

Identifying indicators of community sustainability in the Robson Valley, British Columbia

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Abstract

This paper outlines a method of developing indicators of well-being in small, forest-based communities. It also describes some specific measures of well-being in a particular forest-based community in the Robson Valley Forest District, British Columbia. In this project, we attempted to strike a balance between relying on locally obtained information—collected through workshops, interviews, and a mail survey—and information obtained from the social science literature. We took a broad-based approach toward indicator development by identifying goals and indicators pertaining to the entire region. Our paper explores this theoretical orientation in some detail and then provides an account of the dialogical methods used to identify community-based indicators. Of the six community goals we identified, we discuss “maintaining community capacity” at length by examining the empirical data from five indicators and then drawing some conclusions about the status of community capacity in the Robson Valley.

KEYWORDS: *community sustainability, criteria and indicators, community goals, community capacity, British Columbia.*

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community. It also provides an opportunity to assess competing community goals more objectively and to find strategies—through policy change or informal cooperation—to deal with resulting conflicts.

This study was guided by two considerations. First, in evaluating quality of life, both personal life domains and societal conditions may be considered (Shen and Lai 1998). This consideration was informed by the quality-of-life literature and was key to organizing the local-level orientation of this study. Personal life domains include variables such as family life, relations with friends and relatives, and leisure life, whereas societal conditions refer to housing, employment, recreation, etc. In this sense, the general objectives defined by a quality-of-life research framework focus on the “good life” or, in other words, on the community’s commonly held beliefs and norms. These beliefs and norms are based on how residents might describe the important qualities of their community, and what contributes to their well-being. Community workshops and interviews along with secondary data from sources such as economic development strategies, assisted us in identifying factors that contribute to quality of life in the Robson Valley.

The second consideration is a sense of concern for sustainability that goes well beyond the measurement of what contributes to the “good life.” It resonates with the scientific literature on sustainable communities. This sustainability approach guided the non-local orientation of this study, which incorporated ideas and lessons learned from other research and other indicator initiatives. Toward this end, a sustainability evaluation framework developed by Hart (1999) provides us with a model of community sustainability that integrates economic, social, and environmental variables. Her sustainable community evaluation framework takes into consideration the linkages between these three variables, as well as inter- and intra-generational equity. Hart provides a checklist of 14 questions for evaluating the relevance of a given indicator to some basic sustainability concerns (such as carrying capacity). According to Hart (1999:29), “carrying capacity has to do with the rate at which resources are used up compared to the rate at which they are renewed or restored.” Along these lines, several questions can be asked about all indicators. For instance, does the indicator address the carrying capacity of local and external natural resources? Does the indicator provide a long-term view of the community? Does the indicator measure a link between the economy and the environment? Determining relevant

indicators—i.e., ones that address community goals as well as sustainability concerns—is no small task. However, the benefits of this approach not only force consideration of these questions, they also compel researchers and community leaders to focus attention on areas where indicators are lacking.

In attempting to measure community capacity, our study dealt with several specific theoretical concepts. The first concept is commonly known as *human capital*, which is the “productive investment of resources in human beings rather than in plants and machinery” (Jary and Jary 1991:217). At the level of the individual, human capital refers to a person’s collective skills and capabilities. It encompasses elements of human productivity as diverse as creativity, entrepreneurial ability, education, and specialized skills. Formal training can be easily measured as one dimension of human capital. Informal skills and abilities such as leadership and entrepreneurship, however, are more difficult to measure.

The second concept, commonly known as *social capital*, refers to the connections between individuals or to the network of social relations that builds trust within the community and fosters the community’s social and economic productivity. This reciprocity assists community members in dealing with social problems that arise from complex social situations. Putnam (2000), for example, suggests that improvements in social capital can stimulate economic activity by reducing the costs of doing business. For instance, where thick webs of connection exist between individuals, and where those connections are marked by high levels of trust, the opportunity to develop new business relationships is enhanced and the costs of accommodating distrust (e.g., legal fees) are minimized.

Finally, *sense of place* was introduced as a component of community capacity. Sense of place is defined as the meanings and attachments held by an individual or a group for a spatial setting (Stedman 1999, 2001). In this study, we measured sense of place in two ways. Satisfaction scores measured one’s attitude towards the condition of the setting; for instance, residents were asked about their satisfaction with the physical landscape and with community services. Attachment scores measured the importance of the setting to one’s sense of self; for instance, residents were asked if they felt like they were part of the community. Increasingly, these “social” dimensions are thought to be important components of community sustainability.



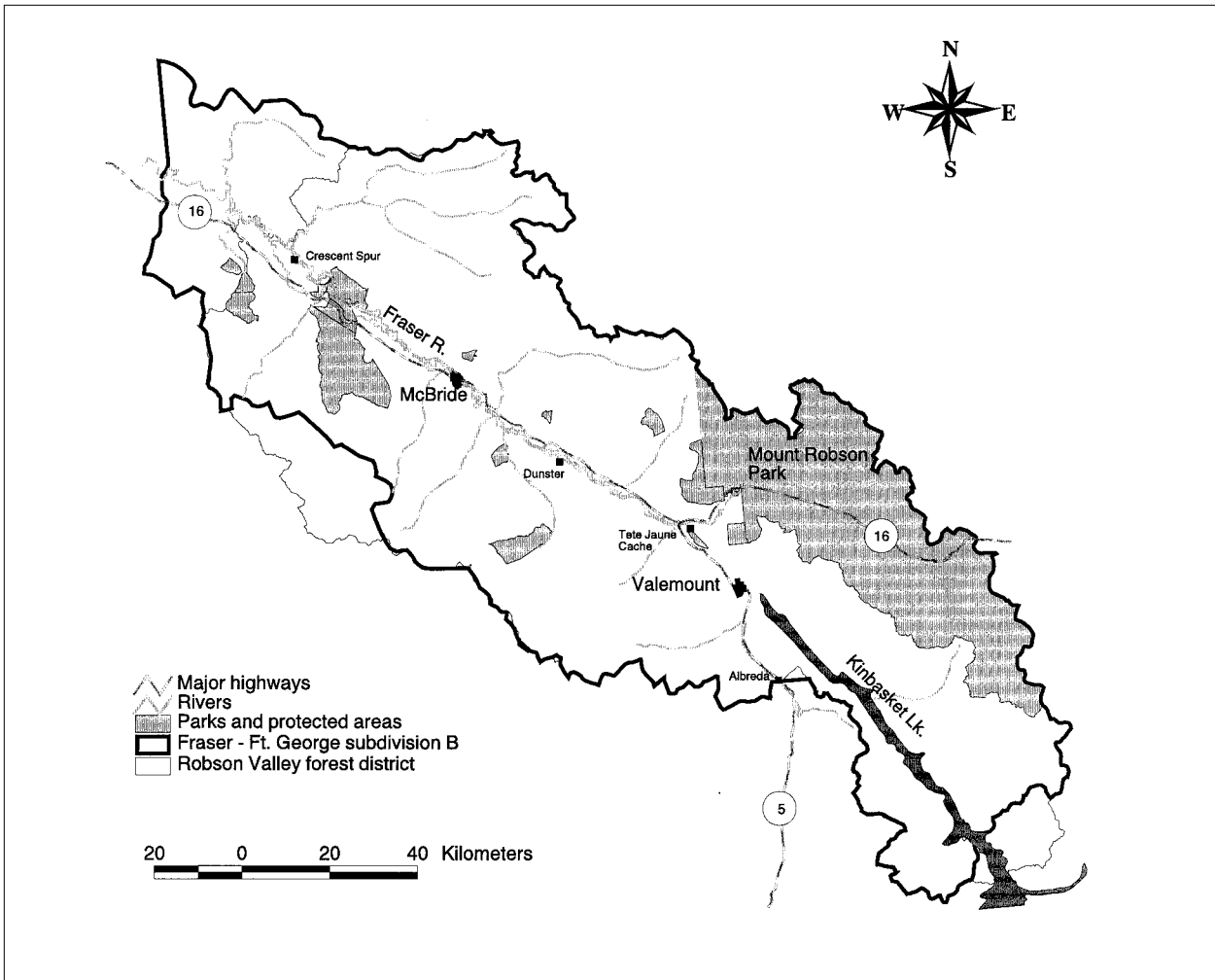


FIGURE 1. Robson Valley Forest District.

Description of the Study Area

The Robson Valley Forest District (Figure 1) covers approximately 1.4 million ha in east-central British Columbia. The district comprises two villages (Valemount and McBride) and numerous dispersed rural communities (including Dunster, Crescent Spur-Loos, Tete Jaune Cache, Albreda, and Dome Creek).

The population of the Robson Valley is approximately 4000. Roughly half live in Valemount and McBride and the other half are dispersed in rural areas. The main transportation routes through the valley are Yellowhead Highway 16 (which connects Prince George

with Jasper National Park), Highway 5 (which connects Tete Jaune with Kamloops), and the CN Railway. Valemount, with a population of about 1300 and located near the junction of the two highways, is the region's largest population center. McBride, with a population of about 740, is located 80 km northwest of Valemount on Highway 16. Both villages are heavily dependent on the forest industry and major wood processing mills are located in both communities. As gateway villages to several mountain parks, however, both communities benefit from an active tourism industry that includes hiking, snowmobiling, heliskiing, whitewater rafting, and fishing.³

³ For more information about the Robson Valley Forest District, see <http://www.for.gov.bc.ca/pgeorge/district/robson/districtinfo.htm>.



Documents gathered from municipal offices suggest that controlled growth with a focus on keeping a small-town atmosphere is a theme common to both villages. Vision statements for McBride and Valemount include the need to build diverse economies, and other considerations for enhancing quality of life. According to these documents, which were developed through community surveys and workshops, McBride and the surrounding area envision the future to include:

... reasonable growth rates, and a more diverse economy with more small businesses. The community would maintain the integrity of the area, people's values, and the quality of the environment. The age distribution would be varied in ages, maintaining the youth and middle age populations. As well, there would be 'broader' local education opportunities.

(McBride and Area Economic Development Committee 1996:21)

Valemount and area envisions a transformation from a one-industry community to a mixed-economy village with a specialized forestry base and a growing tourism and service sector (Valemount and Area Economic Development Commission 2000b:39).

From a historical perspective, the Robson Valley has witnessed rapid social and economic change. Compared to the settlement years of the early 1900s, when the valley was accessible only by rail and numerous small lumber operations dotted the landscape, highway travel and resource sector consolidations (and, more recently, contractions) have since stimulated significant transformation within the communities. Unique religious and cultural traditions and ways of life have survived much of this transformation and have added to the rich texture of valley life. As expressed by workshop participants during this study, these cultural traditions are important contributors to quality of life.

Methods and Results

One of the overarching themes in the literature on social indicators and community sustainability is the need to identify and validate indicators that represent the needs, goals, and aspirations of specific communities. Unlike the generic and all-too-familiar indicators of economic life (e.g., average income and unemployment rates), local-level indicators must be, first and foremost, sensitive to the specific community in question, and they must cover a more specific set of community dimensions. Therefore, the indicators developed for one community are not easily transferable or comparable to other locales. Furthermore, unlike some research

approaches that define or prescribe a specific trajectory for sustainable development (such as tourism-based development, or large-scale industrial expansion), the broad research approach used for this study is non-prescriptive. In other words, our research efforts are oriented around community goals and aspirations, and around a suite of related indicators and measures.

We used several methods including workshops, interviews, community surveys, and a sustainability evaluation framework. These methods helped elucidate important relationships between local-level information and social science information while generating a suite of local-level indicators. Our study methods are described below and Figure 2 provides a schematic of our research framework. Generally, workshops and interviews were conducted first, followed by the community survey, and ending with a comprehensive assessment of the indicator suites.

Workshops

Workshops provided residents with the opportunity to develop a list of quality-of-life priorities for their community. Workshop outcomes formed the basis for determining general community goals that could be checked against secondary sources (e.g., economic development strategies). Workshop participants were identified from a list supplied by an individual well acquainted with many Robson Valley residents, and involved in many community-level economic development and forestry initiatives. The list of potential participants was broken down into the following categories: loggers, tourism operators, environmentalists, working families, service industry, economic development, retirees, and educators. We contacted 22 people in McBride; of the 13 people who agreed to participate in the workshop in McBride, all 13 attended.

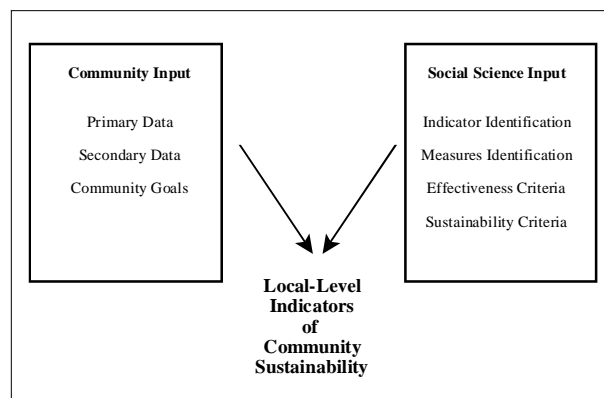


FIGURE 2. Research framework.



We contacted 19 people in Valemount; of the 12 people who agreed to participate, 5 people attended. In order to supplement the low attendance in Valemount, personal interviews were conducted with eight residents. These workshops and interviews were conducted in the summer of 2000.

The workshop format included a brief introduction to the Enhanced Forest Management Pilot Project and the social indicators project relative to initiatives for measuring sustainable forests [such as the Canadian Council of Forest Minister's criteria and indicators framework (CCFM 1995)]. The remainder of the two-hour workshop was dedicated to a brainstorming session on community issues, goals, indicators, and factors associated with community well-being. During this part of the workshop, themes were recorded on flip charts, discussed, and confirmed by workshop participants. For both workshops, 13 specific themes were identified, summarized in written form, and mailed to the workshop participants for comment. The themes formed the basis of a community survey that was administered by mail to a random sample of valley residents in the following months.

Community Survey

Based on the themes developed through the workshops and interviews, a broad range of statements associated with community goals and priorities was prepared for use in a survey of the overall community (see Table 3). Rather than customizing the survey for each community, we employed a single list of statements because themes in both workshops were observed to be quite similar, and because standardizing survey statements opened the possibility that the survey results would reveal differences between communities.

The survey also included questions pertaining to community indicators that social scientists consider to

be important aspects of community sustainability—e.g., questions related to sense of place were added to the questionnaire—thus further linking our local versus non-local approach. Also, several of the survey questions were modified from the questionnaire administered by the New Rural Economy Project (NRE 2002), which is a national initiative to examine the sustainability of rural communities. Specifically, questions about community leadership style, the quality of community services, household dependency, membership in voluntary organizations, and entrepreneurship were taken from the New Rural Economy Project.

Survey Response Rates and Demographic Profile

The survey sample was drawn from the 4000 residents of the Robson Valley. Respondents were randomly selected by a third-party marketing firm and recruited by telephone to participate in the mail survey. With 357 respondents, the confidence interval for this survey is approximately 3.5% (Dillman 2000). Table 1 outlines the response rates for the village and valley residents. The sample draws from just over 20% of the total combined populations of McBride and Valemount, but from only 3.8% of the rural valley population. To reflect more accurately the proportion of total population in each jurisdiction, responses were weighted using a sampling factor of 0.59 for McBride, 0.60 for Valemount, and 3.2 for the rural areas of the valley.

Comparing Statistics Canada's community profile data (Statistics Canada 1998) with the respondent profiles allowed us to assess the representativeness of our sampling relative to the larger community. The respondents represented the community well in terms of average age (dominated by those between 40 and 60 years old) and gender (equally split between males and females). The average age of the respondents was higher in the rural valley. The sample did not, however, represent the unemployed (the unemployment rate

TABLE 1. Survey implementation: overview

Area	Respondents (no.)	Sample size (no. people)	Response rate (%)
McBride	111	132	84.1
Valemount	190	245	77.5
Rural valley ^a	56	63	88.9
Total	357	440	81.0

^a Including Dunster, Crescent Spur-Loos, Tete-Jaune Cache, and Albrede.



ranged from 10 to 22% in the census data, but <3% in the survey sample). As a result, findings from this survey may underestimate the priorities of unemployed valley residents.

From Goals to Indicators and Measures

In this section, we describe the process of moving from primary data collected in workshops and surveys, to the identification of specific indicators and measures of community sustainability. The research team needed to consider ideas from community-based data sources (both primary and secondary) as well ideas from the social science literature. This process is particularly challenging because it attempts to combine a research framework with a sustainability evaluation framework. The final outcome is, ideally, a set of indicators that are attentive to community interests and goals, but also relevant and appropriate for incorporating into the protocols for monitoring the management of sustainable forests in the Robson Valley.

Identification of Goals

The community goals in Table 2 indicate which issues are priorities for Robson Valley residents. These priorities represent categories requiring the attention of formal and informal community leaders, and they collectively form a basis for assessing community well-being. Although not formally endorsed by the municipal leadership, these goal statements reflect priorities identified within primary and secondary data sources.

Identification of Indicators

Most of the indicator selection occurred as a result of analyzing the outcomes of the workshops, interviews, and survey. A few indicators (such as sense of place, progressive industry base, entrepreneurship, social

capital) were added based on the social science literature. As such, identification of indicators involved local input and non-local (or social science) input. Both of these approaches are described in more detail below.

Local input: secondary data, workshops, interviews, and surveys. Identifying and prioritizing indicators involved a careful analysis of secondary data that were available through local economic development strategies and community surveys, and obtained through interviews, workshops, and a quality-of-life survey conducted within the community. Secondary data revealed, for example, that people lived within the rural valley because of nature, small-town atmosphere, and jobs (McBride and Area Economic Development Committee 1996). In McBride and area, the economic growth priorities included recreation and tourism, followed by small business and the service industry. Forestry, tourism, education, and agriculture were identified as key development opportunities. Valemount documents suggested a commitment to a mixed economy based on forestry, tourism, and services (Valemount and Area Economic Development Commission 2000a); key areas of concern included water and air quality, health care, education, and visual quality (Valemount and Area Economic Development Commission 2000b).

Table 3 summarizes the responses to a set of 20 specific statements for the Robson Valley within the quality-of-life survey. Survey respondents were also asked to choose the most important and second-most important indicators of quality of life within their community. The most important was assigned double the weight of the second most important and a sampling factor was used to determine a weighted percentage for the Robson Valley as a whole. The survey statements are listed in ranked order. Although some themes were

TABLE 2. Community goals

McBride and Valemount	Rural valley
Maintain natural amenities (ecological integrity, aesthetics)	Maintain natural amenities (ecological integrity, aesthetics, preservation)
Maintain community capacity	Maintain community capacity
Maintain active community living	Maintain modern services
Maintain modern services	Increase community economic diversity
Increase community economic diversity	Individual economic well-being
Individual economic well-being	



TABLE 3. Survey results supporting identification of community-level indicators

Survey statement	McBride (mean score) ^a	Valemount (mean score) ^a	Rural (mean score) ^a	Ranked weighted ^b (%)	Domain	p-value
Number of respondents	111	190	59			
Modern services such as hospitals and educational facilities	6.59 (0.82)	6.37 (0.94)	5.65 (1.58)	18.0	Economic	<0.05
Traditional jobs in the forest products sector	6.03 (1.21)	5.92 (1.33)	4.96 (1.84)	10.7	Economic	<0.05
Maintaining natural ecological processes	5.05 (1.67)	5.16 (1.53)	5.59 (1.78)	7.8	Environmental	NS
Maintaining the agricultural economy	6.03 (1.16)	5.35 (1.26)	6.09 (1.06)	6.6	Economic	<0.05
Other approaches to forestry, such as community forests, woodlots, and value-added activities	6.04 (1.15)	5.67 (1.34)	5.91 (1.30)	6.5	Economic	NS
Low unemployment	6.42 (0.85)	6.23 (1.11)	6.03 (1.16)	6.5	Economic	NS
A family-oriented community	6.27 (0.95)	6.24 (1.04)	6.16 (1.17)	6.3	Social	<0.05
Maintaining a self-sufficient lifestyle such as hunting, fishing, and gardening	5.60 (1.54)	5.45 (1.53)	5.64 (1.45)	5.9	Economic	NS
Solitude	4.66 (1.60)	4.76 (1.57)	5.67 (1.25)	5.4	Environmental	<0.05
Community control of local decision making	6.15 (1.03)	5.84 (1.33)	5.94 (1.08)	4.4	Social	NS
Low cost of living	6.07 (1.03)	5.86 (1.24)	5.96 (1.05)	4.3	Economic	NS
Developing your community as a tourism destination	5.53 (1.36)	5.28 (1.65)	4.71 (1.76)	4.2	Economic	<0.05
A natural forest landscape undisturbed by humans	3.84 (1.82)	4.36 (1.86)	5.09 (1.84)	3.3	Environmental	<0.05
Large areas of wild, roadless land	3.91 (1.99)	4.34 (1.82)	5.23 (1.94)	2.1	Environmental	<0.05
High-quality recreational opportunities	5.32 (1.48)	5.11 (1.68)	3.83 (1.91)	1.4	Social	<0.05
A working community culture (instead of a tourism destination)	6.06 (1.06)	5.65 (1.32)	5.53 (1.37)	1.3	Social	<0.05
Increasing the number of people who live in your community	5.49 (1.31)	5.32 (1.17)	4.85 (1.66)	1.2	Economic	<0.05
Local clubs, organizations, and events	5.58 (1.35)	5.62 (1.29)	4.86 (1.77)	0.7	Social	<0.05
A thriving arts and cultural life	4.78 (1.43)	4.54 (1.60)	4.51 (1.82)	0.4	Social	NS
Culturally diverse community members	4.47 (1.57)	4.31 (1.53)	4.73 (1.69)	0.0	Social	NS

^a Seven-point scale. 1 = not at all important. 7 = extremely important. Standard deviation in brackets.

^b Calculated based on a sampling factor of 0.59 for McBride, 0.60 for Valemount, and 3.2 for rural valley.

Note: <0.05 = significant difference between mean scores. NS = Not significantly different between mean scores (suggesting potential commonalities between communities).



common to the entire area, others were unique to specific demographic categories.

In general, McBride residents revealed a strong commitment to services, traditional forestry jobs, family-oriented community, and low unemployment, but they placed a lower priority on natural amenities than the Valemount or rural valley residents. Valemount residents showed a similar orientation, with a strong commitment to services, traditional forestry jobs, low unemployment, tourism employment, and family-oriented community. The survey revealed that rural residents have a strong commitment to services, natural ecological processes, an agricultural economy, forestry jobs, self-sufficiency, and a family atmosphere.

As a result of these shared goals, a suite of indicators common to village and rural communities (common indicator suite) was developed. The rural valley shares a large number of indicators with Valemount and McBride; however, differences in priority areas resulted in a few unique indicators within each suite. The level of overlap of the indicator suites reflects common priorities among Robson Valley residents.

Each indicator was classified into one of three domains—environmental, social, or economic—to facilitate the comparison of groups of similar items. The alpha score (Table 4) indicates the degree to which the domains represent reliable groupings. The reliability of the environmental and economic domains was significantly different between groups, whereas the reliability of the social domains was not significantly different between groups. Overall, the environmental domain was of more importance to the rural Robson Valley residents than to either McBride or Valemount residents, and the economic domain was of more importance to McBride and Valemount residents than to the rural valley residents. The differences were also reflected in the composition of the suite of indicators, with the rural valley suite containing more environmental indicators and the

McBride/Valemount suite containing more economic indicators.

Non-local input. Social scientists play an important role in bridging the learning gap for communities by summarizing and communicating experiences from other studies of quality-of-life indicators. Information gleaned from other processes is incorporated into this project through the inclusion of survey questions related to key aspects of community life (e.g., attachment, satisfaction, and volunteerism). Indicators such as “forest company mills moving towards certification” were added, based on anticipated community goals such as the desire to establish a progressive industry base.

Identification of Measures

The identification of appropriate measures was driven by the research team, mostly in order to pinpoint specific data that could speak to community goals and have relevance to sustainability concerns. Based on the indicators, measures were identified that could make use of available data and meet some specific criteria. Whereas indicator identification employed a combination of local and non-local input, the identification of measures was primarily a non-local process. For each indicator, we attempted to identify at least one measure from a primary or secondary data source. To measure economic diversity we used three measures: an index derived from census data, number of visitor-oriented business licences, and number of jobs in the forest sector. For other indicators, like “family-oriented community,” we used census data only. The final suite of indicators was determined based on an evaluation of each measure’s effectiveness and relevance to community sustainability.

Table 5 provides a summary of the indicators and measures developed for McBride and Valemount and Table 6 provides a summary of indicators and measures developed for the rural valley.

TABLE 4. Reliability of indicator categories

Domain	Items (no.)	Alpha score (mean score)	McBride (mean score)	Valemount (mean score)	Rural valley (mean score)
Environmental ^a	4	0.80	4.30	4.64	5.44
Social	7	0.66	5.54	5.37	5.25
Economic ^a	9	0.62	5.96	5.68	5.39

^a Significant difference between mean scores ($p < 0.05$).



TABLE 5. Social indicator suite for McBride and Valemount: summary

Goals	Indicators	Measures
Sustain natural amenities	Natural resources	Length of maintained hiking and multi-use trails within the Robson Valley ^a
	Aesthetic quality	Satisfaction with visual quality of local landscape
Maintain active community living	Local recreation activities ^b	Rate of participation and types of valley outdoor activities ^a
Maintain community capacity	Sense of place	Degree to which people are attached to their community Degree to which people are satisfied with their community
	Family-oriented community	Number of children <15-yr old
	Social capital	Social involvement
	Human capital	Library circulation rates ^a Adult and student educational enrolment
	Community control in decision making	Degree to which people perceive formal and informal leadership to be diversified and representative of the population
Maintain modern services	Service infrastructure	Healthcare expenditures as a percentage of total income ^a
	Accessibility of services	Library circulation rates ^a
Increase community economic diversity	Diverse economic base	Economic diversity index ^a
		Number of visitor-oriented business licenses ^a
		Number of jobs in forest sector
	Low economic leakage	Proportion of spending in local businesses ^a
	Progressive industry base	Number of forest companies (mills) working in the valley moving towards/maintaining certification ^a
	Alternative forestry	Proportion of annual cut (volume) from small operators (woodlots and community forests) and small-scale salvagers
Entrepreneurship	Number of new business licenses ^a	
Enhance individual economic well-being	Unemployment ^c	Youth/young adult unemployment rate

^a Unique to McBride and Valemount.

^b Indicator also addresses goal of sustaining natural amenities.

^c Indicator also addresses goal of increasing community economic diversity.



TABLE 6. Social indicator suite for rural valley: summary.

Goals	Indicators	Measures
Sustain natural amenities	Ecosystem services	Songbird abundance ^a Number of red- and blue-listed species ^a
	Aesthetic quality	Satisfaction with visual quality of local landscape
Maintain community capacity	Sense of place	Degree to which people are attached to their community Degree to which people are satisfied with their community
	Family-oriented community	Number of children <15-yr old
	Social capital	Social involvement
	Human capital	Adult and student educational enrolment
	Community control in decision making	Degree to which people perceive formal and informal leadership to be diversified and representative of the population
Maintain modern services	Accessibility of services	Satisfaction with access to services ^a
Increase community economic diversity	Diverse economic base	Number of jobs in forest sector Number of jobs in agriculture ^a
	Alternative forestry	Proportion of annual cut (volume) from small operators (woodlots and community forests) and small-scale salvagers
Enhance individual economic well-being	Unemployment ^b	Youth/young adult unemployment rate

^a Unique to the rural valley.

^b Indicator also addresses goal of increasing community economic diversity.

Evaluation Framework

There are two dimensions to the evaluation framework. First, effectiveness criteria were compiled from a number of sources including Besleme *et al.* (1999) and Sirgy *et al.* (2000). Effectiveness involves an assessment of understandability, relevance, accessibility of data, reliability of data, cost of obtaining data, temporal comparability of data, sensitivity of data to local policy change, type of measure (cause, state, or effect), and measurement of condition or perception. Second, relevance of the measure to community sustainability was assessed using Hart's sustainability framework with 14 criteria (Hart 1999).

At the core of this evaluation is a capacity assessment, which is based on the following criteria:

1. Carrying capacity of *natural resources* monitors the use of natural resources.
2. Addressing the carrying capacity of *ecosystem services* refers to whether the state of ecological services (e.g., air and water) is addressed by the indicator.
3. If the beauty and life-affirming qualities of nature are considered, then a point is given for addressing the carrying capacity of *aesthetic qualities*.
4. A point is given for *social capital* if the measure monitors the ability of a community to work together.
5. *Human capital* measures the skills, abilities, health, and education of community members.
6. Addressing the carrying capacity for a community's *built/financial capital* emphasizes the need to consider a community's ability to maintain and enhance existing resources.



7. *Not at the expense of global sustainability* takes into account the linkages between communities and reaffirms the need to consider sustainability in a global context.

Table 7 shows how two specific measures were evaluated. It is important to note that all ratings were determined subjectively by the research team. Therefore, these categories are best thought of as *thinking tools* rather than firm rules. The main point to this exercise was to encourage the research team to consider indicators and measures that address the multi-faceted nature of community sustainability.

Comprehensive Assessment of Indicator Suite

In addition to assessing each measure, it was important to consider the strengths and limitations of the entire suite of indicators, with respect to community sustainability. Table 8 shows this comparison. The lower scores indicate where the developers of future indicator measures might focus their efforts. For example, indicators for two areas—*intra/inter-generational equity* and *ecosystem services*—were relatively under-identified in this study.

Measuring Community Capacity

This project developed indicators and measures for six distinct goals for McBride and Valemout and five goals for the rural valley. In this section we explore the indicators and measures associated with just one of those goals—community capacity—and arrive at some general conclusions based on available data. Of the indicators developed within this project (see Tables 5 and 6), those associated with community capacity are: sense of place, family-oriented community, social capital, human capital, and community control of decision making. In examining sense of place, Tables 9 and 10 provide baseline data on levels of attachment and satisfaction in the region. In Table 9, we note that in response to the statement “I feel like I am definitely part of my community,” rural valley residents are more attached than Valemout residents. However, Valemout’s score for “overall, I’m very attached to my community” is slightly higher than for “I feel like I am definitely part of my community,” and it shows no significant difference between communities. Community satisfaction scores are also high (see Table 10), although residents are less satisfied with job opportunities and community services than with personal relationships and the physical landscape. In measuring the family dimensions of community life, we note the proportion of children residing in Valemout declined from 28% of the total population to 21% over a 10-year period (1991–

2001) (Table 11). This decline is similar for the rural jurisdiction, but is less severe for McBride. Social capital was measured by participation rates in voluntary organizations. We note that 76% of respondents in McBride participate in some capacity (Table 12), which appears to be the result of higher rates of participation in religious life. Through another measure of social capital, we also note that use of the public library increased substantially over the last 20 years (Table 13). For instance, in Valemout, where community size has remained relatively constant, the number of library patrons increased from 534 in 1981 to 1423 in 2001. In terms of human capital, as measured by student enrolment, the total elementary and secondary enrolment declined from 761 to 662 between 1995 and 2000 (Table 14). Although this statistic likely reflects declining numbers of total children in the region, the effect on human capital remains an issue in terms of available future human resources. Rates of entrepreneurship also provide a useful measure of human capital. Compared to McBride, Valemout reported higher rates of entrepreneurship (Table 15). Finally, the level of community control in decision making was measured by the perceptions of survey respondents regarding the appropriateness of using community consultation for decision making. Respondents from the rural valley considered current levels of consultation to be more appropriate than did respondents from the villages, especially those from Valemout (Table 16).

So what do all of these numbers mean? First, where trends are available, one can observe decreases or increases in, for instance, the number of children within the community, or the number of library patrons. With other measures, baseline data are available, but the value of measurement will be realized only several years from now when trends in community attachment, satisfaction, voluntary participation, and entrepreneurship are observed. Second, many of the measures developed and reported in this study can be used to inform indicators such as human capital. Space limitations here allow us to describe only a few measures (For a complete list of measures, refer to Varghese *et al.* 2002). We recognize the multi-dimensionality and complexity associated with the notion of community capacity and, therefore, we have attempted to balance this approach with measures that touch on several aspects of capacity and with data available from primary and secondary sources.

Some preliminary conclusions about community capacity can be made. Satisfaction scores generally appear to be high, although they reflect some degree of dissatisfaction with services and job opportunities.



TABLE 7. Evaluation of community sustainability: two examples

Criteria	Degree to which people are satisfied with their community	Number of visitor-oriented business licenses
Understandable and useable by the community	1	1
Long-term view of progress	1	1
Economic, social, or biological diversity	0	1
Intra- or inter-generational equity	0	0
Shows linkages between different community facets	3	2
Natural resources	1	0
Ecosystem services	1	0
Aesthetic qualities	1	1
Social capital	1	0
Human capital	1	1
Built/financial capital	1	1
Not at the expense of global sustainability	Partially true	True
Sustainability rating	11/13	8/13

TABLE 8. Comparison of both indicator suites across sustainability dimensions

Hart's (1999) sustainability criteria	McBride and Valemout	Rural valley
Understandable (is based on community input)	13	11
Long-term view of progress	19	14
Addresses economic, social, or biological diversity	11	8
Addresses intra- or inter-generational equity	4	7
Addresses economy and environment linkages	9	7
Addresses environment and society linkages	9	6
Addresses society and economy linkages	13	7
In terms of carrying capacity, this measure addresses:		
Natural resources	9	5
Ecosystem services	4	5
Aesthetic qualities	8	3
Social capital	12	9
Human capital	15	11
Built/financial capital	12	9
Not at the expense of those outside the Robson Valley	19	14



TABLE 9. Community attachment

Survey statement	McBride (mean score) ^a	Valemount (mean score) ^a	Rural valley (mean score) ^a
People in my community are open to opinions that are very different from their own	3.10 (1.4)	3.30 (1.42)	3.20 (1.75)
People here are willing to contribute time and money for community projects	4.99 (1.47)	4.88 (2.36)	5.23 (1.51)
I feel like I am definitely part of my community	4.95 (1.61)	4.56 ^b (1.60)	5.31 ^b (1.60)
My community is an important part of who I am	4.92 (1.63)	4.64 (1.71)	4.95 (1.77)
Overall, I'm very attached to my community	5.41 (1.54)	5.13 (1.53)	5.51 (1.65)

^a Seven-point scale. 1 = strongly disagree. 7 = strongly agree. Standard deviation in brackets.

^b Significant difference between mean scores ($p < 0.05$).

TABLE 10. Satisfaction with community attributes

Survey statement	McBride (mean score) ^a	Valemount (mean score) ^a	Rural valley (mean score) ^a	<i>p</i> -value (mean score) ^a
Important personal relationships	3.42 (0.64)	3.32 (0.67)	3.47 (0.68)	NS
Community services	2.82 (0.62)	2.65 (0.71)	2.89 (0.80)	<0.05
Physical landscape	3.63 (0.59)	3.60 (0.62)	3.66 (0.76)	NS
Satisfied with job opportunities	2.14 (0.85)	2.30 (0.90)	2.49 (0.86)	<0.05
Overall community satisfaction	3.25 (0.60)	3.14 (0.63)	3.41 (0.54)	<0.05

^a Four-point scale. 1 = extremely dissatisfied. 4 = extremely satisfied. Standard deviation in brackets.

Note: <0.05 = significant difference between mean scores. NS = not significantly different between mean scores (suggesting potential commonalities between communities).

TABLE 11. Proportion of children <15 yr old^a

Year	Valemount (%)	McBride (%)	Fraser-Fort George B ^b (%)	Robson Valley Forest District (%)
1991	28.4	23.3	27.4	27.3
1996	25.7	25.0	25.1	25.7
2001	21.8	21.7	21.6	NA

^a NA = not available at this time.

^b Federal census district, the boundary of which corresponds roughly to that of the Robson Valley Forest District.



TABLE 12. Participation in organizations

	McBride (no. ^a and % ^b)	Valemount (no. ^a and % ^b)	Rural areas (no. ^a and % ^b)
Respondents who say they participate ^c	80 (76.2)	120 (64.5)	38 (69.1)
Type of participation			
Religious	24 (21.6)	30 (15.8)	6 (10.7)
Professional	22 (19.8)	29 (15.3)	13 (23.2)
Civic	67 (60.4)	59 (31.0)	53 (94.6)
Social	45 (40.5)	94 (49.5)	12 (21.4)
Uncategorized	7 (8.1)	19 (10.0)	2 (3.6)
Organizations (avg. no.)	2.1	1.9	2.3

^a Number of organizations mentioned by respondents. The maximum number categorized was eight for one individual.

^b Does not add up to 100 because many respondents participated in more than one type of organization.

^c Not significantly different between communities.

TABLE 13. Public library materials: circulation rates and patrons

Public library	Year	Community size ^a (no. people)	Library patrons ^b (% of population)	Materials circulation rates ^b (rate/population)
Valemount	1981	1 135	534	11 579
	1986	1 161	770	15 143
	1991	1 128	978	17 761
	1996	1 305	1 084	20 481
	2001	1 195	1 423	27 855
McBride & District	1981	645	506	11 847
	1986	592	841	22 813
	1991	580	958	24 749
	1996	740	900	25 148
	2001	715	1175	18 885
Robson Valley total ^c	1981	4 205	1 040 (24.7)	23 426 (5.6)
	1986	3 867	1 611 (41.7)	37 956 (9.8)
	1991	3 642	1 936 (53.2)	42 510 (11.7)
	1996	4 080	1 984 (48.6)	45 629 (11.2)
	2001	3 965	2 598 (65.5)	46 740 (11.8)

^a Population of community where the library resides is included as reference, but it is important to remember that each library serves the dispersed rural residents.

^b Standard deviation in brackets.

^c Robson Valley total is calculated by adding the two library figures together. Community size figure for this portion includes the entire valley.



TABLE 14. Student enrolment ^a

School	1990-91 (no.)	1995-96 (no.)	2000-01 (no.)
McBride Centennial Elementary	198 ^b	186	183
McBride Secondary	NA	152	128
Valemount Elementary	266	264	193
Valemount Secondary	147	159	158
Total	NA	761	662

^a NA = not available at this time.

^b Estimated enrolment based on following year.

TABLE 15. Current and anticipated business aspirations

Survey statement	McBride (no. and %)	Valemount (no. and %)
Currently a business located within the household	50 (45.0)	110 (57.9)
Anticipating a business in 2 years by a household member	17 (15.3)	31 (16.3)

TABLE 16. Perceived community consultation in the Robson Valley

Survey statement	McBride (mean score) ^a	Valemount (mean score) ^a	Rural valley (mean score) ^a
Decisions affecting the community are made with appropriate consultation with residents	3.92 (1.88)	3.54 ^b (1.79)	4.25 ^b (2.09)

^a Seven-point scale. 1 = strongly disagree. 7 = strongly agree. Standard deviation in brackets.

^b Significant difference between mean scores ($p < 0.05$).

Given recent reductions in government services and industry closures,⁴ these sentiments are likely more acute now. More importantly, attachment levels in the Robson Valley are generally lower than those observed in other locales. In response to the statement “my community is an important part of who I am” the mean response score was less than 5 on a 7-point scale. In comparison, a similar study that we conducted in Saskatchewan reported mean scores of almost 6 or greater in response to the same statement (Parkins, Varghese, and Stedman 2001:17). Low attachment levels may suggest that residents have a willingness to migrate when local circumstances become less appealing.

Therefore, community capacity to deal with adverse social or economic conditions may be negatively affected by lower levels of community attachment.

In terms of the other measures of community capacity—e.g., number of children residing in the area and school enrolment decreased, but library circulation rates increased and voluntary participation rates remained fairly healthy—it is difficult to assess any overall trends at this time. Once data are established for these measures, overall trends in community capacity may become clearer. It does seem clear, however, that formal levels of human capital are declining within the

⁴ Shortly after the field work for this study was completed, Slocan Forest Products announced the closure of its mill in Valemount. This closure is likely to affect the results of this research, probably by pushing economic diversity higher up the list of priorities.



valley. This is due, in part, to declining numbers of young people. Whether informal levels of human capital—as reflected in relatively high rates of entrepreneurship and levels of social capital (especially in the rural valley)—can compensate adequately is not known at the moment but these possibilities provide both promise and challenge for the future.

Conclusion

This paper develops a method of identifying and measuring community sustainability at the local level and provides insights into the sustainability of a forestry-based community in the Robson Valley Forest District. One benefit associated with this method is the way it ties together two strong themes in contemporary notions of managing sustainable forests. The first theme deals with the science of ecosystem management. Similar to the biophysical dimensions of ecosystem management reflected in the Canadian Council of Forest Ministers' criteria and indicators framework (CCFM 1995), where the basic functioning of ecosystems is taken into consideration (i.e., biodiversity conservation, and soil and water quality), our project took a science-based approach in determining community sustainability. We incorporated important social science insights into an assessment of the basic functioning of human communities (i.e., human capital and social capital), and we developed indicators of those functions. The second theme deals with strong democratic impulses in sustainable forest management (CCFM 1995). In as much as public participation plays a vital role in defining goals and priorities for landscape management, public participation plays an important role in developing relevant indicators of community well-being. Through extensive use of workshops, interviews, and community surveys, and by examining other data sources available within the community, we employed a method that operates within the dynamic tension experienced between science-based management systems and the democratic (social) processes that help us define management priorities. In this sense, we are proposing a working definition of community sustainability that identifies universal characteristics which are broadly applicable to all communities and specific characteristics which are more applicable to specific locales. We are also proposing a method, or a

collection of social science research tools, to identify relevant indicators and to measure the sustainability of human communities.

Although this study is prescriptive in its outlook (goals are defined and indicators are established), we are not providing a prescription for all forest-dependent communities. We are, however, providing conceptual tools and data sources that such communities may wish to consider using. We are also providing an assessment of well-being that can be used by many levels of government and industry in various ways. For the municipal government seeking external funds for community development, identifying areas of strength and weakness in the community can facilitate learning within the community, can focus attention on areas of need, and, thus, can help communicate important messages to external funding agencies. For the local forest company, contributions to the community can be directed more strategically at specific community concerns. For instance, if local entrepreneurship is low, forest companies may seek to bolster local human capital by sponsoring a workshop or distance education course for residents. This kind of targeted giving can be identified and justified with a suite of indicators like the ones developed in this study.

Future research related to indicators will deal with the evolution of ideas about community sustainability. These ideas are changing from older notions of community stability to more dynamic notions of adaptive capacity and resilience. Although we have some rudimentary ways of measuring resilience that relate to a community's ability to respond to different kinds of shocks, the science of assessing the resilience of human communities remains underdeveloped. On-going research will provide important sources of learning in this regard.

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