

Capturing Old-Growth Values for Use in Forest Decision-Making

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Abstract Old-growth forests have declined significantly across the world. Decisions related to old growth are often mired in challenges of value diversity, conflict, data gaps, and resource pressures. This article describes old-growth values of citizens and groups in Nova Scotia, Canada, for integration in sustainable forest management (SFM) decision-making. The study is based on data from 76 research subjects who participated in nine field trips to forest stands. Research subjects were drawn from Aboriginal groups, environmental organizations, forestry professionals, and rural and urban publics. Diaries, group discussions, and rating sheets were used to elicit information during the field trips. Findings show that different elicitation techniques can influence the articulation of intensity with which some values are held. In addition, certain values are more often associated with old-growth than with other forest-age classes. Some values associated with old-growth are considered more important than others, and some silvicultural treatments are perceived to compromise old-growth values more than others. Demographic characteristics, such as constituency group, gender, and age, are shown to influence value

priorities. Ideas on how to incorporate old-growth values into SFM decision-making are highlighted.

Keywords Old-growth forest · Values · Stakeholders · Field trips · Mixed-methods · Canada · Nova Scotia · Decision-making

Introduction

Prior to European contact, human use of Canadian forests could be characterized as subsistence, i.e., primarily local use with low levels of impact, easily replaced by natural growth (Burton and others 2003). Aboriginal peoples of Canada used the forest for many purposes including food, shelter, fuel, clothing, medicine, rope, and timber for houses, boats, and other products (Drushka 2003). Archaeological evidence, as highlighted by Williams (2000), has shown that fire was used to clear lands for agricultural purposes and to encourage forest re-growth for certain types of flora and fauna. In Nova Scotia (NS), the Mi'kmaw people used the forest for food, transportation, shelter, and medicines (Nova Scotia Museum of Natural History 1997). Further research by Loo and Ives (2003) determined that they relied heavily on coastal resources and their impact on the forest appears to have been minimal.

Many early European Americans viewed the dense and abundant forest land with apprehension and frustration. A variety of authors (Leverett and Davis 1996; Loo and Ives 2003; Beckley 2003) noted that the transformation of forested land to farm land was seen as a positive step towards civilization. These cultural values, coupled with the fact that timber harvesting was a major economic engine in the region, supported the cutting and burning of large swaths of

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forested land for both farming and commercial timber (Leverett and Davis 1996; Loo and Ives 2003; Medley and others 2003). In NS, the first commercial timber operation (1612) was established in the first European settlement in Canada, Annapolis Royal (1605).

Trends in Canadian forest use since the 16th century have been described by Kimmins (1992) as unregulated exploitation (1600–1900), regulation (early 1900s to 1970), and ecologically-based utilitarian management (1970–1990). In recent years, the perceived degradation of forest health, conflict over old growth, and growing demand for nontimber forest values have spawned the birth of a new approach: sustainable forest management (SFM). SFM aims to sustain the health of forest ecosystems while providing ecological, economic, social, and cultural opportunities for the long term. A key tenet of SFM, according to Sheppard (2005), is the engagement of a broad range of individuals and organizations in forest planning.

Forest stand succession varies slightly depending on the forest type. For the most part, it follows four stages (Oliver and Larson 1990): stand initiation, stem exclusion, understory re-initiation, and old growth. Ecosystem and political diversity has given rise to varying definitions of old-growth forests (OGFs). Oliver and Larson (1996) defined old growth as forest in the last of the four stages of stand development generally dominated by self-replacing climax species. Other definitions focus on old-growth characteristics such as the prevalence of old trees, fallen decomposing logs, standing dead trees (snags), canopy gaps, or areas of undisturbed soil; the variety and quantity of lichens or growth layers; or the lack of human disturbance (Leverett and Davis 1996).

UNEP (2002) reported a significant decline in the total area of OGFs world-wide. Old-growth decline in Canada is more prevalent in eastern Canada where some five centuries of European settlement activities have taken their toll (Stewart and others 2003). Historical documents referenced by Mosseler and others (2003) reveal that before European contact, much of NS was covered with old-growth pine, hemlock, spruce, yellow birch, oak, sugar maple, and American beech. Several recent reports (Lynds 1989; Lynds and LeDuc 1995; Wilson and others 2001; Townsend 2004) suggest that OGFs account today for only approximately 0.1–0.3% of the total forested lands in Nova Scotia.

Old-growth conflicts on the west coast of Canada and United States have been described as a “slow motion riot” in Robertson’s study (as cited in Satterfield 2002, p. 3). Consumer boycotts of Home Depot over use of old-growth wood in building products permeated the international scene and resulted in changes to store policy (Motavalli 1999). One of Canada’s largest civil disobedience actions was over the OGFs of Clayoquot Sound (Berman 1994). In NS, conflict erupted in a case where protesters disagreed

with company officials about whether an area being cut was old growth (Grevatt 2002). On April 27, 2006 in Huntsville, Ontario, Greenpeace activists blocked train and truck shipments at Kleenex manufacturer’s factory as part of an ongoing protest over Kimberly Clark’s use of OGFs in tissue products (Greenpeace 2006). These are but a few examples of protest and conflict inspired by different opinions and perspectives regarding what constitutes the highest and best use of OGF.

Forest Values

Values are adapted abstractions (Homer and Kahle 1998) that emerge from social dialogue. They help us define who we are and how we should act. Values predispose attitudes (Tarrant and Cordel 2002). They tend to be stable over time, are limited in number (Kamakura and Mazzon 1991), are deeply held (O’Brien 2003), and are a powerful influence on human behavior (Williams 1979). Two value categories include *held* values (modes of conduct, ethical principles, or end states) and *assigned* values (the relative worth of an object, thus describing a preference relationship) (Rokeach 1973).

Common positivist approaches to value measurement rely on economic theory (Booth 1997). These approaches attempt to quantify assigned values for identification and preference purposes. In turn, this quantification of assigned values can be compared to other quantitative information in areas of the economy and the environment for incorporation into decision-making. Common economic valuation methods include tools such as hedonic pricing, contingent valuation, and constructed-preference surveys (Gregory 1999).

One strength of economic valuation approaches is that it is easier to include assigned values information (dollars and/or numbers) into standard decision-making processes such as benefit-cost analysis or multi-criteria ranking. A key weakness relates to the difficulty of capturing people’s full range of values, including held and intrinsic values. Some values are more easily measured than others. While “prices and other monetary measures are indicators of assigned values” (Brown 1984, p. 231), existence values do not appear to be bounded relative of other values.

Booth (1994) suggested that an intrinsic environmental ethic is reasonable and logical given that human beings can identify emotionally with the environment and nature. Economic approaches to valuing nature only measure benefits and costs in terms of human use and abuse. “A true moral position cannot be bought off in exchange for something of instrumental value” (Etzioni 1986, p. 168). Participant knowledge is another cited weakness of economic valuation. Bengston and Xu (1995, p. 5) commented that the “aggregation of people’s preference (measuring

assigned value) for life-support benefits (ecosystem services) is not a meaningful measure as many people are unaware of the life-supporting benefits that ecosystems provide.”

Interpretive approaches aim to understand how people construct their values within the context of their place in society (O’Brien 2003). Qualitative and quantitative methods, such as focus groups, in-depth dialogues, and multi-attribute elicitations, are common techniques of an interpretivist approach (Gregory 1999).

In the last few decades, researchers such as Dunlap and others (1992), Bengston and Xu (1995), Shindler and Cramer (1999), and Shields and others (2002) have documented shifts in North American value orientations toward environmental views. Factors cited as contributing to this change include a society less directly dependent on natural resources (McIntyre and others 2004), a more urbanized public with increasing recreational and aesthetic values (Lindhagen and Hörsten 2000), increasing environmental degradation (Steel and others 1994), and the environmental movement (Duinker 1998).

Many studies have identified values and value categories associated with forests. Typically, values categories often include two divisions such as instrumental and noninstrumental, material and nonmaterial, and anthropocentric and biocentric (Booth 1994; Bengston and Xu 1995; Manning and others 1999; McFarlane and Boxall 2000). Values frequently associated with human-oriented use and sustenance categories (instrumental, material, and anthropocentric) include economic, ecological and recreational values. Values typically associated with nonuse categories (noninstrumental, nonmaterial, and biocentric) include aesthetic, cultural, spiritual, educational, and ethical values (Rolston and Coufal 1991; Booth 1994; Bengston and Xu 1995; Manning and others 1999; Patel and others 1999; McFarlane and Boxall 2000; Brown and Reed 2000; Tarrant and others 2003; Tindall 2003).

In the recent past, economic and forest-management practices emphasized harvesting OGF for its commercial timber value before the resource was diminished by decay (Hilbert and Wiensczyk 2007). With changing societal values and increasing scarcity of OGF, contemporary OGF values have broadened to include more ecosystem, economic, aesthetic, spiritual, and cultural attributes (Williams and Harvey 2001; Rose and Chapman 2003).

OGFs provide ecosystem services, such as carbon storage, water purification, wildlife habitat, and biological diversity in the form of species, genes, and ecosystems (Hammond 1993; Reed 1993; Boyle 1997). Some of the economic benefits of OGFs, as outlined by the Association of British Columbia Professional Foresters (1993), include products such as timber and firewood and the income generated through recreation, tourism, hunting, trapping, and fishing.

Landscape-preference studies, such as those of Lindhagen and Hörsten (2000) and Kaltenborn and Bjerke (2002), identify the aesthetic appeal of OGFs and particularly large trees are embedded in the human psyche and presented through painting, poetry, and writing as something strikingly beautiful (Leverett and Davis 1996). For some, OGFs hold a spiritual or moral value embodied in feelings of respect, reverence, cultural connectedness, and sacredness. This ethic is reflected in philosophies associated with deep ecology (Lynch 1996) and traditional Aboriginal teachings.

Little has been done to identify old-growth values of different constituency groups for use in forest decision-making. The focus of this article is on a unique mixed-methods study that gathered and identified priority values of constituency groups in Nova Scotia, Canada, for integration in sustainable forest management (SFM) decision-making.

Methods

One key characteristic associated with qualitative research is the gathering of data about sensory experiences in the real world (Rossman and Rallis 2003). This is demonstrated through a number of social-science disciplines. The approach provides data in two ways: (1) participant can use all the senses (sight, touch, taste, smell, and hearing) to create a viewpoint, and (2) the researcher can collect multiple sets of sensory data for comparison purposes.

Many forest-values studies discuss and, in some cases, simulate the forest environment through written text, photographs, and visual modeling (Lewis and others 2004) through techniques such as mail-in surveys, interviews, group discussions, and landscape-preference studies. These studies rely on memories of forest environments and/or two- and three-dimensional information. The participant is a passive, visual observer rather than someone actively engaged with the environment (Mausner 2006).

Several natural settings were used for this study. This enabled participants to use all their senses, and us to observe and capture these experiences using both qualitative and quantitative methods. Some of the data captured and results expressed are uniquely indicative of this field method.

Participants were purposively selected to represent five citizen constituencies identified in the literature as groups whose values should be taken into consideration in forest decision-making (Beckley and others 1999; Bass 2001). These included Aboriginal groups, environmental non-government organizations, forestry professionals, and the urban and rural publics.

We used a multi-tiered strategy of recruitment including contacting key organizations, placing a newspaper ad, and

posting notices in key locations in urban areas of Halifax Regional Municipality and rural communities along the south shore of NS. Participants came from a variety of backgrounds and perspectives, but one could conclude that they all had some interest in OGFs, as they each agreed to participate in a day-long session.

In total, nine field trips to forest stands near Liverpool, NS, were run during fall 2005 and spring 2006 with 76 participants from Aboriginal groups, environmental organizations, forestry professionals, and the rural and urban public (Table 1). Eight of the nine field trips had mixed constituency groups. The ninth field trip focused on Aboriginal peoples as there was less Aboriginal participation compared to other constituency groups in the other eight trips.

Each field trip followed the same procedure: respondents visited six forest stands, wrote in diaries, participated in a focus-group session, and completed a rating sheet (Table 2). All three methods (diaries, focus groups, and rating sheet) included demographic information such as age and gender. As well, participants were asked to self-select as identifying with one of the five constituency groups. The citizen categories are not mutually exclusive. However, in the context of OGF management, these categories define a certain homogeneity of interests. For example, Aboriginal representatives have a cultural and legal stake that is different than that of the other four groups. Environmental representatives have a clear stake as influencers for environmental protection interests. Forestry professionals have an economic stake in employment and stewardship. More rural citizens have a direct relationship to the land through activities such as timber harvesting (National Roundtable on the Environment and Economy 1997) and thus have a different equity stake than urban citizens. Each group is steeped in seemingly different group norms and influences. In the end, participants demonstrated comfort in choosing one descriptive category with which each most closely identified.

Diaries were used in conjunction with focus-group sessions so that individual and group data could be captured. Personal reflections written in the diary provide different information than the focus-group discussion as issues of “group-think” can sometimes emerge in group sessions. Group-think can be generated by a number of elements, such as too much or too little cohesiveness, which ultimately impairs effective discussions (Janis 1972). Due to social norms and the pressure to “fit in,” people may refrain from making arguments unacceptable to the listener whom they are trying to convince.

Respondents were given diaries at the beginning of the day. Each diary included some factual information on each forest stand visited along with in-stand photos. The diaries also contained a few prompts that related to the research questions. Once at a given stand, participants were given 20 minutes to wander through the stand, reflect, and write. Participants were asked not to discuss their observations with each other or with members of the research team even in the van trips between sites as the diary writing time was for individual personal reflection. In the afternoon, they would have an opportunity to discuss thoughts in a group. The diaries followed an open-question format allowing participants to write down values and events in their own words.

The focus-group sessions in the afternoon were designed to follow principles of focus-group protocol which include the researcher as a neutral facilitator. In the case of the Aboriginal focus group, a community member helped facilitate a talking circle using the focus-group questions. In terms of timing, all trips stayed within 15 minutes of the times on the schedule outlined in Table 2.

After the field days, all the information from the diaries and focus groups, including demographic information, was typed and saved as text files. All text files were entered into N6 (formerly NUD*IST), a qualitative research software program, which was used to code information into theme areas.

Table 1 Participant characteristics and numbers

Age	Constituency											
	Mi'kmaw		Env.		For.		Rur.		Urb.		Total	
	Fem	Male	Fem	Male	Fem	Male	Fem	Male	Fem	Male	Fem	Male
<25		2	1			6		1	5	1	6	10
26–44	4	1	2	1		6	5	3	1	4	12	15
45–60		1	2	1		3	7	4	2	4	11	13
60+			1	1		1	2	2	2		5	4
Total	4	4	6	3	0	16	14	10	10	9	34	42

Mi'kmaw: All Aboriginal participants were affiliated with Mi'kmaw communities or organizations. The Mi'kmaw are the First Nations People of Nova Scotia. Env: Environment; For: Forestry; Rur: Rural; Urb: Urban

Table 2 Outline of field day

Time	Activities
6:30 am	Left Halifax West End Shopping Centre Parking Lot
8:10 am	Arrived at NS Power Station (Milton, NS)
9:00 am	Arrived at the Sixth Lake Camp (A Bowater Mersey Camp 40 km inland from Liverpool, NS): Introduction to the research project, including the distribution of diaries and safety gear (glasses and hard hats). Diaries were used to collect data to compare to the focus-group information. They were used in the first part of the day by individuals to record their thoughts as the group visited six different forest stands and at the end of the day to capture final thoughts. During the morning, participants were encouraged to focus on their personal feelings and reflections about old-growth values and not to converse with other participants.
9:30 am	Viewed Stands and Diary Writing: NS's old-growth coniferous forest, including this forest, consists of primarily hemlock, red spruce, and eastern white pine (Stewart and others 2003) with scattered deciduous species such as red maple and white birch. Stands were classified as old-growth using age as a primary criterion. Different stands of young (40–80), mature (81–120) and old-growth (120+) forests that have been uncut and partially harvested were viewed. At each stand, participants had 20 minutes to walk into the stands and write their impressions and values in the corresponding diary section. The following stands were visited in this order: young partially harvested (Stand 1); young unharvested (Stand 2); old-growth partially harvested (Stand 3); old-growth unharvested (Stand 6); old-growth unharvested (Stand 5); mature unharvested (Stand 4). Theoretically, a mature-harvested stand should have been visited; however, none was available within a viable viewing range; therefore, another old-growth unharvested stand was viewed. Of the partially-harvested sites there was less canopy in the old-growth Stand 3. The young partially-harvested stand was thinned approximately 8–10 years prior. Clear cut sites were not visited as this would have increased the stand visiting time in an already packed day and perceptions of clear cuts would more easily be acquired through discussion than perceptions of partially harvested stands. The distance between the first and last stand was approximately 12 km. The base camp was located close to the last two stands.
12:30	Lunch at Sixth Lake Camp
1:15 pm	Focus-Group/Talking-Circle Session & Rating Sheet: Focus-group session. The focus-group script provides the outline of the questions asked (Appendix 1). A talking-circle format was used for the focus-group session with Mi'kmaw constituents. The same questions were covered in an open discussion. This session was facilitated by a community member. (In a talking circle it is important to participate. As a researcher I ended up providing facts rather than views on the questions so I could participate in the circle and not bias the conversation). Data were captured on flipcharts for all field days except during the talking circle; a digital recorder was used. The digital recorder was also used as comparison to the flipchart notes. Between questions five and six of the eight focus-group questions posed, participants were asked to fill out a rating sheet to assess which old-growth values were important to them and the impact of silvicultural treatments on all the values presented. The rating sheet was accompanied by definitions of all the old-growth values identified in the literature and silvicultural treatments. (For the first field trip silvicultural treatments and some of the old-growth values were defined. Participants suggested that even though the other terms were fairly self-explanatory, the definition sheet should include all terms. This was prepared and passed out at all subsequent sessions). The rating sheet was nestled in towards the end of the focus-group session to allow time for detailed individual reflection before the focus-group session was complete.
3:30 pm	Wrap up: Individual recording of final thoughts in the diary, handing out travel claims, and participant selection of forest photo as a thank-you token.
4:00 pm	Left Sixth Lake Camp
4:40 pm	Arrived at NS Power Station (Milton, NS)
6:30 pm	Arrived at Halifax West End Mall

A combination of grounded theory (Creswell 2003) and an existing coding structure (Bengston and Xu 1995) for held values was used as an approach for understanding diary and focus-group data. Grounded theory uses constant comparison to develop conceptual categories from the data to clarify and elaborate continuously as new data are analyzed. Thus, themes were continually evolving and being re-sorted for intensity and occurrence. Bengston and Xu's (1995) coding structure was used to create initial themes for categorizing old-growth values.

From this analysis, a final preference list of forest and OGF values was created and compared to existing value classifications to identify similarities and differences. Key values were identified in order of frequency of mention and intensity of description. Perceptions of silvicultural

treatments versus OGF values were tracked and compared to demographic information using proximity and Boolean searches. Key participant remarks were flagged. Using N6, 45 free codes and 387 tree codes were created to group major and minor sub-themes and categories.

Participants were given a definitions page of values and silvicultural treatment applications for reference and continuity purposes. Participants then used between 15 and 35 minutes to complete a rating sheet in the afternoon half way through the focus-group session. Information captured on the sheet included their personal assessments of the ten most important old-growth values of the 24 values presented, old-growth values important to participants that were not reflected in the sheet, and their assessments of the impact of silvicultural treatments on all values.

Results

What Makes a Forest Old Growth?

Many positive forest attributes were identified such as green lush moss, large trees, rotting deadwood, canopy cover, overall ambience, naturalness, soft light, sound, and unique habitat. These attributes were positively associated with old-growth values and reflected evenly across age, gender, and constituency group categories.

“Visibly unlike anything I’ve encountered in the woods of Nova Scotia. The continuous, green carpet of moss, uncluttered forest floor, high canopy, and opened, wide-spaced items make this seem almost “manicured,” a movie stage forest.” (Rural, Male, 57)

What Elements of Forests are Valued?

Forest values, such as habitat, biodiversity, oxygen production, economic (i.e., timber, forests products, hunting, and fishing), water quality and quantity, education/research, recreation, intrinsic value, beauty, naturalness, and sensory experience were highlighted. Forest values mentioned were similar across all demographic variables.

“Forest would seem to be critical for our lives, animals, mental health (versus just cleared land).” (Urban, Male, 59).

What Elements of Old-Growth Forests are Valued?

Some values associated generally with forests, such as spirituality, biodiversity, and habitat, were also used to describe OGFs, but in a different context or with a different intensity. Out of 32 respondents who wrote about a spiritual connection to the forest in their diaries, 88% of participants referred to this connection with old growth. Other examples include: unique habitat and biodiversity, beauty, sacredness (spiritual connection), personal renewal and reflection, eco-tourism, medicine, recreation, wildlife appreciation, education/research, water quality and quantity, and carbon sequestration. In addition, values of history, heritage, and past/future generations were referred to by over a third of respondents almost exclusively about old growth.

The findings from the rating sheet correlate closely with the information provided in the diaries and during focus groups. One difference is that the information in the diary was more focused on moral/spiritual and aesthetic observations, though life-support values were distinctly identified by many as important. Economic values were also mentioned but not with the same specificity or intensity.

The most important old-growth values, as identified by all participants (Table 3) from the rating sheet, are life-support values. This is followed by moral/spiritual values,

economic, and aesthetic values. The economic values rated the most important were recreation/camping/hiking and education/research. Though many aesthetic values were rated lower than others, natural beauty was rated the second most important value.

Approximately 30% of the time, there were noticeable old-growth value differences based on age and group affiliation. To identify key value differences, we identified when a 10-point or more difference across the 24 rated values occurred. Examples of value differences include higher priority given to values such as: medicine (Mi’kmaw), carbon sequestration (Environment), heritage (Mi’kmaw), majestic surroundings (Urban and Rural), fishing and hunting (Mi’kmaw and Forestry), legacy (women and older populations), and adventure (younger participants). There were also major similarities among groups in their ranking of key values such as habitat, peace, sacredness, beauty, water quality and quantity, education/research, wildlife appreciation, and recreation/camping/hiking.

“They hold great wisdom. They are full of the spirit of the forest. I feel they are worth more to us standing than to cut them. Something more powerful in old growth, the larger trees. What was life like when these large trees were saplings? It gives people a sense of history. What were our ancestors doing at this point in time?” (Mi’kmaw, Female, 27)

What is the Extra or Added Value of Old Growth Compared to Non-Old Growth?

Many positive forest attributes, such as green lush moss, large trees, natural rotting deadwood (not necessarily slash), canopy cover, overall ambience, naturalness, soft light, sound, and unique habitat were associated with the previously identified important old-growth values of peace, beauty, unique habitat and species, and texture. Participants described how OGF attributes create a different landscape than younger forests. Structurally and aesthetically, it is suited to low-impact economic use such as eco-tourism, recreation, nontimber products.

“I once heard someone say, ‘If I have to worship God, I’ll worship him in a temple that his hands created.’ This is truly one of those temples.” (Forester, Male, 20)

The diary analysis revealed that many participants assigned preference for one stand type over another in their writings. Uncut old-growth stands were more preferred than other stand types (Fig. 1).

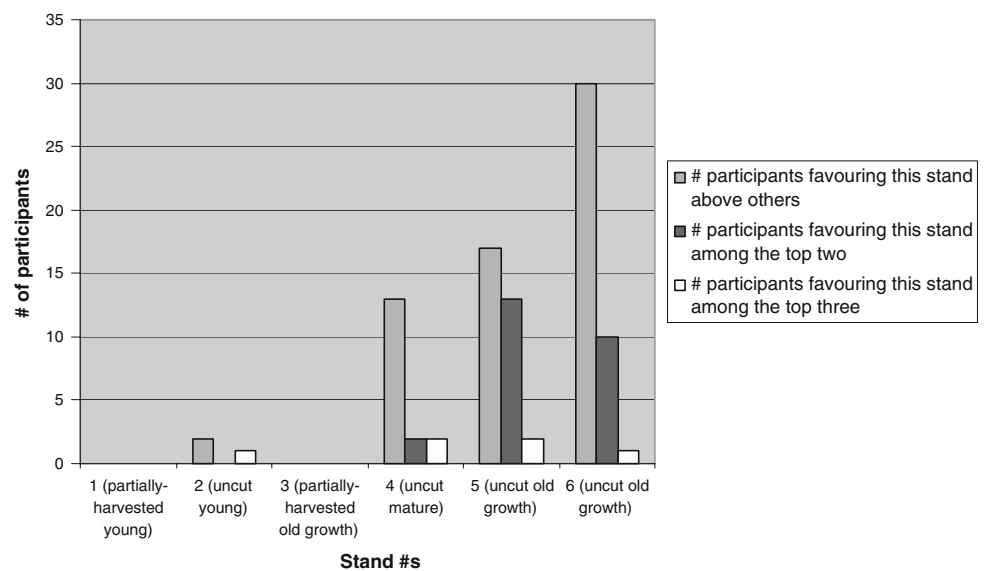
Expressions of preference were categorized into three main areas:

preference suggested for one stand (e.g., “favorite site, and it should be left for Mother Nature to take care of” – uncut old growth, Stand 6).

Table 3 Most important old-growth forest values: all participants

Rank	Value	Forest values category (Bengston and Xu 1995)	# of people who checked it	% = n/total participants (75)
1	Habitat	Life-support	61	81
2	Natural beauty	Aesthetic	51	68
3	Biodiversity	Life-support	50	67
4	Sanctuary/solitude	Moral/spiritual	48	64
5	Recreation/camping/hiking	Economic	46	61
6	Wildlife appreciation	Moral/spiritual	45	60
7	Education/research	Economic	43	57
8	Water quality/quantity	Life-support	41	55
9	Carbon sequestration	Life-support	34	45
10	Oxygen	Life-support	32	43
11	Majestic surroundings	Moral/spiritual	31	41
12	Exploration/adventure	Moral/spiritual	28	37
13	Keystone species	Life-support	27	36
14	Soil conservation	Life-support	23	31
15	Heritage	Moral/spiritual	22	29
16	Fishing/hunting	Economic	22	29
17	Generational sharing	Moral/spiritual	21	28
18	Legacy	Moral/spiritual	17	23
19	Timber	Economic	17	23
20	Untouched	Aesthetic	17	23
21	Medicine	Economic	16	21
22	Pristine area	Aesthetic	15	20
23	Creative inspiration	Aesthetic	15	20
24	Firewood	Economic	7	9

Fig. 1 Preferred stands as mentioned by participants in diaries



preference suggested for two stands (e.g. “Most attractive stands, yes! Leave them unharvested” – uncut old growth, Stands 5 and 6).

preference suggested for three stands (e.g. “This like the other unharvested spaces, has a sense of sacred, special, and yet a wonderful, natural, reality, time measured in

moss, over old stumps, in tiny seedlings under huge trees in fallen ones coming ground and moss".)

Are Old-Growth Values Compromised by Silvicultural Interventions?

The diaries, focus-group data and rating sheets tell a similar story of respondents' impressions of the affects of silvicultural (Fig. 2) treatment on old-growth forest values.

Harvesting (thinning) in the young partially-cut stand was thought to be acceptable by most respondents, though it did reduce some of the aesthetic and spiritual values for some. The cutting and subsequent blowdown in the partially-cut old-growth stand for many (though not all) was "too much, too damaging, a mistake, a devastation". Respondents reported positive comments regarding regeneration and large trees but had more negative feelings when they considered other environmental, aesthetic, and moral/spiritual values. Uncut stands had high aesthetic, moral/spiritual, and environmental values, especially in the old growth.

Intrusive treatments such as scarification and higher-percentage tree removals were perceived to negatively affect old-growth values. Tending treatments and artificial regeneration were viewed more favorably as they could lead to enhancement and restoration in the stand that could positively add to old-growth values. Still, some saw these treatments as negative. Protection treatments were viewed by some as having a negative impact on old-growth values due to the uncontrollable, and often unintentional, effects on the ecosystem. Others viewed these as positive measures that could potentially save forests from impacts such as insect infestations.

With the exception of timber and firewood, all values were considered to be negatively affected by silvicultural treatments. Aesthetic values were affected the most by silvicultural treatments, and economic values the least. Heritage, medicine, pristine, natural beauty, creative inspiration, and untouched values were negatively affected by all treatments.

Environmental and Mi'kmaq constituents, women, and older and younger respondents viewed treatments on the

whole more negatively. Forestry constituents and men viewed silvicultural treatment more positively, though there was still a high level of negative responses to more-intensive treatments. Gender may be an explanatory variable in regard to environmental and forestry affiliations as more women were represented in the environmental category and all the foresters were men.

"The whine of the saw should have been a warning. The trees standing, stand gaunt, boney-like skeletons in this grave and of where a forest once was. The trunks are twisted, many left lying there dying for what reason?" (Urban, Female, 52)

If You had the Chance to Advise an Owner of a Forested Area That has Old Growth or has the Potential for Old Growth, What Would You Say?

The strongest recommendation, suggested by 68% of the 76 participants, was to preserve and protect the old-growth forests. Over 20 suggestions were provided on areas such as education, planning, ethics, silviculture, policy and regulation. Some suggestions included: more collaborative processes, as modeled in this study and other multi-stakeholder forums; stronger old-growth government policy, leadership; incentives; more public access and education related to old growth; changes in old-growth management by industry such as set-asides; and employing more selection treatments versus clearcutting.

Participants in eight of the nine focus groups also suggested that silvicultural treatments could be used to hasten old-growth conditions, though many stipulated that this be dependent on the scale and the treatment type with an emphasis on use for restoration purposes. At six out of the nine sessions, participants suggested letting nature take its course. Though not specifically tested for, there appeared in focus group discussions to be a gender difference with women favoring restoration through natural means (and hands-off approach) compared to men, who reacted less negatively to human intervention to achieve OGF conditions.

Discussion

Value Difference and Similarities

For Mi'kmaq constituents, medicine was rated as the most important old-growth value. Medicine was rated a low priority by all other respondents. It was also a value that participants knew the least about in terms of its relationship and connection to old growth. In the case of hunting and fishing, Mi'kmaq constituents and foresters rated this use value much higher than did other groups. Culture likely

1. Site Preparation Burning Mechanical (scarification) Manual Chemical Flooding	2. Artificial Regeneration Planting Seeding	3. Clear cut (100% tree removal)	4. Seed Tree (approx. 90% tree removal)	5. Shelterwood (60 – 80% tree removal)
6. Retention (50% tree removal)	7. Selection (Uneven-aged) (10-40% tree removal)	8. Tending Pruning Thinning Sanitation Salvage	9. Protection Fire Suppression Insect Control: (Btk)	

Fig. 2 Silviculture treatments listed on rating sheet

plays a key role in this trend as people’s environmental values are often related to the cultural and societal context in which they live (O’Brien 2005).

Forestry generally is an outdoor profession, so many involved in the forest sector are connected to the land. Previous studies show motivations for becoming a forester were related to being close to the wilderness, being a part of rural living and logging culture, and carrying on the tradition of family members (Marchak 1983; Dunk 1994). In this study, all forestry participants were male. Family and community socialization of hunting and fishing as a male-dominated activity may also be an influencing factor (Bissel and Duda 2003). Gender socialization may also explain why women rated legacy and creative inspiration higher than did men.

It was noted by several study respondents that old growth was a place of respite from urban life and degradation. Therefore it is not a surprise that majestic surrounding was a more important value to urban than rural constituencies.

During different life stages, the relative importance of some values can shift. Again it is not a surprise to see intergenerational sharing and legacy values as more important for older respondents while education/research, beauty, and adventure were more valued by younger participants. Similarly it is predictable that environmental participants would rank key life-support values, such as soil conservation, biodiversity, and carbon sequestration, higher than other groups.

In Wagner and others’ (1998) study, foresters tended to be more accepting of forestry practices, more trusting of government and science, and less supportive of environmental values than the general public. In this study, there were similarities among all groups on many moral/spiritual and aesthetic values, though foresters viewed economic values and silvicultural treatments slightly more positively than did other groups. Possible reasons for differences could be related to gender socialization, forestry knowledge paradigms and culture, and economic stakes.

SFM processes outline the importance of incorporating affected and interested parties’ values in decision-making. The priority to have a value reflected in SFM decisions could be reinforced by a combination of having an existing held value, along with the rarity and potential scarcity of the value in question. If key constituency groups and age and gender views are not incorporated in SFM processes, then key values priorities may not be reflected in decisions. This potential values/policy divide becomes exacerbated when the impact of decisions are long-lasting.

The Significance of Multiple Methods

Three sources of data: diaries, focus group notes, and ranking/rating sheets were compared for triangulation and

complementary purposes (Greene and others 1989). Many of the themes were similar in the three data sets; however, the value priority given through rating versus discussion was somewhat different (Fig. 3).

To reflect the breadth of material and nonmaterial values found in old-growth stands, Moyer and others (2008) used results from Moyer (2006) and Owen (2006) to develop a forest-values framework reflective of old growth. This framework provides three levels of forest values and a broad set of distinct nonmaterial values associated with old growth.

Value Trade-Offs

Decision-making processes heavily dominated by trading off values using incompatible measures may cause increased conflict. This is especially the case with OGFs, as key values often are noninstrumental in nature. This is exacerbated by impressions of power collusion among key policy players with interests in a particular set of values. As an example, consider an important old-growth value identified by participants, sacredness (spiritual connection). If a decision-making process uses monetary quantification to value, for example, timber resources in an old-growth stand, and then sets out to compare this to a monetary value associated with sacredness, it may be a futile and arguably illogical task. If the proponents of such a decision-making process pressed forward with an attempt to trade off untradable values, it may be perceived that the process was already a *fait accompli*, and that nonmaterial values like sacredness were not being taken seriously in the process. In addition, value priority methods such as nominal group technique and strategic voting average out all views and often leave those with views different from the mainstream in a position where their values are not reflected in the group list. If decision-making is based on public participation theory, this utilitarian averaging of views should be of concern.

Decision-makers can use the data from this article in a couple of ways. Careful consideration should be given to involving different facets of citizen representation

	Data differences
Quantitative Data: Rating Sheet	Provided specific results on individual and overall group preference.
Qualitative Data: Focus Group	Provided more in-depth information than the rating sheet on why a particular value was important. Provided a forum for hearing and considering other viewpoints.
Qualitative Data: Diary	Yielded more reference to non-material values associated with old growth such as spirituality, beauty, heritage, and equity than in the focus group or on the rating sheet. Provided more in-depth information on why a particular value was important than the rating sheet.

Fig. 3 Impact of research method type on value articulation

including constituency groupings, age, and gender. Information on values can be collected using the forest-values framework of Moyer and others (2008). The framework can be used to prioritize and discuss multi-constituency values, and identify categories for future surveys. Other applications include mapping programs to identify value priorities associated with specific land areas and correlate these findings with management options, and to broaden policy frameworks (indexes) to include nonmaterial values and criteria.

Several methods are available to identify value priority from unstructured discussion to processes such as nominal group and Delphi technique (Van De Ven and Delbecq 1974). These value priorities could be used as criteria or to shape criteria development for option assessment.

Conclusion

The richness and the breadth of value expressions were aided by the in-field and mixed-methods research design. Participants had the opportunity to consider aural, visual, and tactile information in the different forest stands they visited. This opportunity was reflected in the articulation of value statements in focus groups and diaries. Over the course of the day, participants provided values information in an individual and group setting and through oral, written, and numerical expression. This diversity of feedback mechanisms provided participants with safe and comfortable choices for providing values information.

Strongly held old-growth values were expressed for consideration in SFM decision-making, including ecosystem services, unique habitat and biodiversity, spiritual and aesthetic experiences, connections to heritage and nature, food, and products. Based on participant responses, it is clear that: physical attributes of old-growth forest influence values articulation; many aspects of forests are valued though some values are more uniquely associated with old growth; some values are more sensitive to silvicultural disturbances than others such as aesthetic, spiritual and cultural values; and there are some variations in old-growth values and perceptions based on constituency group affiliation.

The findings have implications for SFM decision-making as they highlight the uniqueness and importance of values associated with OGF compared with those associated with younger forests.

“The essential value to me of old-growth forests is the importance of having areas of our province where nature is allowed to reach its full potential, so we can stand in awe of its majesty and beauty. I think it helps us as human beings to dream and imagine our own potential for greatness.” (Urban, Male, 39)

Generic forest-values frameworks and decision-making processes may not be specific enough to deal with differences associated with OGF stands. In addition, decision-making processes need to make efforts to incorporate potential values differences of key constituency groups, age and gender views.

Recommendations for inclusion of old-growth values in SFM decision-making in Nova Scotia include:

Increase public understanding of OGFs and their management. Some participants thought this could best be achieved through controlled public access to old-growth stands and other demonstration projects throughout NS. Organize more collaborative processes and multi-stakeholder forums to discuss values outcomes and strategies in meeting agreed-upon outcomes for OGFs in NS.

Regarding future research, we suggest further study on old-growth values of a range of constituency groups. This would provide additional data for comparison to this study and allow exploration of sub-categories of constituency groups to see if conclusions are representative of the larger population, and deeper exploration of the rationale for held values of individual groups.

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