters and 51 cameras installed on trails throughout the mountain national parks, actual numbers of users and mean counts were ascertained for hourly, weekly, daily, and monthly time periods. Charts and tables were constructed using Microsoft Excel software. Based on a three year average, over 150 trails were classified according to high, medium, or low levels of use⁵; these averages constitute our baseline data. A representative sample from each category will be monitored for the next five years. Averages from 2007 and 2008 informed the design for cluster sampling used to collect qualitative data in 2009.

Trackstick GPS units were handed out to trail user groups in Paradise Valley in Banff National Park and the Little Yoho Valley in Yoho National Park. Using data from these GPS units, two types of density maps were created; the “moving locations” map shows the areas used most by visitors on the move, while the “stopped locations” map illustrates where visitors stopped most often (a stop was anywhere from 10 to 120 minutes), thus providing site-specific information on patterns of use.

⁴ RECONYX LLP, Holmen, WI, USA

⁵ Based on users per month, high is < 10,000, medium 1,000 - 10,000 and low is > 1000. In smaller parks like Glacier National Park, the parameters for classification are adjusted to accommodate annual maximum and minimum levels of use.

Qualitative data on visitors/trail users' expectations and experiences were collected using surveys that were conducted in person by a team of researchers throughout the summer field season. Responses to the various survey questions were recorded on paper and on digital recorders. Results were entered into a central database and analyzed using SPSS and NVivo software and inductive content analysis. It is important to note that in 2009 we were in a position to employ cluster sampling methodology. Using trail data from 2007 and 2008, we selected high, medium, and low-activity trails as survey sites. All survey respondents were intercepted on trails; this differs from Years 1 and 2, when convenience sampling was employed. In those years, survey respondents were intercepted at day-use sites, on trails, in parking lots at visitor centres—wherever it was most convenient and we were most likely to connect with the greatest number of visitors.

From over 4,200 surveys conducted since the summer of 2007, we learned that 51% of the visitors to the mountain national parks are Canadians, 18% are from the USA and 31% are from “other” places. The most popular activities are hiking,⁶ sightseeing, and camping. The majority (44%) of visitors are between 40 and 59 years of age; 36% of visitors are between 18 and 39.⁷ Data from 2,130 survey participants revealed that 51% of visitors come to national parks because they expect to experience flora and fauna in its natural state; 30% are coming because they expect high quality services. The two main areas identified for improvement were facilities (i.e. washrooms) and signage; overall 22% of the survey participants identified facilities and 17% identified signage.

We now have reliable baseline data that sets the stage for a five-year monitoring program that will help evaluate management effectiveness and trends in use. We have standardized an approach to data collection and analysis across the mountain parks and we have a suite of reports that provide much needed information to park managers and planners. Following through on our multi-year trails research and monitoring strategy will put the mountain national parks in good stead for the next round of State of the Park reports and park management plans.

⁶ Other recent surveys targeting broader audiences give similar results. See Ipsos Reid (2008) *Online Panel Composition Overview: A Report for Parks Canada*. Ipsos Reid. Vancouver. Our most recent data from this trail-based research shows that 87% of the people picked hiking as their favourite activity.

⁷ Information on visitors less than under 18 years of age is limited due to research ethics.



Triggered by a motion sensor, a camera took these photos of a grizzly on the trail, and a hiker and dog on the same trail less than 5 minutes later. *Parks Canada photo.*

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2. Creating shared knowledge: The role of trust and credibility in resource management decisions

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The settlement of Yukon First Nations land claims has moved wildlife management from the exclusive realm of scientists and bureaucrats into one of co-management regimes with First Nations governments (Yukon Fish and Wildlife Management Board 2010). Co-management bodies have been established to “ensure the equal participation of Yukon Indian People with other Yukon residents in Fish and Wildlife management processes and decisions” (Umbrella Final Agreement (UFA) 1993, Ch.16.1.1.4) and to “integrate the relevant knowledge and experience both of Yukon Indian People and of the scientific communities in order to achieve conservation” (UFA 1993, Ch.16.1.1.7). More than a decade post-ratification, knowledge integration continues to be one of the greatest challenges of land claims implementation, and some question whether the goal is even appropriate. (Nadasdy 2003).

My interest here is not to discuss the validity of incorporating traditional knowledge in management decision, but I have lived the frustration of trying to put into practice a claim where negotiators left many of the sticky issues to interpretation. As a wildlife biologist with Environment Yukon, my career has spanned pre- and post settlement. I witnessed our attempts at building a dataset that could merge survey data and local knowledge. As misguided as the effort was, it was a sincere attempt to “integrate the relevant knowledge”. We used the tools and expertise that we had, and any progress was made through trial and error. This presentation might be considered a “view from the trenches”.

Background and literature review

In Yukon, forums and formats for information exchange evolved along with the co-management processes themselves. Regional offices were established to facilitate local involvement. Oral presentations are common, in recognition of the fact that many process participants have lower literacy skills. Although fostering interpersonal relationships, reliance on oral presentations has often resulted in the lack of a permanent record that can be referenced in the future

or shared with the wider community. Supplementary fact sheets are sometimes provided, and there is an ongoing attempt to use plain language principles in all technical documents. However, “an assumption that information is a discrete, identifiable, transferable object... [and] treating interactive events as information exchange is limited by its failure to acknowledge the power of communicative interaction to shift, change, and create shared knowledge and values critical to the joint development of a course of action.” (Graham 2004, p. 38)

Glover (2000, p. 46) has contended that practiced models of public engagement are in reality a “monologue of official discourse” and based on the premise that the public was in need of education (Petts 1997, Cox 2006). For a time, we seemed to act as if the only thing that had been standing in the way of getting our message across was the lack of colour in our overheads. More graphs that illustrated smaller and smaller confidence intervals would surely convince the public of the value of our information. Indeed, to do anything beyond data presentation has been seen as advocacy or to be entering biases into the discussion. However, simply presenting data does not facilitate dialogue (Glover 2000, p. 42), nor does it facilitate the integration of scientific knowledge and experience. I agree with Pielke’s (2007) assertion that the role of scientist as “the honest broker”, with the intent to expand rather than limit choices is appropriate. This is especially true in a wildlife management situation where the scientific information providers are part of the community in which decisions are being made.

As managers and scientists, however, our traditional, established method has been to gather information and carefully present all the evidence in such a way that at the end of the report the reader will have reached the same conclusion that we have. We strive to arrive at one answer but, as experience has shown, when we are dealing with complex natural systems there is rarely a simple answer with a single interpretation.

Wildlife management decisions are, in essence, policy decisions, or “who gets what, when and how” (Lasswell 1950, p. i). Policy, in this context is “a process focused on problem-solving, usually involving some technical content...and always involving people with varying perspectives and interests in the problem and its solution” (T. Clark 2002, p. 5). It is through management decisions that conservation biology theory is put into practice (Meffe *et al.* 2006), and it is my contention that it is environmental communication that will enable the practice of conservation biology.

Almost all environmental communication is about risk and ultimately all environmental discourse asks for a decision (Glover 2000, p. 37). Risk has both a technical and a cultural construct (Cox 2006, p. 206) and unfortunately most resource management professionals are ill prepared to communicate within these complex, interdisciplinary arenas (Chan 2008) and lack the expertise to interact with people whose expertise is grounded in real life experience (Carolan 2006, p. 666). While some decision-making processes may involve complex situations and consequences, often the decisions can be summed up as simply as “Does this observation reflect my understanding? Is this information correct? Is this analysis trustworthy?” Because these decisions and recommendations often need to be made with incomplete information, wildlife management may be considered a “crisis discipline” (Cox 2007, p. 8). By framing what we, as managers, have to contribute to the process as information in support of decision-making, we are much better able to be effective.

Innes (1998, p. 4) observed that unless technical information is brought into the realm where it can be examined by all there will not be any shift in decision-making power because “when information is most influential, it is also most invisible. That is, it influences most when it is part of policy participants’ assumptions and their problem definitions, which they rarely examine.” For years, we have struggled with how we could incorporate local or traditional knowledge, and worked at ways of mapping and quantifying that information so that it would “fit” with ours. And, we have met with limited success. We are just beginning to look at what we can do with our own technical information so that it will better “fit” with local knowledge—and thus bring it into the realm of influence by making it available to all. We have control over our information and how we present it. Rather than exchanging information, or “incorporating” other knowledge into ours, I believe what we need to do is create a “shared knowledge”. Science offers no methods for integrating the broad range of relevant data into context-specific information of the type required for intelligent management and policy decisions (Weber and Word 2001, p. 490; T. Clark 2002 p. 9) so we have to expand our horizons and turn to other disciplines for direction.

Trust is the most important characteristic of effective public involvement process (Senecah 2004, p. 20) and the co-management processes that have evolved are reliant on interpersonal trust (Senecah 2004; Parkins and Mitchell 2005). This creates vulnerability on two levels. In an ongoing management

situation consistent participation is impossible (Hamilton and Wills-Toker 2006, p. 769) so the process often stalls when a trusted participant—either technical or community expert—retires or whose appointment expires, until new relationships have time to become established. Nor can the personal relationships and experiences outside of the co-management processes be discounted, especially in small communities. It is naïve to think that familiarity will automatically mean that participants will like, respect, or trust each other. At the other extreme, absolute reliance on interpersonal trust in well-established relationships may leave no room for the critical examination of the information.

Research

The challenge for technical experts is to provide information deemed trustworthy by all participants. Our challenge is not unique, but the conscious decision to examine how we present our information was a step outside the comfort zone of Yukon's Fish and Wildlife Branch. Environment Yukon supported my proposal to go back to school, but what started out as a naively simplistic goal of using plain language principles more effectively quickly exploded into a whole new world of communication theory and qualitative enquiry. It is through that research that I have begun to explore what qualities makes information trustworthy and credible.

In my research, what resonated for me was using “policy sciences” as a frame of reference. Lasswell and McDougal (1992, quoted in T. Clark (2002, p. 6)) define policy as “a social process of authoritative decision-making by which the members of a community clarify and secure their common interests.” Ascher (1999, p. 351) noted that wildlife managers may find this stance familiar because both “ecology and the policy sciences are problem-oriented, value-committed, contextual, process-oriented, multi-method, and holistic.” Using policy sciences as a framework for wildlife management issues has arisen principally from grizzly bear conservation efforts in the Greater Yellowstone Ecosystem (Primm 1996). In a highly contentious arena, over many years, resolutions to seemingly intractable problems among various interest groups have been achieved (T. Clark *et al.* 2005). Unlike traditional adversarial modes of public participation (Cox 2006, p. 128), which can often be described as “tournaments” (Hull *et al.* 2001, p. 325), the policy process provides a systematic, empirical mechanism for enquiry (T. Clark 2002, p. 4).

The success of the decision-making processes rests on a shared understanding of all viewpoints and sources of information such that the participants can either reconcile divergent narratives (D. Clark 2007) or acknowledge differences and agree to disagree (Glover 2000, p. 51). Achieving that shared understanding is an ongoing challenge.

To introduce another mechanism of carrying out our mandated responsibilities is far beyond the scope of my position. What I chose to do, however, was to examine the documents of a project done within a policy sciences framework to learn what we might emulate within our own processes.

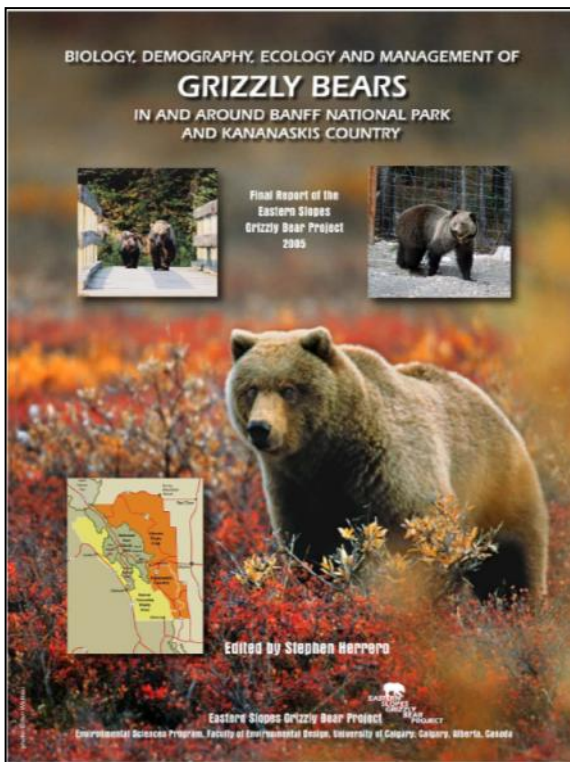
Methods

I used social semiotic concepts and strategies (van Leeuwen 2005) to analyze the final report of the Eastern Slopes Grizzly Bear Project (“the project”), a large, multi-stakeholder, multi-jurisdictional research and management program carried out from 1994 through 2003 in the Rocky Mountains of southern Alberta. This project has been held up as a model for the incorporation of science into policy decisions (Herrero *et al.* 2001). *Biology, Demography, Ecology and Management of Grizzly Bears in and around Banff National Park and Kananaskis Country* (Herrero, 2005) (“the report”) and its associated Internet resources

(http://www.canadianrockies.net/Grizzly/final_report.html) constituted my data. I chose this project and this report specifically because I wanted to understand how a document supporting research carried out within a policy sciences framework is structured, and how it might differ from a traditional scientific report. Wynne (1991, p. 119) commented that “scientific communication is normally ignorant of its own tacit ‘body languages’ of institutional interests” and I sought to make the tacit explicit. Social semiotics provided an approach to deal with not only the “what” but the “how” of communication (van Leeuwen 2005, p. 117), or as van Leeuwen (2005, p. 126) described, “The structure of the story told and the structure of the telling of the story.”

This report also provided me the opportunity to explore how theoretical constructs of trust and credibility can be manifest in practice. Based on my discoveries I then formulated suggestions for the presentation of information that would be more useful to reach the ultimate goal of creating shared knowledge. Simply put, information is trustworthy and credible if it is accessible and allows the audience to assess it in relation to their own

experience. So, how do we make information accessible, and therefore trustworthy?



Front page of *Biology, demography, ecology and management of grizzly bears in and around Banff National Park and Kananaskis Country*, available at:

http://www.canadianrockies.net/Grizzly/final_report.html

Analysis

1. Whenever possible, write in the first person.
 - One of the key considerations is to create a narrative to which participants can relate.
2. Present the information in the same logical order as a story unfolding (i.e. create a narrative)
 - The report is divided into 13 chapters, each with a title page featuring photographs of relevant research activity. The chapters follow the logical life-history order of “reproduction, mortality, population dynamics, and factors that influenced those variables” (p. vi). The reader thus encounters the information as a story unfolding until the management recommendations conclude the report.
3. Situate your information where your audience will find it.
 - The project webpage is housed not in a scientific or government forum, but in *The Canadian Rockies*, an online vacation planning

guide produced by residents local to the national parks (<http://www.canadianrockies.net>) The webpage also reinforces the project's sense of place; this is a very appropriate web site for a report about grizzly bears in and around Banff National Park and fosters a sense of community affiliation. The project is thus placed in a position to be encountered by a general audience of people interested in grizzly bears (or parks) rather than scientists or wildlife managers interested in research about grizzly bears. As explained on the project webpage "Part of our mission is to make sure the information we collect about these bears—their status, the challenges they face, and what can be done to help them—is widely available."

4. Focus on "why", rather than the "what".
 - The word research does not appear anywhere in the title or subtitle – the project is about the bears, not about the research, a fact emphasized by the words "grizzly bear" appearing in font much larger than the rest of the cover text.
5. Order reports in the order that readers need to access the information. This is rarely the same order as would be encountered in a standard scientific journal.
 - The front matter of the report immediately distinguishes it from a scientific report. The overleaf of the title page is a dedication "to everyone who cares about grizzly bears and wildlife and the ecological systems and processes that support them" which, while a common feature of books and dissertations, is not part of a standard scientific report. Far more common is a disclaimer whereby the authors distance themselves from their institutions and take responsibility for opinions (see, for example Stenhouse and Graham 2005).
 - Next, 62 supporting agencies and groups are listed alphabetically, without any reference to their level or kind of support. An alphabetical list demonstrates that all support was equally appreciated, and its location at the beginning of the report ensures that even the most casual reader will likely see the list. Similarly, on the following two pages, the list of people who made the East Slopes Grizzly Bear Project possible is presented alphabetically by first name. Rude (1995) and Gregrich (2003) both noted that researchers should order reports in the order that readers need to access the information. Readers of this report thus know that many people and many organizations played a role in the research and, while one person is credited as editor, many

voices will be heard in the pages to come. The summaries of the project and the management recommendations immediately follow the preface—but precede the Table of Contents—and this is another example of a reader-centric feature.

6. Make generous use of headings and subheadings so that specific sections of the report can be accessed without having to use the entire document.
 - Many of the chapters in the report take the form of independent scientific papers, while some chapters present only one statistical analysis (e.g., Ch. 12, Habitat effectiveness and security area analysis). These shorter papers provide the linkages and context for the other chapters as well as acting as a data record. The overall effect is one of variety and relative accessibility as specific aspects of the project can be accessed without having to use the entire document.
7. Carefully guard earned credibility, and do not compromise institutional credibility.
 - Credibility of information is directly related to the credibility of the person (or institution) providing that information (Pielke 2007). Petts (1997, p. 378) claims that an expert's credibility "is at least as important, if not more important, than his or her knowledge." Credibility of the report is greatly enhanced by the name recognition of its author/editor. As author of numerous peer reviewed scientific papers, and the widely read book *Bear Attacks, Their Causes and Avoidance* (McClelland and Stewart, 1985/2003) Stephen Herrero is frequently called upon by the media to comment upon bear-human encounters and is one of the best known bear researchers in North America.
 - In other situations, recognizing support of partners, by the use of logos, may add to credibility.
8. Acknowledge scientific uncertainty or lack of expertise. There is generally a much more realistic expectation today of what science can tell us, and to pretend otherwise undermines the credibility of what information is available. Use uncertainty to frame decisions in the context of risk, i.e., there is an unknown outcome.
 - In the report, frequent acknowledgements of uncertainty (for example, "this is an inexact...science" (p. vi), "it is unlikely we will ever know

the population status with more certainty” (p. viii) or “possibly, the female grizzly bear mortality rate...may have been higher” (p. x) serve to enhance the credibility of the information.

9. Create an opportunity for dialogue by contributing to an understanding of an issue rather than the presentation of data or information.
 - An understanding incorporates human values and acknowledges that there may be other interpretations of the information.
10. Openly admitting different points of view prior to others raising the issue adds to credibility (Renz 1992, p. 15).
 - Dialogic discourse is also invited in the interpretation of survival data (p. 46), where alternate view are presented, and “those with that view may interpret our research results as evidence that.... We stress, however, that our results include many uncertainties... [and] it seems only sensible to err on the side of prudence.”
11. Acknowledge biases and make assumptions explicit.
 - Acknowledging biases and making assumptions explicit are two factors critical to the perceived credibility of a process because “...people judge whether or not they can use or trust expert knowledge partly by measuring it against elements of their own already-tested knowledge and direct experience” (Wynne 1991, p. 115; Weber and Word 2001).
12. “Reconceived the report not as the end of a study but rather as a tool for action” (Rude 1995).
13. Rather than structuring arguments to advocate for a position, a report should be persuasive because the audience views the investigation and its results as trustworthy.
 - In traditional scientific papers, authors attempt to persuade readers to accept one interpretation of the data and thus narrowing decision options by focusing on that one interpretation.

Discussion

The willingness of an agency to open its decision-making process to the public is important in developing an image of trustworthiness (Renz 1992, p. 14) and in overcoming the common scepticism of government’s motivations (Jardine 2003, p. 468) and credibility (Herrero *et al.* 2001, p. 165). In theory, the co-management bodies put in place through the settlement of First Nations

land claims made this openness mandatory but systemic changes have been slow.

It is only through making our information available in ways that it is deemed trustworthy and credible will we make any progress to “integrate the relevant knowledge and experience both of Yukon Indian People and of the scientific communities in order to achieve conservation”. At the same time, I hope that our information becomes more readily accessible to an audience beyond those involved in the current processes, and can act as more of a reference for new participants such that they trust decisions that have come before their involvement. None of this abdicates our responsibility to gain a greater understanding of local knowledge and experience, but I believe it is one step in the right direction.

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3. Making the New Relationship work: Crown–First Nations shared decision-making in the “Great Bear Rainforest”

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Abstract

In 2005, the Province of British Columbia announced that it was entering into a “New Relationship” with First Nations, “based on respect, recognition, and accommodation of aboriginal title and rights; respect for each others’ respective laws and responsibilities; and for the reconciliation of Aboriginal and Crown titles and jurisdictions.” The Province and the First Nations Leadership Council agreed to establish institutions for shared decision-making regarding land and resources. In the 2009 Throne Speech, the Province pledged to implement these principles through legislation that would take priority over all other provincial statutes. The proposed legislation, however, was resoundingly rejected by First Nations, leaving the Province and First Nations of British Columbia to once again seek an agreeable approach to planning and governing land and resource use.

Despite the setbacks in institutionalising shared decision-making, considerable advancements have been made in the 6.4 million hectare land management area for British Columbia's North and Central Coast, also known as the Great Bear Rainforest. What is emerging in the region, in both process and form, is an unprecedented shared decision-making framework that can provide invaluable insight into some of the pinnacles of First Coastal Nations reconciliation and land use planning for British Columbia and Canada.

This presentation provides an overview of the unique government-to-government process that conceived the land use plan for British Columbia's North and Central Coast, and the framework for shared decision-making that has been established. It provides an overview of the Master of Science research being conducted to uncover the institutions and the mechanisms of authority that are granted through the Crown–Coastal First Nation agreements. It finds that shared decision-making bodies have been established for engagement, but that, externally, uncertainty remains as to where the ultimate jurisdiction over land and resource decisions does and will rest.



Figure 1: Location of Great Bear Rainforest. *Image: BC Ministry of Agriculture and Lands*

Introduction

The North and Central Coast of British Columbia, now commonly known as the Great Bear Rainforest, is a 6.4 million hectare zone of coastal temperate rainforest. It is home to 22,000 people, approximately half of which are of aboriginal ancestry, and includes the traditional territories of 25 distinct First Nations (Price, Roburn, and MacKinnon 2009). The region is being governed under an innovative regime of ecosystem-based management, which is based

on the maintenance of ecological integrity and an increase in human well-being, and a co-governance arrangement between the Government of British Columbia and First Nations. This paper focuses primarily on the co-governance arrangement with the Coastal First Nations coalition, whose traditional territories span nearly the entirety of the North and Central Coast planning areas.

Background

The arrangement as it stands today had its roots in the intense conflict between environmental groups and the forest industry, including a successful international market campaign led by environmental groups, and a subsequent truce in the form of a moratorium in 2000 on both logging and the campaign. Both industry and environmental groups formed their own coalitions, which then came together under the Joint Solutions Project to seek out a common vision for the region. The members of the Joint Solutions Project recognized that management for the region was going to have to include both ecological integrity and human well-being in the form of economic opportunities and maintenance of culture, and they began hammering out the details of an ecosystem-based management regime (Smith and Sterritt 2007; Clapp 2004; Price, Roburn, and MacKinnon 2009; Shaw 2004).

At the same time, a number of First Nations were establishing their own coalitions in the interest of working together toward preservation of their lands and culture. In 2000, First Nations of the North and Central Coast and Haida Gwaii formed the Coastal First Nations coalition (which became Turning Point) and signed a declaration committing to support each other in efforts to ensure the well-being of their lands and waters, and “[to] preserving and renewing our territories and cultures through our tradition, knowledge, and authority” (Turning Point 2000). Other First Nations from the region have since formed together under Nanwakolas Council, Tsimshian Stewardship Committee, and KNT coalitions, or have remained outside the established organizations.

The Government of British Columbia had begun a Land and Resource Management Plan (LRMP) process for the Central Coast of the region in 1996, as had been its practice for strategic planning across the province. It was able to draw both the Joint Solutions Project and the Coastal First Nations coalition back into a revitalized LRMP process by accommodating the vision of ecosystem-based management that was cementing itself as the only acceptable form of management for the region (Howlett, Rayner, and

Tollefson 2009). In 2001, the Government of British Columbia and the Coastal First Nations announced the General Protocol Agreement on Land Use Planning and Interim Measures (hereafter called the General Protocol Agreement) that solidified the formal process of land use planning in the Great Bear Rainforest.

The General Protocol Agreement was predicated on five elements (Smith and Sterritt 2007; Government of British Columbia and Coastal First Nations 2001):

1. A continuation of the strategic logging moratorium;
2. The entrenchment of ecosystem-based management across the region;
3. The formation of an independent multidisciplinary science body to inform multi-scale ecosystem-based management planning;
4. A funding initiative directed toward economic diversification away from forestry; and,
5. A new relationship of Crown–First Nation government-to-government shared decision-making for the Great Bear Rainforest.

Through the General Protocol Agreement, First Nations were officially recognized, not as stakeholders, but as governments. The Province and Coastal First Nations pledged to secure a strategic plan for the region, reflective of all governments' visions, by establishing concurrent land use planning processes that would be reconciled through government-to-government negotiations.

2006 Coast Land Use Plan

To honour the General Protocol Agreement, the Province initiated a multi-stakeholder North Coast Land and Resource Management Planning (NCLRMP) table, and reconfigured the Central Coast (CCLRMP) table that had begun in the region in 1997. At the same time, individual First Nations conducted land use planning according to their own laws, policies, customs, and traditions (CCLRMP Table 2004; NCLRMP Table 2005). The LRMP tables reached consensus recommendations that were presented to the Province and each First Nation in 2004 and 2005. With the approval of the LRMP recommendations by Cabinet, Crown–First Nation government-to-government negotiations were initiated, which resulted in a series of Crown–First Nation agreements in 2006, and the heralded announcement of the Coast Land Use Plan for the Great Bear Rainforest.

The North Coast and Central Coast LRMP recommendations included the management intent, objectives, indicators, and targets for a range of values for the terrestrial portions of the plan area. They further recommended that ecosystem-based management principles could best be met by establishing a series of land use zones, each with their own objectives and acceptable land uses, and put forward candidates for each. The LRMPs introduced recommendations on plan implementation, monitoring, and amendment, including establishing some aspects as legal objectives under legislation (CCLRMP Table 2004; NCLRMP Table 2005).

The LRMP tables were informed by draft land use plans by First Nations in the region and by First Nation representatives at the tables and on the ecosystem-based management scientific team. While the final reports acknowledge that inconsistencies remain between LRMP recommendations and the First Nation land use plans (NCLRMP Table 2005, 4.2.2), the input provided by First Nations allowed for a final outcome that did not differ greatly from the consensus reports. Instead, the Crown–First Nation government-to-government negotiations resulted in agreements that focused largely on governance arrangements and implementation.

Two sets of agreements were made between the Province and the Coastal First Nations in 2006 as a result of the Crown–First Nation government-to-government negotiations: a Land and Resource Protocol Agreement between the Province and the collective Coastal First Nations, and Strategic Land Use Planning Agreements (SLUPAs) between the Province and the individual Coastal First Nations. In terms of governance, the Land and Resource Protocol Agreement focused largely on the establishment of a co-management body, the Land and Resource Forum resolution on outstanding ecosystem-based management objectives; and a dispute resolution process to resolve differences in implementation of the Agreement (Government of British Columbia and Coastal First Nations 2006a). The SLUPAs focused on the Nation or First Nation's individual relationship to the Coastal First Nations Land and Resource Forum, and finalized management objectives and land use zone designations for the individual traditional territories (see for example, Government of British Columbia and Gitga'at First Nation 2006).

The Coast Land Use Plan for the Coastal First Nations territories, in other words, consists of the two sets of LRMP recommendations, amended and elaborated on through the Land and Resource Protocol Agreement and

SLUPAs. The Land Use Plan indicated the need to establish subsequent legal objectives under legislation relating to key management objectives, as well as the creation of new legislation to establish the land use zones. Three land use zone types were agreed upon in the Land Use Plan:

1. Protected areas (conservancies) that would disallow logging, mining, and hydro-electric development, while allowing for tourism, recreation and First Nation cultural use;
2. Biodiversity areas, which disallow logging, but do allow mining, tourism, recreation, and First Nation cultural use; and
3. Ecosystem-based management operating areas, which represents the remainder of the planning area and allows for full resource use in accordance with ecosystem-based management principles (see for example, CCLRMP Table 2004).

To realize the Coast Land Use Plan, legislation was established by 2009 to accommodate the vision of the Conservancy and Biodiversity Areas, and legal orders were established to legislate key management objectives.

The Land and Resource Forum is the co-management body “through which the senior representatives of the First Nations and the Minister or designates will on either Party’s request meet in order to share information and work collaboratively to implement the CCLRMP and NCLRMP within the Traditional Territories of the Coastal First Nations” (Government of British Columbia and Coastal First Nations 2006a, 3). For example, if an issue is raised by an individual First Nation with respect to LRMP implementation or monitoring, but is not resolved through the Land and Resource Forum, that “may be the basis for additional [Crown–First Nation government-to-government] discussions” (Government of British Columbia and Gitga’at First Nation 2006, 10.5).

The Land and Resource Forum is a central component of the collaborative governance system, agreed to through the Crown–First Nation government-to-government process. Any First Nation whose Traditional Territory is in the plan area may participate in the Forum. The Land and Resource Forum is to provide recommendations to the participating First Nations and the Province, who will resolve specific land use and resource management issues on a Crown–First Nation government-to-government basis (Government of British Columbia and Coastal First Nations 2006b). In the dispute resolution mechanisms established in the Land and Resource Protocol Agreement, the

SLUPAs and in the Land and Resource Forum terms of reference, a supreme authority is not denoted.

2009 Reconciliation Protocol

While the 2006 Crown–Coastal First Nations agreements establish the Land and Resource Forum co-management body, the SLUPAs called for the establishment of a further consultation protocol for shared decision-making (Government of British Columbia and Coastal First Nations 2006b). A consultation protocol that fulfils the requirements identified in the SLUPAs did not materialize until the signing of the Reconciliation Protocol between the Crown and Coastal First Nations in December of 2009 (Government of British Columbia and Coastal First Nations 2009). The Reconciliation Protocol provides a framework for shared decision-making that outlines the process for Crown–First Nation engagement based on the potential degree of impact of that land or resource decision. Yet, despite this engagement framework, the protocol for shared decision-making is still incomplete. The Parties of the Reconciliation Protocol “agree that implementation of the Engagement Framework is a *step toward* shared decision-making” (Government of British Columbia and Coastal First Nations 2009, 6.2, emphasis added), indicating the need for clarification on various aspects. Section 5, furthermore, calls for the establishment of a governance forum to support the Protocol, indicating that a subsequent co-management body will be established, either to replace or augment the Coastal First Nations Land and Resource Forum. Developments on this forum have yet to be made public.

Crown–First Nation shared decision-making in the Great Bear Rainforest

At this point in time, outside observers of Crown–Coastal First Nation shared decision-making in the Great Bear Rainforest can look to the Coast Land Use Plan in 2006, including the two LRMPs and the Strategic Land Use Planning Agreements, and most recently, the 2009 Coastal First Nations Reconciliation Protocol. What these agreements illuminate is that decision-making authority between the Crown and Coastal First Nations can be largely uncovered through considering both the establishment of the Coast Land Use Plan, including land use designations and ecosystem-based management operating rules, and now the implementation of ecosystem-based management and Crown–First Nation government-to-government agreements in the administrative and operational decisions related to future land and resource use. But the agreements that govern Crown–First Nation shared decision-making in the Great Bear Rainforest are still materializing. The elaborate unfolding of protocol over a decade and counting speaks to the complexity

involved in establishing terms of governance that are acceptable to governments with differing laws, policies, customs, and traditions, and that each maintain sovereignty, jurisdiction, and the right to make decision on land and resources (Government of British Columbia and Gitga'at First Nation 2006, Preamble).

The methodology this thesis will use to clarify the tools being used and the resulting distribution of decision-making authority between the Crown and the Coastal First Nations is still being finalized. Re-occurring elements from the agreements that are expected to provide vital instruction include mutual assertions of sovereignty and jurisdiction, softened in the Reconciliation Protocol; language noting that the agreements do not change or affect the positions either Party has regarding jurisdiction and/or decision-making authority; and the inconclusive and ambiguous dispute resolution mechanisms throughout the agreements. The spirit for the governance of the Great Bear Rainforest is to operate by consensus. The agreements were developed by consensus and include dispute resolution processes that seek to maintain the ability to reach consensus in management of the land. As long as consensus can continue to be reached, it is possible that neither party will question where ultimate authority lays. However, the details of the agreements, as they are written, do create uncertainty regarding where ultimate jurisdiction over the region does and will rest.

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4. Exploring opportunities and challenges of British Columbia's Community Forest Agreement Program with the Katzie First Nation at Blue Mountain and Douglas provincial forests

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Exploring Opportunities and Challenges of British Columbia's Community Forest Agreement Program with the Katzie First Nation at Blue Mountain and Douglas Provincial Forests is a Masters project conducted under Supervisor Dr. Thomas Gunton in the School of Resource and Environmental Management (Planning) at Simon Fraser University. The project began in January, 2009 and was completed by June, 2010. The thesis is available at:

http://research.rem.sfu.ca/theses/UsborneAnna_2010_MRM498.pdf

(accessed November 24, 2010).

Introduction

This project was designed and developed to be both an academic research project and a practical tool to help the Katzie First Nation increase management influence over forests in their traditional territory. My work began as a case study of the forest management priorities of Katzie community members to help inform and guide Katzie consultation, treaty, and forest tenure activities. By examining Katzie management priorities in the context of community forest literature and existing First Nation forestry studies, I expanded case study results to identify general opportunities, challenges, and recommendations for First Nations considering engaging in the British Columbia Community Forest Agreement program (CFA). I further generated recommendations for provincial administrators of the program working to build agreements with First Nations.

The Community Forest Agreement Program (CFA) and Aboriginal forestry

The province founded the BC Community Forest Agreement program to provide a forest tenure option for communities to manage their local timber resources. The CFA program was established as a pilot project in 1998, and became a full provincial program in 2004 (MOFR 2009). The main distinguishing attribute of CFAs is that the tenure is held by local, community based organizations that are expected to manage the forest according to community values. Unlike other tenures, the CFA tenure also grants rights to manage non-timber forest products (MOFR 2009).

The popularity of the British Columbia CFA program is increasing (BCCFA 2010). For the large number of First Nations engaging in community forestry, the CFA program goals offer exciting opportunities. However, First Nations bring their own Aboriginal approach to forest management, strongly rooted in each Nation's unique history, longstanding connection to a specific land base, and cultural and spiritual beliefs (Parsons and Prest 2003). Combining the Aboriginal approach to forest management with the community forest tenure regime may result in different priorities, goals, and definitions of success for Aboriginal Community Forests as opposed to non-Aboriginal CFAs. To better understand the forest management priorities, opportunities, and challenges of the CFA program specifically for First Nation communities, I conducted a case study with the Katzie First Nation.

The Katzie First Nation

The Katzie First Nation are a Coast Salish nation and part of the Halkomelem speaking group, with a traditional territory directly east of Metro Vancouver that encompasses stretches of the Fraser River, the marshlands below Pitt Lake, and the forests and mountains near Golden Ears provincial Park (Katzie 2002). Katzie have three residential and two non-residential reserves and a registered population of just over 550 members (INAC 2010).

To govern a portion of their forested traditional territory according to community values and for community benefit, the Katzie First Nation are proposing establishment of a Katzie community forest. The proposed tenure would be located in the northeast portion of their territory and will include the existing public lands of Blue Mountain and Douglas provincial forests. The objectives of my study were designed to help assess and evaluate how the CFA program can meet Katzie needs and expectations, and to use case study

results to inform other British Columbia First Nations considering engagement in the CFA program.

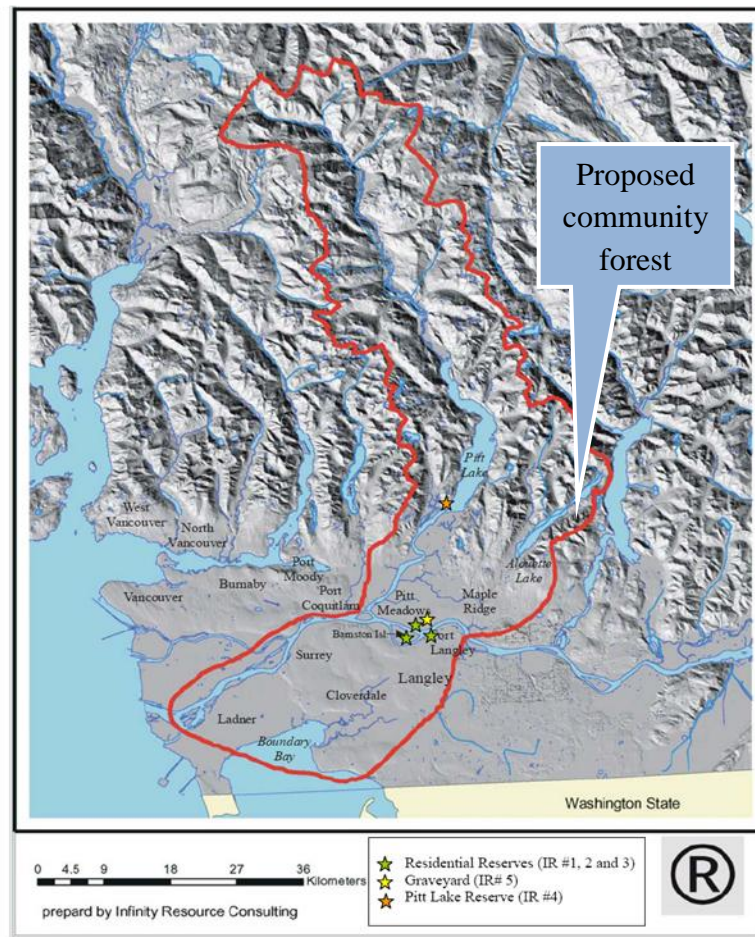


Figure 1: Location of proposed community forest.

Objectives

The specific objectives of the study included:

1. Identify Katzie First Nation forest-use and management priorities;
2. Identify potential opportunities and challenges for First Nation communities striving to meet community forestry goals through engagement in the BC CFA program; and,
3. Generate recommendations for First Nation community forest planners and provincial administrators of the CFA program.

Methods

I completed four phases of research to achieve the above objectives:

1. Completed a literature review of community and aboriginal forestry in BC;
2. Reviewed Katzie ethnographic literature, reviewed Katzie archived land and resource related interviews, and conducted present day interviews with community members that included an oral survey component to identify forest management priorities;
3. Presented a report to the Katzie First Nation for use in their community forest application, as well as in ongoing treaty and consultation processes; and,
4. Generalized findings from the Katzie case study to identify opportunities, challenges, and recommendations for aboriginal involvement in a CFA program.

Results

A rich array of data came from the ethnographic and archived interview portion of the study which highlighted the historical and current importance of the forest to Katzie lifestyle and culture. However, for the purposes of presenting to CMI conference attendees, I focused specifically on the results of the present-day community member interviews. I will further focus my presentation on the results from two of four categories I addressed in interviews, namely “forest management priorities” and “sharing the forest.” For complete results from this project, please see my final thesis.

Katzie responses to the oral survey portion of the study identifying forest management priorities are shown in Figure 2. I asked each respondent to rate the importance of each forest management priority from one to five.

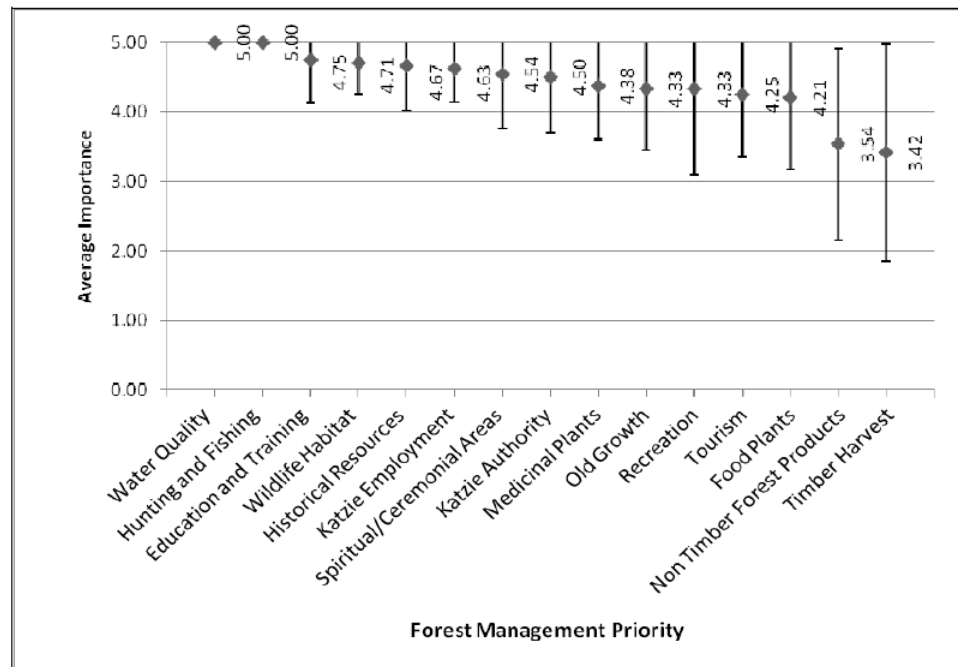


Figure 2: Average importance of forest management priorities from community surveys

Two main themes emerged from the data in Figure 2.

1. The lowest mean score for any category was 3.42 out of 5. The high mean scores for each category suggest no one category was clearly unimportant to respondents, meaning Katzie members highly support the community forest approach of managing a forest for multiple values beyond harvest.
2. The error bars suggest that all respondents generally agree on the importance of some categories such as water quality and hunting and fishing, but have high levels of disagreement regarding the importance of extractive processes for both timber and non-timber forest products. Handling this disparity of opinions forms the basis for discussion of challenges and recommendations.

Under the interview theme of “Sharing the Forest”, respondents addressed how they would like to see the CFA managed as a Katzie forest on public land in a very populated area of BC. Katzie clearly stated they wanted decision-making authority over forest management. Nevertheless, they are well aware of, and already engaged with, the numerous other actors involved in the use and management of Blue Mountain and Douglas provincial forests, and want

to collaboratively involve all parties in directing the management of the forest. Additionally, almost all Katzie spoke to the importance of establishing an area within the CFA for spiritual purposes that was not shared with others. Nevertheless, respondents also stated that the community forest could be used as a tool to educate Katzie as well as non-Katzie of the importance of the forest.

Opportunities and challenges

By examining Katzie case study results in the context of Aboriginal and community forestry literature, I generated a list of opportunities and challenges for First Nation community forestry that nations may want to consider when initiating a CFA program. Obvious for most First Nations who have decided to pursue a CFA are the opportunities: gaining authority over a piece of land to govern it along community values; showing management leadership; having opportunities for community capacity development; reconnecting to traditional lands; and facilitating economic development. Finally, each forest will offer unique opportunities based on forest characteristics. For example, the proposed Katzie forest is close to transportation routes, markets, and a large urban population, making marketing of CFA products easier than for a remote community.

Analysis of results also highlighted challenges—some of which will be shared by all CFAs. Because of the disparity of opinions in communities concerning forest management priorities, managing community expectations and maintaining support for a forest initiative will be challenging. Given that the CFA program is fundamentally a tenure designed to facilitate harvest, but also has a clear goal of allowing communities to manage forests according to community values, which for First Nations may mean limiting extraction, a challenge arises for planners hoping to meet both expectations while maintaining community support for their forest operations. Similarly, the challenge of setting, and achieving, harvest levels for the CFA that meet both community and provincial expectations will be difficult for nations whose members support a low-harvest model. Additionally, economic viability will be more difficult to achieve with a low harvest model. Finally, many nations will engage in the CFA program to generate employment and build capacity, yet some communities may not currently have the capacity or the ability to properly plan and negotiate the intricacies of establishing a feasible CFA while addressing the numerous other demands placed on First Nation administration.

Recommendations for First Nations

Examining these challenges has led me to generate a list of recommendations for First Nations to consider when planning a CFA. Further description of each recommendation is outlined in my final thesis. Recommendations include:

1. Create a vision and communicate with community.
 - Create an inclusive vision for the community forest.
 - Communicate the vision systematically to the community.
 - Use vision as a foundation for further development of goals, objectives, criteria, and indicators, to guide, monitor and evaluate community forestry policies and operations.
 - Continuously communicate CFA decisions and encourage community member participation in decision processes.
 - Continuously communicate discussion items with non-First Nation forest users.
2. Conduct inventory and pursue land use planning.
 - Conduct inventory of timber, non-timber forest products, and culturally significant species.
 - Base the CFA agreement and plan harvests according to studied community priorities and empirical inventory and land use studies.
 - Promote community member involvement through inventory and planning processes.
3. Complete business planning.
 - Complete a careful business plan of forest operations, evaluating options for a variety of timber extraction scenarios and considering capacity of the community.
 - Consider opportunities for non-extractive revenue generation in business plan.
 - Conduct business and land use planning considering variable timber markets as well as potential for non-timber forest products, value-added initiatives, recreation, tourism, and carbon markets.
 - Evaluate need, availability, and cost of hiring outside expertise, training community members, and ensuring ongoing community participation.

4. Complete management planning.

- Establish a management structure that reflects the diversity of community interests, considers capacity and expertise, and promotes community participation.
- Establish a management structure that can remain stable through political and administrative changes of the First Nation.
- Include individuals in management structure who have the time and capacity to operate a community forest.
- Include evaluation of existing and potential capacity within community for managing a community forest and consider options for hiring outside expertise and associated costs.
- Design a management structure to represent community interests and ensure accountability to community.

5. Use additional resources

- Use existing extension, government-based, and academic resources to enhance capacity, access funding, and interact with existing CFAs including engaging with universities and accessing resources from the British Columbia Community Forest Association (BCCFA), the Sustainable Forest Management Network, the National Aboriginal Forestry Association (NAFA), the First Nation Forestry Council (FNFC), and others.

Though the focus of my project was primarily to analyze the CFA program from a First Nations' perspective, developing ideas for how the province can aid in the successful establishment of Aboriginal Community Forests came naturally with my project. As such, policy makers, and provincial staff assessing and working with First Nations to implement the CFA program should consider the unique approach of First Nations to community forestry. Specifically, I suggest that policy makers and implementers consider:

1. Collaboratively determining harvest levels before granting a CFA tenure rather than asking communities to apply for an already determined Annual Allowable Cut.
2. Facilitating economic viability by: generating legislation to regulate non-timber forest product harvest on tenured lands; better coordinating CFA tenure granting process with other ministries and processes for gaining rights to govern recreation and tourism within Crown lands; and including

financial and technical support for development of community-based value-added initiatives in CFA agreements.

3. Contributing to capacity building and training for First Nations engaging in the CFA program. Include a commitment in CFA agreements to provide capacity building for First Nation applicants to ensure the CFA program can become an internally driven operation, benefiting the community, even if the First Nation does not have sufficient capacity at the outset of the agreement.
4. Emphasizing strong working relationships and allow for extended timelines in order to honour First Nation values while encouraging participation in the program. Increased planning and emphasis on working relationships may mean good First Nation CFAs might take longer to plan and agree upon, but will be more sustainable in the long run.
5. Coordinating with other ongoing First Nations forestry initiatives. Much work has been done through entities such as the Aboriginal Forest Network, the First Nations Forest Council, and the National Aboriginal Forestry Association. Community forest administrators should collaborate with these entities to better shape Aboriginal CFAs and help First Nations engage support for their initiatives.

Conclusion

The CFA program continues to improve and gain successful participants; however, challenges to maintain economic viability and meet community expectations continue. First Nations considering engagement in the program should remember that though the CFA program goals may be attractive, the CFA program was not designed specifically for Aboriginal forestry and additional challenges may arise for First Nations working to meet community goals through the CFA program. Nevertheless, good opportunities exist with strong planning and careful thought and management for establishment and development of a CFA. Taking careful stock of First Nation priorities, capacity, and long term goals is necessary before engaging in the program. After assessment, some First Nations may want to explore alternative arrangements for managing their forested lands. Nations may want to consider the new First Nation Woodland License recently released by the province, or join their voice with others advocating for a forest tenure option that lies outside of the Ministry of Forests and grants rights to manage resources beyond timber and non-timber forest products to allow for a more holistic approach to ecosystem management.

Thank you

My project was generously supported by the Social Sciences and Humanities Research Council, the Katzie First Nation, and the MITACS Accelerate Internship program. I would like to thank the following people for supporting me throughout my research: the Katzie First Nation, Chief Mike Leon and Councillor Gail Florence; Debbie Miller; Tanja Hoffman; Jamie Pierre; Katzie interviewees; Dr. Tom Gunton; Dr. Murray Rutherford; Dr. Evelyn Pinkerton, and professors and classmates from Simon Fraser University's School of Resource and Environmental Management.

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5. WildCoast Project: An overview of the research and mobilization of the knowledge

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The WildCoast Project

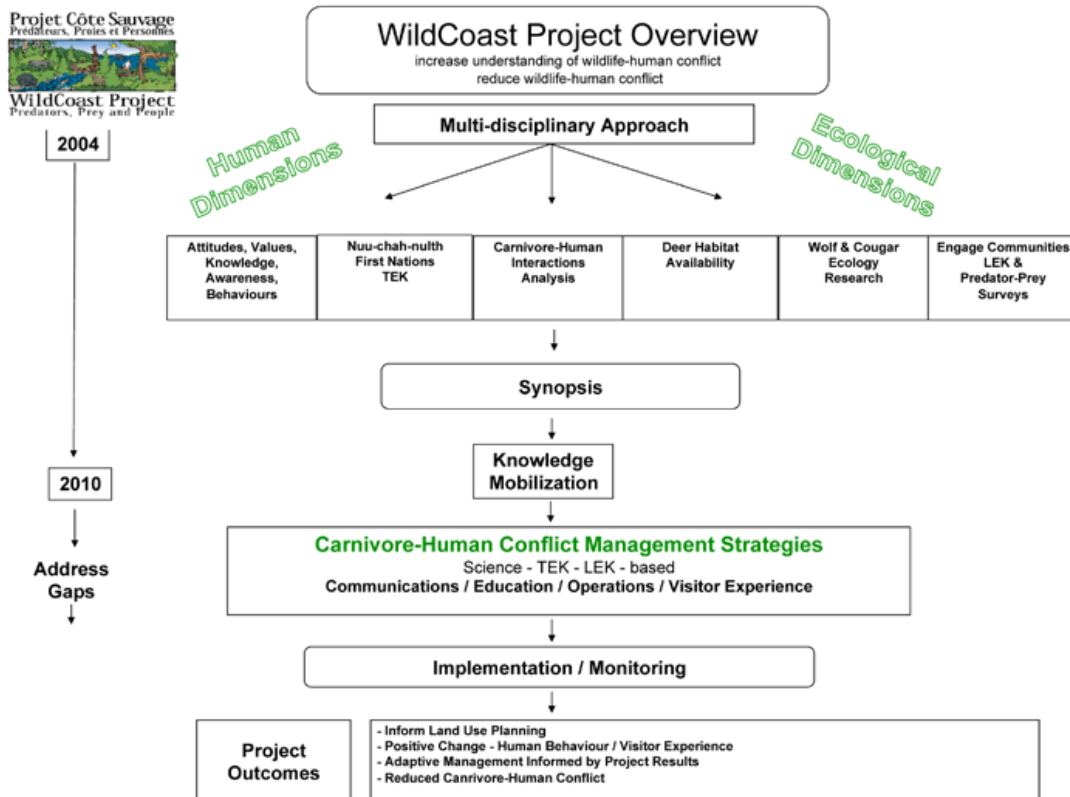
The WildCoast Project was initiated because of concern about the potential for conflict between humans and predators, notably cougars and wolves, in the central west coast region of Vancouver Island. Since the late nineties the number of reported carnivore–human interactions has increased in the region, from Clayoquot Sound in the northwest to Port Renfrew in the southeast.

It makes sense that interactions might be increasing along with visitor numbers in areas like the Long Beach Unit of Pacific Rim National Reserve (PRNPR) and the towns of Tofino and Ucluelet. However, there have also been higher numbers of interactions in some backcountry areas and around remote villages.

These interactions can pose a threat to both people and the animals. Predators may lose their fear of humans over time, and in the case of wolves, they may also become food-habituated due to direct or indirect feeding (e.g., on garbage and unsecured food).

Pacific Rim National Park Reserve with partners such as the Clayoquot Biosphere Trust is conducting research into the links between predators, prey, people, and landscape dynamics that may be contributing to an increase in carnivore–human interactions. The goal is to reduce the risk of conflict between humans and carnivores.

The WildCoast Project began in 2004. A comprehensive, multi-disciplinary research plan was developed that would pursue many threads of investigation, as depicted in the graphic below.



To date, impressions emerging from the work of the WildCoast Project include a mix of ecological and human dimension factors that may be contributing to increased predator–human interactions.

Local ecological knowledge surveys of residents on the coast suggest the deer population on the larger landscape is very low in many areas. One contributing factor is that extensive clear-cut areas in the region now have second-growth forest cover that is older than 20 years of age. Recently logged areas provide very good deer habitat for 10–15+ years. Dense second growth forest that develops after 15+ years shades out the understory forage required by deer, and deer habitat quality is reduced.

There are extensive tracts of older second growth plantations that have become marginal deer habitat. This condition is thought to persist for upwards of 80+ years. A considerable proportion of the landscape is now in this state.

WildCoast field research has documented that cougar and wolves are still pursuing deer but are also hunting a variety of smaller prey found particularly

in shoreline areas. It is important to note that most human infrastructure and the highest levels of human activity in this region are found within 500 meters of the shoreline (e.g., communities, parking lots, trails, subdivisions, resorts). The overlap of a diverse prey base in shoreline areas and concentrations of human activity presents more opportunities for close encounters.

Human attitudes, perceptions, beliefs, and behaviours also appear to be an important dynamic elevating the potential for close carnivore encounters. Interestingly, in many documented events, people have not tried to scare the encountered wolf or cougar away. In many instances people have tried to prolong the experience of being close to a predator. The human behaviours have included following a predator, or enticing animals to approach humans more closely, sometimes with food.

Before carnivore–human interactions increased in the region there was a general perception that wolves and cougar were extremely wary of people and just the presence of people prevented close encounters. The trend in encounters suggests that some proportion of the population of wolves and cougar are adapting to the non-confrontational behaviours of people they encounter.

Some wolves and cougar have exhibited a considerable degree of habituation to human activity. This lack of wariness of people allows these animals to hunt in places where there is considerable human use, such as shorelines areas (e.g., beaches, mudflat edges, coastal trails), newly created edge habitat (e.g., new subdivisions) and green spaces in and around communities. The reward for these predators is a variety of natural prey as well as domestic animals running at large.

Collectively this combination of social and ecological dynamics suggests that a higher level of carnivore–human interactions can be expected to continue.

The WildCoast Primer

Websites hosting *WildCoast Primer – Learning to Live with Large Carnivores*:
http://www.clayoquotbiosphere.org/wildcoast/docs/Wildcoast_Primer_v3.pdf
http://ekoscommunications.com/files/wildcoast/Final_WildCoast_Primer_V3.pdf

The WildCoast Primer is the principal means of mobilizing the knowledge gained through the WildCoast Project. The Primer provides an easy-to-browse overview of the body of WildCoast Project research, as well as conflict prevention and public safety guidelines.

The WildCoast Primer starts with an overview of the story and then profiles the research in the form of easy to browse summaries. The summaries serve two purposes. First, key findings are presented. Second, the summaries also serve as a portal to much more detailed information.

Near the title of each project summary is a balloon-type icon that says “Click here for more detailed information”. One click may take you directly to a slideshow, a technical report, or a complete Master’s Thesis.

Two other summaries chronicle accounts of close encounters involving people and carnivores and one report provides a system for classifying cougar and wolf encounters.

The last section of the Primer has conflict prevention and encounter response guidelines for specific audiences.

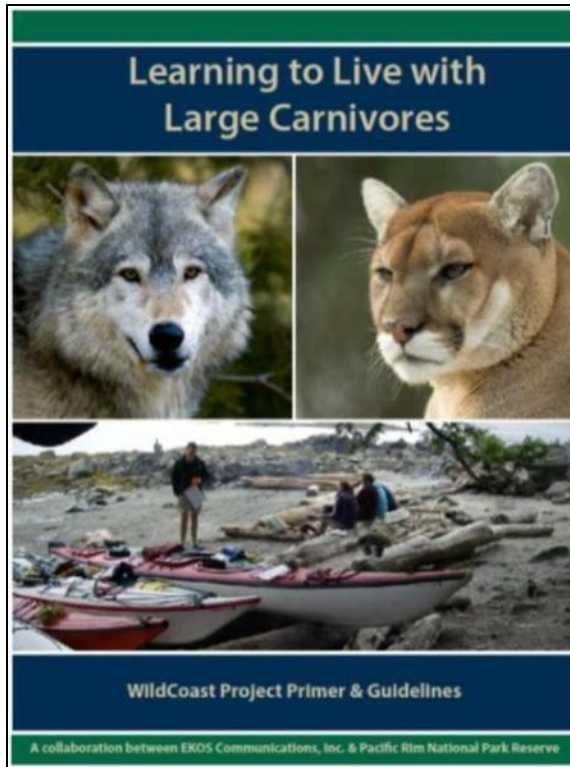
The primer is used by:

- Local residents. The Primer tells their stories, speaks to the sense of place, and teaches their children using local research.
- People in communities beyond the west coast region of Vancouver Island. There has been national and international interest.
- Visitors. Visitors share our local stories and gain an appreciation for the wildness of the west coast. The Primer enhances visitor safety and enjoyment, and it supports educational tourism.

- Wildlife–human conflict professionals
- Research community
- Information providers and educators. The Primer is a resource for wildlife watching guides, sea kayaking guides, interpreters and teachers, Information Center staff, the Raincoast Host training program, and the service industry staff at resorts, restaurants, and surf shops.
- Community leaders, including town planners, Parks and Recreation staff, and habitat managers.

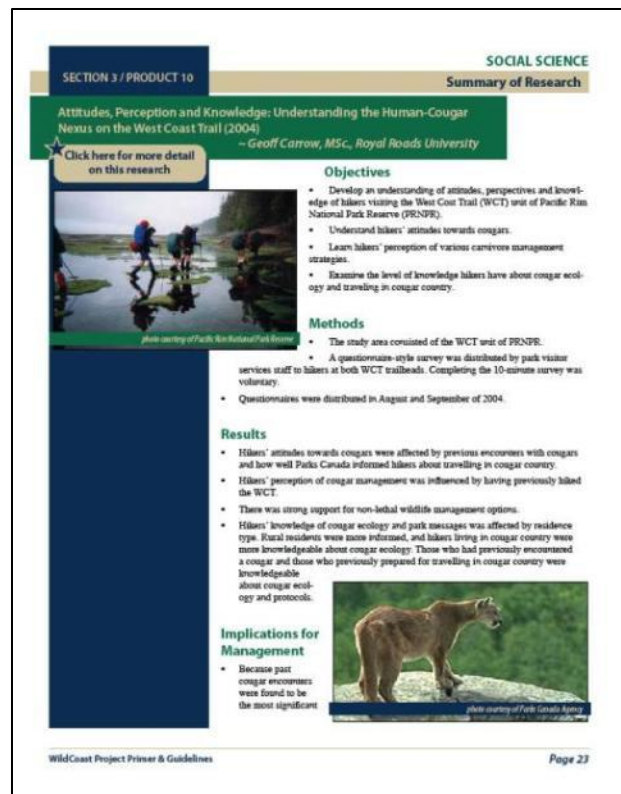
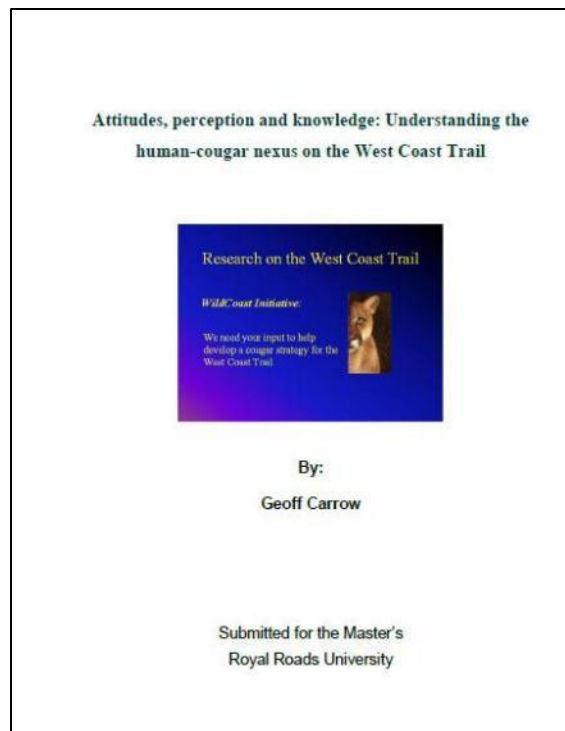
The WildCoast Primer includes a list of the many funders and supporters for this multidisciplinary project.

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Front cover of WildCoast Primer

Example of a project summary



The project summary provides a link to more details, e.g., a Master's Thesis.

6. Challenges for grizzly bear management in BC

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Introduction

The explicit role of human dimensions in the Fish, Wildlife and Habitat Management Branch of the Ministry of Natural Resource Operations is a relatively new field. Although many people within the Ministry incorporate aspects of human dimensions in their work, the importance of including the social components in conjunction with the biological sciences in wildlife management and decision-making is becoming more prevalent and increasingly recognized. To better understand how human dimensions can be used to improve decision-making in the natural resource sector, we must first understand the underlying framework upon which human dimensions research is based.

Social-ecological systems

The use of human dimensions research in the Fish, Wildlife and Habitat Management Branch is based on a systems theory called social-ecological systems. Using this framework (see figure 1) Branch staff seek to explore the linkages and interactions between and within social and ecological systems with the goal of creating more robust and sustainable wildlife management decisions. According to Holling (2001) social ecological systems are in essence “systems of nature... and humans... as well as combined human-nature systems... [that] are interlinked in never-ending adaptive cycles of growth, accumulation, restructuring and renewal” (p. 392).

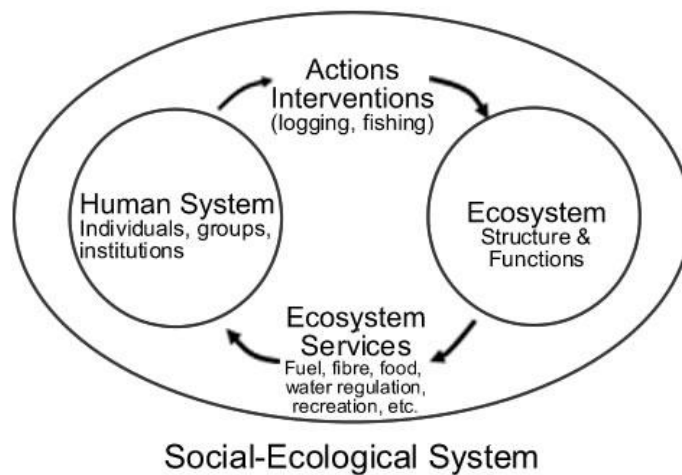


Figure 1: Conceptual framework outlining the basic elements and interactions of social ecological systems (Resilience Alliance, 2010)

The idea that natural and social systems are complex and therefore require a systems approach that explores the whole and wholeness is by no means a new concept (Decker, Brown & Siemer, 2001; Levin, 1999; von Bertalanffy, 1968). It has been further recognized by Adger (2000) and Berkes and Folke (1998) that many natural resource and environmental challenges involve the added complexity of interactions between and within natural and social systems.

Human dimensions

The human dimension of natural resource management is used to understand complex problems from different perspectives, or ways of knowing (Organ, Decker, Carpenter, Siemer & Riley, 2006; Manfredo, Vaske, Brown, Decker & Duke, 2009). For instance, from a philosophical perspective, there are many ways of knowing depending upon one's epistemology or the lens through which one sees the world (Martin, Cashel, Wagstaff & Breunig, 2006). Human dimensions research tends to evaluate a research problem or provide information for a management decision using a multi-pronged approach which includes scientific data from both biological and social sciences; traditional ecological knowledge; and/or local ecological knowledge.

When the human dimensions lens is focussed on grizzly bear management in British Columbia, there are a number of challenges that can be addressed

related to the myriad values and perspectives that stakeholders, the public and First Nations hold.

Grizzly bear management in British Columbia

“Wildlife management is no longer just game management; it involves stewardship of a valuable and limited public resource.”
(Hendee, 1974, p. 104)

British Columbia is home to Canada's largest and healthiest population of grizzly bears. Approximately 16,000 grizzly bears, about one-quarter of the North American population, range across the province from the Lower Mainland to the northern border. Grizzly bears in BC are comprised of fifty-seven discrete or nearly discrete viable population units known as Grizzly Bear Population Units (GBPUs) and are not part of one large interbreeding population (Ministry of Environment, 2010). In order to ensure that management and local conservation objectives are met, grizzly bears are managed by GPBU (Ministry of Environment, 2010). Managing by GPBU also enables provincial biologists to identify known or suspected fractures in Grizzly Bear distribution. “GPBU’s have been used for setting land use priorities for Grizzly Bear conservation during strategic land use planning and are currently being used to direct population recovery” (Ministry of Environment, 2010, p. 02).

Hunting

In the mid-1900s, the grizzly bear was identified as a game species. Since then, management programs have been put in place to ensure that the hunt is sustainable. “Today, the grizzly bear hunt is the most rigidly and conservatively controlled hunt in the province” (Ministry of Environment, 2010, p. 01).

By 1996, all grizzly bear hunting opportunities were managed using a quota system for non-resident guides and a Limited Entry Hunting (LEH) system for resident hunters. The LEH system is essentially a lottery where a limited number of hunting authorizations are available to resident hunters in the province. The grizzly bear is the only big game species in the province that is managed completely through LEH and quotas (Ministry of Environment, 2010).

There are many criteria that are used to determine if a GBPU can sustain any degree of harvest. The following figure describes a very high level of the decision making process to determine whether or not to open a particular GBPU to hunting. There are many other more detailed factors, not discussed here, that come into play when deciding what GBPUs to hunt in, how much of a GBPU to open, how much non-hunting mortality exists in a particular GBPU, etc. (Ministry of Environment, 2010).

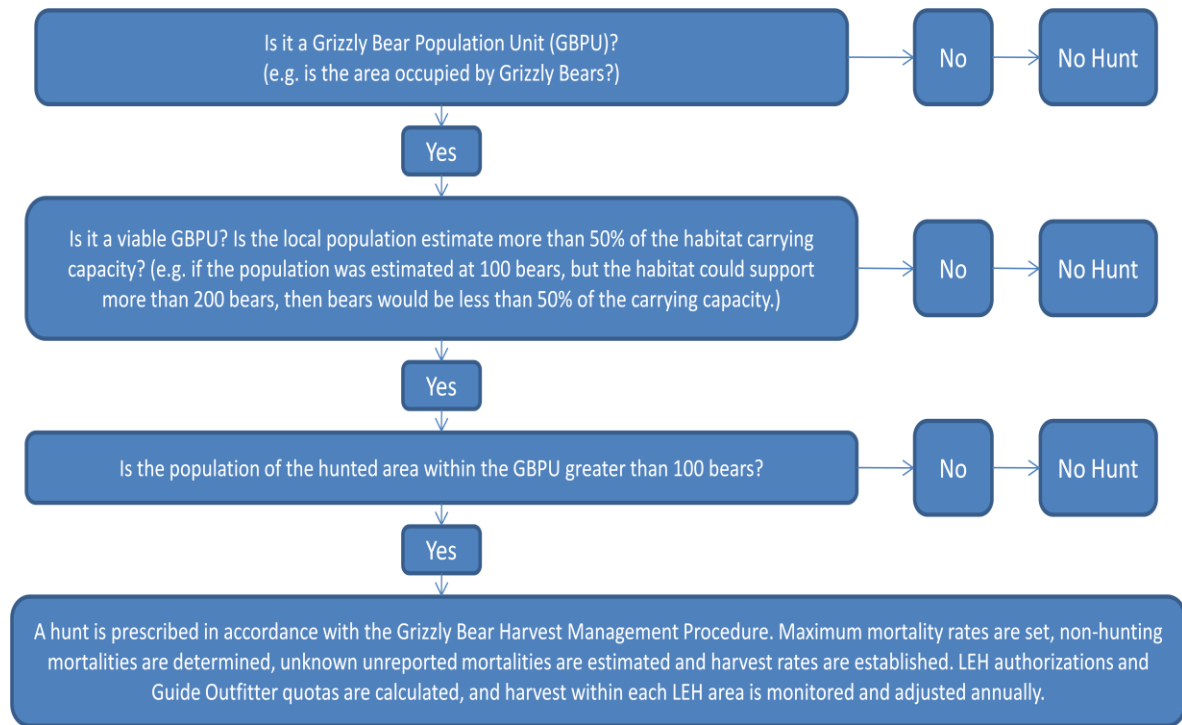


Figure 1. Diagram illustrating the decision making process to open or close a GBPU to hunting (adapted from Ministry of Environment, 2010, p. 03).

When the hunt is determined to be sustainable, the resource is then divided between First Nations' food, social, and ceremonial needs, resident hunters, and non-resident hunters. However, there are other competing interests related to grizzly bears in BC including the ecotourism industry and bear viewing operations. Furthermore, the grizzly bear tends to elicit different values from members of the public who may or may not be directly associated with grizzly bear use (be it consumptive or non-consumptive).

Human dimensions of hunting grizzly bears in British Columbia

Due, in part, to these diverse values, there exists a strongly polarized ethical debate in the public arena regarding the grizzly bear hunt (Davradou & Namkoong, 2001). One perspective relates to the concept of density dependency. This concept is based on the hypothesis that harvesting big male grizzly bears could increase the likelihood of cub survival rates (Miller, Sellers, Keay, 2003). There is also the position that the hunting community can be a good conservation force for the protection of wild lands and habitat (Knezevic, 2009).

On the other hand, we have heard arguments from members of the public that grizzly bears should be protected from hunting in all parks and protected areas to ensure sustainable populations. Anti-hunting proponents also argue that, compared to bear viewing, grizzly bear hunting results in a net loss of revenue for, and biodiversity in, the province (Parker & Gorter, 2003).

Human dimensions research can help to provide wildlife managers with more profound insight into these perspectives through scientific research focused on ethics, attitudes, perspectives, values, and the public's confidence in the ability of wildlife and resource managers to manage wildlife and wildlife use (Campbell & MacKay, 2009; Davradou & Namkoong, 2001; Decker, Brown & Siemer, 2001; Decker, Brown, Vaske & Manfredro, 2004; Duda, Jones & Criscione, 2009; Manfredro, Teel & Bright, 2004; Manfredro, Vaske, Brown, Decker & Duke, 2009). Incorporating human dimensions into resource management also lends itself to finding common ground between opposing views. For example, Knezevic (2009) explored the proposition that "both hunters and environmental groups are interested in land conservation, and given the rapid habitat loss around the globe, the question is asked whether joint conservation efforts would prove beneficial" (p. 12).

Bear viewing

Grizzly bears elicit a wide spectrum of attitudes and values from both the public and specific user groups, thus increasing the challenges faced by wildlife managers in balancing the impacts of bear viewing, bear hunting and public perceptions of bear conservation.

Wildlife viewing, tourism and hunting are recognized as important economic and social components of BC's resource-based industries. Although wildlife viewing is technically a "non-consumptive" activity, it has the potential to adversely affect the movement of bears (Crupi, 2003; DeBruyn, Smith,

Proffitt, Partridge & Drummer, 2004; Olsen & Gilbert, 1994) and has the potential to displace them from their preferred habitats and seasonal food sources (Herrero, Smith, DeBruyn, Gunther & Matt, 2005; MacHutchon, Himmer, Davis & Gallagher, 1998; Nevin & Gilbert, 2005; Rode, Farley & Robbins, 2006). It is the Government of British Columbia's policy to respect all interests related to wildlife use, while ensuring decisions are guided by science and that the number one priority is the maintenance of healthy, sustainable populations.

Grizzly bear viewing in BC is not a new activity, but the industry has recently experienced a growth in popularity (Herrero, Smith, DeBruyn, Gunther & Matt, 2005; Nevin & Gilbert, 2005). This growth brings new challenges and new opportunities for grizzly bear management. The challenges, at present, lie in knowing where grizzly bear viewing should or should not occur on the land base and how much is sustainable in each particular area. There are also societal and ethical concerns related to bear viewing. In addition there are concerns related to tourist safety, wilderness experiences, habituation of the bears, and visitor behaviour at viewing sites. (Pitts, 2010).



Photo courtesy of Tory Stevens.

Bear–human interactions

The most recent data estimates that approximately fifty “problem” grizzly bears are killed per year (T. Hamilton, personal communication, September 27, 2010). The majority of these deaths could be prevented through a combination of enforcement and public education. BC has a number of active

“Bear Smart” programs that are working tirelessly to reduce the number of problem bears killed, using public education and training with the intent to change people’s behaviour and reduce the number of attractants in communities (T. Hamilton, personal communication, September 27, 2010).

Human dimensions can play a key role in reducing the number of problem bears killed, by exploring the most appropriate balance between a highly regulatory, enforcement-oriented response, and the pro-active prevention of Bear Smart community programs and public education. Relevant questions could also include what kinds of educational programs would be most effective to change behaviour; what sectors should be targeted; and what is the best way to access the various audiences (including First Nations) (Baruch-Mordo, Breck, Wilson & Broderick, 2009).

Threatened populations

Within BC, there are currently nine GBPU; three of which are in or near the Kootenay area (Ministry of Environment, 2010). “If the current estimate is less than 50% capability (i.e. the population is less than 50% of the number of animals that the habitat could support), the GBPU is designated as Threatened” (Ministry of Environment, 2010, p. 03). If a GBPU is designated as Threatened, no hunting is allowed and the primary objective is to recover the Grizzly Bear population to sustainable levels (Ministry of Environment, 2010).

Human dimensions can play a key role in recovering Threatened GBPU by helping to identify and address cumulative effects of land designation and resource use. Motorized access, wild land management, sustainable development and Aboriginal rights and title are also examples of areas that could benefit by human dimensions research as it relates to recovering Threatened GBPU.

Conclusion

In the interest of adaptive management and knowledge mobilization, new areas of research that the Fish, Wildlife and Habitat Management Branch will be exploring in relation to grizzly bear management include many facets of human dimensions such as social science (attitudes, motivations, satisfaction, etc.); ethics; stakeholder engagement; and creating policies and procedures to support these various components.

In areas of the province where both hunting and viewing activities occur in the same geographic areas, the challenge remains centred around managing grizzly bear populations and managing human use responsibly. The answers remain complex, but incorporating the use of human dimensions can help add clarity and robustness to the dynamic and often polarized values related to the management of people in relation to grizzly bears and habitat use in British Columbia.

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7. Managing grizzly bear– human conflicts in a high human use landscape

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Kananaskis Country is a 4,100 square kilometre multi-use area of public land within an hour's drive of Calgary, an urban centre of over one million people. The Town of Canmore lies along its western edge, situated in the Bow River valley just east of Banff National Park. The Bow Valley is a major movement corridor for large ungulates and carnivores including grizzly bears. Despite high levels of human activity, grizzly bears continue to persist and successfully reproduce in this landscape. The Bow Valley has a long history of bear–human interactions and conflicts. Since the 1988 Winter Olympics and the 1992 Natural Resources Conservation Board approval of the Three Sisters Resorts residential and recreational development, Canmore has undergone a rapid expansion both in terms of human population and the footprint of development.

The population of Canmore has increased from approximately 3,000 people in 1979 to a current population of just over 12,000. Increasing development has filled much of the higher quality habitat in the valley bottom and displaced wildlife to fringe areas, which are also the only areas remaining for the recreational pursuits of residents and visitors. Highway fencing and three wildlife crossing structures have been constructed to address wildlife highway mortalities and to improve habitat connectivity. In an effort to reduce potential conflicts in town, an extensive network of habitat patches and wildlife corridors provide movement options for ungulates and carnivores around built-up areas of the valley. However, human use of these same areas ensures that interactions are inevitable.

Interactions between bears and people are a common occurrence and managing such interactions to ensure public safety and address conservation concerns has become a huge challenge. With long standing conservation

concerns over the sustainability of grizzly bear populations and the 2010 listing of the grizzly bear as a threatened species in Alberta, old ways of managing conflicts such as destruction and/or relocation, have become less desirable options. There is an increased focus on finding ways to coexist on the same landscape. However, maintaining grizzly bears on lands with increasing and diverse human activity levels can only be accomplished with shifts in public attitudes and tolerance, and with extensive management programs aimed at reducing negative bear–human interactions while ensuring public safety.



Figure 1: Bow Valley near Canmore

A hazard assessment was completed in 2007 for the Bow Valley (Honeyman, 2007). This assessment analyzed bear–human interactions between 1990 and 2006. Its purposes were to:

- Quantify the number and nature of occurrences;
- Identify the causes of these occurrences;
- Determine spatial and temporal distribution of interactions; and
- Further analyze those conflicts where a public safety concern was involved.

Sightings of bears in the Bow Valley and Kananaskis Country are common occurrences and were not included in any analyses for the hazard assessment. The assessment only looked at interactions where there was a public safety concern (n = 656). Most conflicts (56%, N = 399) involved non-natural food sources (birdfeeders, composts, golf course grasses, ornamental fruit trees), however very few of these were garbage related. Serious conflicts involving human injury or death have been rare (1% of conflicts, n = 3). One human fatality occurred in 2005.

The assessment further identified a breakdown of factors involved in the conflicts. Natural attractants (e.g., buffaloberries, red-osier dogwood, chokecherries) were the primary factors that were causing conflict between bears and people, followed by garbage, golf course vegetation, birdfeeders, grain, ornamental fruit trees and then a collection of other human food related items (Honeyman, 2007). This assessment allowed specific management actions to target high conflict areas and be directed towards specific causes of conflict. Canmore and the Municipal District of Bighorn eliminated curb side garbage pick up in 1999 which has significantly reduced garbage related bear conflicts. Such a program was initially a tough sell to the public but is now the accepted way of doing business. It has proven effective. Birdfeeder bylaws have also been enacted to reduce another source of conflict.

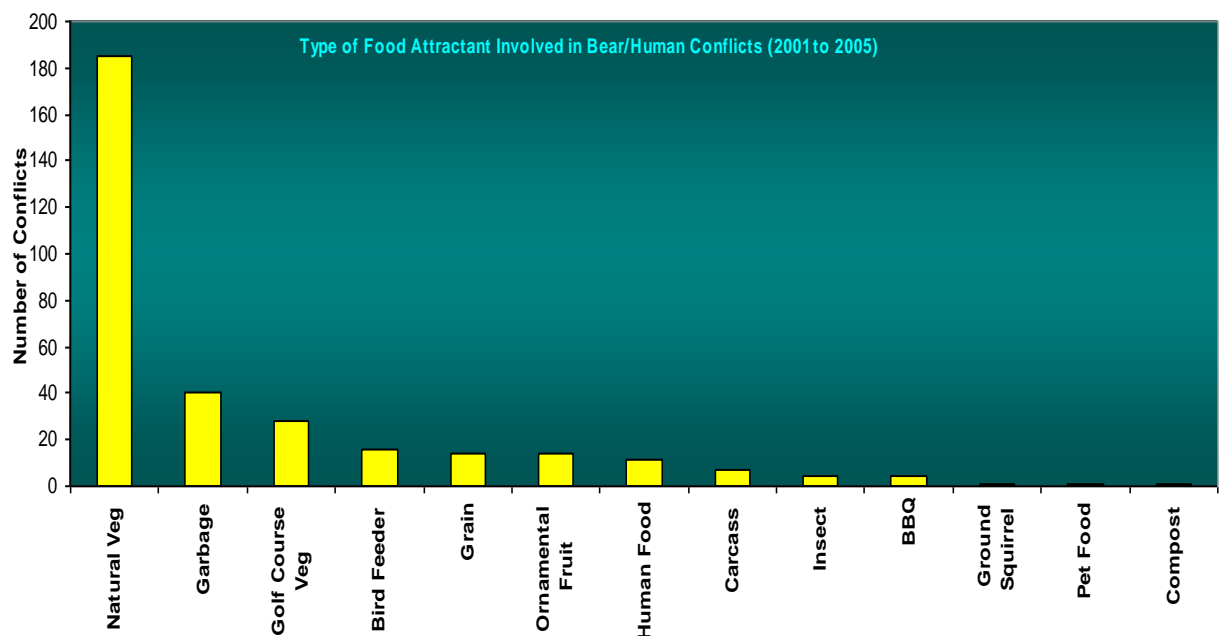


Figure 2: Types of food attractant involved in bear–human conflicts, 2001–2005.

In an effort to mitigate negative bear–human conflicts, we employ a comprehensive suite of management programs. Most of these programs have a human dimension, which facilitates achieving acceptance and ultimately a high level of compliance. If the human dimension is not addressed, success is always going to be limited. Government agencies are limited in their capacity to address issues on private land and regulate human activities on public lands.

Bear conflict specialists and contractors are employed by the provincial government to coordinate programs and focus efforts where needed. Aversive conditioning including the use of specialized Karelian bear dogs is used to discourage bear activity in developed areas. Public education about the purpose of these programs is a key component. We use the media, special events, and one-on-one interactions with the public. The bear dogs are a fantastic attention grabber to facilitate message delivery.

Natural vegetation, primarily berry producing shrubs, is currently the most significant attractant bringing bears into close contact with people. Attractant management programs which physically remove these shrubs have been underway for several years in an effort to discourage bears from feeding in developed areas. Because much of this attractant grows on private lands, education initiatives including media blitzes, door-to-door contacts, and public involvement efforts are employed to raise the issue and seek compliance from landowners to remove the attractants from private property. Vegetation removal programs also carry the added benefit of opening sightlines along trails and in developed areas.

Bow Valley WildSmart (<http://www.wildsmart.ca>) is the major, multi-stakeholder funded, education and outreach arm of these coordinated programs. WildSmart is a self-sustaining program with a salaried education director that oversees numerous public directed initiatives from bear safety training, corporate and school presentations, bear spray courses, volunteer coordination, information dissemination via media contacts, and a speaker series. A website and a Facebook site are maintained to provide an avenue for social networking and information exchange. A link to a weekly bear activity report is provided on this website and automatically distributed to the public who sign up. The weekly bear reports provide information on recent bear activity in the valley and are sent out to subscribers every Friday afternoon.

Permanent closures as well as temporary area closures are used when needed to address site specific bear conflict issues. These are designed to address both bear and human safety issues. Such closures can impact the public's right to access public lands for recreational activities and can affect commercial business operations such as campgrounds and golf courses.

While not always popular with everyone, these initiatives are increasingly supported by the public. These intensive management programs and education initiatives have increased awareness amongst the public, municipal governments, and management agencies, which in turn has raised tolerance levels and allowed bears to persist in situations where previously they would have been trapped and removed from the system, all the while ensuring that public safety remains the number one priority. Such acceptance levels likely result from a certain demographic that is not present in other areas of the province. Increasingly, multiple interest stakeholders are becoming involved in the implementation and facilitation of monitoring, management, and education initiatives.

The current management approach in Kananaskis Country comes from an evolving relationship between biologists, various levels of government, local businesses, and the public, resulting in a genuine shift in values towards a grizzly bear conservation ethic. The result is grizzly bear persistence and Alberta's Kananaskis Country represents a unique and successful model for maintaining grizzly bears in a high human use landscape.

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8. Good management is not only wildlife management: Understanding public preferences for wild boar management in a protected area of central Italy

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Over the past century the growth in human population worldwide has resulted in the expansion of human settlement into rural and natural areas (Choudhury, 2004; Jankins and Keal, 2004; Woodroffe *et al.*, 2005). As a consequence, wildlife–human interactions have become more common in and around protected areas, resulting in a rise of wildlife management challenges (Jankins and Keal, 2004; Choudhury, 2004; Woodroffe, 2000). Wildlife issues, mostly related to damage directly to people or their belongings, have resulted in the decline of public support and the rise in community hostility toward wildlife conservation initiatives (Gore *et al.*, 2007; Kalternborn *et al.*, 2006). Park authorities have therefore received more and more requests to manage wildlife, despite the fact that animals should be totally protected inside parks.

In Italy, a highly populated country, wildlife–human challenges have grown over time due to the lack of physical separation between spaces used by people and wildlife. Protected areas in the Italian peninsula enclose a mosaic of natural landscapes, healthy populations of wildlife, and several thousand park residents. Daily interactions between species and people in Italy are causing a rise in wildlife–human conflicts, necessitating the application of integrated management strategies and the need to engage people more proactively in wildlife decision-making processes.

1: Wild Boar

The Regional Natural Reserve Nazzano-Tevere-Farfa

The Regional Natural Reserve Nazzano-Tevere-Farfa of Lazio Region is situated 40 km north of Rome and bounded by three villages, Nazzano (1,344 residents), Torrita Tiberina (1,040 residents) and Montopoli di Sabina (3,999

residents). The reserve is a mosaic landscape of wetlands, cultivated fields, reeds, and various kinds of forest. Controversies have emerged in this



Figure 1: Wild Boar

protected area as the population of wild boar has increased to over 15 individuals per km². The population has expanded to areas of human activities, creating the need for wild boar management. Integrated management strategies that encompass preventive measures, compensation systems, and wild boar relocation and culling have been applied to lower conflicts with local communities. In the last 4 years, of the total budget of the reserve, an average of 17% per year has been used to compensate for wild boar damages, and another 5% has been allocated to supply preventive measures to farmers. In the last two years an average of 14 wild boars per km² have been trapped and removed from the protected area. A total of 194 wild boars were culled in the reserve in 2009 and 2010.

Despite all these wild boar management efforts, conflicts still exist in the reserve. Previous management strategies have focused mainly on managing wildlife–human conflicts such as crop damage, and have hardly looked at other challenges such as conflicts between interest groups, multiple uses of the reserve, or disagreements between local communities and park authorities. Therefore, the current controversial situation on wild boar management in the reserve may not be due to poorly developed wildlife management strategies, but to the lack of properly planned public involvement. Indeed, when the public has been consulted on wild boar management issues in the reserve, it has been done in traditional ways such as public presentations, which is not an

effective technique to engage local communities in wildlife decision-making processes.

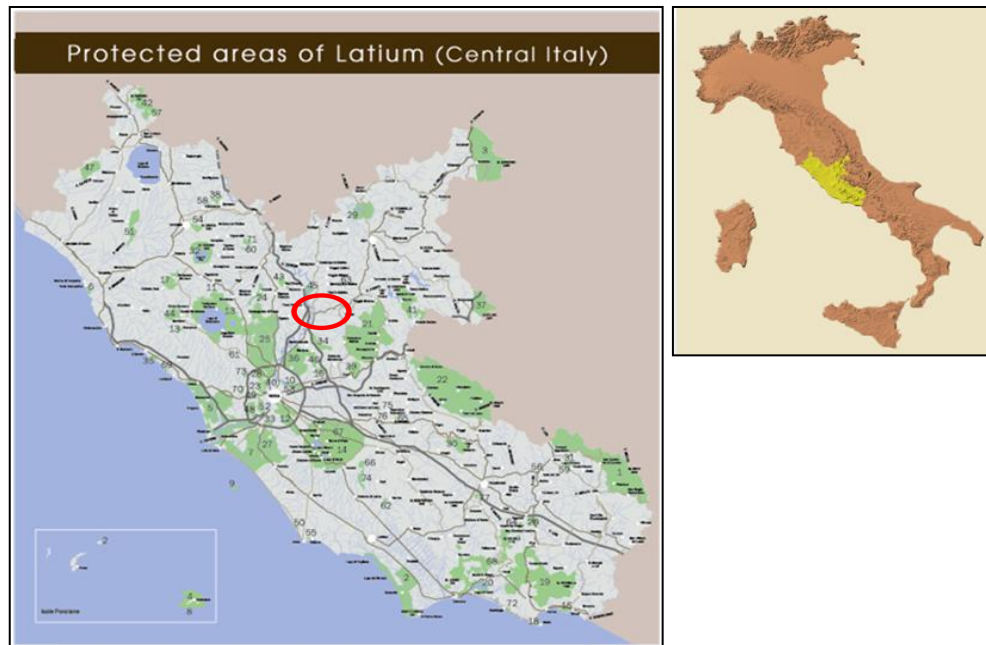


Figure 2: The Regional Natural Reserve “Nazzano-Tevere-Farfa” of Lazio Region is situated about 40 km north of Rome.

A human dimension project

To solve this situation, a cooperative human dimension research project between the Regional Park Agency Lazio and Memorial University of Newfoundland (Canada) has been developed. The purpose of the study was to explore and better understand wild boar–human management challenges in the reserve; and to develop a shared and widely accepted wild boar management plan through the involvement, support, and collaboration of local communities. The main objectives of the study were to identify participant’s opinions toward wild boar management options and to understand the underlying conflicts between general public, interest groups, and park managers.

Approaching the general public

To gather information and start involving local communities in wild boar management, a quantitative questionnaire was developed and administrated to the general public in the Regional Natural Reserve Nazzano-Tevere-Farfa. The questionnaires, composed of 71 items, focused upon attitudes, beliefs, and

knowledge about wild boar, management options, experience, and perception of tolerance, and socio-demographic characteristics of respondents. To obtain a representative sample of the residents living in and outside the Regional Natural Reserve Nazzano-Tevere-Farfa, a grid system was set up over the study zone, dividing the protected area into 48 squares. In each square, random streets and households were selected for interviews. To allow the inference of the data to a larger population, 400 interviews were conducted in and around the Regional Natural Reserve Nazzano-Tevere-Farfa.

Participants were essentially divided between positive (40%) and negative (36%) attitudes toward wild boar. A large percentage of respondents, however, were also neutral, neither liking nor disliking (24%) the species. By further asking what this species represented for them, half of the general public identified wild boar as a pest (51%). However, the species was also portrayed by the public as a local (15%) or a game species (14%). People that answered this question with the option “other” (20%) mainly explained their response by stating that wild boar is a wild species part of the natural ecosystem, an edible species, a non-local species, or just a wild pig.

The general public perception of conflicts associated with damages to cultivated areas, gardens, and car accidents was high in the Regional Natural Reserve Nazzano-Tevere-Farfa, explaining why people believe that wild boar represent a negative species. Indeed, when asked whether there were more benefits to have wild boar in the park than disadvantages, more than 60% of the residents perceived the species as causing more problems than positive returns.

To better understand what type of management techniques would be preferentially supported by local residents, management options such as preventive methods, compensation, capture and removal, culling wild boar, and increasing viewing opportunities to observe wild boar in nature were investigated. Not surprisingly, high support was expressed for possible supply of preventive measures (73% agree) from the park, for the increase of compensation for damages (65% agree) and for the capture and removal of animals (52% agree). However, for this last item, 26% of the sample population was against this management option for wild boar. Such split in opinion becomes more evident for culling, where 42% of participants were in favour of selective killing of wild boar, while the other 39% were against this management option. Existence value and animals rights, mistrust toward the park, and who should carry out this management option were the main explanations given by participants while explaining their negative attitudes

toward wild boar culling activities. By discovering that some management options are highly supported by the general public whereas others are not so homogenously sustained, reserve managers are able to apply wild boar management tools that are widely accepted by local residents and thus mitigate wild boar–human conflict in the reserve.

Even though in the Nazzano-Tevere-Farfa area the general public does support the wild boar management strategies currently applied, conflict between local communities and the park still exist. The opposition of several local interest groups toward the applied wild boar management is creating controversy and discontent in and around the reserve area. This suggests that general public surveys are not always enough to fully understand local community's needs and local social dynamics since they rarely explore a variety of issues in depth. The general overview about wild boar management in the area obtained through the general public is therefore just a first step toward engaging local communities in wild boar decision-making processes in the Regional Natural Reserve Nazzano-Tevere-Farfa.

Approaching interest groups

To proactively engage the local community in wild boar management and to take into account the opinions of interest groups, four meetings were organized in May and June 2010 with hunters, park rangers, farmers, and the committee of the reserve. Presentations at meetings included results of the human dimensions research described above, and information on the reserve's current wild boar management strategies. Extra time for discussion was allocated at the end of the presentations to engage the interest groups. Since local hunters expressed particular interest in being involved in wild boar management, a second meeting was organized with this interest group, addressing culling activities inside the park, hunters' involvement in supplying preventive methods to farmers, and reducing sabotage in the reserve area. The possibility of involving hunters in wild boar count and monitoring in fall 2010 was discussed and at present, the involvement of hunters in wild boar management is a work in progress.

Next steps

In December 2010 the plan that currently regulates wild boar management in the Regional Natural Reserve Nazzano-Tevere-Farfa will expire and a new one will be designed by park authorities for 2011–2015. Consequently, more meetings with interest groups are envisioned in 2011 to proactively involve

local residents in wild boar management in the reserve. Transparency about future wild boar management strategies will be increased by constantly sharing information with local communities.

Furthermore, local people will be invited to take part in the review of the new management plan and better communication strategies will be planned by developing new educational campaigns and workshops. Also, a more proactive involvement of local hunters is envisioned in regard to wild boar monitoring and preventive methods. How to involve hunters while estimating the current population of wild boar in the area and while applying preventive methods will be discussed and planned. With the support of local communities and interest groups on how to manage this controversial species in the reserve, managers will lower existing conflict and consequently manage wild boar more effectively.

Only by listening and taking into account public opinions will managers be able to make better decisions and solve wildlife–human challenges such as wild boar management (Bath and Enck, 2003). We really do not manage wild boar—we manage people (Woodroffe et. al., 2005). People decide whether they want more or fewer animals, can tolerate more or less damage, and whether they can be comfortable with coexisting with wild boar. Effective wildlife management is not only managing a species, but also listening to people and working with them to achieve successful wildlife conservation and management. Conflicts should be not measured only in ecological terms but also in terms of people’s values and their tolerance toward wildlife.

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9. Urban Ungulate Conflict Analysis

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The full report *British Columbia Urban Ungulate Conflict Analysis* can be found on the BC Ministry of Environment website at:

http://www.env.gov.bc.ca/cos/info/wildlife_human_interaction/UrbanUngulatesConflictAnalysisFINALJuly5-2010.pdf

A shorter, summary report, *British Columbia Urban Ungulate Conflict Analysis Summary Report for Municipalities*, prepared for municipal councils, can be found at:

http://www.env.gov.bc.ca/cos/info/wildlife_human_interaction/UrbanUngulatesSummaryReportFINALJune21-2010.pdf

Deer, moose, elk, and bighorn sheep have a widespread distribution across British Columbia, providing significant public recreational opportunities and aesthetic enjoyment to BC residents. However, excellent habitat in residential areas and protection from hunters and predators has encouraged some ungulate populations to become urban dwellers. Increasing numbers of ungulates (primarily deer) living in urban areas has led to increased conflict with the human residents of those areas.

Consequences of overabundance

Conflicts between urban ungulates and municipal residents include damage to gardens and landscaping, high rates of ungulate–vehicle collisions, aggressive behaviour towards humans, and potential transmission of disease from ungulates to humans and livestock.

Attractants

The increases in urban ungulate populations (primarily deer) are a predictable consequence of human actions within municipalities. People have established greenways and parks, planted gardens and trees, eliminated natural predators, leashed and controlled their dogs, enacted municipal bylaws to prohibit the discharge of firearms, and deliberately fed the wildlife. The resulting habitat and protection that people have provided have enabled ungulate populations to not only survive, but thrive.

Management challenges

Urban ungulate populations are challenging to manage for biological, jurisdictional, and social reasons. Deer are very adaptable to human-altered environments, and thrive in urban areas. The overlapping roles and responsibilities of the municipal and provincial governments complicate management decisions. Further, the wide range of public opinion on the most appropriate management interventions presents a huge challenge, as the diversity of often opposing opinions makes for a controversial management project.

Canadian and USA overview

	Species of Concern	Public Involvement?	Concerns	Action taken	Results
Ottawa, Ontario	White-tailed deer	Yes: deer management committee formed	<ul style="list-style-type: none"> • Damage to natural ecosystems • Deer–vehicle collisions (dvcs) 	2006: Public awareness campaign to reduce deer–vehicle collisions	Deer–vehicle collisions reduced by ~25%
Winnipeg, Manitoba	White-tailed deer	Unknown. Lots of volunteer assistance with the project	<ul style="list-style-type: none"> • Damage to gardens and plantings • Deer–vehicle collisions 	1985: Capture and relocate 283 does	Damage complaints reduced considerably for the next 10–12 years. Action required now.
Magrath, Alberta	White-tailed deer	Yes: public meetings held	Damage to gardens and plantings	2003: Controlled hunt right up to municipal limits. Removed 164 antlerless deer.	Damage complaints and dvcs reduced considerably for the next 6 years. Action required soon.
Sidney Island, BC	Fallow deer (not native to BC)	Yes: deer management committee formed	Damage to natural ecosystems	2009: Capture and euthanize 848 deer; process for venison	Project successful, but population still above targets
Helena, Montana	Mule deer	Yes: deer management committee formed	<ul style="list-style-type: none"> • Aggression towards humans • Damage to gardens and plantings 	2008–09: Capture & euthanize 200 deer; process for venison	Project ongoing in 2010, but population still above targets. Complaints reduced.

Table 1: Overview of urban ungulate management in USA and Canada

British Columbia overview

In BC, although moose and bighorn sheep cause occasional seasonal management issues, deer are the major urban ungulate management challenge. The municipalities with the greatest challenges are Princeton, Kimberley, and Grand Forks. Princeton and Kimberley have resident populations of mule deer and aggressive incidents are becoming more frequent. Grand Forks has white-tailed deer, but few aggressive incidents have been noted to date. Meetings have been held with municipal governments in all three communities, and Kimberley has implemented a bylaw prohibiting deer feeding. Kimberley and Cranbrook have initiated resident surveys, and formed deer management committees.

Management options

Urban ungulate management strategies should be focused on the reduction of conflicts and management of populations to an acceptable level, not the complete elimination of the conflict or herd. A comprehensive and integrated plan that incorporates aspects of many options is required to achieve the project objectives. Short term strategies may provide relief from symptoms, while long term plans address population levels. Provincial and community resources plus property owner cooperation are needed to achieve measurable results.

Management options fall into four categories: conflict reduction, population reduction, fertility control, and administrative options.

1. Conflict reduction. Conflict reduction options keep ungulates away from susceptible properties, minimize the damage that is sustained if animals do enter property, and reduce ungulate–human conflict. Landscape design, careful plant selection, taking preventative measures early before patterns of behaviour are established, and using repellents and scaring devices can reduce, but not eliminate, ungulate damage. Fencing is the only viable option when damage cannot be tolerated.

2. Population reduction. Population reduction programs are ongoing activities, with an initial reduction phase, when a significant proportion of the population is removed at one time, and a maintenance phase, occurring after ungulate densities are reduced and when fewer individuals are removed. Community specific management decisions have to factor in the number of animals to be removed and at what intervals, the potential for increased

reproductive productivity, and possible increased immigration due to less competition for habitat and resources. Capture and relocation of deer has not often been implemented across Canada and the United States due to concerns about animal mortality post-release, however, in localized areas, and under special circumstances, it may be appropriate. Sharpshooting, capture and euthanization, and controlled public hunting have all been used in the United States to reduce ungulate populations.



Figure 1: Fertility control is an issue. Photo courtesy of A. Bowen, Saanich.

3. Fertility control. Fertility control options are extremely limited because no fertility control drugs are approved for general use in ungulate populations in Canada, and only one drug is approved for use in the United States. Immunocontraceptive vaccines are the most promising fertility control method and have been approved for experimental research purposes. Ongoing, long-term research reporting on the efficacy of these drugs to reduce populations and maintain them at low enough levels to keep ungulate damage at acceptable levels is just starting to emerge. For the near future, most researchers suggest that populations be lowered using lethal control, and then, when proven practical, population levels can be maintained using fertility control.

4. Administrative options. Administrative options such as amending municipal bylaws and provincial regulations to permit lethal control options need to be implemented, and public education and formal project monitoring need to be ongoing before, during, and after any management interventions.

Management implications

When complaints caused by overabundant ungulates are increasing in numbers and severity, then conflict reduction options such as fencing, repellents, and aversive conditioning will not significantly reduce the numbers of complaints. Population reduction is needed to reduce the damage caused by overabundant ungulates. Once the population numbers are lowered, then damage is easier to manage with conflict reduction techniques. The method of population reduction and how often it needs to be carried out is dependent on the site specific circumstances in each community.

Human dimensions

In wildlife management, human dimensions refer to the study and understanding of the human considerations that may be involved in wildlife management decisions (Adams *et al.* 2006). Human dimensions information is important in managing urban wildlife because it helps to anticipate issues, makes management decisions more defensible, provides a scientific basis for action, demonstrates the agency is trying to be responsive to public concerns and is cost effective compared to after-the-fact results. Some considerations are:

- people's personal experience with animals;
- human health and safety;
- animal health and safety, including disease, injury, animal suffering, and animal rights;
- treatment effectiveness;
- duration of any implemented treatment;
- inconvenience to residents;
- cost, including personal costs, taxes, time to learn about wildlife management;
- legality of treatment options; and,
- humaneness of treatment options.

Deer management committees

In general, community based, co-management processes are usually perceived to be more appropriate, efficient, and equitable than traditional authoritative wildlife management approaches. Although these processes may take more

time, they may result in greater stakeholder investment in and satisfaction with deer management (DeNicola *et al.* 2000).

Successful committees need to have:

- relevant stakeholder representation;
- an external trained facilitator;
- accurate and complete biological data;
- a survey of community attitudes; and
- technical support from wildlife management agencies.

Responsibilities of a committee usually include:

- setting goals and objectives;
- reviewing pertinent biology;
- examining management options;
- selecting appropriate management techniques that are biologically feasible and socially acceptable;
- identifying funding sources and staff sources;
- coordinating dissemination of information and results to the community and media;
- evaluating results; and,
- revising goals and objectives as needed, as part of an adaptive management program.

Stakeholders

Stakeholders are individuals or groups that have legal standing, political influence, sufficient moral claims connected to the situation, or power to block implementation of a decision (Adams *et al.* 2006). There are four major categories of stakeholders: government, non-governmental organizations, members of the academic community, and the general public. Traditional stakeholders tend to have shared management goals. Urban residents may have conflicting goals—one resident may wish to reduce deer–vehicle collisions, and another may wish to enhance deer viewing opportunities.

Conover (2002) describes more specific categories of stakeholders, and notes that each stakeholder group will have its own wildlife acceptance capacity (the wildlife species population level that is acceptable to a specific group of stakeholders). These categories are: farmers, ranchers, private landowners;

hunters and trappers; wildlife enthusiasts; animal welfare activists; animal rights activists; metropolitan residents; and rural residents.

Resident surveys

There are many reasons why a survey of public opinion may be conducted. A survey may be held prior to any management option implementation to provide a benchmark level of damage, and then the same survey may be conducted at intervals after treatment to determine the effectiveness of the interventions at reducing damage levels. Alternately, a survey may be held to assess the views of the public about the acceptability of management options to be undertaken or the amount of funding or effort that they wish expended upon ungulate management. A survey provides a quantitative tool to aid in decision-making.

Appropriate topics for a residents' survey on urban deer include questions about residents concerns, deer aggression, deer damage, deer feeding, deer–vehicle collisions, management options, and management considerations.

How is project success determined?

In an analysis of 6 communities undertaking collaborative, community-based deer management, Raik *et al.* (2004) summarized the criteria that stakeholders used to assess both the success of the collaborative decision-making processes and the community-based deer management programs that were implemented (Table 2). These criteria can be used to measure the success of any generalized urban ungulate management project.

Table 2. Criteria used by stakeholders to judge the success of community based, collaborative decision-making processes and the resulting deer management plans (Excerpted from Raik *et al.* 2004)

Process	Environmental outcome	Socio-economic outcome	Impact outcome	Management performance
Peaceful, collaborative process	Improved deer herd health	Increased hunting opportunities	Decrease in vehicle collisions	No complaints about the hunting program
Public input into decisions	Improved forest regeneration	Positive public reaction to the program	Decrease in property damage	Wildlife agency says deer population is under control
Assimilation of all interests in the decision	Decreased predator population	Good communication between public and elected officials	Decrease in shrub damage	Increase in deer harvest
Diverse representation on committee	Decreased deer population		Decrease in crop damage	Safe and effective hunting program
Fair stakeholder involvement	Vegetation is protected	Decrease in controversy about the issue	Decrease in aggressive deer encounters	Genuine attempt to implement non-lethal options
Divisive controversy avoided	Decrease in road side deer carcasses		Decrease in complaints from the public	Successful implementation of an adaptive management plan
Decision is a compromise				Plan based on scientific fact
				Balance between safety and environment

Conclusions

The successful resolution of urban deer challenges involves cooperation and partnership between the municipal government, the provincial government, and community residents. Municipalities will need to introduce bylaws to discourage feeding, and empower community-based deer management committees to prepare a deer management plans. Deer management committees can implement education initiatives to reduce deer–human conflict, specify community-acceptable objectives, and identify community-acceptable tools to address the problem. Public consultation on management objectives and strategies will assist in determining the appropriate actions to be taken. Management strategies, focused on conflict reduction and effective management practices, need to be implemented, and post-treatment monitoring must be in place to measure mitigation outcomes. The provincial government can manage deer populations around communities, increase forage outside of communities through ecosystem restoration, encourage communities and citizens to prevent deer–human conflicts, educate the public about the negative consequences of wildlife feeding, destroy aggressive deer, and facilitate urban deer population reduction when supported by community deer management plans.

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10. Incorporating Structured Decision Making into wildlife management

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Wildlife management in North America has undergone a significant paradigm shift over the last twenty years. Traditionally, wildlife management was focused primarily on the analysis and insights from the biological sciences and expert opinion to make decisions. More recently, increased stakeholder interest in wildlife and their expectations for direct participation in management decisions have necessitated integration of traditional wildlife management practices with the human dimensions of wildlife. One of the ways we are attempting to make complementary use of biological and social science for wildlife management in British Columbia is through Structured Decision Making.

What is SDM?

Structured Decision Making (SDM) is a common-sense framework that formalizes the steps of good decision-making, emphasizing the integration of scientific, socioeconomic, and other technical analysis with value-based information. It also recognizes that “hard decisions” require trade-offs, and that decisions need to be communicated in a transparent and thoughtful manner. The SDM framework has proven to be a useful tool for integrating biological assessments with stakeholder values and interests, and thereby improve wildlife management decisions in BC.

There are six steps to the SDM process as outlined below:

1. Define the problem and the issues (also called framing the decision context).
2. Define objectives (sometimes called end points) and evaluation criteria (sometimes called performance measures).
3. Develop alternatives or options.
4. Estimate the consequences. These are the social, economic, and environmental or biological consequences of each option as measured against the objectives and evaluation criteria.

5. Evaluate the trade-offs and select an option.
6. Implement the option, monitor, and re-evaluate (the “adaptive management cycle”).

In SDM, “objectives” are endpoints or interests, i.e. things people care about. Objectives are not targets (which are largely value judgments).

SDM outlines clear roles and responsibilities for the analyst (e.g., the scientist, economist, and policy specialist), the decision maker, and stakeholders, as outlined below:

1. The decision maker needs to approve the decision context, and approve the objectives, evaluation criteria, and alternatives before the analyses begin. The decision maker also has the responsibility for assessing the trade-offs and making the final decision.
2. Stakeholders help clarify the problem by providing their perspective, but most importantly, they provide value-based input into the evaluation criteria and alternatives. They also state their preferences for options and trade-offs based on their values.
3. The analyst’s job is to explain the key technical issues to both the decision maker and stakeholders, and to provide technical input. Their primary role is the objective analysis of the consequences associated with each management option, typically shown in the Consequence Table.

Consequence tables have proven to be a very effective communication tool for SDM. The consequence table is a table where the objectives are listed in the first column, along with the evaluation criteria in the second column, and the options or alternatives are listed in the remaining columns. The following example is for a hypothetical moose population with different expectations for harvest.

End Points (Objectives)	Evaluation Criteria (Performance Measures)	What's Better	Alt A Low Harvest	Alt B High Harvest	Alt C High & increase KCC	Alt D High & increase inventory
Conservation	Average expected abundance	Higher	10,000	8,000	9,000	8,000
	Probability of falling below B/C threshold	Lower	10%	40%	40%	5%
First Nation Needs	First Nation's sustenance harvest		500	500	500	500
Socio-economic costs/benefits	Average annual hunter harvest	Higher	500	800	800	800
	Probability of hunting moratorium	Lower	5%	20%	20%	3%
	License Fees	Lower	\$45	\$45	\$100	\$100
Management Costs	Program Costs	Lower	\$50K	\$50K	\$225K	\$200K

Note: KCC refers to habitat carrying capacity

As some consequence tables can be quite complex, it is a good idea to simply the table, in order to expose the key trade-offs that need to be made for a decision. A number of techniques can be used to simplify the consequence table, such as looking for redundancy, sensitivity, and dominance. This helps to expose and focus the discussion on the key trade-offs that need to be made.

Case studies

A. Hunting stakeholder committee meetings

Experience with SDM really began with our traditional hunting stakeholder groups. In the past these meetings have been very challenging as various

stakeholder groups have brought forward competing interests for the use of wildlife, which we really had no way to adequately resolve. SDM was used as a way to enable us to accommodate these multiple competing objectives in the decision process.

Our first experience was with moose management in Cariboo Region. Typically, the regional manager will deal with a number of guide outfitter appeals each year, as a result of the decisions that come out of these meetings. We held two meetings that year to work through a SDM process for moose regulation setting. While not everyone was happy with the outcome, they did feel that their values and interests had been considered, and we had no appeals. Given the success in the Cariboo Region, we applied SDM to mule deer management in the Peace sub-region. This brought in another stakeholder group—the agriculture community—who had very strong concerns about crop depredation by deer. We held three meetings, used a facilitator, and again we had a positive outcome. We continue to use the SDM process for many of these meetings, and while the meetings continue to be a challenge, stakeholders are generally more accepting of the outcomes when they feel that have actively been involved in the decision-making process.

B. Kootenay Elk Management Plan

The Kootenay Elk Management Plan (download at: <http://www.env.gov.bc.ca/kootenay/emp/emp.htm>) is an example where SDM was used to develop management direction statements over a five year period. Ministry of Environment staff in the Kootenay Region, in consultation with First Nations, stakeholder groups, staff from other ministries, and the general public used SDM to assess and make recommendations for elk management in seven population management units. Consequence tables were developed for each population management unit. There were six objectives focused on population management, hunting and viewing opportunities, management and enforcement, ecosystem health, and agriculture. A total of 22 evaluation criteria were developed and five management options were analyzed. After considerable debate, this plan was supported by all stakeholders and it has reduced the controversy around elk management in the Kootenay Region.

C. Big game harvest management procedures

Last, but not least, we have put SDM language and process directly into our “big game harvest management procedure” which stipulates the use of SDM, consequence tables, consultation guidelines, and a process for conducting a

trade-off analysis. Further information on this procedure is available from Gerard Hales in Victoria (gerad.hales@gov.bc.ca).

Lessons learned

While we have had some bumps along the road while using SDM, most often this has occurred when we have tried to hurry the process with stakeholders. Some key lessons learned regarding stakeholder acceptance and support of SDM include:

1. Involve stakeholders early enough to provide critical input on decision framing.
2. Involve stakeholders often enough to ensure that the process appears and is transparent.
3. Involve stakeholders actively enough so that they provide useful input to objectives, evaluation criteria, and alternatives.
4. Have stakeholders state their preferences for the trade-offs that will be made in a decision.

Learning more about SDM

Additional information on using SDM is available at this website: <http://www.structureddecisionmaking.org> developed by Compass Resource Management, a team of research and consulting professionals dedicated to improving both the quality of policy and management decisions and the decision-making capacity of citizens, organizations, and governments.

One of the great tools that Compass has developed is ViSTA, which stands for “Values in Stakeholder Trade-off Analysis.” ViSTA is a spreadsheet-based tool that assists the implementation of a multi-attribute trade-off analysis approach in decision-making. ViSTA is copyright of Compass Resource Management and BC Hydro. While the BC Ministry of Environment cannot distribute ViSTA, Compass will grant permission to use ViSTA to any party on a not-for-profit basis.

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11. Assessing public preferences using trade-off analysis to inform and support natural resource policy and management

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Increasingly, natural resource management in British Columbia must address multiple values (e.g., ecological, social, and economic) to be considered “sustainable”. A critical component in addressing and understanding social values (as well as public preferences for ecological and economic conditions) is public participation. There is broad recognition that involving stakeholders and the public in the decision-making process can yield benefits for managers, including a social license based on public priorities.

Although appropriate for understanding some management issues, the use of interval scales, such as Likert Scales, to gauge the degree of agreement, importance, or acceptability of an action or an outcome may not discern whether an action or outcome is preferred, or is a priority, as there is no interaction between the actions or outcomes being asked about. For example when presented with a list of actions or outcomes to be realized, it is not uncommon for respondents to indicate that everything is important/agreeable/acceptable everywhere, all of the time. This does not necessarily provide useful information to natural resource managers, who often must choose one action or outcome over another based on the allocation of limited resources.

One means of identification of priorities is to engage in trade-off analysis. In the context of natural resource management, trade-off analysis assumes that management outcomes are distinct and that one outcome may be preferred, or identified as a priority, over another. Thus, engaging in trade-off analysis entails choosing one outcome over another. There are different ways of eliciting people’s preferences for natural resource management outcomes, including:

1. Discrete statements that describe one outcome as being preferred over another and ask about the level of agreement with that preference (e.g.,

- you would be prepared to accept some visual change in views from your community if it reduced ecological impacts in the backcountry);
2. Eliciting a threshold of how much of something can be gained or lost in order to achieve an outcome (e.g., how many forestry jobs would you be willing to lose in your community to ensure that the economic well-being of future generations is the same as it is today);
 3. Ranking a set of actions or outcomes in terms of what is preferred; and,
 4. A choice experiment, which is a sophisticated approach to eliciting trade-offs (or preferred actions or outcomes) that are based on statistical models derived from random utility theory (Hunt, 2005), which permits an examination of the interactions between multiple variables.

Another approach for addressing trade-offs is Thurstone's Law of Comparative Judgment. With this approach, respondents make repeated comparative judgments about preferences for outcomes. This approach permits the construction of a univariate interval scale, conducive to statistical analysis, to identify the priority rankings of different natural resource values, as well as the relative importance of each forest value.

The Thurstone Case V scaling procedure asks respondents to consider a series of paired trade-offs among different items (e.g., values, outcomes). The items are arranged in pairs, such that each item is compared against the other item. The order of the paired statements should be randomized to avoid bias. For each pair, respondents indicate which item they think is a higher priority. This method of inquiry is based on the standard approach developed by Thurstone (1959) in which respondents make repeated comparative judgments about preferences for outcomes (Green & Tull, 1978). This approach permits the construction of a univariate interval scale (that is conducive to statistical analysis) to identify the priority rankings of, for example, forest values, as well as the relative importance of each forest value. The results of separate Thurstone Scales can be compared (e.g., comparing the priorities of two different places, or comparing the priorities of one community at two or more different times) to examine whether Scale items are prioritized in a similar manner. This can be done by calculating the proportions of times that each attribute was selected over the others; z-scores corresponding to the proportions are assigned to each attribute. Ranking scales are created showing the differences from each of the attributes' standardized means scores. Thurstone scales show not only the rank of the attributes, but the cumulative distances between them. Thus, it serves as an effective and straightforward visual tool for conveying how respondents within each community value or

prioritize the attributes of, for example, sustainable forest management and how the distances between the attributes vary. For a more detailed description and formulation of the technique and its applications, see Green (1974), Green and Tull (1978), and Malhotra (1986).

Prior to constructing Thurstone Scales, the internal consistency should be assessed (Torgerson, 1958; Thurstone, 1959). The average absolute differences between derived and observed proportions is computed for each attribute, summed, and divided by the number of attributes to obtain a grand average known as the overall discrepancy of the analyses (see Torgerson 1958 and Thurstone 1959 for a complete description of this methodology). Average discrepancy values of up to 7–8% are generally considered acceptable (Thurstone 1959). Thurstone's Case V procedure also allows for confidence intervals to be constructed around the scaled attributes, and thus, inferential statistical techniques can readily be applied to the values observed in multiple locations or time periods.

The following example illustrates how public priorities can be elicited and used to inform natural resource management and policy using results. This question (Figure 1) from the BC Sustainable Forest Management Public Opinion Survey (n = 1,795) asked respondents to consider a series of paired trade-offs among six factors from the BC Conservation Framework that are used to prioritize the protection and recovery of species at risk in British Columbia.

Q9**This question asks about what is important to consider in the protection of *species at risk*.**

There are several things that can help to identify which species should be priorities for protection. The following list of factors that are considered in the protection of species at risk has been arranged in pairs. For each pair, check the box beside the factor that you think should have a higher priority for identifying what species should be protected. For example, if you think that animals that eat plants are a higher priority than animals that eat other animals, you would check the box on the left:

Animals that eat plants. ☒ ☐ Animals that eat other animals.

The likelihood of the species being protected.	<input type="checkbox"/>	<input type="checkbox"/>	Cultural and traditional importance.
Species at risk in BC but common elsewhere.	<input type="checkbox"/>	<input type="checkbox"/>	Species only or mainly occurring in BC.
Species only or mainly occurring in BC.	<input type="checkbox"/>	<input type="checkbox"/>	The likelihood of the species being protected.
Cultural and traditional importance.	<input type="checkbox"/>	<input type="checkbox"/>	Species only or mainly occurring in BC.
The likelihood of the species being protected.	<input type="checkbox"/>	<input type="checkbox"/>	Common species whose numbers are in rapid decline.
Common species whose numbers are in rapid decline.	<input type="checkbox"/>	<input type="checkbox"/>	Cultural and traditional importance.
The costs associated with protecting the species.	<input type="checkbox"/>	<input type="checkbox"/>	The likelihood of the species being protected.
Common species whose numbers are in rapid decline.	<input type="checkbox"/>	<input type="checkbox"/>	Species only or mainly occurring in BC.
Species at risk in BC but common elsewhere.	<input type="checkbox"/>	<input type="checkbox"/>	Common species whose numbers are in rapid decline.
The costs associated with protecting the species.	<input type="checkbox"/>	<input type="checkbox"/>	Species at risk in BC but common elsewhere.
Species at risk in BC but common elsewhere.	<input type="checkbox"/>	<input type="checkbox"/>	Cultural and traditional importance.
Cultural and traditional importance.	<input type="checkbox"/>	<input type="checkbox"/>	The costs associated with protecting the species.
The costs associated with protecting the species.	<input type="checkbox"/>	<input type="checkbox"/>	Common species whose numbers are in rapid decline.
The likelihood of the species being protected.	<input type="checkbox"/>	<input type="checkbox"/>	Species at risk in BC but common elsewhere.
Species only or mainly occurring in BC.	<input type="checkbox"/>	<input type="checkbox"/>	The costs associated with protecting the species.

Figure 1. Question from the *British Columbia Species at Risk Public Opinion Survey*: Trade-off question using the Thurstone approach (Harshaw, 2008).

The results of the Thurstone analysis show the following prioritization for species at risk in British Columbia to be protected and recovered (Figure 2):

1. Common species whose numbers are in rapid decline (this was second in the Coastal BC sample region);
2. Species only or mainly occurring in BC (this was first in the Coastal BC sample region);
3. The likelihood of the species being protected;
4. Species at risk in BC but common elsewhere (this was fifth in the Coastal BC sample region);
5. The costs associated with protecting the species (this was fourth in the Coastal BC sample region); and
6. Species of cultural and traditional importance.

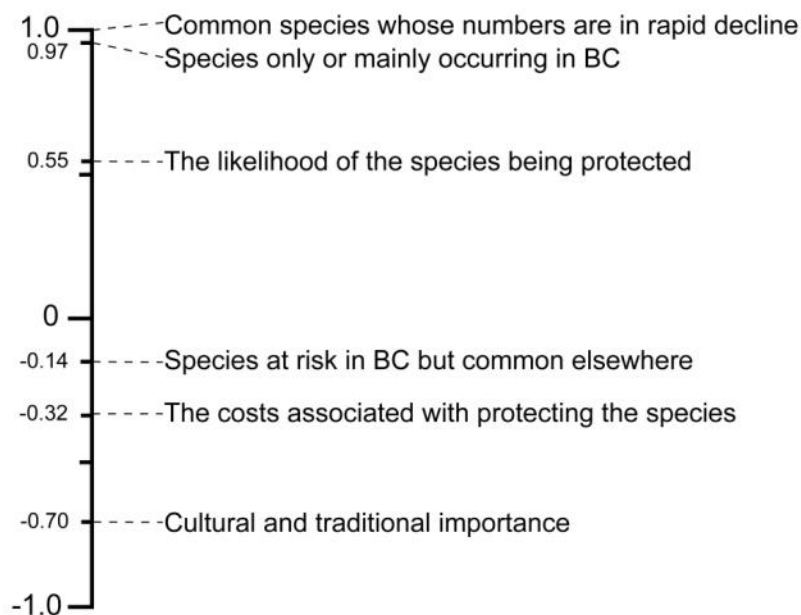


Figure 2. Thurstone Scale results from the *British Columbia Species at risk Public Opinion Survey* (Harshaw, 2008).

As noted above, in addition to creating a ranked list of factors used to prioritize species at risk protection and recovery in BC, the distances between the factors are meaningful in Thurstone scales. In this example, *species at risk in BC but common elsewhere* is twice as important as *the costs associated with protecting the species*, which is roughly twice as important as *cultural and traditional importance* of species. By demonstrating the relative importance of factors used to prioritize species at risk protection and recovery, the Thurstone scale provides information that would not be available using univariate scales on their own.

To conclude, trade-offs are a necessary part of natural resource management, and the public should be aware of this. As the public becomes involved in natural resource decision-making, it is important for them to realize that actions, outcomes, and resource values cannot persist everywhere all of the time. Priorities need to be identified in a rigorous and transparent way. I suggest that Thurstone Scales permit an assessment of the relative importance of different things (e.g., actions, outcomes) in a manner that makes the trade-off decision transparent. Respondents make the trade-offs themselves by identifying their priorities for a series of paired actions and outcomes, and in so doing are faced with some of the challenges facing natural resource

managers and planners. Further analysis suggests that Thurstone Scale results are similar to results from ranking procedures, but have the advantage of indicating the relative degree of priority of different actions and outcomes.

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12. Assessing mechanisms for engagement in access management planning for public lands in southwestern Alberta

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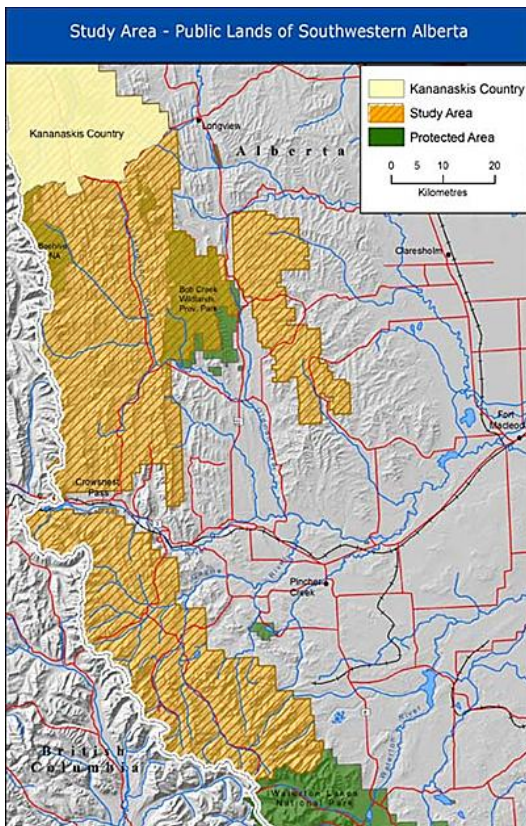
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Rachelle Haddock's presentation was based on her Master's research. You are welcome to contact her directly for a copy of her thesis.



This paper describes efforts to bridge the gap between existing research and proposed recreation access management for an area of public lands located in southwestern Alberta. The results of the research will be relevant to researchers and practitioners with an interest in managing public landscapes facing increased pressure from a diversity of uses. The study area consists of multiple-use provincial public lands wherein a wide range of opportunities for recreational and industrial activities are available (Figure 1).

Figure 1: Map of study area.

Source: Miistakis Institute

The research is important for a number of reasons. During the last two decades, recreational and industrial use in the study area has increased significantly. Along with its ecological effects, increasing use is leading to diminished quality of recreational experiences and interference between users. At present, there is no comprehensive access management plan for the study area.

The region also provides important wildlife habitat and large-scale connectivity for wildlife moving up and down the Eastern Slopes of the Rockies, including the grizzly bear which was recently listed as threatened in Alberta. Finally, the Government of Alberta is currently pursuing a new approach to land-use in Alberta through the Land-use Framework. The outcomes of this research project could inform the Land-use Framework's regional planning approach to land-use planning both from an access management planning and public consultation perspective. Public consultation literature suggests that information, consultation, and active public participation provide government with a better basis for policy-making, while also ensuring more effective implementation, because citizens are well informed about the policies and have taken part in their development.

The research methods included both focus groups and an online survey. Three focus groups were used to get a sense of: recreation users' views towards what is currently happening on the landscape within the study area; their views toward potential access management; and if and how they would like be involved in the access management planning process through public consultation.

Based upon the information generated by the focus groups, and in consultation with other researchers, an online survey was created. The internet-based survey was used to examine three primary areas:

1. How recreation users perceive recreation access management issues;
2. The values and attitudes of users towards those issues; and
3. The acceptability and desirability of different public consultation processes to assist with recreation access management planning.

Snowball sampling was used to generate a purposive sample. Nine hundred and forty-five people responded to the survey. Respondents were categorized into several different groupings for analysis, including: age, membership to an

organized recreation use group, user type (motorized vs. non-motorized recreation users), gender, length of time spent recreating in the area (tenure), and place of residence (large city vs. other communities).

Access management

When respondents were asked if and how their recreation experience quality had changed since they began recreating in the study area, over half of respondents indicated that their experience had decreased or declined in quality, while only 15% indicated that it had increased or improved. This result could indicate that a majority of respondents would be willing to engage in access management planning in order to seek improvements in their quality of recreation experience.

Respondents were asked to select their level of agreement, using a seven point Likert scale from “strongly disagree” to “strongly agree” for 14 questions related to 1) what is currently happening on the landscape, and 2) proposed access management. The survey results from these questions indicated that respondents were strongly divided in their opinions regarding:

- Should public lands be open for all types of recreation uses?
- Do recreation users demonstrate responsible use?
- Are there are enough rules, regulations and fines?
- Is the current level of impacts from recreation acceptable?

These results indicate areas where there is no common ground between recreation users, or where opinions are polarized. These are subject areas that should not be targeted in the early stages of access management planning.

The majority of respondents agreed on some level that:

- There is not enough enforcement;
- The current level of impacts from industrial activities is not acceptable;
- It is important to maintain recreation opportunities for future generations;
- User education is critical; and
- There is a need for access management planning.

These are areas of common ground or shared views between respondents, and are of critical importance in bringing people into an access management process and achieving early successes in that process.

Quantitative analysis through factor analysis and multiple analysis of variance indicated significant differences in opinions about what is currently happening on the landscape and the need for access management within all variables except place of residence (large cities [Calgary & Edmonton] vs. other communities). This means that there was no significant difference between respondents from Calgary and Edmonton and those from other communities with regard to how they perceive the current situation on the landscape, and their views towards access management. This is an interesting finding because some focus group participants had the strong perception that “city folks” are different from rural recreation users in how they value and treat the landscape.

For the remaining variables, there were statistically significant differences between variable groupings in opinions about what is currently happening on the landscape, and the need for access management. To use the gender variable as an example, men expressed higher levels of agreement that the current situation on the landscape was acceptable and lower levels of agreement regarding the need for access management. Women expressed the opposite, with lower levels of agreement that the current situation on the landscape was acceptable and higher levels of agreement regarding the need for access management. These differences are important for considering how to engage different types of users in an access management planning process.

Public consultation

Meeting with decision-makers ranked highly for desired forms of public consultation. Four out of five of the most favoured types of public consultation involved interacting with people—meeting with decision-makers, meeting with decision-makers on the land, public meetings, and open houses. With regard to feedback following public consultation, respondents expressed high levels of desirability for feedback following public consultation via email.

Non-parametric tests indicated there were no significant differences in preference for type of public consultation between genders; however significant differences in preferences for types of public consultation existed within all other variables. This means that there were no significant differences between men and women regarding how they want to be involved in public consultation. For example, there were no differences between men and women regarding whether they wished to fill out an online survey, attend an open house, or write a letter, to name but a few types of public

consultation. However, there were significant differences within all of the other variables on how respondents wish to be involved in public consultation. For example, respondents who are 18–29 years old expressed a significantly higher desirability for completing an online survey compared to those who are over 60 years old. As a result of this research, mechanisms for engagement could be designed with the opinions and public consultation preferences of these groups in mind.

Recommendations

The analysis indicates that different types of users find different types of public consultation more desirable. Therefore, use a variety of public consultation techniques to engage different types of users, including opportunities for recreation users to meet with decision-makers, especially on the landscape.

The following recommendations are couched within the results of the focus groups and online survey, literature review, access management planning cases, and speaking with informants:

- Use a collaborative management approach for access management planning. Collaborative management involves pooling resources and appreciations between two or more stakeholders to achieve something that neither can achieve individually (Gray 1989). This would result in a marked departure from the provincial government's recent use of Forest Land Use Zones to impose access management without any public consultation.
- Use areas of common ground identified through this research, such as the desire to maintain recreation opportunities for future generations, to bring recreation users into the access management planning process. The literature states that enabling users to craft a shared vision for the landscape is critical to the success of the process and the eventual implementation of an access management plan.
- Use areas of agreement to achieve early successes: address some of the issues that the majority of respondents identified as being important, such as a lack of enforcement of rules and regulations, early in the process to achieve successes and build momentum.

- Honour the role of all stakeholders. All types of recreation users need to be given the opportunity to participate. Involving diverse types of users can be difficult and uncomfortable at times, but it is critical.
- Provide sufficient time and resources for access management planning. This is a key factor identified in the literature and existing successful access management plans.
- Include a strong education component as part of the final product.
- Use an ecosystem-based management approach. Ecosystem management involves managing for ecological integrity based on both scientific and social data through cooperation and partnerships (Grumbine 1997). Such an approach could work to manage the dual concerns of recreational and industrial use effects on public lands.

Summary

In summary, there were high levels of agreement regarding the need for access management planning in the study area across all respondents. Significant differences between recreation users need to be considered and honoured in the access management planning process. The Land-Use Framework presents a significant opportunity to realize access management planning in southwestern Alberta. Finally, access management will need to be a continuous process in order to realize a shared vision for the landscape.

Acknowledgements

Partners: Miistakis Institute, Richard Roberts (The Praxis Group)

Major Funders: Faculty of Environmental Design, Miistakis Institute, Social Sciences and Humanities Research Council (SSHRC), TD Friends of the Environment Foundation

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13. Stories that won't leave my mind: My life as a human ecologist

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Dr. Mike Robinson was our keynote speaker.

Drawing on career experience earned, delivered, and suffered over a thirty year period, Mike Robinson reflected on key lessons about integrating humans into natural resource management. Drawing on his nearly completed memoir, *Stories that won't leave my mind*, he talked of how engineers at Syncrude, trappers at Fort McKay, caribou hunters at Tetlit' Zeh (once called Fort McPherson), Mikhail Gorbachev, Russian Sami reindeer herders, certain BC bureaucrats and the CEO of BP Canada learned how to combine human needs with environmental constraints in the creation of a shared vision of what might just be possible.

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14. Why people help: Motivations and barriers for stewardship volunteering

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This conference presentation was based Veronica's Ph.D. research.
Her dissertation is available at: <https://circle.ubc.ca/handle/2429/21215>

Background

Community-based environmental stewardship organizations are those that perform a wide range of activities that help local natural areas, including education and outreach, planning, advocacy, and monitoring and assessments. However, stewardship groups are distinguished from other types of environmental organizations through a focus on the rehabilitation of habitat and populations for fish and other wildlife. Because of the nature of this work, stewardship activities have alternatively been called “gumboot” (Justice, 2007) or “dirty hands” (e.g., Light, 2002) activities.

Stewardship groups are also volunteer-based, meaning that while some of these groups might have paid staff, most of the people active in the groups are volunteers, or those who contribute “time, resources, energy and/or talent without monetary compensation” (McClintock, 2004). Stewardship groups are heavily reliant on volunteers who perform numerous activities in support of their groups and local natural areas including: clearing brush, planting native trees and shrubs, removal of invasive weeds, litter clean-ups, mapping and inventories, education and outreach, monitoring and assessments, and office and administrative work (e.g. Grese *et al.*, 2000, 265; King and Lynch, 1998, 7; Rosenau and Angelo, 2001, 15). Research across Canada has shown that volunteers were the second most frequently cited factor (after funding) that allows groups to meet their goals (Gardner *et al.*, 2003, 56). In fact, volunteers

are so essential to stewardship groups that many of these groups could not function or would even cease to exist without this unpaid support¹.

Relevance and purpose of this research

Unfortunately, while there is a rich body of literature on volunteer management, this literature seems to largely ignore environmental volunteering. As a result, resources are scarce for those managing volunteers in stewardship groups. Additionally, stewardship volunteer managers are often frustrated when trying to apply suggestions from more “mainstream” volunteering resources to assist recruitment and maintenance of support for environmental organizations². The lack of resources to support volunteer management in stewardship is not just a source of frustration, but also a practical matter, as Canadian stewardship and conservation groups have cited the recruitment and maintenance of volunteer support as their second most pressing challenge (again after funding) (Gardner *et al.*, 2003, 56).

This research helps to address the gap in the volunteering literature by providing information gained firsthand from surveys of volunteers in eleven stewardship groups in Metro Vancouver. The study also supports the work of stewardship groups, as recommendations are made to the groups about volunteer management in an environmental context. Additional recommendations are made to “beyond-group” supporters, like umbrella and governmental organizations, as well as to the volunteers themselves.

Research methodology

Volunteer surveys

The bulk of the data for this study was obtained through surveys of the memberships of eleven stewardship groups based in Metro Vancouver. The surveys were self-administered and made available to participants both on-site at workdays and meetings as well as online through invitation emails sent from the groups’ coordinators. Surveys (which are found in whole in Wahl, 2010) asked questions dealing with a variety of topics, including: participation variables, such as the activities done by the volunteers, activity frequency and enjoyment, group tenure, and volunteering priority; Likert-type ratings of

¹ This idea came out repeatedly in the coordinator interviews that were done during Veronica’s Ph.D. research in response to questions on the role of the volunteers within the groups (see Wahl, 2010).

² This is another idea that arose frequently in the interviews done for Veronica’s dissertation.

volunteer motivations, and of volunteer constraints; and demographic information, like age and gender.

Coordinator interviews

Additional information was obtained through interviews of seven of the groups' coordinators who agreed to participate in the research. The interview schedule (which is also found in Wahl, 2010) asked about various aspects of the groups' functioning, including funding and in-kind support, and current volunteer management practices. Information from the interviews was used mainly to support the interpretation of the survey results and to form the recommendations.

Other sources of information

Informal sources of information came from talking to volunteers and participating in activities at the workdays and/or meetings of the study groups. The researcher's own experiences with environmental organizations also supported the interpretation of the results and the creation of the recommendations.

Analyses

Much of the analyses done in determining factors that might prompt or deter participation in stewardship groups consisted of correlational analyses between the ratings given to the motivational or constraint items on the survey and the participation variables of: group tenure; the frequencies at which people participate in each activity category; the enjoyment ratings given to each activity category; and the priority ratings the respondents gave to their volunteering.

Other data from the survey came from open-ended questions. One of these questions asked people about the "greatest satisfaction or reward" taken from the work. Another asked for suggestions on ways for the groups to show appreciation for the volunteers' efforts. Responses from these questions were coded into discrete themes that captured all of the data without allowing for overlap between themes.

Key findings

Volunteer characteristics

The results from this research indicated that there are few variables that characterize a typical stewardship volunteer. People of all ages, ethnicities,

incomes, and employment backgrounds participate. In fact, there were only two characteristics of note among the respondents to this survey.

The first outstanding characteristic was that the people in the study tended to be highly educated, with most achieving at least a high school education, and just over three quarters achieving at least some post secondary education. This finding is consistent with literature on other environmental volunteers (e.g., Bell, 2003; Bradford and Israel, 2004; Schrock *et al.*, 2000; Tindall, 2002).

Another consistent finding among the characteristics of the volunteers in this study was that people tended to volunteer close to home. Here, people generally stayed within their home municipality to volunteer and travelled less than 10 km to get to their worksites. This finding again corresponded with other research on environmental volunteers (e.g., Donald, 1997; Ryan *et al.*, 2001).

Activities undertaken by stewardship volunteers

Volunteers were asked to list the various activities that they did with their groups, to state how often they did each activity and to give an enjoyment rating from 1 (not at all) to 5 (very much) for each. The activities were then sorted into categories. Overall frequencies and enjoyment ratings were then calculated for each individual for each category. When discussed here, the category names are capitalized in order to differentiate them from general comments about a particular type of task.

The four activity categories that resulted from this question were:

1. Hands-On

- Includes outdoor work that involves direct contact with the environment, for example, plantings and invasive weed removals. Hatchery and salmon enhancement work is included in this category.
- This was the most commonly listed, most frequently done, and most enjoyable of the categories.

2. Administrative

- Generally involves indoor work that supports the functioning of the group, for example, database management and funding applications.
- The second most commonly listed and frequently done of the activity categories, administrative work was also rated as the least enjoyable.

3. Outreach

- Encompasses all activities related to educating, outreach, and spreading the word about environmental issues, the groups' activities, and related topics such as writing newsletters and holding workshops.
- This was the third most commonly listed, frequently done, and enjoyable of the four categories.

4. Other

- Not relating to a specific theme, this category contains all items that do not belong to the other three activity groupings, for example, attending group-held parties, and taking courses to improve one's volunteering skills.
- Because activities in this category do not form a coherent theme, no further analyses were done on it.

Volunteer motivations

One of the key findings of this research is that motivations that are commonly found in the more general volunteering literature (e.g. Clary *et al.* 1998; Clary and Snyder, 1999; Esmond and Dunlop, 2004) were not generally relevant to the stewardship volunteers in the study at hand. Conversely, a set of "Big Four" motivators was developed to reflect four motivational themes that were commonly found among the volunteers in this research, but which are not usually found in the volunteering literature. These "Big Four" motivators are:

- Accomplishment;
- Group solidarity;
- Learning and skills; and
- Personal welfare.

Each is discussed separately below. Another finding of note was that these "Big Four" motivators seemed to be most relevant to the Hands-On volunteering and least important to the Administrative activities.

Accomplishment

The accomplishment motivational theme encompasses ideas of feeling that one is making a difference through one's efforts. This theme was seen in the results of a number of survey questions.

Not surprisingly, motivations relating to feelings of accomplishment were important to participation in Hands-On work, particularly the frequency at

which people do Hands-On volunteering, but also to the enjoyment ratings given to this type of volunteering. Higher ratings for items relating to making a difference were also related to longer group tenure and higher priority ratings for the volunteer work.

The value of “making a difference” was also seen in the open-ended question about the “greatest satisfaction or reward” that people take from their efforts. In this case, items in the “environment” or “helping nature” theme were the most frequently reported responses, where “making a difference” was a common thread in this category. For example “seeing a noticeable change in the park to which I can feel like I’ve accomplished something” (respondent 125).

Group solidarity

This “Big Four” theme relates to ideas of working together as a team to accomplish shared goals, as well as items related to camaraderie and working with like-minded others.

Enjoying a sense of teamwork through volunteering was again important to both the frequency at which people did Hands-On volunteering as well as the enjoyment taken from this type of activity. Teamwork was also related to the frequency at which people undertook administrative work and to the priority ratings people gave to their volunteering.

The social aspects of volunteering made up the second most commonly reported “greatest satisfaction” for the survey respondents. While the social aspects of these responses included aspects of making friends and meeting new people, the dominant theme included group solidarity concepts of working with like-minded others, enjoying being part of a team, and sharing a sense of camaraderie. For example “Spending time in the bog with like-mannered people” (respondent 88) and “connecting with people that have the same goals as you” (respondent 28).

The open-ended question about ways to show volunteer appreciation also illustrated the importance of group solidarity among the volunteers. Here, the respondents listed 35 types of tokens or small gifts. About half (18) of the suggestions were for articles such as T-shirts, buttons, and vests containing the groups’ logos and demonstrating the wearer’s membership within the team.



Figure 1: Group identity through clothing. Photo courtesy of the Evergreen Foundation

Personal welfare

This “Big Four” motivational theme addresses ideas that doing the work leads to good feelings, is fun, recreational, relaxing, and allows for contact with nature and the outdoors.

Motivations relating to personal welfare were of particular importance to the frequency and enjoyment of Hands-On work, as well as to the priority the volunteers gave to their participation.

The good feelings derived from stewardship volunteering also made up the third most commonly coded theme in the “greatest satisfactions” question. Responses in this category reflected the inherent pleasure taken from the work, for example “enjoyment of activity...” (Respondent 71), as well as appreciation of opportunities to be in the worksites, for example “It feels good to be in such a beautiful place” (Respondent 86).

Learning and skills

Of the “Big Four” motivational themes developed in this research, learning and skills was the only one that reflected well with motivations that are suggested in the more general volunteering literature. As the name indicates, the learning and skills theme includes reasons for volunteering that relate to opportunities to learn new things, as well as to use and develop one’s own existing skills.

The enjoyment of “learning new things” was important to the frequency and enjoyment of Hands-On volunteering, as well as to the frequency of participation in outreach activities.

Volunteer constraints

In contrast to the reasons people have for stewardship volunteering, the barriers against this type of volunteering tend to be more consistent with findings from more general volunteering literature. For example, being too busy and not having enough time was rated as the strongest deterrent to participation by the volunteers in this study, a finding reflective of volunteers in other settings (e.g., Braker *et al.*, 2000, 7; Esmond and Dunlop, 2004, 61; Hall *et al.*, 2009, 50; U.S. Bureau of Labor Statistics, 2004, 4).

However, two types of volunteer constraints were found in the study at hand: i) practical considerations, like lack of time and difficulty reaching the worksites and ii) personal considerations, like not feeling appreciated by the group. On analyses, these two types of constraints related to volunteer participation in different ways. Additionally, the role of gender as a constraint came out during the research. These three different types of constraints are discussed in the following three sections.

Practical constraints

In general, people seemed willing to overcome more practical considerations in their volunteering decisions. Although cause and effect relationships cannot be shown with the methodology and analyses used, correlations were found between both higher priority ratings and longer group tenure and lower constraint ratings for many of the more practical constraint items. The more priority people gave to their participation, and/or longer tenure they had with their groups, the lower they tended to score the practical constraint items on the survey. Similarly, higher frequencies of participation in Hands-On activities also correlated with lower scores on the constraint item of “being too busy” to volunteer.

Personal constraints

In contrast to practical considerations, personal constraints seem more likely to have a negative impact on participation, particularly the enjoyment people have for their volunteering (again keeping in mind that cause and effect relationships cannot be shown). For example, lower enjoyment ratings for all three analyzed activity categories— Hands-On, Administrative, and Outreach

activities—were correlated with the constraint item of feeling that “one’s efforts were not making a difference”. This example is especially important as it relates directly to the accomplishment theme of the “Big Four” motivators.

Gender and stewardship volunteering

The role of gender in stewardship volunteer participation was a factor that came out during the research and analyses so it could not, unfortunately, be explored fully in this study. However, it is worth noting a few key gender-related findings that came out of the research.

In this study, analyses showed that being a woman was associated with less frequent participation in Hands-On work. Additionally, comments made to the researcher on the surveys, in the interviews, and during informal discussions often brought out the idea that in some of the groups men got to do the “fun stuff”, like Hands-On activities, and to hold the more powerful positions, like group president, while the women took on or were relegated to a disproportionate share of the less interesting Administrative activities. Although the number of respondents in these groups was too small for appropriate analyses, these findings were reflective of other research done with similar types of environmental organizations (Brasell-Jones, 1998; Curtis *et al.* 1997).

This issue of perceived (and real) gender-related unfairness is an important consideration to those organizing and supporting stewardship groups, as underlying resentments can have negative impacts on the group, both in the short- and long-term.

Recommendations

Recommendations to group coordinators

The recommendations to the group coordinators in gaining and maintaining volunteer support are largely centred on tapping into the “Big Four” motivators. Suggested ways of doing this are:

- Highlight the group’s accomplishments.
 - During workdays point out areas of the park where successful efforts have already been made.
 - Take time at the end of a workday to notice the work that was completed, e.g., appreciate the giant pile of invasive weeds that were removed.

- Update the volunteers on milestones, e.g., number of salmon released that spring, number of trees planted, number of volunteer hours contributed.
- Act as a facilitator during workdays.
 - Coordinator interviews suggested that coordinators feel torn between “working” at workdays and “just talking to the volunteers”.
 - Acting as a facilitator is important work as it fosters the feeling that each volunteer is a welcome member of the team, as well as providing opportunities for people to ask questions and learn new things, discuss and appreciate accomplishments, and to feel included in the fun.
 - More senior members of the group may be willing to take on a facilitator role in supporting the newer volunteers.
- Provide break times, preferably with snacks.
 - Breaks allow the volunteers to get to know one another and feel part of the team, to share success stories and discuss the work being done and the accomplishments being made.
 - Snacks help to show appreciation for the volunteers’ efforts and provide a reason for the volunteers to congregate and interact.
- Keep thank you gestures simple, frequent, and sincere.
 - Tokens, like pins and T-shirts, that allow volunteers to display their membership in the group not only show appreciation, but also reinforce the group solidarity motivation.
- Be aware of group dynamics.
 - Foster an atmosphere where volunteers can raise concerns about the group or the work being done.
 - Be aware of gender roles within the group.
 - Do not mistake ability or willingness for doing a task with enthusiasm for the work.

Recommendations to beyond-group supporters

Backing from beyond-group supporters, such as umbrella groups and governmental agencies, is often vital to community-based stewardship groups. This support was generally appreciated by the group coordinators and volunteers in the study. However, some comments were made on surveys, in the interviews, and informal discussions that led to the formation of recommendations for those who wish to help stewardship groups from beyond the groups’ immediate membership or worksites. These recommendations are:

- Recognize “beyond-project” needs.
 - Many of the participants expressed appreciation for funding and in-kind support received by beyond-group supporters.
 - However, many were also discouraged that the support does not usually allow for related needs to make projects successful. For example, many groups would benefit by having paid staff to manage volunteers, prepare funding reports, and handle group communications. Others lack infrastructure, such as computers, phones, and office space, which would help to organize them and make projects run more efficiently.
- Continue to recognize volunteer expertise.
 - Through spending so much time at the worksites, monitoring, assessing, planting, etc. the volunteers gain a unique perspective on their areas.
 - Many volunteers and coordinators expressed appreciation that their opinions and ideas were sought out for local planning and decision-making processes, even if this input was not fully implemented.
 - Continuing to seek out feedback from the volunteers will foster good relationships with the groups and help maintain volunteer support.
- Continue to support volunteer appreciation efforts.
 - Many of the volunteers noted that they valued expressions of appreciation from beyond-group supporters through gestures like having the group/volunteer highlighted in the larger groups’ newsletters, and being invited to events like thank you banquets held by the larger group.
 - Such thank you gestures not only help volunteers to feel appreciated by others outside their own organizations, but also help to advertise the efforts and accomplishments of the stewardship groups, helping to maintain current volunteer support and potentially bringing in new participants.

Recommendations to stewardship volunteers

- Attend when you can.
 - Discussions with both group coordinators and other volunteers clearly indicated that everyone is welcome. Whether an individual is able to participate once each week or once each year all efforts are appreciated.

- Be honest about the commitment you can make.
 - Although many activities are important to the functioning of a group, know that it is acceptable to say “no” sometimes, or to place limits on the amount of involvement you can have in a project.
 - Taking on more work than you can handle will lead to burn out and lower the overall commitment you would be able to make.
- Give constructive input.
 - During the interviews, the coordinators consistently indicated they would enjoy having feedback in a number of areas ranging from the types of snacks to serve at workdays to which sites should receive priority for the work.
 - Giving polite, constructive feedback is appreciated, even if it cannot always be implemented.

Conclusions

In examining the motivations and barriers people have for stewardship volunteering, this study also revealed the source of frustration that the coordinators in this research had in trying to apply suggestions from the volunteering literature to their groups; that is, stewardship volunteers are exceptional. The reasons people have for this type of volunteering does not correspond well with the reasons that people seem to have for volunteering in other contexts. Rather, stewardship volunteers have a unique set of “Big Four” motivators—accomplishment, group solidarity, personal welfare, and learning and skills. Additionally, while the stewardship volunteers’ constraints to participation had greater overlap with those of volunteers in other settings, personal constraints had more of an impact on the participation of the volunteers in this study than did practical constraints. By drawing on the “Big Four” motivators, and striving to minimize personal barriers to participation, the coordinators may have more success in gaining and maintaining volunteer support for their groups.

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15. As the world burns: Social dilemmas in climate change adaptation for nature

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According to the International Panel on Climate Change and other respected scientists, at this point, no matter how well society manages to reduce the human contribution to climate change by lessening greenhouse gas emissions, the Earth's climate will still change due to the amount of greenhouse gas emissions already in the atmosphere and the lag effect in global climate systems (IPCC 2007a; Weaver et al. 2008). Adapting to this inevitable climate change, and its myriad implications, poses a wicked problem with many, very complex interconnections.

In terms of the social context, polling data in Canada suggests that concern about climate change and global warming peaked in 2006 and dropped off in 2009. Concern is still greater than it was prior to 2003, but the majority of the citizens polled in 2009 had other things (like the economy) as the issue that they were most concerned about (McAllister and Gentles, 2009a).

However, according to research that Dr. Tim McDaniels at the University of British Columbia has been conducting, in North America significant recent progress has been made in climate change adaptation for human communities and infrastructure. Engineers and urban planners already have experience with designing structures with climate in mind and they have access to resources and opportunities to upgrade existing infrastructure. In the Pacific Northwest in particular, actions are resulting based on guidance and sharing of case studies and best practices through conferences, websites, and print material. Here in British Columbia, the Pacific Climate Impacts Consortium (PCIC) (<http://pacificclimate.org>), the Pacific Institute for Climate Solutions (PICS) (<http://www.pics.uvic.ca>), Natural Resources Canada, and the Climate Action Secretariat within the BC Ministry of Environment (<http://www.env.gov.bc.ca/cas>), have assisted local governments and related organizations such as the Columbia Basin Trust and the Union of BC Municipalities prepare for and adapt to a changing climate (McDaniels, 2009).

However, climate change adaptation for nature involves considering both environmental and social systems. From the biological perspective, species adapt to their environment, and if they cannot adapt, or move to an area with conditions more favourable to them, they perish. From a psychological perspective, adaptation refers to human beings adapting their behaviour. Climate change adaptation for is really about how we modify human behaviour in order to help nature adapt to a rapidly changing climate, a climate that is changing partly due to the atmospheric change resulting from greenhouse gas emissions since the industrial revolution. Climate change adaptation is anticipating and reacting to the unavoidable consequences of climate change (IPCC, 2007a).

Dr. Robert Gifford from the University of Victoria's Department of Psychology has developed a model to show how both the human and environmental systems and the interactions among these different facets affect the climate change adaptation for nature issue (Gifford, 2008 and Swim et al 2009 as adapted from IPCC 2007b) (Figure 1).

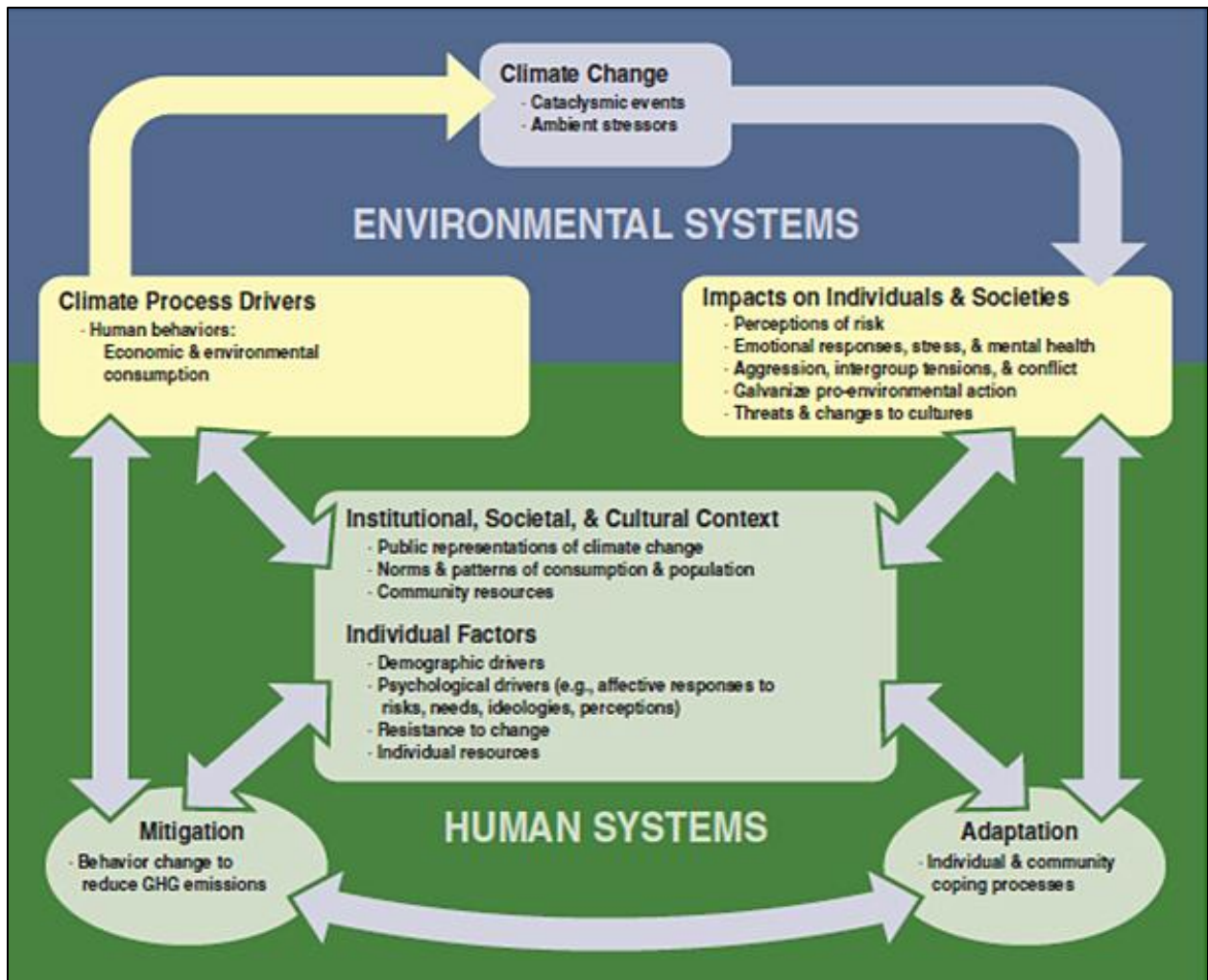


Figure 1: Model of environmental and human systems interactions relevant to climate change adaptation and nature (Swim et al 2009 adapted from IPCC 2007b).

Independently, Dr. Tim McDaniels from the University of British Columbia, compared climate change adaptation in human urban systems with that in complex socio-ecological systems (McDaniels, 2009). His research highlighted that there is little or no knowledge of how complex social-ecological systems will function outside of the known historical climate range. He also found that ecosystems in the Pacific Northwest and elsewhere are already under stress from human activities and that natural resources are often already completely allocated or even over allocated, in the case of water and some fish species. He concludes that the current natural resource management practices are often ill structured in terms of objectives, clear alternatives and understanding of trade-offs, and that there is resistance to changing practices

among natural resource management agencies and their stakeholders, who appear puzzled about how to deal with emerging ecological change at this large scale.

Dr. Tim McDaniels concluded that climate change adaptation is going to be more difficult to manage for large scale socio-ecological systems than it will be for climate change adaptation for urban infrastructure. Human society and economy rely on continuous provision of a huge variety of ecosystem services, many of which are treated as “free goods”, e.g., carbon sequestration, water purification, soil building, pollination. Their availability and quality will change as the climate changes.

Human dimensions that contribute to the stress on natural resources noted by Dr. McDaniels in the Pacific Northwest and specifically British Columbia include the cumulative effects of rapidly changing climate with the following social factors: increasing human population; increasing urbanization; greater consumption of natural resources and manufactured products; and increasing development. Scientists anticipate climate change will result in a wide array of hydrological and ecological change (Glick et al 2009; Inkley et al, 2008; Walker and Sydneysmith, 2008), including:

- Changed hydrological patterns (less snowpack, increased ice crust, droughts, fewer and smaller glaciers, etc.);
- More erosion and melting of permafrost, resulting in loss of soils, more landslides, etc.;
- Loss of soil productivity;
- Reduced, fragmented, and altered habitats, as climatic conditions change;
- Increased disease outbreaks among fish and wildlife populations;
- Mortality of individuals and groups from extreme events (avalanches, floods, windstorms, fires);
- Increased stress on animal and plant health from weather extremes; and
- Changed food availability and quality in both aquatic and terrestrial systems.

There are several ways that nature in British Columbia is expected to respond to a changing climate. Species will respond to climate change in different ways and at different rates (move, adapt behaviour, or perish). The composition of existing habitats will change and transform as species move. The natural migration of many plant and animal species will not keep up with

the rate of climate change, especially if they encounter barriers to movement (e.g., culverts, roads, urban areas).

However, it is not all doom and gloom. Some species will be challenged by the changes; others will seek out and find expanded opportunities. Polar bears have been documented to switch to Snow Geese eggs when they cannot reach their favoured food, normally ringed seals, because of lack of reliable sea ice. However, polar bears need to consume 3,600 eggs per year to equal the energy they previously were able to get from eating 60 seals annually (Hamilton, 2008; Rockwell and Gormezano, 2008; Than, 2010). Very recently, the Galapagos fur seal population moved to islands offshore of Peru because their favourite prey species migrated there in response to ocean temperature changes. This species was protected in the Galapagos Islands, where it is a native species, but is not protected in Peru, where it is not yet listed as one of their wildlife species according to law (Wade, 2010). Examples like these have led more scientists and practitioners to recognize that climate change adaptation for nature requires understanding and consideration of complex socio-ecological systems.

Many difficult social dilemmas arise when natural resource practitioners consider what to do to assist native species and ecosystems adapt to a changing climate. Millar (2010) encourages agencies to use three strategic steps to incorporate climate change adaptation into natural resource management in such a way that it is more likely to conserve nature. These can be applied at any scale—on a particular site, in a sub-region, region, or across the province. Each is fraught with social dilemmas.

1. Review so we understand what the scientific literature and the various climate projection models are telling us, and what other jurisdictions are doing to help nature adapt to climate change. We also need to assess where nature is vulnerable, as well as identify gaps in our laws, policies and other tools that could help conserve nature as climate changes.
2. Evaluate and rank the various options and best practices that could be employed in our province, region, or on a particular site, as well as our capacity to implement them directly or indirectly.
3. We need to resolve the issues by considering climate change effects on nature while making and influencing land and natural resource management decisions, and while applying various adaptation tools, or

promoting and facilitating their application by other organizations. A key tool to help resolve climate change implications is monitoring.

The climate change adaptation literature recommends a number of ways to prepare for and adapt to the forecasted changes. These have been summarized by Hansen (2008), Hansen and Hoffman (2010) of Eco-Adapt (<http://www.ecoadapt.org>) and Glick et al (2009) and Inkley et al (2008) of the US National Wildlife Federation <http://www.nwf.org>. These practices include:

- Adopt principles of adaptation – Climate change adaptation for nature is such a new and emerging field that a principles approach is warranted. Articulating or changing principles affects how an organization does its business.
- Practice adaptive management – It's extremely important to take action, learn from that action, and apply the lessons learned. It's also amazing how scary this concept is for most big organizations.
- Support monitoring – Changes are happening at such a rate and extent that ground-truthing is needed to understand what is taking place, what practices work and which ones don't, etc.
- Facilitate interdisciplinary research – Many disciplines and perspectives are needed to resolve the complex issues that arise when developing ways to prepare for and help fish and wildlife adapt to climate change.
- Structure adaptation decisions – Tough choices will need to be made mindfully and structured decision-making tools can be extremely helpful in laying out which options will be most effective and efficient.
- Conduct outreach and communications – Help is needed to build understanding for this facet of the climate change story, i.e. climate change effects on fish and wildlife and their habitats and what can be done about it.
- Collaborate and form partnerships – Collaboration and innovative partnerships will be needed to support fish and wildlife populations during this dynamic period.
- Integrate and coordinate action – To be efficient and effective, actions need to be coordinated and integrated.

The second strategic action is to rank and choose what approach to take at the various scales (Millar, 2010). Here again, there are social dilemmas in the three choices:

1. Do nothing to prepare for climate change effects on biodiversity;
2. Choose only to react to an extreme event or after major disturbance; or
3. Be proactive by planning and implementing adaptation strategies.

When we are setting priorities for climate change adaptation for nature, we need to think about what will be best in the longer term as well as the immediate future. Our efforts in the short term should be on things that will cause no harm. This is the best time to reconsider our organizational goals and whether they are realistic in light of climate change. Over the long term, we can anticipate surprises. The extent and speed of the mountain pine beetle outbreak in British Columbia surprised many. Bear researchers did not think that polar bears could survive eating Snow Geese eggs, and no one predicted that Galapagos fur seals would move to Peru! Also, by preparing we can do things to ease the transition from the former to the new approach.

Dr. Connie Millar and her colleagues (Millar et al., 2007 and 2008; Millar 2010) recommend taking a tiered approach to setting climate change adaptation priorities, starting with “win-win” actions that reduce the impacts of climate change while providing other benefits (like improving fish passage through culverts, removing alien invasive species), as well as “no regrets” actions that provide important benefits at relatively little additional cost or risk (e.g., protecting riparian areas in parks), and then “piggybacking” climate adaptation into priorities determined by other projects (such as BC’s Conservation Framework, and carbon offsetting programs).

As the magnitude and pace of climate change exerts greater effects on nature, Millar (2010) notes that agencies will have to take a triage approach to help determine whether we take action or not. We may be already approaching having to make these types of decisions with some of our species at risk.

The literature discusses various technical approaches to resolve or take action to prepare for and adapt to climate change. These include practicing the five “R”s of adaptation, as promoted by Dr. Connie Millar of the US Forest Service (Millar et al 2009, 2010). Deciding which of these approaches to take is as much of an ethical question as a technical question. The 5 Rs are as follows:

1. Increase **resistance** to change—the “Homeland Security” approach;
2. Promote **resilience** to change—the “Health Care” approach;

3. Enable ecosystems and resources to **Respond** to change—the “Beginner’s Mind” approach;
4. **Realign** conditions to current and future dynamics—the “Auto-Mechanic” approach; and
5. Establish **refugia**—the “RRSP” approach.

There are several key obstacles related to the human dimension that need to be addressed in order to make progress in climate change adaptation for nature. The behaviour of organizations and individuals can obstruct or advance climate change adaptation for nature in legislation, policy, planning, and practice. Dr. Robert Gifford from the University of Victoria has identified contributions that psychology can make to taking action to address climate change (Gifford, 2008) and teaches a course on the Human Dimensions of Climate Change Adaptation at the University of Victoria (<http://web.uvic.ca/calendar2009/FACS/InPr/HDofCC.html>). He has also been working on a theoretical framework he refers to as “the dragons” (of human behaviour) that are impeding progress in climate change action (Gifford 2009a and b, Gifford 2010; McGillivray, 2009).

Taking action can be intimidating for natural resource practitioners since climate change adaptation challenges the underlying assumptions based on stable climatic regimes. Natural resource management agencies will not be able to use the past to predict what they will see in the future. In this very dynamic period where lots of things will change, it will be increasingly difficult to predict (with any accuracy) population sizes and distributions of fish and wildlife species, much less what constitutes ecological communities. For example, most of the aerial moose surveys could not be completed in the winter of 2009/10 because of weather conditions that were too warm. In these situations, moose, with their heavy winter coats, hide out in heavily wooded area seeking cool conditions, and are thus not visible in aerial surveys. The lack of snow and/or slushy snow conditions also makes it challenging to see moose tracks (Ian Hatter, Manager, Wildlife Management, BC Fish, Wildlife and Habitat Management Branch, Ministry of Natural Resource Operation, pers. Comm., 2010). Inflexible allocation policies based on knowing the exact size and distribution of natural resources, including fish and wildlife species, will not work well in a time of rapid climate change. More and more, it will be increasingly important to focus on the health of habitats, ecosystems and the connections among various ecosystems, so that species can move to areas with suitable conditions if their current habitat becomes compromised.

Knowledge about climate change effects on nature changes so rapidly that questions often arise faster than policy makers can address them. Thus there is the irony that we have the Cohen Commission investigating why we had record low numbers of Fraser River sockeye returning to spawn in 2009 at the same time that we have a record high number of returning sockeye returning to spawn in the fall of 2010 (<http://www.cohencommission.ca/en>). Nevertheless, the consensus within the emerging field of climate change adaptation, in general, including climate change adaptation for nature, is that waiting for perfect technical information is not needed to move forward. Enough natural scientific information exists to start taking action now. What is required relates to better understanding and addressing the human dimensions, both the social and economic.

The field of climate change adaptation for nature is an emerging and quickly evolving field and new articles appear with increasing frequency. Dr. David Inkley, Patty Glick, Dr. Lara Hansen and Dr. Connie Millar and their various colleagues state that an effective way to look at climate change adaptation options and best practices for natural resource management is to take a tool box approach. Just as with someone fixing a structure or mechanical device, there isn't just one tool that will solve every biodiversity conservation situation. We need to think about what options will work best in the long term as well as what we need to do to conserve biodiversity in the short term. We'll need to mix and match the tools we employ. It will be really crucial to be flexible, experimental, and innovative. We will need to take some risks. Most important, we must be willing to learn from what we do, and make course corrections if we see something isn't working. As Dr. Inkley says, "There's no silver bullet; we need silver buckshot to solve this problem" (Inkley, 2008). There are some specific social science techniques that can help us do this.

The BC Ministry of Environment helped to fund social science research carried out by a polling firm commissioned by the Canadian Parks and Wilderness Society (CPAWS) in 2009. CPAWS planned an outreach campaign to educate citizens about the need for climate change adaptation for biodiversity and wanted to ensure that their messages resonated with target audiences who would make a difference. The results of the focus group research in Vancouver and Victoria was surprising to CPAWS and caused them to rethink how they need to communicate about this issue (Chloe O'Loughlin, CPAWS, pers. comm., 2009). The lessons they learned are equally valid for us in the BC government. Most people in the focus groups did not understand the link between carbon and climate or the concept of

carbon accounting, nor did they really care. However, they said that they do care about nature and what happens to BC's natural environment. They also understood the importance of forests in "cleaning" the air, e.g., "trees are the lungs of the Earth", and the concepts of food chains, food webs, and ecosystems (McAllister and Gentles, 2009b).

Natural resource management agencies need the willingness and capacity to take action based on a structured, risk-based decision-making process with robust options for adaptation strategies that perform across a range of plausible climate change scenarios. Based on his decision analysis research at the University of British Columbia, McDaniels (2009) recommends natural resource management agencies and their partners, clients, and stakeholders use judgment-based approaches within structured decision-making processes that are oriented to finding robust alternatives that will build healthy ecosystem resilient to climate change.

Within the Columbia Mountains region, positive examples of collaborative initiatives related to climate change adaptation for nature include: Columbia Mountains Institute of Applied Ecology workshops (<http://www.cmiae.org/Events/past-events.php>) ; the Crown of the Continent's multi-jurisdictional workshops and strategies for climate change adaptation (<http://www.crownmanagers.org>), and the Columbia Basin Trust's Communities Adapting to Climate Change initiative (http://www.cbt.org/Initiatives/Climate_Change/?Adapting_to_Climate_Change). The Yellowstone to Yukon initiative (<http://www.y2y.net>) has also been a leader in considering landscape level trans-boundary approaches to climate change adaptation for nature. In addition, thanks to the leadership of the US Department of the Interior, as well as academic institutions like the University of Montana, and certain environmental non government organizations, specifically the Wildlife Society and the National Wildlife Federation, there is major progress in developing adaptation strategies for trans-boundary species such as grizzly bear and wolverine (Servheen and Cross 2010a and b), and planning on a landscape scale through the Great Northern Landscape Conservation Cooperative (<http://www.nrmssc.usgs.gov/gnlcc>).

In conclusion, information from the social sciences can inform the development of adaptation strategies for nature conservation. Key will be knowledge of how to structure and integrate social and natural science information as part of natural resource management risk assessment and decision-making. Knowledge about how and what people value about nature and what resonates with them affects the success of outreach efforts to

encourage people to take climate action. Psychology can help us better understand individual and organizational behaviour.

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16. People are the problem and the solution: Characterizing wildfire risk and risk mitigation in a wildland–urban intermix area in the southern Gulf Islands.

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Matthew's presentation was based on the following article:

Estimating the consequences of wildfire for wildfire risk assessment, a case study in the southern Gulf Islands, British Columbia, Canada, Can. J. For. Res. 40(11): 2104–2114 (2010), doi:10.1139/X10-159, published by NRC Research Press

Authors: Matthew Tutsch, Wolfgang Haider, Ben Beardmore, Kenneth Lertzman, Andrew B. Cooper, and Robert C. Walker

Abstract

Wildfire risk assessment research has made considerable progress towards estimating the probability of wildfires but comparatively little progress towards estimating the expected consequences of potential fires. One challenge with estimating wildfire consequences has been to identify a common metric that can be applied to consequences measured in different units. In this paper, we use the preferences of representatives of local fire management agencies as the common consequences metric and apply it to a case study in the southern Gulf Islands, British Columbia, Canada. The method uses an expert survey and a maximum-difference conjoint analysis to establish the relative importance of specific fire consequences. A fire with a major potential for loss of life was considered to be about three times worse than major damage to houses and 4.5 times worse than loss of a rare species. Risk ratings were very sensitive to changes in fire consequences ratings. As the complexity of values at risk and number of stakeholders increase, the most efficient allocation of wildfire prevention, protection, and suppression resources becomes increasingly challenging to determine. Thus, as the



complexity of stakeholder representation and values at risk increases, we need to pay increasing attention to quantitative methods for measuring wildfire consequences.

Location of the southern Gulf Islands.

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17. The Elwha River: Large scale dam removals and opportunities for community engagement

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Introduction

As ecological restoration expands as a practice, so does the complexity, cost, and scale of many projects. Higgs (2003) terms these projects technological and argues that they limit meaningful community focal restoration practice (local community engagement), which is one component of good ecological restoration. The planned removals of two large dams on the Elwha River in Washington State provide a case study to illustrate this theory. I conducted 18 in-depth interviews with community leaders and restoration practitioners in order to explore the question, “How do technological restoration projects enable or constrain community engagement, and in the case of the Elwha River, how might such engagement be enlarged?”

In this paper, I show how the case study of the Elwha River in Washington State can illuminate both the challenges and opportunities in engaging local communities in meaningful ways with large restoration projects. I describe how traditional approaches to community engagement—usually in either decision-making or participation in restoration activities—limit the potential of meaningful practices, and argue for a focusing of engagement activities by suggesting an alternative: “engagement in the spaces between.” I offer a set of questions to assess engagement with a restoration project, and argue that community engagement be defined more broadly.

Why engage?

Often in discussions of public engagement with land management issues, engagement is cast as necessary for:

- Garnering public support for an agency’s decisions;
- Directing a particular policy; and,
- Providing capacity that helps the project be completed in situations with limited financial resources.

However, several ecological restoration theorists and practitioners (e.g., Higgs, Martinez, Jordan, House, Cairns Jr.), have argued that engagement in restoration can also contribute not just to the health of the ecosystem being restored and the political success of the project, but to the health of the community engaged. Specifically, engagement in restoration activities can:

- Foster local knowledge and skills;
- Increase the democratization of the landscape; and,
- Create meaning for those engaged.

Higgs argues that, “Restoration must be conceived in a way that makes the connections between culture and ecology, people and place, prominent.” (2003).

But as projects increase in scope and scale, they veer towards what Higgs terms “technological”. Technological restoration projects share common features:

- Professionalization
- Scientific Focus
- Long Temporal Scale
- Large Spatial Scale
- External Mandate
- Expensive (exceeds capacity of local community).

Each of these features contributes to a drift away from meaningful local community engagement and towards professionalized and externally enacted restoration work.

The Elwha River

The Elwha River winds north for nearly 70 km from its headwaters in the rainy heart of the Olympic Mountains of Washington State to its mouth on the southern edge of the Strait of Juan de Fuca. Sixteen kilometres east lies Port Angeles, a city of just under 20,000 people—the largest on the North Olympic Peninsula.

Between 1912 and 1923 two dams constructed on the Elwha River decimated eleven runs of anadromous salmon and trout that inhabited the river, including a run of Chinook known to often reach 100 pounds. Both dams—the Lower Elwha and Glines Canyon—were built without fish ladders, and the

construction of the lower dam effectively shrank their spawning habitat from 112 km of streambed to 6 km. Sediment trapped behind the dams starved the river mouth of fine sediments, causing the erosion and ultimate destruction of important habitat for shellfish and estuarine species. The creation site of the Lower Elwha Klallam Tribe, who relied heavily on both fish and shellfish, lies at the bottom of one of the reservoirs.

In 1968, when the Elwha dam was scheduled for relicensing, the Lower Elwha Klallam Tribe, fisheries advocates, and environmental groups based on the North Olympic Peninsula and in Seattle collaborated in a campaign to remove the dams and restore the watershed, in the hopes of restoring the decimated fishery of the river. Over twenty years later, their collaboration resulted in the 1992 *Elwha Restoration Act*, the first federal watershed restoration legislation in the United States. When completed, the removal of the Glines Canyon and Lower Elwha dams will be the largest dam removals in American history and the largest river restoration project on federal land.

Since 1992, the project has been in planning phases. Several technical and political setbacks have drawn the process out for nearly twenty years. The dam removals are scheduled to begin in 2011. The project, administered by the National Park Service, has had very few formal avenues for engagement by the local public. In interviews, park officials and community members generally spoke of engagement opportunities in two categories: public meetings (mostly over) and volunteering in the process of restoration (far in the future). Members of the public expressed a sense of alienation from the project because of its current place in time (in-between these two chances to be involved in the project).

The frustration that arises from engagement confined by agency processes is exemplified in the words of one informant:

“It comes down to a question of what do you think you have control over? I don’t feel like I have control over what goes on in the Park, except for with my federal vote, maybe, and participation in environmental assessments, Environmental Impact Statements, and public comment periods, which close next Wednesday at 12 p.m.!”

*Life-long Port Angeles
resident*

Park employees, for their part, busy with the technical work of planning such a large and unprecedented restoration project, felt limited in their ability to engage the public during such a tumultuous phase.

Engagement in the spaces between

Participants characterized the national park and the city of Port Angeles as notably absent in promoting the Elwha project to the Port Angeles community. However, programs designed to engage the public have arisen at the fringes of these areas, both physically, (outside the boundaries of Olympic National Park) and institutionally (through organizations tangentially associated with both Olympic National Park and the City of Port Angeles). Many of the engagement programs use scientific investigation as their organizing principle.

Peninsula College, a community college in Port Angeles, has developed two research programs that deal directly with the Elwha River Restoration Project:

- 1) The Elwha Research Consortium, “a strategic partnership between governmental agencies, educational institutions, and community groups focused on understanding societal and ecological effects of dam removal and ecological restoration activities in the Elwha River watershed and nearshore environment.” The consortium is explicitly designed to connect the disparate groups and purposes that meet around the restoration project.
- 2) Research Experiences for Undergraduates Program, in which students are awarded undergraduate credit for work in natural sciences, and are then placed as technical field assistants with ecologists, biologists, and fisheries scientists working on the Elwha River.

In 2004, a multi-disciplinary group of educators at Peninsula College published a book called *Landscapes of Home*, a compilation of professors’ and students’ poetry, art, and writings about the Elwha River.

In 2004, the Clallam Marine Resource Committee, the Department of Fish and Wildlife, the National Park, and the Lower Elwha Klallam Tribe convened a workshop forming the Elwha Nearshore Consortium, a collaborative group that shares scientific information, monitoring, and project planning for the nearshore environment, which is officially outside the boundary of Olympic National Park, and has received little attention in the park’s plans for restoration. The Elwha Nearshore Consortium’s primary goal is to understand

and promote the restoration component in the nearshore associated with the project. A local citizen group, the Clallam Marine Resources committee, is one of the key players. The organization has become a vocal advocate for nearshore issues. Participants mentioned that involvement with ecological surveys has also contributed to increased citizen support for the project. This type of engaged participation in the restoration process both changes participants' ideas of ecosystem health and helps increase support for the project.

Olympic Park Institute, 23 km west of Port Angeles, an independent environmental education organization, has developed two programs: the Elwha Science Education Program and the Elwha Geosciences Program. The Elwha Science Education program was launched first, and involves thousands of visiting students each year in collecting baseline ecological data on the Elwha River. Funded through a National Science Foundation funding track called "Opportunities for Enhancing Diversity in the Geosciences", the Elwha Geosciences program's primary focus is to involve native youth in geoscience education on the Elwha River.

From this grant, the Olympic Park Institute has also developed a program focused specifically on 8th grade students throughout the county. Educators "pick up local students, take them to the river, do field studies on the river, learn about the cultural history and the geography of the river, and take them back to school for the bus at the end of the day." (Derek Staab, program coordinator for Olympic Park Institute's Elwha Education programs)

Between 2006 and 2008, OPI involved every local 8th grade science classroom in this project. The Olympic Park Institute, through other cooperative agreements, has also created an Elwha-specific website (<http://www.naturebridge.org/olympic-park/elwha-science-education-project>), funded a science curriculum and human history papers for use by middle and high school teachers, and given public talks in Seattle and across the Puget Sound region about restoring the Elwha River.

Both Peninsula College and Olympic Park Institute have created niches as "agency connectors", often using their status as educational organizations and non-profits to vie for grants that benefit the project through research or education. Educational institutions are uniquely situated to engage the community during the current planning phase of the project, because of their

relative political neutrality and their focus on science education and research collaboration.

Expanding and focusing engagement

The projects that have arisen in relation to the Elwha Restoration project illustrate that engagement can happen in a broad range of categories, not the traditionally defined decision-making or participation categories. In fact, engagement with the Elwha has existed across six broad categories:

- 1) Participation in restoration activities (i.e. volunteering in replanting, etc.)
- 2) Planning and decision-making (i.e. public meetings, formal comment periods)
- 3) Economic arrangements (i.e. jobs created by restoration, local economic benefits)
- 4) Research activities (i.e. Peninsula College's Research Experiences for Undergraduates program)
- 5) Education and information (i.e. Olympic Park Institute's programs)
- 6) Community conversations (i.e. Landscapes of Home book)

The last three items on the above list have been the most effective in maintaining meaningful public engagement during the planning phase of the project that benefited the human community as much as it benefited the restoration project. Analysis of interviews resulted in five steps for fostering meaningful engagement with ecological restoration projects:

- 1) Identify and assess current engagement;
- 2) Emphasize local engagement;
- 3) Enlarge opportunities to physically engage with the landscape;
- 4) Foster and utilize connections between agencies, educational organizations, non-governmental organizations, community groups; and,
- 5) Create arenas for "community conversations".

Questions to ask in assessing engagement

Assessment of engagement strategies can happen by asking ten questions about the qualities of engagement. These questions are designed to identify which qualities of the project the engagement emphasizes, and to deepen the understanding of the qualities of engagement (i.e. technological or "focal").

- 1) Who is engaged? (local/non-local, demographics)
- 2) Where does it take place? (on-site or not?)

- 3) Is it experience or information based?
- 4) Do skills and knowledge relate to this place, or other places?
- 5) Is it ongoing or a one-time event?
- 6) Do people participate together or alone?
- 7) Who organized the participation? (community/agency)
- 8) What role do stories and non-technical information play in the activity?
- 9) Is the experience situated in the context of local region, culture, history?
- 10) Does anyone receive money? Who?

Activities that engage the local public, are located in place, experience-based, localized, build long term involvement, socially engaged, contextualized, and volunteer-based fall towards a “focal” end of the spectrum. Those activities that engage a broader public or none at all, that are remotely accessed, that are information or image based, that occur one time only, occur individually or bureaucratically, that have more of a technical or scientific focus, and that are economically motivated, would fall closer to the “technological” end of the spectrum. Activities towards both ends of the spectrum are necessary in technological restoration projects.

Conclusion

While technological restoration projects like the Elwha River restoration can happen without the engagement of local public, there are many opportunities to expand local engagement. This will require community members, land management agencies, and educational organizations working to think outside traditional categories of engagement and build relationships that foster engagement that is meaningful and connected. The Elwha River provides an example of a good start in this ambitious endeavour.

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18. Source water protection in BC's community forests: The benefits and challenges of locally-rooted management

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Lauren Rethoret's Master's thesis *Evaluating BC's Community Forest Agreement Program as a Tool for Source Water Protection* is available here:
http://www.bccfa.ca/index.php?option=com_k2&view=item&id=110:academic-research-on-community-forestry

Introduction

This presentation discusses one facet of the results from my Master's Research Project, *Evaluating BC's Community Forest Agreement Program as a Tool for Source Water Protection*. The project was part of a larger, overarching study undertaken by an interdisciplinary research team that sought to answer the question, "how and to what extent can community forests act as a new model for forest management in BC?" This presentation focuses on the human dimensions of source water protection by community forests that operate under the Community Forest Agreement form of tenure.

Background

A short history of community forests in BC

Theoretical rationales for engaging in community based natural resource management have been widely publicized. Advocates of the concept believe that transferring decision-making power from large, centralized organizations

to smaller, localized groups can improve rural economies, strengthen social systems, and enhance the sustainability of resource management (Ostrom, 1999; Bradshaw, 2003; Davis, 2008). Calls for more community-centred forest management in British Columbia have been heard for several decades and go back as far as the 1945 Royal Commission of Inquiry into the forest resources of British Columbia (the Sloan Commission) (Mitchell-Banks, 1997). At that time, BC's first municipal forests were established in Mission and North Cowichan. Through the 1990s, a series of tree farm licenses and volume-based forest licenses were also acquired by communities such as Lake Cowichan, Nootka Sound, and Revelstoke (Howlett, 2000). In the BC context, many people hoped that community forestry would help stabilize the economies of logging-dependent regions, retain a higher percentage of economic benefits within the geographic bounds of the community, and present opportunities for local residents to decide, for themselves, what forest resources were most important to manage for.

In 1998 the BC government demonstrated its support for the community forestry concept by introducing the Community Forest Pilot Project. The Project gave 11 communities five-year licenses that provided exclusive rights to manage and harvest timber in nearby lands. The program was successful enough that, in 2003, the Pilot Project evolved into the Community Forest Agreement program, under which, as of May 2010, 48 communities collectively managed 1.2 million hectares of land.

Relationships between community forests and source water protection

There is a long history of conflict in BC over logging activities in source watersheds. The Sunshine Coast, Vancouver, and the west Kootenays have been historic hotspots for this type of conflict (Koop, 2007, Pinkerton *et al.*, 2008). Such pervasive conflict exists because logging activities can negatively affect water quality, quantity, and timing of flow (Herbert, 2007). Removing a significant amount of timber from a landscape can affect drainage and snowmelt patterns, leading to erosion, stream sedimentation, or temperature changes. Furthermore, improperly managed forests that fall victim to catastrophic fire can have similarly negative impacts on source watersheds.

Recognizing the compatibility between the official objectives of the Community Forest Agreement program (which include promoting local decision-making and encouraging multiple uses of the land base) and the concept of source water protection, some communities have applied for community forest agreements with the specific intention of keeping industrial-

style logging out of nearby watersheds. Residents of these communities appreciate the high level of accountability to water users that community forests demonstrate, as well as the additional benefits, described above, that community forests can potentially bring to rural areas.

Source water management under the Community Forest Agreement can be seen as a win-win opportunity for both the provincial government and rural communities—communities gain greater control over their water sources, and the Ministry of Forests and Range is able to access timber that, in many cases, has been locked up for decades in conflict.

Objectives and methodology of the study

Research objectives

The objectives of the study to which this presentation is linked were threefold:

1. Evaluate how successful current initiatives have been at protecting source water through Community Forest Agreements;
2. Examine what aspects of the legal, institutional, social, economic, and ecological context of community forests either enable or hinder effective source water management; and,
3. Identify what changes could be made in order to improve the potential for source water protection in community forests.

Evaluation methodology

I developed a set of common objectives following an extensive literature review. These objectives were applied to each case study. Other objectives, not described here, were also pulled from the community forest's own forest planning documents and from discussions with local residents. In this way, community forests were evaluated using their own goals, as well as externally imposed ones. The common objectives were developed with two goals in mind. First, in order to ensure acceptable watershed conditions, community forests must engage in forest planning and practices that protect source water. Second, community forests must conduct their operations in a way that assures their long-term viability as the entity with management authority in the watershed. This second goal requires that the community forest succeed as a community-based organization, a business, and a timber licensee. Therefore, the objectives that I used to evaluate each case study were:

- Engage in forest planning and practices that promote source water protection;

- Adopt effective governance arrangements, including sound decision-making structures and stakeholder engagement strategies;
- Achieve financial stability and maintain funding for water management initiatives; and
- Fulfil legal requirements in order to maintain authority over watershed.

Results

Forest planning and practices

Community forest harvest activities were not detrimentally affecting source water quality, quantity, or timing of flow. In all cases, results showed that no water quality issues, which could be attributed to forest operations, had arisen since the inception of the community forest. Deficiencies in forest planning existed, however, that affected the guarantee of adequate source watershed conditions in the future. In one case a lack of short term site planning reduced the advanced planning that went into setting up cut blocks, as well as the accountability of the community forest to water users. In another, the community forest was failing to incorporate considerations of pest or fire management, to the degree that some respondents felt was necessary, into longer-term forest planning.

Governance

The case study community forests employed a number of different approaches to governance. The ability of the various governance structures to serve the common interest varied widely; however, the governance structures that were most able to achieve this goal incorporated all community interests into decision-making to the highest degree possible. A commitment to collaborative, accountable governance improved source water management by ensuring the needs of all water users groups were considered equally, by facilitating group learning processes, and by encouraging low levels of conflict surrounding the community forest.

Finances

The case study community forests were surviving financially, but had very limited financial resources to engage in activities, not related to timber harvests, which promote source water protection and awareness. The most commonly cited issues that prevented more secure financial positions were:

- A lack of capacity to research and implement moneymaking strategies;

- No economies of scale to allow for the development of reliable relationships with value-added producers;
- Not enough unconstrained, productive forest land to subsidize management activities in source watersheds; and,
- Expensive tenure obligations and start-up costs.

Tenure obligations

The case study community forests were generally fulfilling their legal obligations; however, some tenure requirements inhibited the success of community forests and their source water protection objectives. Specifically, forest managers cited administrative obligations as time consuming, expensive, and too extensive for licensees with small Annual Allowable Cuts. Some respondents also shared their opinion that certain community forests subscribed to a philosophy concerning forestry that was incompatible with that of the Ministry of Forests and Range. As such, these respondents felt that community forests did not receive adequate support from the government, especially for alternative forest activities like source water protection.

Key “barriers and bridges”

Factors that inhibited successful source water protection were:

- Polarized populations and competing resource demands created conflict within the community and board of directors over management approaches and distribution of benefits;
- Unreasonable community expectations placed pressure on small organizations to pursue goals that would be difficult to achieve given limited capacity and resources; and,
- The expensive nature of careful forestry limited profit opportunities, funding for water protection initiatives, and benefits to be distributed.

In general, issues such as those listed above created social problems that consumed the already thin time and financial resources available to the community forests. As a result, forest managers were, in some cases, spending more time on political issues than forest management or source water protection.

Factors that facilitated source water protection were:

- A well-defined mission helped orient activities and scarce resources towards the goal of source water protection;

- High levels of dependence on clean source water motivated community members to contribute time and energy towards making the community forest successful; and,
- Cohesive populations limited conflict surrounding management strategies and distribution of benefits.

In general, factors such as those listed above encouraged valuable volunteerism and allowed community forests to achieve more than what they would be able to otherwise. They also helped to ensure that the community forest achieved, first and foremost, what it was initially developed to do, before committing resources to other activities.

Recommendations

Below, I highlight five of the nine recommendations that were included in the final report.

1. Long term, multi-objective strategic plans could help the community forest to prioritize activities like source water protection. If developed collaboratively among community members, they could also help address conflict around management approaches.
2. Standard protocols for decision-making could help improve accountability of the community forest to stakeholders and could therefore reduce conflict surrounding the inclusivity of the forest or its approach to distribution of benefits.
3. Consulting experts in the fields of stakeholder engagement and conflict mediation could ensure that forest managers are able to focus on what they are trained to do. This could also improve the community forest's ability to effectively engage stakeholders.
4. Prioritizing public education campaigns could help inspire volunteerism, demonstrate sound forest practices to stakeholders, and clarify expectations of what the community forest is realistically able to accomplish.
5. Revising the legislation for small tenures could reduce the administrative burden on community forests and free up resources for forest management activities other than timber harvest.

Key lessons surrounding the human dimensions of source water protection in community forests

Conflict over water resources will not necessarily disappear when the community gains control.

Each case study forest dealt with persistent conflict, originating from community members, over how water and forest resources should be managed. Though many community forests have been conceived in the midst of such conflict, these organizations, just like the provincial government or major licensees, need to work hard to build trust among local residents. Some conflict is undoubtedly good for community forests, as it demonstrates active discussion around how and why certain resource values should gain management priority. Other types of conflict can be less productive and can prevent the community forest from focusing its activities on what it originally set out to accomplish.

The human dimensions of community forestry impact the success of the licensee, as a source water manager, just as much as ecological or financial factors.

Just as persistent debt-loads can stymie the abilities of community forests to achieve their goals, ongoing social issues can inhibit forward motion of the organization. Low levels of community engagement prevent the organization from being able to define and serve the common interest. Uncoordinated attempts to resolve high levels of conflict consume energy and the resources available to forest staff and board members.

Community forests need to dedicate more time and resources to addressing persistent social issues in order to improve the stability of the organization. For the reasons stated above, community forests, especially in their early stages, need to commit to activities or processes that build a positive image of the organization within the community. By doing this, community forests may be able to gain support from local (opinionated) leaders, promote high levels of volunteerism, or minimize distracting and unproductive conflict. As such, the community forest can develop into a stable, well-supported organization that is able to fully dedicate itself to source water protection through sustainable forest management.

Community forests need the support of the Ministry of Forests and Range in order to be able to address social issues and to work towards achieving water stewardship objectives.

The case study forests were generally unable to free up resources to address social issues, as most available time and funding was being put toward fulfilling forest planning requirements or accessing more profitable markets. Changes to legislation or policy could improve the economics of community forestry or address onerous administrative requirements that, in some cases, may be inappropriate for small tenures. In this way, the Ministry of Forests and Range would be able to support community forests in their efforts to engage local residents in watershed management processes or to initiate other activities that promote water stewardship.

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19. Strategies and tools for effective public participation in natural resource management

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Introduction

Public participation is widely recognized as a critical aspect of sustainable development and adaptive management, and is a regulatory requirement for a variety of environmental and natural resource management processes in British Columbia. The expectation is that, through participation, the processes and outcomes of natural resource planning and decision-making will be more efficient, equitable, and sustainable.

Research and experience from natural resource management worldwide have proven that public participation leads to better decisions, by providing local or independent sources of information by examining alternative management strategies, and by building trust. It also reduces uncertainties, delays, conflicts, and legal costs.

Public participation is often a regulatory requirement. Forest certification systems, such as the Canadian Standards Association and the Forest Stewardship Council, require extensive public participation. It is sometimes a civic duty. For example, 94% of Canada's forests exist as a public trust managed by the government license holders on behalf of the public, who are the actual owners of the forest. The need for public participation is particularly relevant in BC because most of the province's forests are on Crown land, and many aboriginal and non-aboriginal BC communities depend on forest resources.

Natural resource management practitioners are moving from talking about public participation and controlling dissent towards meaningfully incorporating public values into the planning and implementing process. Despite this, few resource managers actually have formal training or

professional development opportunities to build their capacity in planning for, and implementing, participatory processes.

Goals

The goals of the presentation were to assist natural resource management practitioners in developing:

- An understanding of basic concepts and best practices of participation;
- Familiarity with different tools that can be used for effective public participation, and an awareness of which tools are appropriate under different circumstances; and
- Strategies to assess the effectiveness of the participatory processes.

The presentation focused on answering these questions:

- What is public participation?
- Why do we need to do public participation?
- Who should participate?
- How do we do it, that is, what tools are available?
- When and where do we use a specific tool?

The presentation was structured into six curriculum modules:

1. The many facets of participation
2. Benefits, challenges, and best practices
3. The context and purpose of participation
4. Identifying who participates
5. Planning to evaluate
6. Tools for participation

Each module will be discussed separately in the sections below.

Module 1: The many facets of participation

The learning outcomes of this module were to:

- Articulate a clear definition of participation; and
- Identify different levels of participation in decision-making processes.

Participation is... “various forms of direct public involvement where people, individually or through organized groups, can exchange information, express opinions and articulate interests, and have the potential to influence decisions or the outcome of specific forestry issues” (UN FAO 2000 cited in Beckley *et al.* 2005, p. 14). It is where individuals, communities, and stakeholder groups can exchange information, articulate interests, and have the potential to influence decisions or the outcome of natural management issues (Means *et.al.* 2002, DSE 2005a).

It is a two-way process between the public, and experts or managers, and should not be confused with the one-way flow of information in public relations exercises. Participation is a willingness to respect and give space to other people’s views. Participation may not be ideal for many situations. One should not claim that they are doing participation when in fact they are not doing it, or if the situation is not appropriate for participation.

Participatory approaches are often classified along a continuum (Beckley *et al.* 2005, Arnstein 1969, Auditor General of British Columbia 2008, IAP2 2007a). Figure 1 describes the different stages in the continuum of public participation along with examples of tools that are suitable for each stage. The continuum spans nominal participation (e.g., information exchange) to full participation (e.g., co-management), and helps conceptualize the level of participation expected when using a particular tool. The natural resource management practitioner should be aware where their participatory experience or approach is along the continuum. This awareness will enhance the transparency of the participatory process. It will also help the practitioner select tools suitable for a participatory process.



Information Exchange	Consultation	Collaboration	Co-management / Control
Information is communicated primarily in one direction, with limited opportunity for dialogue.	Public opinions are sought and considered in expert or managerial decision-making. Information flows in two directions but decision-makers not obliged to integrate comments received.	Representatives of the public are actively involved in developing solutions and directly influencing decisions. This usually involves iterative activities, dialogue, and in-depth working relationships with more focus on joint responsibilities.	Decision-making authority and sometimes responsibility for organizing public participation is partly or wholly delegated directly to the public or their representatives.
Examples: <ul style="list-style-type: none"> • Discussion paper • Comment sheet 	Examples: <ul style="list-style-type: none"> • Public hearing • Survey • Open house 	Examples: <ul style="list-style-type: none"> • Round tables • Workshops • Public advisory committees 	Examples: <ul style="list-style-type: none"> • Community forest board

Figure 1: Continuum of public participation

Participation encompasses a variety of approaches, processes, and tools. There is no one correct way to “do” participation; it is an art and a craft and requires practice. Nevertheless, there are some principles and best practices that help to devise effective participatory processes which will be discussed in the next section.

Module 2: Benefits, challenges, and best practices

The learning outcomes of this module are to:

- Recognize the benefits and common challenges of participation; and
- Understand best practices of participation in natural resource management.

There are both benefits and challenges to participation (Beckley et. al. 2005, DSE 2005a). Practitioners should be aware of these when planning for participation in natural resource management.

Some of the benefits of public participation are:

- Participatory decisions are more inclusive of different perspectives and values;
- Participation can result in better, more informed decisions;
- Participation can generate durable and sustainable solutions; and,
- Participation lends legitimacy and encourages compliance with decisions.

Some of the challenges involved in participatory processes are:

- Participation takes more time, effort, and resources;
- Participation may achieve “lowest common denominator” results; and,
- If poorly done, participation can exacerbate existing conflicts.

A stakeholder-driven public participation process often responds to organized interest groups, and may not lead to the same results as a more general public process.

Based on experience and analysis of case studies, practitioners and scholars have identified some principles and best practices for participation (DSE 2005a). The International Association of Public Participation (IAP2) (2007b) has identified core values of participation. The IAP2 core values are:

- Public participation is based on the belief that those who are affected by a decision have a right to be involved in the decision-making process.
- Public participation includes the promise that the public's contribution will influence the decision.
- Public participation promotes sustainable decisions by recognizing and communicating the needs and interests of all participants, including decision makers.
- Public participation seeks out and facilitates the involvement of those potentially affected by or interested in a decision.
- Public participation seeks input from participants in designing how they participate.

- Public participation provides participants with the information they need to participate in a meaningful way.
- Public participation communicates to participants how their input affected the decision.

The International Association of Public Participation (2010) has also a code of ethics for its members. The code is:

1. **Purpose.** We support public participation as a process to make better decisions that incorporate the interests and concerns of all affected stakeholders and meet the needs of the decisions-making body.
2. **Role of practitioner.** We will enhance the public's participation in the decision-making process and assist decision-makers in being responsive to the public's concerns and suggestions.
3. **Trust.** We will undertake and encourage actions that build trust and credibility for the process among all the participants.
4. **Defining the public's role.** We will carefully consider and accurately portray the public's role in the decision-making process.
5. **Openness.** We will encourage the disclosure of all information relevant to the public's understanding and evaluation of a decision.
6. **Access to the process.** We will ensure that stakeholders have fair and equal access to the public participation process and the opportunity to influence decisions.
7. **Respect for communities.** We will avoid strategies that risk polarizing community interests or that appear to "divide and conquer."
8. **Advocacy.** We will advocate for the public participation process and will not advocate for interest, party, or project outcome.
9. **Commitments.** We ensure that all commitments made to the public, including those by the decision-maker, are made in good faith.
10. **Support of the practice.** We will mentor new practitioners in the field and education decision-makers and the public about the value and use of public participation.

Module 3: The context and purpose of participation

The learning outcomes of this module are:

- Recognizing the variety of contextual factors in which public participation occurs.
- Developing clear objectives for effective public participation in natural resource management planning and decision-making processes.

Effective participation requires careful planning and a clear understanding of why you're doing participation. Why is participation called for, and in what context? There are some framing questions that the proponent of a participatory process needs to ask before starting a participatory process (DSE 2005b). These are:

- WHY? The situation that calls for or has produced the need for public participation.
- WHAT? The objectives or desired outcomes.
- WHO? Profile of potential participants. What are their interests, experiences, values, etc?
- HOW? The approach, tools, and methodology to be used.
- WHEN? The timeframe for public participation.
- WHERE? Site for public participation.

There are numerous factors that affect participation (e.g., social, political, cultural, economic, and personal); all of which should be recognized when developing an effective public participation process. The historical, legal, and policy context needs to be taken into account when developing a participation program for natural resource management. Increasingly, this includes a consideration of Aboriginal rights and title, recent court rulings, and the New Relationship between the Province and First Nations in BC (Auditor General of British Columbia 2008, Joseph 2005).

A critical step in planning for effective participation is identifying what you want to achieve. Before initiating a participatory process, managers should identify "SMARRT" objectives: Strategic, Measurable, Achievable, Relevant, Realistic, and Time-bound (DSE 2005b).

Module 4: Identifying who participates

The learning outcome from this module is to identify different interest groups, stakeholders, and citizens and how they may affect (or be affected by) natural resource management decisions.

Planning for effective public participation involves identifying who should be involved. This may involve engaging both the general public and organized interest groups. The general public encompasses diverse values and potentially conflicting perspectives.

Stakeholders in a participatory process are persons or groups that affect or are affected by issues, decisions, or outcomes. Groups and individuals who have a formal or informal stake in resource management decisions include: tenure holders, resource users, local community groups, non-governmental organizations, and research institutions. Because of aboriginal title and rights, First Nations usually do not consider themselves as stakeholders, but as partners on the land base, so their involvement may need to be treated differently from other stakeholders.

Stakeholders need information regarding how they will benefit by participating. Some of the reasons that could be used to explain benefits from participating are:

- Ownership in design, process, and decisions;
- Learning and knowledge enhancement through participation;
- Building relationships and networks;
- Bringing in diverse perspectives;
- Reducing conflict; and
- Increasing the chances of success of the decision or solution.

The proponent of a participatory process may need to conduct outreach to attract and engage stakeholders, raise the visibility and transparency of the process, and inform stakeholders about progress and results. They also need to build common understanding and trust. Building trust is a necessary stage at the beginning of a participatory process. Building common understanding may involve different stakeholders agreeing to a shared vision. Building trust and common understanding takes a lot of time and patience, thus a participatory process could be long and complex.

For effective participation, people need to recognize and respect that others may view the same issue from different perspectives. The participation practitioner needs to recognize and respect diverse values. The process may also involve identifying and connecting with leadership of local First Nations. One of the core values of participation is to be inclusive as possible (Auditor General of BC 2008). However, sometimes this is easier said than done. Some participatory processes that are frequently used are not broadly inclusive, despite best efforts.

It is also important to consider the level of influence that different stakeholders have over the process and its outcomes, stakeholders' perspectives on issues involved in the process, and past experience with participatory processes (Crosby 1992). DSE (2005c, pp. 87) suggests using a stakeholder analysis matrix to help identify which stakeholders are the most important to involve in natural resource management decisions. This matrix plots the level of "importance" of stakeholders against their level of "influence".

The person and organization responsible for developing the participation process should also be aware of their own interests, biases, and personal involvement in the process (DSE 2005c).

Module 5: Planning to evaluate

The learning outcome of this module is to identify ways to assess the effectiveness of participatory processes. A critical, yet often missing part of planning for participatory processes is follow-through. A best practice of participation is to plan to evaluate to "close the loop" and generate valuable feedback and learning. This includes reporting back to participants to identify how their contributions have been included in the decision-making process.

A best practice of public participation is developing a plan to evaluate whether the participatory process was successful. In planning for developing an evaluation framework, the following questions could be considered:

- What is the purpose of the evaluation?
- Who wants to know what? Will different individuals and organizations be interested in different parts of the process?
- What information will you collect, and how will you go about gathering it?
- What resources (e.g. time, funding, and expertise) will you need to conduct the evaluation?

The DSE (2005c) "SMAART" objectives described in Module 3 could be used to develop an evaluation framework for a participatory process.

Module 6: Tools for participation

The learning outcomes for this module are to:

- Identify a variety of participation tools that can be used to achieve different levels of participation; and,
- Present guidelines to select participation tools appropriate for particular situations.

Choosing the appropriate tool (or bundle of tools) for participation will depend on the purpose for participation. The selection of tool(s) will also vary according to:

- Management goals, objectives, and desired outcomes;
- The community profile and the social-political context;
- Project size, budget, timeline, and resources allocated;
- Skills and availability of management team.

Beckley *et. al.* (2005, pp. 27) suggest an organizing framework for classifying various public involvement tools (Figure 2). They classify tools as either indirect (non face-to-face) or direct (face-to-face), and further divide them into tools useful for small or large groups. Indirect tools include comment sheets, toll-free lines, referenda, and surveys. Direct tools include public advisory committees, focus groups, workshops, round tables, open houses, and public hearings. Emerging tools are designed to convey information or technical details visually, and are usually electronic or web-based. Examples of these are community-based mapping with GIS, 3D visualization software, and television based participatory tools (Beckley *et. al.* 2005).

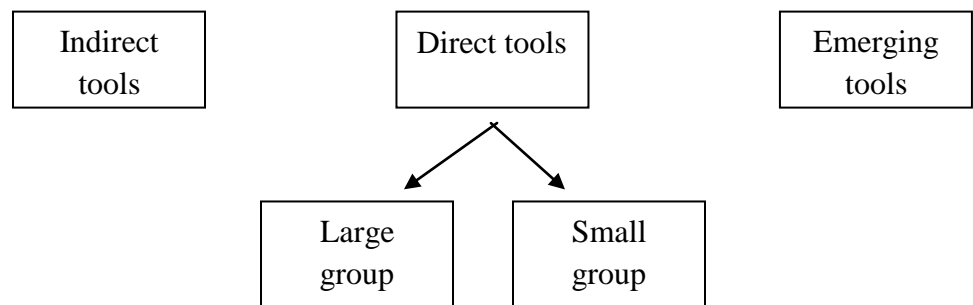


Figure 2: Organizing Framework for Public Participation Tools (Beckley *et. al.* 2005)

The distinction between direct and indirect tools of public participation can be related to the continuum of public participation (Figure 1). The more collaborative participatory methods tend to be associated with face-to-face techniques (direct tools). However this general distinction is starting to break down with “emerging” computer-based, “remote” participatory tools such as social media (e.g., Facebook) and web dialogue techniques.

Usually, a suite of tools will be employed in different stages of a public participation process starting from outreach to stakeholders, building common understanding by defining a shared vision and goals, to evaluation and decision-making. Hislop and Twery (2001) produced a matrix which classified different tools appropriate for the various stages of a participatory process. Beckley et. al. (2005, pp. 45) presented a simplified version of this classification of tools into different stages in the public participation process.

In planning for participation, it is also helpful to evaluate how different tools perform based on criteria and indicators of a successful participatory process. In the context of evaluating a public participatory process, criteria can be broadly defined as values that are inherent in a successful participatory process. Indicators measure aspects of criteria and are used to evaluate the success and appropriateness of tools used in a participatory process to reach desired outcomes or sound decisions.

Table 1 below adapted from Beckley et. al. (2005, pp. 21) classifies criteria and indicators to evaluate participation tools into three core elements: breadth, depth, and outcomes. The core element “breadth” addresses the degree to which a process adequately incorporates a broad range of public values into the decision-making process. The “depth” of public participation measures the quality of participation and addresses the levels of exchange between participants in a participatory process. The third core element “outcomes” relate to the goals of the participatory process—how well the process met the shared vision or goals identified by the participants. Often, agencies sponsor a participatory process, and have specific goals and expectations from the process. This core element measures the extent to which the process meets those goals and expectations. Beckley et. al. 2005 have a reference guide which evaluates a variety of direct and indirect public participation tools against these criteria and indicators.

Table 1 - Core evaluation criteria and indicators of successful participation tools

(Adapted from Beckley *et al.* 2005 p.21)

Core Elements	Criteria and Indicators
Breadth	Representation – Incorporate a wide range of public values
	Accessibility – Be available to all public interests
	Renewal – Allow for new participants over time
	Anonymity – Protect participants’ identities when necessary
Depth	Listening and dialogue – Foster a two-way flow of information
	Flexibility – Be flexible in scope
	Deliberation – Provide opportunities for frank and open discussion
	Transparency and credibility – Promote and make available in a clearly understandable form, independent input from scientific and other value-based sources
	Relationship building – Promote positive personal and institutional relationships
Outcomes	Relevance – Influence the decision-making process
	Effectiveness – Improve the quality of decisions
	Mutual learning – Contribute to all participants’ knowledge
	Reciprocity – Reward or provide incentives
	Cost-effectiveness – Output or outcome is cost-effective relative to inputs

Specific public participation tools may not rate highly for every criteria and indicator. For example, indirect methods, such as surveys, provide little opportunity for participants to learn more about an issue. But they are often cost-efficient, anonymous, and more representative of the broad public. Conversely, direct methods such as workshops and round tables provide great opportunities for learning, for establishing dialogue between individuals with

diverse values, and for identifying workable solutions. A participatory process should not be thought of as a single event or application of a single tool, but a long-term process integrating a series of appropriate tools.

Conclusion

The presentation intended to provide an overview of the knowledge, tools, and skills to better implement participatory processes in natural resource management. It aimed to address the needs of resource managers who work with communities and First Nations, and whose job requires them to engage the public in resource planning and management. This may include practitioners working for, or with, local government, First Nations, or small tenure holders, as well as university-based researchers, consultants, or provincial government employees working in operations or policy.

“Doing” participation effectively is more of an art rather than a technical skill that can be taught. Many practitioners “do” participation every day, but many do not have the opportunity to reflect on their practice or to contemplate ways to do it better. The presentation was designed to offer this opportunity, and to provide practitioners with useful knowledge and tools that could help them engage communities and the public to make sound management decisions.

Research and experience from natural resource management worldwide have proven that public participation leads to better decisions, and builds trust. It also reduces uncertainties, delays, conflicts, and legal costs. In Canada, despite all the talk about public participation, there hasn’t been much synthesized information about tools for natural resource managers to use. The use of the tools introduced in this presentation could help move natural resource decision makers from talking about public participation and controlling dissent towards meaningfully incorporating public values into the planning process.

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Field trip descriptions

1. In collaboration with a community: A walk through BC Hydro's involvement at Downie Marsh, Revelstoke

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From the Revelstoke Community Centre (location of the conference) the group walked down to Centennial Park to talk about a BC Hydro recreation study, issues about the boat launch, and the sturgeon release program conducted with Fresh Water Fisheries, First Nations, school groups and BC Hydro's sturgeon team. Then they went south to look at the plantings along the non-functional section of dyke beside the walkway, and to the Illecillewaet River Bridge while talking about BC Hydro's physical works habitat projects, their dyke pump maintenance, their collaboration with the Illecillewaet Greenbelt Society, and the decommissioning of the Illecillewaet Dam in the late 1960s.

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2. Revelstoke's Bear Aware Program

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Revelstoke has been a pioneer in developing bear awareness within a community. On this 2 hour field trip the group visited various sites around town to get a behind the scenes look at a Bear Aware program in action. You can read more about Revelstoke Bear Aware at: www.revelstokebearaware.org.

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3. Understanding visitors' connection to place in Mount Revelstoke National Park

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Parks Canada has been exploring the science behind park visitors' connection to place in Mount Revelstoke National Park. This field trip to the Meadows in the Sky Parkway summit area focused on the human dimensions of protected natural places. Visitors have identified the importance of elements that create a great national park experience, ranging from the natural settings themselves to the services and facilities offered by the park. This information is important locally as Parks Canada upgrades the visitor opportunities in the parkway area, and nationally as each park reports on its success in making connections with Canadians. The field trip also covered the management approaches that Parks Canada uses to facilitate access for thousands of visitors to this fragile subalpine environment, while protecting the integrity of the ecological and cultural resources on-site.

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Posters

1. Considerations for mitigating moose–human conflict in moose habitats undergoing urban development

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Gayle Hesse, Wildlife Collision Prevention Program, British Columbia
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Where land development and city expansion occur within moose habitat, interactions between moose and humans will increase. To determine the potential for such future increases in Prince George, BC, we collected and overlaid data on moose–human conflicts with current land development plans for the city. Our results indicate that 4 of the 8 new developments planned for the city occur where moose–human conflicts (such as vehicle collisions) are common or where ungulate winter range is located. To minimize future conflicts between city residents and moose in areas slated for or undergoing development, we recommend alternative design features for planners to consider (such as rights-of-way and green space planning that consider moose ecology), public education and citizen science programs, as well as more robust record-keeping initiatives. We discuss proposed solutions in broadly-applicable, rather than locally-specific terms.

For more information about the Wildlife Collision Prevention Program, a program funded jointly by the BC Conservation Program and the Insurance Corporation of British Columbia, visit: <http://www.wildlifecollisions.ca>

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2. Wildlife record keeping at western Canadian regional airports: Implications for risk assessments

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Annie L. Booth, University of Northern British Columbia

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Aircraft collisions with wildlife, primarily birds, result in substantial personal and economic losses in Canada and throughout the world. As part of a larger online survey, we collected survey data from 16 regional airports in British Columbia, Alberta, and Saskatchewan to document the use of Airport Wildlife Management Plans and wildlife strike and sighting record keeping systems. Eighty-one percent of airports had an Airport Wildlife Management Plan and strike records were kept at 94% of airports, however despite the legislative requirements, only 19% of airports recorded all bird sightings and only 25% recorded all animal sightings on their airport lands. Out of the 12 responding airports, 25% used strikes, near misses, and sightings data as factors in risk assessment; 25% used the data in their data bases; and 25% used the data to develop management plans. Only 3% of airports used strike records to evaluate the success of countermeasure implementation, with 33% using staff or pilot reports and 57% using experience.

Airports that are not recording data on wildlife movements and habitat use patterns on and near airport properties will not have the necessary information to accurately conduct a risk analysis of wildlife hazards. More education, funding, and enforcement may be required not only to collect, but use these data for countermeasure implementation. Testing the effectiveness of countermeasures that improve aircraft and human safety through research and record keeping is a critical component of countermeasure evaluation that we found was lacking. Such testing must be conducted so that countermeasure costs can be evaluated, due diligence demonstrated, and effective tools advertised and adopted broadly.

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3. Wildlife and Private Land Stewardship: The Provincial Agriculture Zone Wildlife Program

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The Provincial Agriculture Zone Wildlife Program (PAZWP) has been developed out of a recognition by the BC government that agricultural zones throughout the province are subject to special objectives and hold special opportunities for hunters. PAZWP will coordinate crop damage prevention, mitigation and compensation strategies, increase hunting opportunities in “Special Hunt Zones” and promote healthy hunter–landowner relationships. These zones have a combination of uses for agriculture and ungulate winter range, and were delineated because of concerns with elk depredation on agriculture crops, and/or rangeland condition and forage availability on important range for wintering ungulates.

The PAZWP will coordinate these strategies with Ministry of Agriculture and Lands. They will also implement strategies to mitigate damage through hunting regulations, permitting, and hunter access programs. As the program becomes established it will also consider the possible development of an agriculture zone licensing system as well as private land stewardship and access incentives.

The PAZWP came about because Ministry of Agriculture and Lands required assurance from Ministry of Environment that it would engage in the development and implementation of crop damage mitigation strategies. The Ministry of Environment’s support allowed the Ministry of Agriculture and Lands to initiate a crop damage compensation program known as the Agriculture Wildlife Program, which has already bought government and wildlife considerable goodwill in agricultural communities.

Regional Agriculture Wildlife Committees are being established where there is a need to promote discussion and development of ideas for reducing conflicts between wildlife and agriculture. Currently, three PAZWP Agriculture–Wildlife Specialists are located across the province in regional Ministry of Environment offices to establish these Regional Agriculture Wildlife committees and initiate conversations between hunters and landowners. These individuals are a provincial resource and the PAZWP team

will be asked to lead, or provide assistance, in the development of management solutions throughout the province.

For more information about the PAZWP program, visit:

<http://www.env.gov.bc.ca/kootenay/wld/pazwp.html>

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4. Exploring “Humane” Dimensions of Wildlife

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The field of Human Dimensions of Wildlife has evolved over the past 30 years from hunter satisfaction and recreational use enquiry to a dynamic discourse between researchers in the natural and social sciences on human behaviour in relation to wildlife and the environment. This interdisciplinary field attempts to take social considerations into account when creating effective wildlife management policy and legislation. In British Columbia, the emergence of this field is marked by the Ministry of Environment’s Wildlife–Human Conflicts Prevention Strategy released in 2003 by the Wildlife Conflicts Working Group. Another milestone on this path was the creation of a “Human Dimensions Specialist” position in February 2009 within the Ministry’s Fish and Wildlife Department.

As the evolution of this field continues in BC, a new dimension of “humane” considerations in wildlife management should be investigated. Animal welfare and conservation share the common goal of reducing human impacts on wildlife. Understanding animal welfare ethics and values held by stakeholders is important for resource managers who may be unaware of public opinions and acceptance of conservation practices. Equally important to know is the level of public awareness of human activities that cause true harm to wildlife (in terms of extent and/or severity) as compared those that are perceived.

This research uses social science methods to capture both “expert” and the public’s perception of harms to wildlife. Public participation tools are essential to understanding attitudes and values about the management of wildlife from broad audiences. An interactive online survey was created to help understand the differences in values held between the public and wildlife

professionals (those who work with or for wildlife in BC). The survey platform technology called NERD (Norm Evolution in Response to Dilemmas) was developed by researchers at the University of British Columbia's W. Maurice Young Centre for Applied Ethics and College for Interdisciplinary Studies.

The *Wildlife Values Survey – Navigating Harm* was designed to facilitate informed discussion and explore attitudes about complex ethical issues related to animal welfare, policy, and wildlife management in BC. Attitudes towards direct and indirect harms, and intentional and unintentional harms to wildlife, were explored. Further, typical wildlife management scenarios were investigated in order to discuss the “humane” dimension of such practices. The survey is an initial phase of a Ph.D. graduate research project to assess the potential to use social filters to create effective wildlife policies on the path to compassionate conservation in BC.

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5. Exploring the human dimension: visitor use analysis of Willmore Wilderness Park

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Dr. Elizabeth Halpenny

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There have been few studies that focus on the human dimensions of backcountry users in provincial wilderness areas within Alberta. It is often difficult to integrate ecological data with human use requirements without relevant and sound information. It is also a challenge to understand visitor experience needs and management preferences without a foundation of visitor information. The purpose of this study is to address the need for acquiring a better understanding of visitors in the Willmore Wilderness Area in west-central Alberta. Specifically, this study will examine the demographics, spatial patterns, motivations, park familiarity, and place attachment of visitors to the park. This project will entail a mixed-methods approach and project instruments will include: trail surveys, in-depth questionnaires, trail cameras,

Global Positioning System (GPS) Tracksticks, and in-person interviews. Results from this study will feed into the future parks management plan for Willmore and may have linkages to the Alberta Land-Use Framework.

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6. North America and Italy: shared concepts and challenging differences

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In the 1960s, North American wildlife managers began to consider the human dimension and involve people in wildlife management. However, human dimensions research outside North America began only in the late 1990s and research was mainly in Scandinavia. Human dimensions research remains a relatively new research tool within Italy and very few studies have applied human dimensions research in wildlife management. In Italy there are, to date, not more than 22 human dimensions studies completed. Being mostly theses for academic purposes, the sample size is relatively small and the general public (45%) were the main actors followed by a mix of interest groups and residents (32%). Only 18% of these research projects had a follow-up, while the rest were a one-shot case study that remained as unpublished documents and represented only trials of a human dimensions academic exercise.

Whereas in North America the interest in doing human dimensions research is driven by wildlife agencies, in Italy universities are still trying to demonstrate to park managers and agencies the importance of involving people in wildlife conservation.

In North America studies are carried out in urban settings, whereas in Italy most human dimensions research is performed in and surrounding protected areas (72%), for conservation purposes. In contrast to the traditional North American mail delivery and telephone surveys, in Italy face-to-face interviews are the methodology applied (77%). Such methodology is considered the most

suitable instrument for collecting data in a southern European context, where building trust through personal contact plays a fundamental role in dealing with controversial themes such as wildlife management.

Although there are differences in approach, North America and Italy share the basic concepts of human dimensions. Indeed, both strive to involve people in decision-making processes through the best practices learned through human dimensions. Italy has still a lot to learn from their more experienced North American counterparts. Understanding the differences in value systems and cultures can drive human dimensions toward new achievements.

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7. Networking in the Human Dimensions of Natural Resource Management

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This poster introduces the Human Dimensions in Natural Resource Management (HDNRM) group on “LinkedIn”, the professional social networking site. The HDNRM group is comprised of 120 members drawn mainly from Canada and the United States. It exists to: promote the utility of human dimensions research in natural resource management; to share news about meetings, issues and methods; and to promote networking among members. Our purpose here is to determine how successful the group is in promoting networking.

We asked members to participate in a survey that sought information on members' backgrounds and work experience as well as on their participation

in the HDNRM group. Of the 115 members then part of the group, only 17 responded, a response that in itself may tell us that the group has not yet reached a critical mass where participation occurs spontaneously. We attempt to connect responses with the wider literature in networking and social capital.

A series of questions concludes the poster as we seek to engage conference attendees in helping us to understand what needs to be done to increase the levels of networking in the group.

<http://www.linkedin.com>

Bob Payne invites people to join the Human Dimensions in Natural Resource Management group on LinkedIn, a professional social media site. Membership is LinkedIn is free; membership is subject only to approval by the moderator (Bob Payne).

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8. Harming or killing snakes in Canada: Results of the national survey, 2010

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Snakes not only face problems of habitat loss, they also are harmed or killed intentionally by people. Given that some snakes—for example, the

Massassauga Rattle Snake—are designated as species at risk, agencies such as Parks Canada are required not only to protect snake habitat, but also to communicate with people who might intentionally endanger snakes. This poster outlines the results of a survey that represents a first step in understanding who might harm or kill a snake and developing a social marketing strategy to change that behaviour.

Harris/Decima Inc. was contracted to administer a short series of questions to 2,021 randomly selected people through its weekly “Vox” telephone survey. The questions included awareness of snakes in the respondents' provinces, reactions to encountering a snake on one's property and reactions to encountering a snake elsewhere (e.g., on the road, in a protected area). Demographic, social, and economic data were also collected about the respondents.

The results indicate that nearly two-thirds of the respondents have encountered snakes, in a variety of locations. For encounters on their own property, people's responses are quite varied and include a relatively high number of “harm/kill” responses. However, harming or killing a snake definitely ranks lower than reactions such as “avoid the snake”, “get someone else to deal with it”, and even “study the snake”. When snakes are encountered elsewhere (i.e., away from home), the array of responses is much smaller and the “harm/kill” response is insignificant in numerical terms.

A respondent's gender is significant in the “harm/kill” response, with men more likely than women to harm or kill snakes encountered on their property. Similarly, respondents' location in either rural areas or urban areas shows a statistically significant difference response, with people in rural areas more likely to harm or kill a snake encountered on their property. Two other variables—income and education—exhibit marginally significant differences when examined for responses to snakes.

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9. MULTISAR: Partnering for Species at Risk Conservation

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MULTISAR (**M**ultiple **S**pecies **a**t **R**isk) is a collaborative and voluntary process to help maintain, improve, and restore the habitat of multiple species at risk in priority areas of Alberta's Grassland Natural Region. This stewardship approach is landscape-based, combines the principles of wildlife management and range management, and incorporates the expertise of wildlife biologists, range agrologists, land managers, and landowners in a group setting (e.g., MULTISAR team for Smith Ranch). One of the biggest keys to MULTISAR's success is reliance on this partnership. By building a cooperative relationship, many stewardship activities can become reality and be beneficial to all involved. This cooperation can be demonstrated in one of MULTISAR's tools, the Habitat Conservation Strategy. A Habitat Conservation Strategy is used to guide stewardship activities to improve the ecological integrity of habitat for multiple species of wildlife, as well as improve the sustainability of the ranching operation. After a series of structured wildlife, vegetation, and key habitat inventories are completed on a ranch, the information collected is analysed and discussed with the MULTISAR team and used to direct the development of jointly agreed upon enhancement priorities. A positive relationship continues as enhancements are implemented, with MULTISAR assisting when and where possible.

For more information about MULTISAR, visit:

<http://www.multisar.ca/home.php>

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10.A policy journey: Crafting an Environmental Stewardship Mitigation and Compensation Policy for British Columbia

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With contributions from

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The BC provincial government administers, actively encourages, or facilitates development activities to meet a variety of economic, social, and environmental objectives. The types and scale of specific tenures and authorizations and the associated infrastructure development to service them (i.e. transmission corridors, roads and rights of way) are diverse, operate at a variety of scales, and vary greatly in the magnitude and intensity of their environmental effects.

The BC Ministry of Environment possesses few regulatory authorities regarding natural resource use and extraction. Employees from the ministry are asked to provide advice to many statutory decision makers in other government agencies regarding use and allocation of natural resources. At times, private sector proponents request comments from Ministry of Environment regarding ways to address impacts from their developments.

As of 2009, Ministry of Environment employees had little or no written guidance to help them articulate expectations of development proponents with respect to mitigating or compensating for individual and/or cumulative environmental impacts of land and water-based developments. Also lacking were adequate and appropriate financial mechanisms for proponents to make monetary compensation for environmental damage, as well as efficient and effective means to have compensation funds directed to relevant priority species and ecosystems conservation and restoration actions. As a result, ad hoc arrangements for compensatory mitigation actions and monetary compensation took place across B.C.

Other jurisdictions have implemented mitigation and compensation policies. Having clear guidance on mitigation and compensation for environmental damage increases certainty for industry and improves environmental outcomes.

In March 2010, the Ministry of Environment began to develop a policy to guide their staff on when and how to apply mitigation and compensation measures when development projects and/or activities on provincial Crown land have the potential to adversely affect the environment. This presentation explores the challenging process of integrating human dimensions into the development of this new policy. The policy-making journey covers: seeking approval and resources to undertake the project; launching teams to develop and refine the policy; conducting policy research; engaging other government agencies, affected stakeholders and First Nations; crafting and drafting the policy, and seeking approval for the policy. It outlines some of the tricky policy issues that emerged, and how the teams of people developing and refining the policy dealt with them. Some of the key lessons that informed the policy's development came from the Columbia Basin Fish and Wildlife Compensation Program and other case studies from the BC interior.

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Summary of conference evaluation forms

There were 50 people at the conference, and 26 evaluation forms were returned.

Not all forms had a response for each question.

1. How well did the conference meet your expectation?

Fully met expectations: 16 people

Met most expectations: 9 people

Intermediate between “met most” and “met a few”: 1 person

Met only a few expectations: 0 people

Did not meet any expectations: 0 people

2. The presentations at this conference were the result of a Call for Papers. If we run a sequel to this conference, what topics would you like to see included?

- more on socio-ecosystem research; resilience and vulnerability
- more on climate change issues
- more about wildlife–human management issues from the visitor experience perspective as opposed to wildlife impacts
- more on recreational user and land management issues, i.e. winter users
- meeting “modern” expectations for activities in protected areas
- economy vs. protection debates
- wants presentations that explicitly incorporate psychological and organizational behaviour theories into environmental/resource management challenges
- more on methods and theory
- more best practices and success stories
- First Nations issues and perspectives (5)
- ecosystem valuation, more on economics
- tools for human dimensions practitioners
- discussion on fisheries
- urban ecological issues, improving environmental productivity in urban areas
- how to use facilitation and participatory techniques to improve application of human dimensions in resource management

- more information on how public participation info was used and integrated into final outcomes and decisions
- less presentation-style approach, more participatory to allow for more discussion and sharing in groups
- story telling is huge for getting a message across, how to do this
- more inspirations for engaging public in nature and wildlife
- how to reach regular people and excite them about conservation, how to get them to care
- wants specific speakers targeted to give a broader spectrum of presentations from over the full span of natural resource management. Invite some of the pros that lead this kind of work and practitioners from other provinces.
- more cutting edge methodology, information on new computer programs, etc.
- more information on how public participation info was used and integrated into final outcomes and decisions.

3. *Do you have comments for us to pass on to specific presenters?*

- I was impressed with how the presenters spoke and presented before the room. High quality across the board!
- workshop discussion session at end would be useful
- all presenters should definitely provide a text summary for the CMI website
- all were good. depth of presentations was good
- some presenters missed the human dimensions piece, they almost got their but needed more time. More need to focus in.
- too many acronyms made it difficult to follow
- thanks for sharing your experiences
- assume more existing knowledge in the audience and be more technical.
- (two critical comments which were passed to individual speakers)

4. *Do you have any other comments about the conference?*

- great conference, I enjoyed a focus on human dimensions
- enjoyed the number of student presentations. I am preparing my defence and this gave me really good insight
- liked the casual format
- good variety of presenters (3)

- good mix of presenters and field trips (style of learning)
- well organized (2)
- great informal atmosphere
- perfect number of participants
- this number of participants meant we could have discussion without breakout sessions
- great opportunities for networking, made good contacts (2)
- would like to see an annual conference or every two years. We have momentum.
- sequel is a good idea (3)
- wants a contact list of presenters and participants
- not so many presentations on day one. Wanted more time for breaks and talking, wants a panel discussion
- likes the day and a half format, with a field trip.
- wished they had attended the course before the conference (on public participation skills)
- food was fantastic
- did not like the cheese in the field trip lunches
- poor choices for gluten and lactose intolerant people
- thank you to United Church Ladies
- great facility, great location.
- community centre a good setting but chilly
- room was cold and bland, a hotel would have been better.
- hotel closer to community centre so we can walk?
- great to see high school and community members present, good to give back to Revelstoke.
- wanted more time at breaks for networking
- wanted Ajit to present earlier so we would have a framework for other talks
- changed my perceptions about many things
- BC agencies are leading the way for understanding and applying human dimensions information.
- wants people from other provinces to share their information

5. *The Columbia Mountains Institute is always looking for suggestions for courses and workshops. Our niche is offering continuing education for ecologists, foresters, biologists, and resource managers. Do you have any suggestions for courses or events you like us to organize?*

- suggests connection and collaboration with “First Nation Environmental Assessment and Technical Working Group”
<http://www.fneatwg.org>
- course about human dimensions and facilitation techniques. Would include a general overview of the disciplines, followed by practical exercise and best/worst practice/examples experienced in the fields.
- Human dimensions events specific for parks, wildlife, and fisheries
- more “human” stuff: social science research, methodologies, social media tools
- public participation
- understanding cultural diversity
- indigenous knowledge about natural resource management
- have human dimensions aspects to all events as this is a recurring theme in many disciplines
- Sequel to this, more sophisticated
- ecological goods and services, ecological economics
- environmental assessment
- Another idea for Ajit’s Public Participation course: a second phase of the course would be excellent if it went over each tool, exercise in groups to use tool, examples of how group members had used tool and was it successful, and pros/cons of each. Make it very hands on now that the basics of public participation have been covered.
- First Nations engagement. Invite them to come?
- hadn’t heard about CMI until this conference. Would be great if university faculty listservs could have your information, e.g., SFU REM students’ network.
- assessing recreational impacts on protected areas.

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