

Relevance of social science to the management of natural resources in British Columbia

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Abstract

Ecosystem-based natural resource management involves the integration of biophysical and human dimensions. Both the social sciences and biophysical sciences contribute to our understanding of the process of balancing social, economic, and biological factors. While the role of the biophysical sciences is relatively well recognized in the natural resource management sector, the contributions of the social sciences are less well understood and they are less frequently incorporated into management plans and activities. In this paper we summarize several distinct contributions of the social sciences to natural resource management and describe 10 ways that decision makers use social sciences. We predict the role of social sciences in natural resource management will become more important and we suggest that more collaborative research projects between social science researchers and natural resource managers will emerge. We also suggest that more cross-fertilization within the diverse streams of social sciences—as well as between the social sciences and biophysical sciences—will be essential in order to address complex research questions related to natural resource management.

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Introduction

Their commitment to managing natural resources sustainably has led many resource management organizations to adopt the principle of ecosystem-based management. At the heart of this approach is the recognition that ecological, social, and economic factors are intricately linked (Grumbine 1994, 1997; Yaffee 1999). While the biophysical aspects of this approach have received significant discussion and attention in British Columbia over the past 10 years, the social and economic aspects are only relatively recently finding their way into the conversation.

Many processes—such as forest certification, forest stewardship planning, criteria and indicator frameworks such as the Montreal Process, and enhanced forest management pilot projects—require forest and land managers to consider social and economic concerns. The history of integrating social science research into these processes in British Columbia is short, but it is emerging.

If the experiences in other jurisdictions can provide insight into our own future, we see the role for social sciences increasing in British Columbia. During the 1990s, the role of social sciences increased dramatically within the U.S. Department of Agriculture's Forest Service, and social sciences are now considered on par with biological, physical, and forest sciences (Estill 1999). The Forest Service's support of a National Human Dimensions Task Group has contributed to elevating the status of social scientists within that agency.

In Canada, social science researchers with the Canadian Forest Service and with the Sustainable Forest Management Network work on British Columbia issues. The Centre for Northern Forest Ecosystem Research within the Ontario Ministry of Natural Resources has had a social research scientist on staff for more than 10 years.

The need for closer involvement between social scientists and natural resource managers was voiced at the "Social and Economic Criteria and Indicators for Natural Resource Management in B.C." workshop hosted by FORREX—Forest Research Extension Partnership in 2002. At that forum, natural resource managers described the gap between their knowledge of social sciences and their need for social and economic information.

To natural resource managers, the social sciences may appear fuzzy, "soft," and not directly applicable to their work. While many managers regularly deal with social and economic issues, many others have had little

contact with anthropologists, sociologists, human geographers, psychologists, community economists, and political scientists. This paper aims to help resource managers in British Columbia understand the relevance and value of social sciences by summarizing the diverse and significant contributions that social sciences can and do make to the management of natural resources.

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How Do Social Sciences Differ from Natural Sciences?

The term "social sciences" encompasses a wide range of fields. Despite the diversity, it is easy to assume that any one social researcher can cover the entire range of social sciences. However, just as entomologists would not be expected to research fisheries issues, sociologists would not be expected to investigate political science questions.

Social scientists recognize that the social world consists of individually as well as socially constructed knowledge, which leads to a diversity of "world views." This diversity is best investigated and understood by means of a diverse set of research methods. Each management question and decision may benefit from the application of one or more of the social sciences. And this diversity also may explain why different fields of social science occasionally appear to be in significant disagreement with each other.

Social science research can include either quantitative or qualitative methods, and both methods are frequently used in a single study. Qualitative data-collection methods provide in-depth understanding of a single topic and are unique to the social sciences. Qualitative data-collection methods include individual and group interviews, surveys, content analysis (such as document review), observation, and case studies. Quantitative methods typically include surveys and document reviews, as well as the modelling of statistical trends and behaviour.



Social science research is complicated by ethical concerns because it inevitably involves human subjects. Participation in studies needs to be voluntary and fully consensual.

What Does Social Science Research Do?

While the field is too large to present all possible applications of social science research in this paper, here we highlight 10 important contributions of social sciences in informing decision making in resource management.

1. Social Science Research Documents “What Exists”

Any analysis starts with some data. The most basic types of social data are simple statistics collected routinely in the national census and other surveys, such as labour surveys, which are conducted by agencies like Statistics Canada and BC Stats. These data can be used to compile demographic, social, and economic profiles at the provincial, regional, or community levels, and to compare the profiles. Some questions associated with these data are:

- What are the socio-demographic characteristics of a community or region?
- What are the employment and industrial characteristics of a community or region?
- How many people visit a region?
- How many people use certain recreation facilities?

In addition to the routinely collected data, other descriptive information about human and industrial activity is often collected through direct observation or through surveys. For example, resource managers and planners might want to know the recreation use patterns for a certain area; these can be obtained by recording information about the behaviour of recreationists, such as how many people visit a location, and what they do there.

2. Social Sciences Examine Relationships Between Factors

Once basic data have been collected, it is possible to explore relationships between variables. Example research questions are:

- Is there a relationship between forest harvest rates and population dynamics in communities across the province?
- What are the similarities and differences between communities?

- Does a correlation exist between how people use the forest and their likelihood of participating in public forums?
- Do census data or other longitudinal data reveal trends over time?

Analyses can be undertaken with either census or survey data. These data often provide the basis for more sophisticated analyses such as economic impact assessments or social impact assessments, as described below. Some data, such as visitor counts, may also be used for more sophisticated economic valuations of non-forestry uses such as fishing and hunting.

An example of research that examines relationships is a recent paper by Tindall *et al.* (2003) that compares women’s and men’s participation in the environmental movement in British Columbia. It examines the relationship between gender and level of environmental activism.

3. Social Sciences Analyze Values, Attitudes, and Perceptions

Values, attitudes, beliefs, perceptions, and preferences guide and influence human behaviour. It is assumed that understanding values and perceptions will contribute to better predictions of the public’s reactions to policies and other interventions before they are implemented. Typical research questions are:

- What attitudes do the general population or stakeholder groups have regarding land uses, recreation activities, or management approaches?
- What values do a population or stakeholder group associate with a resource such as the forest?
- What attitudes and knowledge do the general population or stakeholder groups have about wildland fuels management, and how do these attitudes compare across jurisdictions?
- What trade-off is the public willing to make between fire hazard and scenic beauty in the wildland/urban interface?

Attitude-based research may focus either on general values, or on very specific management issues. For example, a researcher might study a community’s attitudes regarding the role of wildfire in forested ecosystems (Rideout *et al.* 2002), or attitudes regarding closures of forest roads used for recreational purposes. Robinson *et al.* (1996) also relied on attitude-type research to identify and describe stakeholder interests for the McGregor Model Forest in north-central



British Columbia. For the Foothills Model Forest in Alberta, McFarlane and Boxall (1996, 2000) compared the values and attitudes of two stakeholder groups toward the forest.

A more sophisticated form of analysis requires survey respondents to choose between, or evaluate, sets of management alternatives (Adamowicz *et al.* 1998). For example, Moore (2002) modelled the trade-offs between ecological, economic, and social indicators of sustainability for forest communities in northern Ontario. Watson *et al.* (2004) undertook a preference-based analysis of land use options and biodiversity values for the Robson Valley.

Investigating the aesthetics of forested landscapes has emerged as a separate field of inquiry in the area of social psychology. Typical research questions are:

- How would respondents describe the scenic beauty of a particular landscape scene?
- What are the effects of natural and human disturbances on the aesthetics of landscapes, especially in forested landscapes?

The government of British Columbia has introduced guidelines for managing the aesthetics of forested landscapes (e.g., B.C. Ministry of Forests 1997a), and one study has investigated the public perception of different harvesting practices (B.C. Ministry of Forests 1997b). One comprehensive paper summarizes the findings about the public's perception of forests, including perception of forest management (Ribe 1989). A recent study in the Canadian Shield of Ontario focused on the scenic beauty of natural and disturbed forested shorelines (Hunt and Haider 2000; Haider and Hunt 2002).

Attitudinal and value research are also applied to management concerns such as fire and insect management in forests. For example, Daniel (2002) investigated public tradeoffs between fire hazards and scenic beauty in the wildland/urban interface, and Monroe *et al.* (2002) looked at levels of fire emergency preparedness. Decision Research (1995) undertook a very detailed investigation of vegetation management options in Ontario's forests and also compared the opinions of the general public with those of residents of forest-dependent communities and forestry professionals.

4. Social Sciences Design, Describe, and Evaluate Decision Processes

Facilitators of large strategic land use processes in British Columbia often have backgrounds in the social sciences, such as training in conflict resolution, participatory

planning, or planning in general. Social science researchers also conduct studies that describe, compare, explain, and evaluate decision-making processes. Having a better understanding of these processes helps managers and planners avoid pitfalls and focus on the processes that have the best chance of success.

For example, researchers have begun to identify criteria for evaluating public involvement processes (Parkins and Stedman 2002). In British Columbia, the provincial land-planning processes conducted through the Commission on Resources and the Environment have been investigated and evaluated extensively (Owen 1998; Williams *et al.* 1998). Similar work is being undertaken on the Land and Resource Management Plans (Frame 2002; Albert 2002). Hunt and Haider (2001) investigated the satisfaction of tourist outfitters in northern Ontario with the forest management process and its outcomes. Other researchers have also observed and commented on trends in forest and resource management practices (e.g., Shindler 1998). Typical topics of investigation are:

- What are the most effective ways to involve the public in decision making?
- What makes some public involvement processes work and others fail?
- How fair and effective are the various decision processes?
- How satisfied are the participants (or affected population) with the participation process?

This kind of investigation can examine many different perspectives because concepts of fairness, effectiveness, and satisfaction can all be analyzed from the perspective of participants, non-participating stakeholders, and the public.

5. Social Sciences Investigate Power Relationships and Act as Agents of Change

Some social scientists focus on power and allocation of resources. Questions include:

- Why is there an uneven access to resources?
- Why are specific social groups disadvantaged?
- How can inequitable situations be changed?

These questions are usually investigated on a smaller scale, such as at the community level. Often called "participatory action research," this type of research involves community members as co-investigators, and the researcher perceives her/his role as both a researcher



and as a community “empowerer” or agent of change. The researcher may participate in community meetings, or may become immersed in the community as a way to more fully understand the society. Beckley (1998) provides a concise comparative summary of the various approaches towards consensus- and forest-based management. Ostrom’s work (1990, 1992) discusses common property theories that examine approaches to managing collectively used natural resources, such as fisheries, irrigation systems, and groundwater basins.

Some research is designed to provide mechanisms for reducing conflict, such as the work of Morford *et al.* (2003) on the relationship between jargon and conflict. A workshop and a video developed from the research have been designed to reduce conflicts that occur as a result of misunderstanding the terminology used during negotiation and public input processes.

6. Social Sciences Contribute to Understanding Indigenous Knowledge Systems, Human Culture, and Methods of Relating Western and Indigenous Forest Management Approaches

Anthropologists and other social scientists study Indigenous and Western approaches to resource management in order to assist resource managers in incorporating both approaches in decision making. Questions include:

- How can managers represent traditional ecological knowledge and Western science in management decisions?
- What types of management practices were employed by Indigenous peoples throughout history and how did these practices influence forest function?
- How does use of language and jargon among cultural groups contribute to potential conflict?

Thomson (2000) reported on a study, involving the Nicola Tribal Association in British Columbia, which used a computerized database to represent traditional knowledge. The database allowed Western data-collection approaches to be compatible with traditional ecological knowledge approaches. The methodology is adaptable to circumstances where managers want to incorporate Western management approaches with more holistic, anecdotal, and experiential approaches. Booth (1998) describes a community-focused approach to forest management in a video that features interviews with First Nations community members and leaders about their management philosophies and approaches.

7. Social Sciences Analyze Political and Institutional Structures

Political science investigates the political and institutional structures associated with forest, land, and resource management. Wilson (1998) compiled a series of essays on British Columbia wilderness under the title *Talk and Log*, and Cashore *et al.* (2001) compiled a diverse set of essays on British Columbia’s forest policy in the 1990s under the title *In Search of Sustainability*. In a similar compendium, Howlett (2001) provided a collection of essays for the Canadian forestry sector. Much of this work is based on the policy cycle concept, which is a framework for understanding how institutions work, including the factors that contribute to changes in the institutional arrangement. Jackson and Curry (2002) provided an in-depth review and discussion of the role that Forest Renewal BC played from 1996 to 2002. A book by Cortner and Moore (1999) provided a thorough policy-based discussion of the concept of ecosystem management.

Typical research questions about political and institutional structures include:

- What are the effects of various forest policies on rural community economics?
- What are the effects of various land tenure arrangements on the ability to implement ecosystem-based management in British Columbia?
- What governance issues arise out of the influence of forest certification schemes?

8. Social Sciences Assess Social and Economic Impacts

These studies examine the impact of resource management activities or economic investment activities on the social or economic fabric of a community or region.

Social impact research questions include:

- What are the effects of a forest management plan on crime rates, high school completion rates, emigration rates, or other indicators of community health?
- What are the effects of establishing a protected area on the socio-economic situation of a community or region?
- How have other rural communities dealt with transitions, and how can their learning experiences be applied to other locations?

Researchers will write community profiles that document population trends, age structure, and other social indicators. In more sophisticated investigations, community planners might want to know what activities



will lead to making the most successful transition from a timber-based economy to a more diversified economy. Some researchers might investigate the success of policies in assisting local entrepreneurs to get a foothold on other industries (Lankford *et al.* 2002). *Community Guide to Social Impact Assessment* (Burdge 1995) is one of the most authoritative books on social impact assessment.

Determining the economic impact is often required for implementing planned activities. Typical research questions are:

- What are the predicted economic impacts of a mill closure or a re-fit on a community or region?
- What are the predicted economic impacts of a new oriented strand board mill on a community or region?
- What are the predicted economic impacts of the softwood lumber dispute on various regions?
- What are the economic impacts of managing wildfire fuels and of risk mitigation for communities in the rural/urban interface?

Information on the immediate economic impacts of a planned activity can be compiled directly from the various business transactions. It is much more complex to estimate the indirect benefits associated with transactions that benefit local or regional economies in subsequent rounds of spending (multiplier effect). For some economic sectors such as tourism, no basic statistical data exist because many transactions cannot be easily distinguished from non-tourist spending. Statistics Canada has therefore spent considerable effort isolating relevant information about tourism from its baseline data via so-called "satellite accounts" in order to measure the economic contribution of these otherwise ill-defined economic activities. Other studies, such as one by Wellstead *et al.* (2001), report on visitor sector employment and income in particular geographic areas. Many economic impact studies focus on a specific

project or a specific area and time frame. In Ontario, a regional input-output model has been developed to estimate the social and economic effects associated with most economic activities, especially forestry (Kubursi *et al.* 1996). In Alberta, Alavalapati and Adamowicz (1999) and Alavalapati *et al.* (1998) have developed a much more sophisticated state-of-the-art regional economic impact model (based on the concept of a computable general equilibrium) that estimates the economic impact with more accuracy. Ecoplus Consulting Services (1995) determined the economic impacts of protected areas in British Columbia as a means of assisting the protected areas planning process that was under way at that time.

9. Social Sciences Estimate Non-timber and Non-market Values

Economic valuation is concerned with identifying and estimating the economic value associated with any particular resource, including market values and non-market values. Valuation economists pose such questions as:

- What is the economic value of recreational fishing or hunting in a particular region or province?
- What is the total economic value of protecting a particular area?
- What is the existence value of a particular (endangered) species?

These are crucial questions for managing public lands, especially in the context of forest certification and full-cost accounting, because many benefits accruing from public lands are not reflected in standard market values. Economic valuation research has therefore developed several techniques to estimate the non-market values of public goods and services. They are usually categorized into "use benefits" and "non-use benefits." Use benefits may include consumptive and non-consumptive recreation and options for future uses. Examples of non-use benefits include "existence values" (the values placed on protected areas and wilderness for their mere existence) and ecological services, such as clean air, clean water, and carbon storage. While the academic literature contains reports of many economic valuation studies undertaken in many parts of the world, relatively few studies have been undertaken in British Columbia. One example is a willingness-to-pay study that investigated the economic value of wilderness protection and recreation in British Columbia (Reid *et al.* 1995). Haener *et al.* (2000) provide another example

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of such a study in which the value of moose hunting in Saskatchewan was examined.

10. Social Sciences Evaluate Projects and Provide Decision Support Tools

The social sciences comprise a large array of approaches that can assist resource managers in formally structuring and making decisions. In many cases these tools are not isolated methods, but instead they rely on elements of the methods mentioned above. While the methods may vary widely, they attempt to focus on research questions similar to those noted above:

- What is the most economically viable project or land use alternative?
- Which project or land use alternative is most acceptable to the public?
- What trade-offs are decision makers, stakeholders, or the public at large willing to make?
- What is the structure of a complex decision context?

Economists and evaluators use *cost-benefit analysis* as a tool to systematically compare a number of alternatives. Typically, the monetary values—including non-market use and non-use values—of the land use components are estimated and compared for the alternative scenarios under consideration. *Cost-effectiveness analysis* is a similar tool and it is also used to compare alternatives. However, it leaves the value judgement up to decision makers rather than assigning monetary values.

If relevant economic data are not available, *multiple accounts analysis* (B.C. Crown Corporations Secretariat 1993) can be used. Under this framework, the crucial variables that influence decisions are not necessarily measured in monetary terms; rather, measuring is done in a unit suitable for respective variables and simply tabulated systematically for the various alternatives under consideration. The multiple accounts approach has been used in many land use planning processes, and has also been condensed into a decision support tool (Brown *et al.* 1994).

Economics literature such as *Dynamic Programming: A Tool for Financial Analysis of Stand Management Regimes* (White 1993) provides tools to help managers examine forest management activities, such as fertilization and rotation length, based on their expected financial returns; it also guides managers in ranking alternatives based on various investment criteria. Managers also use economic tools to make risk management decisions. For example, managers could consider

whether or not the cost of fuel treatment outweighs the risk of catastrophic forest fire.

A significant area of social sciences is *decision analysis*. This generic term refers to a diverse set of methods for structuring decision processes that may be focused on either single or multiple objectives. Complex problems and the associated decision making are structured around objectives. Possible indicators that may be suitable measures for these objectives are developed. Then a small set of feasible alternatives is selected, and the objectives are used to evaluate the alternatives. See McDaniels (1992) for an example of how decision analysis was applied to a land use decision in British Columbia.

Choice research is another type of decision analysis. This type of research models multi-layered preferences of many decision makers, separate stakeholder groups, or the public at large, and is also referred to as *stated preference research*. This kind of research requires data collected through surveys in which each respondent makes trade-offs between hypothetical alternatives. The results can be presented in a computer-based interactive decision support system (Akabua *et al.* 2000; Haider *et al.* 1998; Hunt and Haider 1998).

Who are the Players in Natural Resource Social Sciences in British Columbia?

Academic departments in most—if not all—post-secondary institutions in British Columbia conduct social science research related to natural resources. The researchers are sometimes found in the “social sciences” side of a campus rather than in natural resources departments, but in several institutions the curriculum and much of the research activity are integrated. Institutions such as the Canadian Forest Service and the Sustainable Forest Management Network both support a strong social science research direction. All universities in British Columbia have researchers with a wide array of expertise in many different social sciences related to resource management.

FORREX’s Socio-economics Extension Program is designed to bridge research and practice in social sciences and other natural resource disciplines; see www.forrex.org/programs/program5.asp. The University of Minnesota also maintains an on-line bibliography called “Social Sciences in Forestry” at <http://forestry.lib.umn.edu/bib/SSiF>. The International Symposium for Society and



Natural Resources Web page also lists hundreds of recent social science project abstracts from all over North America and internationally (www.indiana.edu/~issrm), and thus provides a convenient overview of state-of-the-art research, as well as access to the many researchers active in this field.

Conclusion: What is the Future of Social Sciences in Natural Resource Management?

Many social and political shifts are occurring during this time of unprecedented public interest in natural resource management. When we look into our crystal ball, we can visualize a time in British Columbia—soon—when social sciences will have a more significant role in resource management decision making.

Increased use of interdisciplinary approaches to resource management and research will be crucial in dealing effectively with the complexity of management issues. We expect increased collaboration between resource managers, natural scientists, and social scientists, as well as more interdisciplinary research within the social sciences. Most social science research will require the collaboration of managers, decision makers, and scientists during all stages of research—particularly in conceptualization. The intricate problems associated with ecosystem-based management, the implementation of forest certification frameworks and of the criteria and indicator framework, and the implementation of adaptive management concepts will all demand more of this integration.

Different types of social and economic research will be needed to provide different insights into the same problems simply because the social reality is a complex phenomenon itself, and one social science research approach or method is capable of contributing only certain insights. The concept of triangulation, where one problem is investigated with various research approaches, will therefore be important.

Finally, we expect to see even more cross-fertilization between faculties and departments at academic institutions—and perhaps more joint appointments between social sciences and traditional natural resources programs. The trend of offering social science-oriented courses as part of the traditional forestry curriculum may continue.

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