

A review and synthesis of social indicators for sustainable forest management

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Abstract

This review synthesizes some of the main themes of social sustainability indicators for forest management, and addresses conceptual categories, issues, and limitations associated with the use of social indicators. Socio-cultural values and conditions associated with quality of life, public access to non-market benefits and resources, governance, and community stability are discussed. The paper illustrates how a selection of social indicators has been prescribed and used within various sustainable forest management (SFM) systems of criteria and indicators (C&I) at different scales from the international to the local in British Columbia. Social indicators are, in general, weakly developed relative to ecological and economic indicators. Standard C&I systems often omit crucial social indicators, or include them without specific definitions or measurable benchmarks. Recommendations are made for future research that examines the fundamental nature of social indicators and their underlying cause-and-effect relationships, and supports improved methods and tools for integrating social indicators into forest management and decision making. The role of forestry in contributing to broader social indicators, such as sense of place and community cohesion, needs to be clarified.

KEYWORDS: *criteria and indicators, First Nations, outdoor recreation, public participation, social values, sustainable forest management, tourism, visual quality.*

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Introduction

The importance of the social sciences in forestry has received more recognition in recent years due in part to the sustainable forestry certification movement and its market influence in seeking a social licence¹ (Cashore *et al.* 2004). Despite their relatively recent application in forest management, social indicators have a considerable history. For several decades, practitioners from a wide range of professions have monitored the trends and conditions that support and characterize human communities and their interactions with the environment. The United Nations, for instance, has made a considerable investment in developing quality-of-life indices, such as the human development index, for the monitoring of social, economic, and environmental progress.

The scope of social sustainability has the potential to be enormous, largely due to poorly defined boundaries. This paper addresses social indicators and considers socio-cultural values and conditions associated with quality of life, public access to non-market benefits and resources, governance, and community stability. The discussion of values focusses on those influenced by forest management and relevant to common trade-offs in forest planning at regional and local levels; these include recreational, cultural, spiritual, and aesthetic values. The special concerns surrounding indicators of aboriginal values, equity, and First Nations governance are addressed briefly, but other references should be consulted for more in-depth treatment of this complex subject (e.g., Stevenson and Webb 2003).

This paper is not an exhaustive review. The objective is to summarize some of the main social sustainability indicators used in natural resource management, and to address conceptual categories, issues, and limitations associated with them. The authors recommend future research that will address the issues and problems they have presented.

Categories and Uses of Social Indicators

Forests provide many benefits to society beyond the basic need for food, water, and employment: values such as cultural diversity and identity, community recreational opportunities, and sense of place contribute to the desirability and therefore viability of communities.

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The potential for forest-based tourism is an increasing consideration for forest management. Forestry also has many influences on social conditions, such as the safety of forest workers, visitors, and residents in areas prone to fire risk, flooding, or slope instability.

Notions of quality of life and human well-being are central to social sustainability. Prescott-Allen (2001:5) defines human well-being as “a condition in which all members of society are able to determine and meet their needs and have a large range of choices.” The Human Well-being Index (Prescott-Allen 2001) was developed to measure quality of life at a global/international scale and identifies ten elements of human well-being:

1. health
2. population (in balance with the environment)
3. household wealth
4. national wealth
5. knowledge (for innovation)
6. culture (spiritual growth and self-expression)
7. freedom and governance (open decision-making processes)
8. peace and order
9. household equity
10. gender equity

While such overarching frameworks can help structure social indicators at the forest management level, there are a number of inherent characteristics of indicators that can pose problems.

¹ Social licence has been defined as: “The tacit approval the public provides to a landowner or forest manager based on its acceptance of their management practices and its recognition of their demonstrated commitment to sustainable forest stewardship” (Forest Systems 2006).

Inherent Issues and Problems with Social Indicators

First, criteria and indicator frameworks for sustainable forest management (SFM) have been developed at many levels and scales: international, national, regional, and local. As the scale of jurisdiction decreases, indicators of SFM move from the generic to the specific as they begin to address particular landscapes. While international and national frameworks typically address policy and governance concerns, regional and local frameworks can address the symptoms of, and influences on, social conditions that are more meaningful to individual communities. Social indicators data needs to be collected at a variety of appropriate scales or policy units (e.g., district, municipality, designated Indian Reserve, or park).

Second, the arbitrary nature of the separation between the three pillars of sustainability (i.e., social, ecological, and economic values) raises problems. People involved with forest management would like clear demarcations between indicators intended to measure ecological, economic, and social phenomena. However, such boundaries reflect, to a large extent, professional biases of various disciplines. For instance, a sociologist may address suicide, marriage, and divorce rates as proxy measures of life satisfaction, while an economist may develop measures of economic growth and household income to evaluate community well-being. Public perceptions of forest management outcomes may address not only social factors (e.g., community stability or recreational access), but also other types of factors, particularly ecological sustainability; various surveys of public attitudes and opinions have shown the importance of broader ecological or biophysical conditions (Robson *et al.* 2000; Tindall 2003; Sheppard and Meitner 2005). Quality of life is linked to, and dependent upon, a healthy environment (Prescott-Allen 2001). Aspects of consumptive uses of water supply—quality and quantity—are often near the top of the forest-related concerns for local residents in drier regions of British Columbia (Sheppard and Meitner 2005). There is often confusion between production of non-timber forest products (such as salal or medicinal plants) as an economic activity, and enjoyment or dependence on non-timber values as a social amenity, cultural tradition, or subsistence requirement. Are these ecological, economic, or social problems?

A third issue is the range of social indicator types on a spectrum from objective to subjective. Social indicators in the past have often constituted objective measures such as demographic characteristics (e.g., gender and ethnic composition) taken from statistical records on population, income, health, and employment. However, increasingly sociologists have employed more subjective indices such as community cohesion, social capital², and social alienation. These can be harder to define and measure (Nadeau *et al.* 1999) unless indirect, surrogate measures are used (e.g., divorce rates, youth out-migration, and crime statistics). In either case, quantitative indicators are not necessarily ideal: social indicators that are intended to include quality-of-life considerations in a community, and employment statistics for forest-dependent communities, for example, may say little about the quality of work such as long-term stability, safety, advancement opportunities, training, and so on. It must be recognized that the full range of social values cannot be reduced to a simple list of quantifiable indicators if they are to reflect what is really happening within a community. In particular, the economic valuation of quality of life may distort and trivialize those things that people value such as clean air, traditional practices, or freedom (Prescott-Allen 2001).

A related issue is that there are many publics and many stakeholders, making determination of appropriate social indicators very complicated. First Nations concerns are often treated separately in social indicator systems in Canada because of legal and governance differences. However, other sectors of society—i.e., urban versus rural or local versus global—also raise difficult problems about whose opinions should be represented and how their values are to be measured. Even within a community, people have different opinions, preferences, and needs which are often expressed as competing visions for the future of the community. In addition, perceptions can change over time with events and changing conditions.

An additional challenge posed by social indicators is the multi-causal nature of rural social problems. For instance, health problems in many First Nations communities can be attributed to disruptions to traditional subsistence lifestyles, activity levels, and diet. However, the extent to which this issue can be linked to industrial forest resource extraction versus broader forces

² Social capital “is defined by its function. It is not a single entity, but a variety of entities having two characteristics in common: They all consist of some aspect of social structure, and they facilitate certain actions of individuals who are within the structure” (Coleman 1990:302). Social capital can be considered social goods, such as information and social influence, which are produced and dissipated through social relations.

of acculturation or lifestyle choice, remains debatable. Those social conditions and indicators which forest managers can directly control or influence through management activities and policies represent a subset of the wide range of possible indicators. External forces (e.g., market fluctuations, market demand, and government policy) may dictate community well-being, and their weight relative to forestry's influence may not be clear. Even within forestry, distinctions can be made between social impacts of corporate or government-level strategies (e.g., closing of mills, introducing more shift work, and altering tenure arrangements) and the social effects of forest management practices and tactical or operational planning under the direct control of forest managers.

Developing Social Indicators

Much has been written on what constitutes a good indicator for SFM. This section is adapted from Bunnell (2000), von Mirbach (2000), Prescott-Allen (2001) and Raison *et al.* ([editors] 2001), and addresses issues raised in the above discussion. Social indicators should have the following characteristics:

Relevancy:

- Does the indicator tell us something *meaningful* about social conditions?
- Is it *sensitive* to change, and will it show trends over time?

Credibility:

- Is the indicator *reliable* (relatively free of factors that introduce “noise”) when it comes to interpreting indicator measurements?
- Is it *seen as valid* by affected communities and *grounded* in their cultural worldviews?

Measurability:

- Is the indicator *clearly defined and specific*?
- Is it measurable at an *appropriate scale* and with *sufficient accuracy* to be useful?
- Is data for this indicator *available*?

Cost-effectiveness:

- Is the cost of measuring this indicator *justified* by the value of the information it provides?

Connectedness to forestry:

- Is the indicator *responsive* to management actions and practices?
- Can future indicator levels be *forecasted* with

reasonable accuracy in relation to planned forestry activities?

A Framework for Categorizing Social Indicators for SFM

In keeping with ecological and economic indicators for SFM, sets of social indicators should include procedural indicators (what needs to be done to sustain social values) and outcome-based indicators (what social conditions are expected or desired). Procedural indicators are often related to issues of governance and compliance with established procedures, while outcome-based indicators relate more to performance criteria and results-based forestry. Based on a review of the literature, Sheppard (2003) proposes a framework for categorizing procedural and outcome-based social indicators, which is summarized below.

Procedural Social Indicators

Procedural social indicators address issues of governance and communication with stakeholders and the public through consultation, decision making, and collaborative management processes (Beckley *et al.* 2005). Such processes allow for consideration of social values and involvement of stakeholders and communities. The stages of public involvement are usually readily documented and can be reviewed by the public, outside experts, or certification auditors at a later time. The stage of decision making often does not involve the public directly, and may lack transparency. Procedural social indicators tend to be easier for forest managers to measure and document than subjective social outcomes: the number of people attending meetings, for example, is much easier to document and quantify than the increase in awareness or satisfaction level resulting from those meetings. However, the process is important (Kruger 2001; Sheppard 2003), as are the desired outcomes of that process (e.g., consensus and clear decisions).

Direct Social Outcome-based Indicators

Direct social outcome-based indicators address key social values, resources, or conditions associated with human security, social cohesion, equity, wellness, and enjoyment as estimated or measured directly via technical or scientific studies. These may draw on primary sources (e.g., specific studies) or secondary data (e.g., available demographic databases). Use of such indicators is often expert-based (sometimes called “top-down”), at least partially quantifiable, standardized, and to some extent verifiable by other experts using defined methods; examples include the objective statistics on

TABLE 1. A conceptual framework for assessing social sustainability indicators

	Relevant	Credible	Measurable	Cost-effective	Connected to forestry
Procedural social indicators					
Direct social outcome-based indicators					
Perceptions or satisfaction indicators					
Capacity and knowledge indicators					

demographics or poverty levels (Nadeau *et al.* 1999), recreational opportunity evaluation (British Columbia Ministry of Forests 1998), risk and hazard assessment, and documenting community access to services. Some of these indicators are compiled from existing data sources and are relatively economical and straightforward. Data points can be added as they become available from one year to the next for tracking trends.

Perceptions or Satisfaction Indicators

Perception or satisfaction indicators address outcomes as expressed by people’s views on and evaluations of social conditions and forest management. They usually require engagement with stakeholders and (or) the general public. These indicators can address opinions and concerns about both SFM procedures and outcomes: examples include levels of satisfaction with consultation processes or quality of recreational experiences. These results may differ from those obtained by an expert’s technical assessment of the same issue. Perception indicators speak to the core of the social licence question; they address the issues of preference and satisfaction, and are often narrowed down to judgments of acceptability, although it is understood that public acceptability can be influenced by many different factors (Shindler *et al.* 2002). These indicators can be measured through social science instruments for preference elicitation (such as public surveys and qualitative interview techniques) or through less reliable, though pragmatic and less expensive, methods such as recorded public comments or complaints, public advisory group (PAG) minutes, or practitioners’ observations.

Capacity and Knowledge Indicators

Capacity and knowledge indicators “should recognize the importance of individual and community capabilities and functioning” (MacKendrick and Parkins

2004:10). Such indicators measure outcomes of broad concepts such as social capital and community resilience in the face of changing conditions (Nadeau *et al.* 1999), and the state of peoples’ level of awareness and understanding of SFM and its consequences. Indicators of knowledge about SFM may reflect what the community has learned through their involvement with the process (Kruger 2001). Other indicators of community capacity and social capital include stakeholders’ commitment to planning processes and stewardship activities, and the extent of partnership formation. Such indicators can be measured formally through participant surveys or assessed more generally through observation of behaviour and capabilities of affected communities.

These categories can be used in conjunction with the criteria listed earlier to characterize, assess, and compare specific social indicators as suggested in Table 1 and discussed below. Several other frameworks exist for assembling suites of social indicators at the local or higher levels (Quigley *et al.* 1996; von Mirbach 2000; Parkins and Beckley 2001; Prescott-Allen 2001; Parkins *et al.* 2004; Jeakins *et al.* 2006). Indicators are also being developed for the Forest and Range Evaluation Program (FREP) under the *Forest and Range Practices Act (FRPA)* (British Columbia Ministry of Forests and Range Forest and Range Evaluation Program 2007). There have also been attempts to assemble indicators for First Nations communities and values, which tend to cut across the categories identified above, though with differing areas of emphasis. Lewis (2004), for example, identifies three broad domains or principles which appear in the literature on indigenous approaches to SFM and certification:

1. **Access:** Forest management maintains or enhances fair access to resources and economic benefits, including intergenerational access (addresses issues of process/governance, equity, and direct outcomes).

2. **Co-operative management:** Concerned stakeholders have acknowledged rights and means to manage forests co-operatively and equitably (addresses process/governance and capacity).
 3. **Social well-being:** The health of the indigenous forest users and the forest ecosystems, and the material and spiritual importance of the forest, are maintained (addresses direct outcomes and preferences).
- cost-effectiveness,
 - clarity of structures and roles in the decision-making process,
 - representation of stakeholders,
 - openness of communication and access,
 - inclusiveness of participants in the design of the process,
 - neutrality of the process, and
 - influence and accountability in decision making.

Examples of Social Indicators Used in C&I Frameworks

Four social values, or general criteria/indicators, have been selected to represent both procedural and outcome-related social issues and common forest management concerns in trade-offs among non-timber values in British Columbia. The values considered are public participation in decision making, outdoor recreation, visual quality/aesthetics, and tourism. The first is primarily procedural, while the other three present both procedural and outcome-based indicators. In each case, we provide the general rationale for indicators of these values, and relate them to the assessment criteria described previously.

We also present the strengths and weaknesses of the social components of 11 C&I systems or standards, representing four levels of forest management jurisdiction: international, national, regional, and private/local. All the systems are assessed from the perspective of the British Columbia values.

Table 2 summarizes the systems examined, and indicates the extent to which they provide outcome-based (as opposed to only procedural) indicators in the four values considered.

Public Participation: Fair and Effective Decision Making

Public participation has become a critical aspect of SFM (Canadian Council of Forest Ministers 2000; Hunt and Haider 2001; Sheppard and Achiam 2004; Beckley *et al.* 2005). Most Canadian jurisdictions now routinely employ public participation in forest land-use planning including British Columbia, Nova Scotia, Ontario, Alberta, Quebec, and New Brunswick (Canadian Council of Forest Ministers 2000). Concepts, principles, and methods for conducting public participation processes as a key component of governance are now becoming more widely understood (Beierle and Cayford 2002). Sheppard and Achiam (2004) review various attributes of effective participatory processes including:

However, two C&I systems, the Helsinki Process (Ministerial Conference on the Protection of Forests in Europe 2002) and the Forest Stewardship Council (FSC) International Standard (Forest Stewardship Council General Assembly 2004), do not address public participation explicitly. Within the Montreal Process Working Group's framework, a policy-level criterion addresses opportunities for public involvement in policy and decision making and the transfer of information: "... an informed, aware and participatory public is indispensable to promoting the sustainable management of forests" (Montreal Process Working Group 1999:2). Nonetheless, the criterion is fairly general and not readily measurable.

The Sustainable Forestry Initiative (SFI) system's ninth objective acknowledges that the availability of information is key for effective public participation. However, no proactive engagement or performance evaluation is required, such as responding to specific information requests. Similarly, the SFI system's tenth objective—conducting outreach and the use of focus groups—makes no mention of whether meaningful opportunities for public participation or influence on decision making are provided (Sustainable Forestry Initiative 2002).

The Protection of Forests in Europe (PEFC) framework weakly addresses public participation as it only requires that policies for public awareness and participation be drafted, but not necessarily implemented (Ministerial Conference on the Protection of Forests in Europe 2002). Although the United Kingdom Forestry Standard (United Kingdom Forestry Commission 2004) incorporates public participation into their framework for SFM, the language is vague, seeking only *enhanced opportunities* for increased awareness and community involvement without identifying a benchmark to measure against (i.e., enhanced from *what?*). The sole relevant indicator suggests that "consultations and involvement of communities are reasonably accommodated, especially in relation to work opportunities" (United Kingdom Forestry Commission 2004:18); yet

TABLE 2. Selected social criteria and indicators in 11 forest certification or standards programs

Level	C&I Framework	Public participation		Outdoor recreation		Visual quality		Tourism	
		C&I mentioned	Outcomes ^a explicitly addressed	C&I mentioned	Outcomes explicitly addressed	C&I mentioned	Outcomes explicitly addressed	C&I mentioned	Outcomes explicitly addressed
International	Helsinki Process	No	No	No	No	No	No	No	No
	Montreal Process	Yes	No	Yes	Yes	Generally	No	Yes	No
	FSC International	No	No	No	No	No	No	No	No
	PEFC	Yes	No	Yes	No	Yes	No	No	No
National	USDA Forest Service	Yes	No	Yes	No	No	No	Yes	No
	SFI	Yes	No	Yes	No	Yes	Largely procedural, fairly specific	No	No
	CSA ^b	Yes	Yes	Partly	No	No	No	No	No
Regional	U.K. Forestry Standard	Yes	No	Yes	Largely procedural.	Yes	Partly, but general	No	No
	FSC BC	Yes	Partly	Partly	No	Partly	No	No	Partly, as an example
Private/Local	fsc Boreal	Yes	Partly, measures not identified	Yes	Partly	Yes	No	No	No
	Canfor SFM Framework (CSA)	Yes	Yes	Yes	Yes	Yes	Yes	No	No
Total: 11 programs		No: 2 Yes: 9 Partly: 0	No: 7 Yes: 2 Partly: 2	No: 2 Yes: 7 Partly: 2	No: 7 Yes: 2 Partly: 2	No: 4 Yes: 5 Partly: 2	No: 8 Yes: 1 Partly: 2	No: 9 Yes: 2 Partly: 0	No: 10 Yes: 0 Partly: 1

^a While public participation is primarily a procedural indicator, performance outcomes can be measured for such processes in terms of participant satisfaction, attainment of consensus, etc.
^b Although the CSA framework is a national framework, it is locally driven as public advisory groups assist in identifying and conceptualizing local indicators.

use of “reasonably accommodated” is ambiguous and appears to fall short of requiring a clear and meaningful role in decision making.

The United States Department of Agriculture (USDA) Forest Service National Report on Sustainable Forests (United States Department of Agriculture Forest Service 2004) assesses public participation in forest conservation and sustainable management within the context of legal, institutional, and economic frameworks. The USDA Forest Service approach recognizes that public involvement may foster support for SFM, yet the indicator is mainly procedural, seeking only to provide “opportunities for public participation in public policy and decision making related to forests and public access to information” (USDA Forest Service 2004: 64). However, the type and frequency of these opportunities are undefined, and desired outcomes are not addressed.

Public participation is prominent in the latest Canadian Standards Association (CSA) framework and is a critical component (Canadian Standards Association 2003). The public is involved in the development of indicators, targets, and thresholds, often through representatives on public advisory groups. This requirement is largely due to the high degree of public ownership of Canadian forests, and the public right to play a role in determining planning outcomes on public land. The CSA has defined effective public participation as considering “the public’s wide range of knowledge, different interests, and varying levels of involvement with regard to SFM, as well as its differing cultural and economic ties to the forest” (Canadian Standards Association 2003:12). The CSA framework is oriented towards consensus in the decision-making process and repeatedly refers to examples of this process. Adherents to the CSA framework must demonstrate that their public participation process is designed and functioning to the satisfaction of planning participants.

The importance of public participation has also been captured in the FSC’s Boreal and British Columbia standards. In the Boreal Standard (FSC Canada Working Group 2004), local citizens are accorded meaningful opportunities for participation in the development of management strategies, the management plan, and monitoring activities; however, “meaningful” is not defined, which hampers measurement. Although a broad and balanced range of public interests must be openly sought (FSC Canada Working Group 2004), the desired outcome of this process is not stated. The FSC British Columbia Standard is less specific, but does call for ongoing public participation. Within this framework it

is considered a major failure if the rights and interests of directly-affected people are not identified and incorporated into a management plan (FSC Canada Working Group—British Columbia Regional Initiative 2003).

The Canfor (2004) SFM framework incorporates public participation in two indicators: one address inclusive consultation with stakeholders and the other facilitates capacity-building through collaborative planning processes. Both of these indicators are supported by five measures with associated outcomes where appropriate (Robinson 2006).

As shown in Table 2, many of these systems weakly circumscribe the nature, depth, and desired outcomes of public participation. The CSA, regional FSC, and Canfor systems appear to provide useful precedents for more meaningful participation indicators at the working forest level.

Outdoor Recreation

Opportunities for and participation in non-commercial outdoor recreation on Crown land outside of parks and protected areas contribute to beneficial social conditions. In 1996, 82.2% of British Columbians participated in a nature-related activity (Federal-Provincial-Territorial Task Force on the Importance of Nature to Canadians 1999), and almost half of them engaged in outdoor recreation in natural areas. This survey concluded that nature-based outdoor recreation had the potential to increase by 150%, and that recreational fishing and hunting had the potential to double. The survey was employed to provide information about recreation use for earlier versions of the CCFM SFM criteria and indicator framework (which in turn informed the development of the CSA framework). However, recreation as an indicator has been difficult to measure as it doesn’t often have a market value and user fees do not fully account for it (Canadian Council of Forest Ministers 2000).

The Helsinki Process and the FSC International Standard do not address outdoor recreation explicitly. Recreation is addressed in three indicators of the Montreal Process Working Group (1999). Under the first criterion—conservation of biological diversity—indicator 1.1c addresses recreation through the recognition of The World Conservation Union (IUCN) guidelines and categories for protected areas framework: the provision of opportunities for recreation is an explicit goal of Category 2 of protected areas (The World Conservation Union 1994). However, this indicator is tangential and largely procedural. The sixth criterion recognizes

recreation and defines three specific indicators for evaluation: the area and percent of forest land managed for recreation; the number and type of facilities available for recreation; and the number of visitors as a proportion of the population and forest area. Under a third criterion—legal, institutional and economic framework for forest conservation and sustainable management—recreation is included in forest planning assessment and policy review as a forest value.

The USDA Forest Service National Report on Sustainable Forests identified three indicators for recreation and tourism which are primarily inventories of facilities and use:

1. relative area of forest land managed for general recreation;
2. number and type of facilities available for general recreation; and
3. number of visitor days relative to population and forest area.

These indicators are primarily procedural (i.e., measurements of use and infrastructure) and do not identify desired outcomes. The USDA Forest Service explicitly acknowledges that recreation is a significant part of people's lifestyles, and also identifies data gaps that make the measurement of these indicators difficult.

The PEFC (Ministerial Conference on the Protection of Forests in Europe 2002) addresses recreation in two indicators. Recreation access is framed as a quantitative indicator where an area of forest is measured to provide an indication of intensity of use. However, specific recreation access outcomes are not addressed. Assessing policies for the provision of recreation is the second indicator, but it lacks measures of the effectiveness of the policies.

The SFI framework incorporates recreation into socially sound practices as three supporting indicators; these indicators are largely procedural and do not address implementation and monitoring of the indicators. The first indicator—providing opportunities for recreation that are consistent with forest management objectives—may not be valid or credible since it is contingent on whatever planning process has been undertaken, which may intentionally omit recreation objectives. The second indicator—providing accessibility to staff—is unclear as to its relevancy to recreation opportunities. The third indicator—maintaining recreation access as appropriate to significant and special places—recognizes the importance of place to recreation quality, but is vague and contingent on an unstated definition of “appropriateness” (Sustainable Forestry Initiative 2002).

The United Kingdom Forestry Commission (2004) does not frame recreation as an economic value, but views it in the context of community and culture. The commission recognizes that recreation plays an important role in forested landscapes and calls for recreation opportunities and access to be enhanced, but the indicators are poorly defined and largely procedural.

The CSA framework incorporates outdoor recreation into its vision of SFM. It advocates the management of a mix of timber and non-timber benefits as necessary components of sustainable forest management (Canadian Standards Association 2003). Outdoor recreation is generally framed as an economic amenity, but desired recreation outcomes are not specifically addressed.

Although recreation was explicitly addressed in the CCFM's 2000 SFM framework, specific mention of it was surprisingly dropped in the 2003 framework (Canadian Council of Forest Ministers 2003). A consequence of this is that the CCFM and the CSA no longer have clear links to the sixth criterion (i.e., 6.2a, b, and c) of the Montreal Process which addresses recreation (Canadian Council of Forest Ministers Technical Working Groups 2004).

Outdoor recreation is a consideration in three of the FSC Boreal Standard's principles for SFM and includes access management and the provision of access to remote areas for recreation. Recreation is explicitly addressed as both a cultural value and a resource, in terms of management objectives, strategies, inventorying resources, and monitoring impacts of recreation opportunities (FSC Canada Working Group 2004). However, desired outcomes are not clearly stated.

In the FSC British Columbia Standard, although recreation is mentioned as one of the values supported by forests that are central to the British Columbian way of life, it is only included tangentially in the seventh principle where adherents are directed to describe recreation resources and supporting inventories (FSC Canada Working Group—British Columbia Regional Initiative 2003). This approach is again procedural only, and while measurable, is not relevant to sustaining recreation outcomes and values, or fails to show how these might be connected to forest management actions.

One of the indicators of the Canfor (2004) SFM framework calls for the enhancement of resources and opportunities for recreation. The indicator is supported by six quantifiable measures that can be compared against an existing baseline condition:

1. area and percentage of forest managed primarily for one or more important recreation activities (by activity);

2. number of maintained recreation sites and facilities;
3. success in maintaining major existing access routes for recreation and communicating changes effectively to users;
4. balance of primitive, semi-primitive, and developed recreation opportunities maintained relative to current Recreation Opportunity Spectrum inventory;
5. number of visitor days attributed to recreation and tourism; and
6. level of satisfaction (for a range of activity types) maintained or enhanced.

As summarized in Table 2, many SFM systems omit recreation explicitly or provide indicators that are vaguely defined and are primarily procedural; some include specific quantifiable outcomes, but fail to address relevant outcomes as perceived by resource users (e.g., quality of experience). Of the conventional certification systems reviewed here, the Boreal FSC and the Canfor SFM framework systems appear to provide the most meaningful recreation indicators for further consideration at the forest level.

Visual Quality and Aesthetics

Aesthetics and visual quality are important to the economy, quality of life, and identity of regions such as British Columbia, but they also make contributions to other social values, such as recreation and tourism. This section is adapted from reviews by Burley (2001) and Sheppard *et al.* (2004).

The Helsinki Process (Ministerial Conference on the Protection of Forests in Europe 2002), the FSC International Standard (Forest Stewardship Council General Assembly 2004), and the USDA Forest Service National Report on Sustainable Forests (USDA Forest Service 2004) do not address visual quality or aesthetics.

Aesthetics are addressed tangentially in a procedural indicator of the Montreal Process Working Group (1999). Under the first criterion—conservation of biological diversity—indicator 1.1c incorporates aesthetics through use of The World Conservation Union (IUCN) guidelines for protected areas framework, categories three (natural monuments) and five (protected landscapes/seascapes); however, outcomes are not identified (The World Conservation Union 1994).

The PEFC framework addresses aesthetics in their sixth criterion—maintenance of other socio-economic functions and conditions (Ministerial Conference on the Protection of Forests in Europe 2002). However, the

treatment of aesthetics is procedural with only vague guidance for practice, and no quantitative indicators are provided.

The SFI system addresses aesthetics through 25 indicators, some of which are quite specific like maximum clearcut sizes and green-up requirements. Some specify desired methods of visual resource management (Sustainable Forestry Initiative 2002). However, nearly all of them are procedural.

The United Kingdom Forestry Standard (United Kingdom Forestry Commission 2004) provides the strongest framework for addressing visual quality and aesthetics. Under the forest management unit indicators, there must be evidence that landscape principles of forest design are used, and aesthetic values are to be maintained and improved as a management consideration. While the Standard is specific about visual resource priorities (e.g., sites within designed landscapes of heritage importance and areas of highly valued character) the targets and desired conditions are vague.

Aesthetics are addressed in the FSC Boreal Standard (FSC Canada Working Group 2004) and the British Columbia Standard (FSC Canada Working Group–British Columbia Regional Initiative 2003) as part of their monitoring and assessment principle. The impacts of forest management on “cultural values and resources,” which includes high aesthetic value areas, are monitored, but outcome-based indicators are not provided.

The CSA framework does not address aesthetics. However, Canfor’s (2004) SFM framework (which is based on the CSA approach) explicitly addresses measurable satisfaction outcomes, stating that the visual quality of the harvested land base must be acceptable to a broad range of stakeholders. The framework is supported by three landscape measures that are quantifiable and explicit (Meitner *et al.* 2006).

Overall, many systems of indicators omit visual quality explicitly or identify indicators that are vaguely defined and primarily procedural (Table 2); even those which are specific or suggest desired outcomes fail to link strongly with existing visual resource inventory systems or address visual quality as perceived by users. The SFI, the United Kingdom Forestry Standard, and the Canfor systems appear to provide the most meaningful indicators on visual quality at the forest level.

Tourism

Generally, tourism is poorly addressed, if at all, in the eleven frameworks. The Montreal Process Working Group (1999) addresses tourism within the context of recreation in the sixth criterion, yet the three indicators are indistinguishable from the recreation indicators. Although tourism and recreation are not explicitly addressed in the CSA (2003) framework, ecotourism is included as a non-timber benefit and is framed in economic terms. The FSC British Columbia Standard (FSC Canada Working Group 2004) addresses tourism as a social cost to consider in forest management, and is also framed in economic terms. The USDA Forest Service National Report on Sustainable Forests (USDA Forest Service 2004) considers tourism and recreation together in the three procedural indicators that measure visitor use, infrastructure, and area of a forest managed for general tourism; however, preferred outcomes are not identified. The remaining seven frameworks do not address tourism explicitly (Table 2).

Despite the importance of tourism to the economy of British Columbia, there is a potential conflict between timber values and tourism development. Yet tourism has potential as a high-value forest product and pillar of community sustainability. Therefore, the omission of tourism from the development of social indicators for SFM remains a large gap (Beckley 2000). Visitor-based, provider-based, or dependent community-based satisfaction outcomes appear to be completely lacking. This is a potentially serious problem given the importance of quality-of-visitor experience in achieving a successful and beneficial tourism sector. In addition, tourism can play a key role in informing visitors about forestry in British Columbia.

Summary of System Approaches to Social Indicators

At the international level, it is expected that indicators be broader and less relevant to specific community or resource outcomes. The role of forests in providing long-term well-being of local populations is recognized in the Montreal Process and some of its criteria, but not explicitly in the Helsinki Process. The FSC International Standard is largely procedural, focussing on the development and implementation of management plans and establishing a structure to inform national and regional level standards. It identifies broad principles and criteria for SFM, but public participation, recreation, visual quality, and tourism are not mentioned; the focus is instead

on social rights, environment, and sustainable economics. The fourth and fifth principles in this framework seek to enhance economic and social well-being, and call for the efficient use of forests to provide economic viability and social benefits (FSC General Assembly 2004). Although the PEFC addresses social indicators in their SFM framework, its treatment of public participation, outdoor recreation, and visual quality is procedural and does not address specific outcomes (Ministerial Conference on the Protection of Forests in Europe 2002).

The FSC Boreal and British Columbia Standards are somewhat more specific about social values than the International Standard, but they remain largely procedural. The British Columbia Standard is strong on workers' safety and rights, but provides little guidance on quality-of-life benefits, and is more heavily weighted to ecological indicators.

In contrast, the United Kingdom Forestry Standard (United Kingdom Forestry Commission 2004) gives amenity and cultural values a higher profile than any of the Canadian systems (Burley 2001). The SFI framework consists of largely procedural social indicators, but is quite comprehensive in scope; visual quality is prominent, but the treatment of recreation is weakly incorporated into socially sound practices and significant places as supporting indicators. The latest CSA framework is especially strong regarding public participation relative to all other official systems examined. It sets targets for inclusion of the public in various aspects of sustainability assessment and decision making. However, surprisingly, recreation, visual quality, and tourism are not explicitly addressed. Like the SFI, the CSA enables forestry companies to develop their own certification standard on a case-by-case basis (i.e., it is locally driven), thereby not presenting a consistent minimum standard.

The USDA Forest Service National Report on Sustainable Forests (USDA Forest Service 2004) is consistent with the Montreal Process and addresses public participation, recreation, and tourism with procedural indicators. However, as with most other SFM frameworks, desired outcomes are not identified. Although the USDA Forest Service Framework does not address visual quality, it does provide indicators for other contributing elements to social aspects of SFM including cultural, spiritual, and community needs and values.

The framework in use by Canfor (2004) emphasizes pragmatic, manageable indicators, and represents a wider range of social issues than in many higher-level frameworks. It acknowledges the need for measurable

outcomes and incorporates a relatively high level of public participation in determining those outcomes.

Although local stakeholder processes may be well-defined through public advisory groups, they are often heavily influenced by the company responsible for their implementation (Parkins 2002). They may not be effective in defining meaningful and measurable social indicators. They may, therefore, fail to protect a wide range of social values or improve management (Forests and the European Union Resource Network 2004).

A Synthesis of Social Criteria and Indicators

Problems and Gaps in the use of Social Indicators

It is widely recognized that social C&I have until recently been given less weight than ecological and economic ones (Haynes 2005), and that the state of our knowledge on social indicators is weak (Burley 2001). With the recent exception of procedures for public involvement in forestry (Hislop and Twery 2001; Sheppard and Achiam 2004; Beckley *et al.* 2005), there is seldom comprehensive or detailed guidance on using social objectives, measures, and methods. Burley (2001:97) argues that “for some criteria, no good quantitative indicators have yet been developed, particularly for social benefits.” In several SFM frameworks, it is still common to find social indicators that are few in number, incomplete, and often vague or largely meaningless. Many social indicators employ permissive terms like “taking into account” that are not specific, measurable, or substantive.

Social values are commonly framed and measured in economic terms (Nadeau *et al.* 1999). They reflect cultural conventions of the “good life” as a material standard-of-living, and use standard objective indices of community well-being such as gross domestic product (Diener and Suh 1997). Even where there is legitimate overlap with economic-related values (e.g., employment), the treatment of non-timber values often falls short, exacerbated by poor data availability. Economic diversity (i.e., reducing reliance on a timber economy) is an important and desired community trait; yet tourism values associated with forests, for example, are not explicitly addressed in many SFM frameworks.

Many SFM approaches can be criticized for framing social indicators without an appropriate background on the community or stakeholder values being addressed. Top-down indicators established by experts or resource managers are seldom grounded in the experience of

the affected communities and stakeholders, and may represent a last minute “add-on” to pre-existing lists of C&I or longstanding forest management objectives. Ultimately, the development of locally relevant C&I for both indigenous and non-native communities needs to follow a “bottom-up” approach, with scientific and management experts facilitating their development. MacKendrick and Parkins (2004) suggest that if social outcomes are to be meaningfully addressed, it is better to first identify desired social outcomes and associated measures, and then frame the C&I to match them. Similarly, rather than focussing on forest sustainability with the assumption that social values will follow, a preferred approach might be to identify the needs of social sustainability and then determine how the context of forest management may affect it (Beckley 2000).

Commonly used social indicators are often procedural and do not measure salient outcomes. This is to be expected in areas of governance and public involvement. The CSA system in particular stands out as setting a generally high and effective standard in governance and public involvement. In a review of indicators used by the Canadian Model Forest Network (von Mirbach 2000), 46% of 134 social indicators were procedural (Sheppard 2003). Of the remaining 54% relating to social outcomes of forest management (e.g., number of well-maintained recreation sites), the majority (39%) were measured directly by experts. Only 2% dealt explicitly with people’s satisfaction with the SFM process or outcomes; the remainder addressed community capacity. Expert judgments of social conditions such as visual quality (Daniel and Vining 1983; Kaplan *et al.* 1998) can depart markedly from public perceptions, raising questions about the appropriate role of standard resource inventory data on social issues (Sheppard *et al.* 2004). Measures of satisfaction with SFM outcomes are still rare in certification and management systems, and are largely missing from basic international agreements. This leaves forest managers vulnerable to differences between positive sustainability measured on the ground and negative public opinion (Sheppard 2003). It is therefore advisable that social indicator sets represent all of the four categories identified in Table 1, including both procedural and outcome indicators. The use of satisfaction indicators, however, should not be interpreted as endorsing complete consensus as the necessary criterion of success; work is needed on what constitutes appropriate levels of agreement.

In a review of C&I for First Nations, Lewis (2004) concluded that “universal” criteria and indicator

frameworks that are adapted by experts and applied across geographically and culturally distinct aboriginal communities tend to be: technocratic or academic in origin, production and economically oriented, expert-driven as opposed to locally generated, and too generalized to be readily applied to local conditions.

Sheppard *et al.* (2004) have proposed three possible reasons for the weak representation of more “subjective” indicators such as aesthetics:

1. cultural bias among professionals and scientists to favour more easily quantifiable values;
2. general lack of social science training; and
3. absence of substantive public input in SFM framework development.

If “subjective” issues are not codified in an indicator which is grounded in the community context, social outcomes may be based on an individual’s taste or bias rather than by scientifically determined public preferences (Sheppard *et al.* 2004). Clearly defined outcomes and expectations are more likely to result in consistent interpretations and measurement.

There are significant inter- and intra-cultural perceptions of the environment that guide action and definitions of socially acceptable forest management. Development of socio-cultural indicators for aboriginal and non-native communities should recognize the importance of cultural, normative, and symbolic elements as well as the physical and economic bases of social sustainability. Resource managers should take these localized and culturally relevant indicators into consideration (Lewis 2004), along with externally derived “scientific” indicators. This would allow managers to make decisions by examining individuals’ choices about enhancing their lives, rather than by considering only aggregated higher-level statistical patterns. How people define the “good life” varies considerably within regions, and even among individuals in a community. The most appropriate approach to measuring life satisfaction may be to determine whether individuals can obtain the things they desire from life (Diener and Suh 1997). Methods available to achieve this information have been in use for decades by ethnographers, and include a variety of qualitative and quantitative techniques to prompt dialogue such as: in-depth, semi-structured interviews; analysis of oral histories and community narratives; photo-elicitation; Geographic Information Systems (GIS) mapping; and visualisation (Lewis 2000). However, the cost-effectiveness of these intensive methods, alone or in combination with more standard tools such

as surveys and focus groups, has yet to be established in routine SFM practice. Generally, it’s expected that the cost and complexity of forest management and certification will increase with in-depth social measurement methods. However, there may be considerable beneficial impacts such as: improved awareness of community sensitivities that may avoid unforeseen delays and costs; increased social learning about forest management; and improved community relations through increased communication.

The difficulty associated with trying to develop locally-driven contextualized indicators is primarily a function of finding data sources that accurately reflect local conditions and community values. There is a trade-off between validated, stable, and comprehensive data at larger geographic scales (e.g., regional, provincial, national, or higher scales) where internal variability is a major issue, and less reliable and more idiosyncratic data at smaller scales (e.g., municipalities, census tracts, and postal code units), where the localized nature of the data more accurately reflects local conditions (D. Tindall, University of British Columbia Departments of Forest Resource Management and Sociology, pers. comm., 2005). Other problems with using local indicators of satisfaction or other outcomes include the risk of deliberate bias in responses from community participants, or simply the inaccuracies of self-reporting methods (Schwartz 1999).

Standardized indicators permit researchers to make comparisons easily between communities and over time. However, the expert-driven methods have their limitations. General, standardized, or top-down indicators may not provide information of interest to particular communities or relate well to forest management activities, and they often refer exclusively to variables where there is available data rather than to more meaningful characteristics (D. Tindall, University of British Columbia Departments of Forest Resource Management and Sociology, pers. comm., 2005). Kusel and Fortmann (1991) have noted that conventional expert-driven socio-demographic indicators of community well-being can hide considerable inequality because they are based on aggregated or average values. Forest communities are comprised of diverse populations which may or may not benefit equally from access to forest wealth. For instance, in many rural British Columbia communities, particularly those with large First Nations populations, there is a fairly wide gap between the “haves” and “have nots,” as illustrated by a strongly bimodal distribution of income. Also, it is often unclear how pre-existing socio-economic

information such as census data, should be interpreted in terms of sufficient or even desirable levels of an indicator value, such as health or social cohesion: when do changes in these conditions become critical?

Methods for identifying indicators using subjective, locally based surveys (i.e., bottom-up indicators) rather than objective, statistically based indices, have the advantages of relevance and credibility to the community. They increase the depth of the manager's or researcher's understanding of a particular community (Parkins and Beckley 2001). They are more likely to address local concerns and interests as they emphasize people's perceptions of their own well-being and the factors that influence it. They can be reapplied within the same community by means of regular surveys, which makes them amenable to statistical comparisons as well as providing a vital tool for measuring shifts in community values and circumstances over time.

Such methods also measure the diversity of people—different ethnic groups, different lifestyles, and urban and rural residents—who make use of the forests. Recognition of the diversity of cultural needs and experiential knowledge and skills within communities is important pragmatically and ethically if social acceptability for management decisions is to be gained. One disadvantage of locally-derived or customized indicators is that using them to compare communities or to track community indicators at an aggregated level is difficult.

In developing sets of indicators, most current SFM frameworks attempt to structure indicators into rigid and mutually exclusive categories and ignore vital links between ecological sustainability and quality of life. An effective suite of indicators may not necessarily be the most exhaustive; it may be better to use a narrower list of indicators recognizing that each indicator may address one or more social values. For instance, dependence on a “country food” diet in a First Nations community may be an indicator of community health, as well as social cohesion and the stability of traditions and customs. Clearly, it is important for experts in social sciences and related disciplines to work alongside forest managers to define cost-effective suites of key indicators and methods to contextualize them through engagement with communities. It is also apparent, as referenced in the CSA system, that the public should have a role in setting indicators; any pre-existing set of indicators should be treated as a baseline template for further discussion and adaptations through an iterative local process.

Finally, the question of the role of forestry in

determining broader characteristics of community well-being is not yet clear; however, there are major implications for selecting indicators that can be influenced by managers versus other agencies and policy-makers. There is considerable debate on cause-and-effect relationships, for example, in the connections between local timber production and community well-being (Parkins *et al.* 2004). Weaknesses in co-ordinated planning on private and Crown land in British Columbia between regional districts and the provincial government, for example, raises difficult questions on the relative impact of forest management on rural quality of life. Fundamental factors such as climate change may also limit or exacerbate the influence of forest managers on social sustainability.

Research Directions

Relative to silvicultural, ecological, and economic elements, little is known about the social elements that need to be addressed in SFM framework development. There are a multitude of research needs that require consideration. However, there are a number of areas where relevant research (i.e., on general public participation and ethnographic/cultural research methods) has been conducted. What is required is to extend this information to potential users in industry, government, and communities.

Additionally, trade-off analysis methods in other disciplines, recreation management approaches in the United States, and sense-of-place analysis methods need to be adapted and tested in the British Columbia forestry context.

Present and Ongoing Research

There is a considerable amount of social science research in development which should begin to fill some gaps in knowledge over the next 2–5 years. There is a variety of ongoing research in Western Canada at the following prominent loci:

- The Canadian Forest Service, Edmonton, has research programs in community sustainability, participatory methods, and recreation behaviour.
- The Sustainable Forest Management Network, Edmonton, supports collaborative research with First Nations communities and other partners, and sponsors an ongoing study on defining social sustainability.
- The British Columbia Ministry of Forests and Range, Victoria, co-ordinates a visual resource management

program that focusses on visual perceptions of forestry.

- Universities in British Columbia—Malaspina University–College, Simon Fraser University’s Resource and Environmental Management Program, University of British Columbia’s Forest Resource Management Department, University of Northern British Columbia, and University of Victoria—research multi-disciplinary aspects of forest management, including: integrated resource management, multi-criteria modelling and scenario analysis, cultural anthropology, social surveys, aesthetics and landscape planning, recreation inventory and modelling, landscape visualisation, and public participation.
- Various forest companies—e.g., Canfor, Tembec, Tolko, Weldwood—implement SFM systems and (or) support research which can involve public surveys, public advisory groups, and planning processes.

Research Needs for Western Canada

Prioritizing the multitude of research needs for Western Canada should be guided by the following considerations:

- fundamental research on social issues which would complete or synthesize prior studies and provide a strong platform on which to develop guidelines for the practice of forestry and further research over the long term;
- immediate opportunities to learn from already-funded, ongoing activities or programs that may not be as accessible in a few years’ time and are not generally well-documented or analyzed systematically for the benefit of others (e.g., current attempts to implement SFM frameworks in communities across British Columbia);
- relevance to urgent or rapidly emerging themes and issues in forest management that involve social dimensions; and
- applicability of research and methods used in other countries and regions of Canada that may be adaptable and readily transferable to Western Canada.

Priorities for further research on social indicators can be organized into two main clusters of topics.

Fundamental Research Priorities

The fundamental research priorities identified here examine the *nature of social indicators and their underlying cause-and-effect relationships*, and should contribute to a deeper and broader understanding of key social issues and theory. Many of these priorities apply to

social outcomes (particularly preference and satisfaction measures, and community capacity), and emphasize understanding the salience, validity, and reliability of social indicators. There are five areas of research that should be prioritized:

1. Characterization of the *diversity and patterns of key characteristics, values, attitudes and perceptions* among communities and stakeholders that go beyond assumed polarities between environmental and timber interests: examples include determining the commonalities among multiple stakeholders, local versus urban preferences, and shifts in perception over time—Generally, there is very little documented about the current state and direction of social indicator trends (e.g., on social cohesion and how it relates to forestry), or relationships between local, regional, and global acceptability for various forest resource trade-offs. Research in this area would support the robustness and applicability of indicators in various settings.
2. Identification of *attitudes towards acceptability* of forest management practices, including the role of knowledge and how it is delivered (e.g., via the media, social networks, government programmes, and collaborative learning processes)—This research should include both perception experiments to pin down cause-and-effect relationships under controlled conditions, and validation with real-world case studies.
3. Establishment of *subsets of general/standardized indicators relevant to forest management* for comparison across communities using data that has been collected at the local level—This approach should be employed to examine the role of standard FRPA social values (recreation, visual, and cultural) in British Columbia. The choice of indicators should also illuminate the *cause-and-effect relationships between forestry and broader social indicators* such as community cohesion, sense of place, and spiritual values.
4. Establishment of a scientific basis for *thresholds and desired levels in key social indicators* such as the FRPA social values and broader indicators of community capacity and well-being, so that these can be translated into meaningful targets for indicators.
5. Investigation of the *interactions between and among social and other indicators*, including acceptability of trade-offs over time within current stakeholders’ lifetimes and across generations.

Pragmatic Research Priorities

Pragmatic research supports the *development, testing, and implementation of methods and tools for integrating social indicators* into forest management and decision making. They emphasize participatory methods and preference elicitation where there has been little prior experience in the forestry sector. Is it important to demonstrate the utility of processes and techniques in practice (i.e., public consultation) such as assessing the efficacy of procedural indicators. There are five pragmatic areas of SFM research that should be prioritized:

1. Development of *participatory methods for defining* more meaningful, contextual, and “subjective” indicators for social outcomes that relate to forest management activities; *inventorying* those outcomes in measurable terms; and *identification of thresholds* in preferences and acceptability levels among stakeholders.
2. Development of methods to *weigh the perceived importance of indicators*, identify real (versus assumed) *trade-offs*, and evaluate appropriate trade-off decisions.
3. Development and testing of promising *new tools and associated participatory processes* for integrating social indicators into decision making, such as perception testing, multi-criteria scenario analysis (Sheppard 2005), choice experiments (Haider *et al.* 1998), participatory GIS, participatory modelling (Mendoza and Prabhu 2005), landscape visualization (Sheppard and Meitner 2005), and community charettes—An important consideration is whether these tools live up to their promise in helping to measure “subjective” preferences or to envision long-term forest futures after beetle infestation or under climate change.
4. Longitudinal assessment of what works in social indicator systems and what is useful in practice through “*fly-on-the-wall*” *case studies* in participatory SFM, co-management with First Nations, and community forests—Determination of methods that can be used reliably without advanced social science expertise would be especially valuable.
5. Low-cost techniques for *participatory monitoring* of indicators (Lawrence 2003) with documentation of benefits and risks in terms of community relations and scientific credibility.

Social indicator research is particularly needed to address currently critical issues and emerging themes

in forest management in British Columbia and should include the following:

- Identifying the range of perceptions that the public has about the mountain pine beetle epidemic and associated management responses with attention to desired or alternative visions of the future of the post-attack forest.
- Investigating thresholds of acceptability of prescribed burning and fuel reduction/fire management strategies with reference to information provided to the affected wildland-interface communities—(This has been widely studied in the United States).
- Exploring the public’s perceptions and understanding of climate change impacts to forested landscapes, including issues of mitigation, and the vulnerability of the forest industry and resource-dependent communities.
- Understanding the future of variable retention harvesting systems and their applicability in different areas of the province—Early evidence suggests increased levels of public acceptability with some partial cutting systems, just as industry’s commitment to such methods is in doubt. Although researchers are close to defining public acceptability thresholds and relationships to perceived sustainability or stewardship with these new forest practices, there is a need for improved visual indicators and modelling to more reliably and cost-effectively identify thresholds for acceptable harvesting plans.
- Establishing targets and thresholds for recreation satisfaction—The recreation experience, perhaps the most relevant element of recreation participation, is largely unaddressed by SFM C&I frameworks. Recreation experience can be measured in terms of a person’s satisfaction with recreation management outcomes; the framing of the recreation experience in terms of satisfaction is both measurable and transparent.
- Developing indicators that help to inform the appropriate balance of tourism and timber production (including measures of the quality of visitors’ experiences)—For example, defining back-country or roadless area values, an increasingly important economic resource in British Columbia.
- Analyzing and documenting cultural heritage values and sense-of-place indicators associated with community cohesion and affected by forest management practices among First Nations and other

communities—This would be valuable for monitoring some of the more subjective aspects of people's attachment to the places where they live.

It is anticipated that these research priorities might lead to more effective, meaningful, and contextual social indicators. To increase public acceptance of forest management decisions, both scientists and managers need to improve their understanding of management outcomes for social values within the context of the people that are affected by these outcomes. Improved knowledge would reduce risks to global market factors and local forest management operations, and promote trust and credibility among the various stakeholders. The recent move by various forest companies, First Nations, and community forests towards initial implementation of social indicators as part of SFM C&I systems in Canada, heralds the next wave of experimentation and learning in this rapidly developing field.

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Test Your Knowledge . . .

A review and synthesis of social indicators for sustainable forest management

How well can you recall some of the main messages in the preceding Discussion Paper? Test your knowledge by answering the following questions. Answers are at the bottom of the page.

1. Which national/international SFM frameworks provide explicit and meaningful directions/indicators that address visual quality?
 - A) All except the Helsinki Process and the FSC International Standard
 - B) Only the Sustainable Forestry Institute and United Kingdom Forestry Standard
 - C) None

2. For the majority of people who participate in outdoor recreation activities, it is the recreation experience that matters most. Which of the following approaches might best measure the recreation experience?
 - A) A survey of the public that asks about their satisfaction with their recreation experiences
 - B) Expert opinion about what constitutes a good recreation experience
 - C) Public meetings about goals for recreation management

3. Which SFM C&I framework is predicated on a high degree of public participation and involves the public in the development of indicators, targets, and thresholds?
 - A) Canadian Standards Association (CSA)
 - B) Forest Stewardship Council (FSC) Boreal Standard
 - C) United Kingdom Forestry Standard

ANSWERS

1. B 2. A 3. A