Social indicator approaches to assessing and monitoring forest community sustainability

T.M. Beckley and T.M. Burkosky

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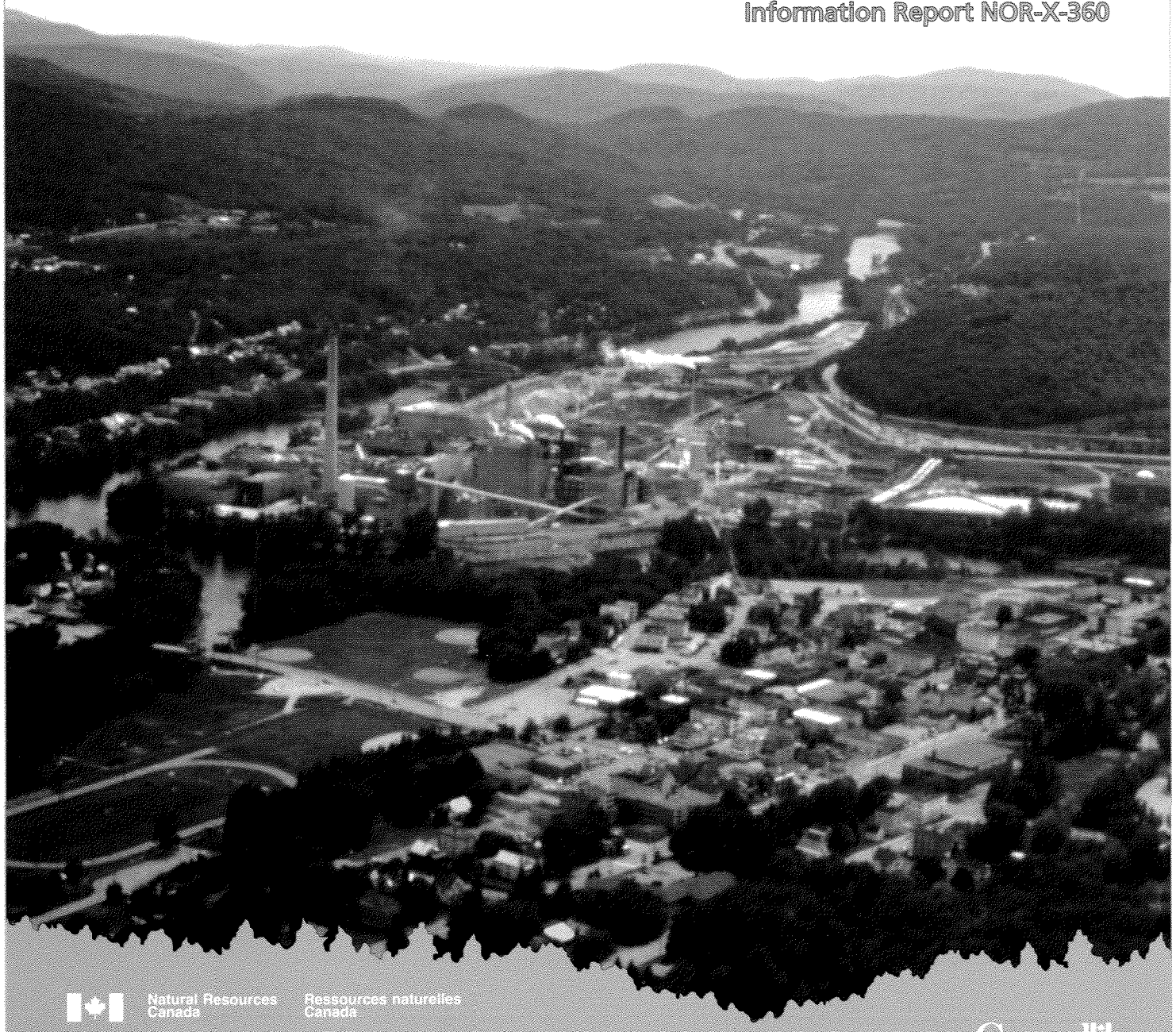

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SOCIAL INDICATOR APPROACHES TO ASSESSING AND MONITORING FOREST COMMUNITY SUSTAINABILITY

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ABSTRACT

Several national and international initiatives have encouraged the development of criteria and indicators to measure progress in sustainable development and sustainable forest management. This review is intended to introduce the forestry community to social indicators that have been used to document and monitor community sustainability and community well-being. Natural resource sociologists have been studying community stability for over half a century. Included is a discussion regarding selection criteria for social indicators that focuses on the advantages and disadvantages of qualitative and quantitative indicators. A review of several ongoing projects is included, and the appendix provides a quick reference for twenty-two indicator initiatives.

RÉSUMÉ

Plusieurs initiatives nationales et internationales ont favorisé l'élaboration de critères et d'indicateurs en vue de mesurer les progrès accomplis en matière de développement durable et d'aménagement durable des forêts. Ce compte rendu vise à faire connaître au milieu forestier les indicateurs sociaux qui ont servi à documenter et à surveiller la durabilité et le bien-être des collectivités. Des sociologues des ressources naturelles ont étudié la stabilité de collectivités durant plus d'un demi-siècle. On trouvera ici un exposé concernant les critères de sélection des indicateurs sociaux qui met l'accent sur les avantages et les inconvénients des indicateurs quantitatifs et qualitatifs. Un examen de plusieurs projets en cours est aussi inclus, et l'annexe fournit un bref renvoi à vingt-deux initiatives liées aux indicateurs.

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NOTE

The exclusion of certain manufactured products does not necessarily imply disapproval nor does the mention of other products necessarily imply endorsement by Natural Resources Canada.

INTRODUCTION

For several decades, there have been ongoing efforts to define and monitor the health and well-being of societies, economies, communities, and biophysical environments. The Brundtland commission popularized the concept of sustainable development in 1987, and in the wake of its report *Our Common Future* there have been many efforts to assess social, economic, and ecological health and well-being, using the language of sustainability (World Commission on Environment and Development 1987).

Social and political pressure on various groups to deliver hard evidence of progress toward sustainability is forcing them to define and monitor measures of sustainability. Some of these efforts focus on different scales of sociopolitical jurisdictions, such as communities, provinces, and nations. Others focus on different ecological scales, such as watersheds, forests, and ecosystems.

The failure to define and monitor sustainability, through establishing benchmarks and subsequently tracking trends, will relegate the concept of sustainability to buzz word status. Some already feel that the term is vacuous, and will never contribute to meaningful analyses. Many people describe sustainable development as a path as opposed to a destination. Nevertheless, we still need concrete measures for sustainability indicators so that we know if we are moving in the right direction along that path. This paper is an effort to review indicators that have been or are being used to measure community sustainability. The ultimate aim is to help clarify the concept and thereby increase our chances of choosing policies and practices that enhance community sustainability.

Sustainability monitoring of social and economic variables often takes place at the community or municipal level, though household, regional, and national initiatives exist. The Canadian Council of Forest Ministers has initiated the Criteria and Indicators Initiative (C&I) to monitor the environmental, social, and economic aspects of forest management in Canada. One of the social themes included is "Sustainability of Forest Communities." Indicators under this theme are intended to monitor variables relevant to the sustainability of human communities that depend on their surrounding forest resources (Canadian Council of Forest Ministers 1995). Such attempts to measure the sustainability of human forest communities are rare, but there is growing interest.

Other national and international initiatives are relevant. The Montreal Process for reporting sustainability indicators at an international level incorporates community-oriented social indicators. Forest certification processes that also entail social indicators of community health and well-being have been proposed by environmental non-governmental organizations such as the Forest Stewardship Council (Forest Stewardship Council 1994), or by governments and industry, such as the Canadian Standards Association (Canadian Standards Association 1996). Recently, model forests in Canada have been charged with defining and monitoring indicators that are appropriate and relevant to their specific locales.

Many of those who are developing these protocols for forest community sustainability monitoring have forestry or physical science backgrounds. This paper is intended to provide these decision makers with some background knowledge of current and historical attempts to develop indicators for measuring community sustainability.[1] It should also benefit academics working in this area, as resources related to community sustainability monitoring are widely scattered in booklets, internet sites, articles, newsletters, and the like.

This review is not meant to be comprehensive. Instead, it is intended to direct readers to some of the most recent and current initiatives. Despite the focus on contemporary efforts, some reference is made to the reasonably long history of social indicator research that takes the community as the unit of analysis.

We begin by discussing dynamic tensions between qualitative, subjective indicator approaches and quantitative, objective indicator approaches. We then review the literature on community stability, a closely related precursor to today's concern with community sustainability. This is followed by a review of contemporary initiatives that attempt to

[1] It is important to note that there are significant areas of social indicators for forest sustainability that this review will not address, such as public involvement in decision making and Aboriginal rights and opportunities.

define measures of community sustainability. Because so few examples exist that are specific to forest-dependent communities, other community indicator monitoring initiatives, as well as quality-of-life research (a predecessor of the social aspect of sustainability reporting), are discussed later in the paper. We conclude the text with some recommendations for future research, and with some issues that need further attention. Finally, an appendix is included that lists the indicators from 22 studies that we have reviewed. The appendix will help the reader make a quick assessment of indicators that are widely used or agreed upon (*see* inside back pocket of report).

DYNAMIC TENSIONS INVOLVED IN DEFINING AND USING INDICATORS OF COMMUNITY SUSTAINABILITY

Selecting indicators of community sustainability involves a number of normative issues. Any given indicator list reflects the needs and interests of the group that chose them. Specific to our concerns with forest-dependent communities, some groups may have a significant interest in demonstrating that *status quo* forestry practices and procedures result in sustainable communities. Other groups or individuals may feel that current forestry practices do not result in sustainable communities.

Persons with these different perspectives may agree on some indicators, such as unemployment or poverty, for example, but differ on what they consider acceptable thresholds. In other cases, defenders of the *status quo* and proponents of reform may propose quite different sets of indicators. It is important to acknowledge these underlying political dimensions when considering any given list of indicators.

The purpose behind generating lists of indicators may also influence the scope and nature of those reporting frameworks. A community interested in developing its local natural, human, and institutional resources may come up with a very different list from a government department that is interested in tracking sustainability over time for the purpose of periodic reporting to provincial, national or international constituencies. Again, consideration of the audience is important. Communities may only be interested in answering questions for themselves and developing appropriate community development programs based on results of such introspection. Government departments are likely to be concerned with provincial, national, and international image.

Therefore, locally generated indicators may include such things as empowerment, the depth and breadth of community networks, access to decision-making, etc. (Bauen et al. 1996).

Public-service-generated indicator lists may focus more on aspects of communities that are easier to quantify, generalize, and compare across jurisdictions. Examples of these indicators might be poverty or unemployment, as mentioned above; or education attainment, suicide, divorce, and other measures of social dislocation; or per capita expenditures on education, health, or other social services.

A related source of dynamic tension in the selection of community sustainability indicators has to do with the objectivity or subjectivity of indicators. Subjective measures often entail some form of community self-assessment, either by key informants, or through community surveys. Objective measures are drawn primarily from secondary data sets that document social structural variables, rather than psychological states.

Kusel (1996) provides a detailed discussion of the limitations of each approach. Among the disadvantages of objective, sociodemographic measures are the potential of aggregate data to mask important distribution issues within families, communities, or regions, and the fact that secondary indicators of wealth or income do not address how effectively individuals utilize these resources to increase their quality of life.

A major disadvantage of using subjective indicators is that there is no standard measure of happiness or fulfillment, so that results from individual respondents may not be comparable. Individuals may lower or raise their expectations based on what they believe they may realistically achieve (Kusel 1996). Beckley (1995) also discusses

limitations of traditional, objective approaches of community sustainability in a forestry context.

A few examples will better illustrate the difficulties associated with each of these general types of indicators. Hart (1995) provides a definition of a sustainable community as a group that:

> "seeks to maintain and improve the economic, environmental, and social characteristics of an area so its members can continue to lead healthy, productive, enjoyable lives there . . . the primary goal of a sustainable local community is to meet its basic resource needs in ways that can be continued in the future".

Social sustainability, according to the British Columbia Round Table on the Environment and the Economy (BCRTEE) 1993, is achieved when all members of the community are practicing responsible citizenship and can

- achieve and maintain personal health: physical, mental, and psychological;
- feed themselves adequately;
- provide adequate and appropriate shelter for themselves;
- have opportunities for gainful and meaningful employment;
- improve their knowledge and understanding of the world around them;
- find opportunities to express creativity and enjoy recreation in ways that satisfy spiritual and psychological needs;
- express a sense of identity through heritage, art, and culture;
- enjoy a sense of belonging;
- be assured of mutual social support from their community;
- enjoy freedom from discrimination and, for those who are physically challenged, move about a barrier-free community;
- enjoy freedom from fear, and security of person; and
- participate actively in civic affairs.

The barriers to selecting indicators based on these definitions are significant. Most of these are subjective, and many would require extensive psychological testing in fairly large samples to create baseline data. There are likely to be major methodological issues in defining such things as a sense of belonging, or mutual support from their community. Even if appropriate measures for such concepts can be constructed, the issue remains—are these thresholds or benchmarks? Assuming one could develop effective measures for freedom from fear, or a sense of identity, how much of such desired ends are enough to ensure sustainability? And who will make those determinations?

Conversely, objective measures such as poverty, unemployment, education attainment, and the like, may have little relation to individual or aggregate (community level) assessments of well-being. Communities with high levels of negative indicators may come to accept such conditions as normal (Duncan and Lamborghini 1994; Gaventa 1980), while communities with low levels of negative indicators may feel they have room for improvement. There remains a poor correlation between objective indicators and self-assessments of individual or community health and well-being.

The debate over the utility of subjective versus objective indicators will continue. Objective indicators are widely used, however, in both general social evaluation contexts, and in more directed and specific social impact assessment research (Burdge 1994). Anyone using an indicator approach to community sustainability must balance the issues of audience, data availability, validity, reliability, and comparability as they relate to subjective and objective indicators. When in doubt, the best approach is likely to include both objective and subjective indicators, recognizing that subjective indicators may perform better with respect to certain selection criterion (such as validity), and objective indicators may perform better with respect to others (such as reliability).

FROM STABILITY TO SUSTAINABILITY IN FOREST-DEPENDENT COMMUNITIES

There is a long tradition of studying well-being in forest-dependent communities, usually in the context of community stability (Kusel 1996). Community stability has historically been closely linked to a steady flow of timber products to ensure stable employment in the timber industry.

Policy makers assumed that steady flows of timber would lead to stable levels of employment, which in turn, would lead to community stability. These turned out to be spurious assumptions. LeMaster and Beuter (1989) and Richardson (1996) provide extensive background and citations on the community stability debate. We wish to highlight just a few early approaches that either embodied or implied an indicator approach to community stability. Following these, we will move on to a discussion of contemporary efforts to define community sustainability in forest-dependent places.

Kaufman and Kaufman (1946) undertook one of the first studies that examined the relationship between natural resource use and community well-being, in 1946 in the forest communities of Libby and Troy in Montana. The Kaufmans defined a stable community as "one in which there was orderly change toward given goals; those goals embracing 'the good life' in whatever way that may be defined".

Even in this early work, the Kaufmans discussed dimensions of stability that were amenable to an indicator or monitoring approach. They wrote that forest community decline was characterized by ". . . an exhausted resource, . . . unemployment, . . . declining population, . . . and empty and decaying buildings." (Kaufman and Kaufman 1946). The Kaufmans proposed 10 strategic areas of physical, economic, and social life that promote forest community stability:

1. Developing a stable timber industry with the greatest possible remanufacturing.
2. Practicing sustained yield forestry and wise use of other natural resources on timber lands.
3. Promoting greater public participation in determining forest policy.
4. Creating a more diversified and balanced economy.
5. Securing adequate leadership in community affairs.
6. Providing greater assistance to youth, especially with reference to vocational guidance and training in citizenship.
7. Strengthening the rural home.
8. Creating a more community-centered religious emphasis.
9. Developing a forest-centered tradition.
10. Organizing for united action of the greater Libby–Troy community.

(Kaufman and Kaufman 1946)

Many indicators that scholars consider relevant today are derived from these 50-year-old stability indicators.

The Kaufmans' approach centered on identifying factors in community life that lead to stability. Marchak (1983), in a study of forest-dependent towns in British Columbia, attacks the same problem from a different angle. She focuses on causes of community instability. The most prominent source of instability, according to Marchak, is the uncertainty of employment in the forest industry. Both loggers and sawmill workers experience frequent layoffs, leading to high turnover rates and transience. Sawmill workers can be quickly trained, so the loss of experienced workers is not particularly problematic for employers. Loggers tend to be more skilled, but are also readily available, so there is little need for companies to invest in the labor force or its stability (Marchak 1990). Transience brought about by unstable labor markets, in turn, leads to community instability, as forest sector workers move from place to place in search of more permanent employment.

Another reason for community instability in many British Columbia forest communities is geographical isolation and the lack of employment for women. Marchak (1990) says:

"Women co-resident with loggers, in particular, are likely to live in trailers with their children while their husbands are at logging camps. Few can find work in these resource-extractive towns; very few employers in resource industries employ women in production lines or logging camps. These women have no social network of kinfolk as they would in a rural community. . . . Women are profoundly isolated . . ."

A third source of instability, according to Marchak, is the uncertainty parents feel toward their children's future in what they know is an impermanent, unstable community. Because of such concerns, many residents work to buy themselves out of the community. If they cannot, they know that their children may be destined to repeat their own patterns of transience (Marchak 1990).

More recently, Kusel (1996) has expanded the concept of well-being in forest-dependent communities to include the concept of community capacity. Community capacity is "the collective ability of residents to respond (the communal response) to external and internal stresses; to create and take advantage of opportunities; and to meet the needs of residents, diversely defined."

Kusel (1996) combines subjective assessments with objective measures to determine community capacity. Elements that require consideration in the evaluation of community capacity include:

- physical capital, or the physical elements and resources in a community and financial capital;
- human capital, or the skills, education, experiences, and general abilities of the residents; and
- social capital, or the ability and willingness of residents to work together for community goals.

Some of these elements rely on objective measures, others on subjective assessments. The resulting aggregate measure of community capacity is not intended to measure the well-being of individuals, but that of the community as a whole and the potential for creating additional opportunities and improving well-being (Kusel 1996). Assessing community capacity this way represents a promising step toward multidimensional sustainability monitoring, one that avoids the pitfalls associated with committing to exclusively objective or subjective approaches.

The process Kusel outlines for measuring community capacity is complex. Researchers conduct workshops with local experts who are knowledgeable about diverse community issues. The experts assess the three components and identify those that have the greatest impact on overall community capacity (Kusel 1996). The selection of the experts is a critical aspect of an assessment. The individuals chosen must be knowledgeable about local issues, resources and institutions without being "community boosters or overly partisan about issues" (Kusel 1996).

Beckley and Murray (1997) are currently conducting a multi-year research project on forest community sustainability across Canada. This research is similar to Kusel's work in its attempt to combine subjective and objective assessments of variables thought to be related to community sustainability. Objective indicators under investigation include the incidence of low income, the unemployment rate, demographic stability, education attainment, proportion of local income from social assistance, and real estate values. Some of these variables will be compared in a national database of timber-dependent communities.[2] All the listed indicators will be examined in detail in eight case studies.

The case studies will also entail qualitative interviews of residents on their perceptions of poverty, unemployment, education, etc. Furthermore, the case studies will use subjective assessment of residents to examine opportunity structures for men, women, seniors, youth, and racial minorities.

The attempt to understand the chosen indicators through qualitative methods will address, in part, the shortcomings of objective indicators. Paying close attention to sub-groups within the population of any given community will help address distribution issues that may be masked when using only aggregate, secondary data. These concerns are reflected in the title of the project, *Sustainability for Whom? Social Indicators for Forest-dependent Communities in Canada.*

[2] Timber-dependent communities are the subset of forest-dependent communities that rely upon the industrial forest sector (harvesting and processing) for a significant portion of their economic base.

Another explicit attempt to define and measure community sustainability indicators in a forestry context is work by the Institute for Research on Environment and Economy under the direction of Dr. Phillipe Crabbé, titled *Developing Indicators of Community Sustainability in Relation to Forestry*. This research is similar to Kusel's effort in that the researchers include the concepts of physical, human, and social capital, along with natural capital, and community capacity. Also similar to Kusel, they attempt to strike a balance between objective and subjective approaches to defining community sustainability.

According to Crabbé et al. (1995), there are three stages in determining community sustainability. The first is establishing community goals and defining community conceptions of sustainability through interviews with stakeholders, analysis of local council meetings, news reports, and public debate. This is an important step because of the various meanings different communities may give sustainability:

> "In a rural community, the main objective might be generation of income, stable local employment opportunities, meaningful work for all or a forest environment that can provide a sustained yield of all resources, while a First Nations community might emphasize sustenance of long term hunting, trapping and fishing levels as a prime objective" (Crabbé 1996).

The second step, an assessment of where a community stands relative to where it wants to be, involves a number of factors, including examining sources of instability. The third step involves assessing resiliency and the adaptive capacity of a community to change. Ideally, the community sustainability indicators chosen provide information in both of these areas.

Crabbé et al. developed 11 categories of indicators: construction of the community, recruitment of citizens, organization of work and occupation, material and wealth stratification, interpersonal relationships and associations, recreation activities, goods and services, healing, school and training programs, cultural/spiritual [activities], and social conflict and control. These indicators were then grouped under the four factors of production: human capital, physical capital, natural capital, and social capital. This framework was then applied to two forestry-dependent communities.

The Willapa Alliance has put together a document that reports a wide range of indicators relevant to one rural community in Washington State. Their report *Willapa Indicators for a Sustainable Community*, is an impressive collection of secondary data related to the productivity, diversity, and resilience of their community. The indicators chosen by the Willapa Alliance WISC Committee cover environmental, economic, and community topics. The effort of this group is also a significant demonstration of community capacity to address community sustainability from a local perspective (Schoonmaker and von Hagen 1995). Other communities interested in taking an indicator approach to identifying issues of prime concern in achieving sustainability should consult this document as a possible model. The report also includes an appendix of additional potential indicators for community sustainability monitoring.

The Sustainable Communities Initiative (University of Victoria) has developed an ambitious framework for what it terms State of Sustainability (SOS) reporting. The framework attempts to treat biological, social, and economic indicators in an integrated fashion. Walter calls this the Ethics-Conservation-Competition Framework (ECCF). According to Walter (1994), "these aspects or dimensions are fundamental because they govern the central relationships of community: of humans to each other, of humans to non-human populations (plant and animal), and of humans to their ecosystem, including the natural resource base." Each dimension is measured using four classes of indicators: resources, capacities, processes, and interventions. The framework is intended to provide

> "... a classification of indicators that allows various parts of the sustainability system to be examined in a multi-dimensional way. A particular indicator may appear in various places in the system, and in each case would have a different interpretation according to the aspect of the system being examined." (Walter 1996a)

A modified version of the ECCF has been applied to a pilot study of British Columbia's Southern Interior Ecoprovince. While the study is not specifically related to communities, this region contains many forest-dependent communities. The major dimensions of indicators used were Conserving Basic Resources, Living in the Ecosystem, and Socioeconomic Sustainability (which involved

competition, cooperation, and adaptation) (Walter 1996a).

The Sustainable Communities Initiative will also be using this framework to conduct a Forestry-Based Community Sustainability Audit Project (CSAP). This project will be implemented in three forestry-based communities. It is designed to lay the foundation for understanding the threats and opportunities influencing the sustainability of communities and to develop a method for identifying these in practice, and provide periodic audits to support assessments of policy and policy revision (Walter 1996b).

Attempts to develop indicators for community sustainability are not limited to North America. A project initiated by the Centre for International Forestry Research (CIFOR) focuses on socioeconomic sustainability in a general sense, not necessarily specific to communities. The CIFOR project considers social sustainability to be comprised of three distinct social elements: 1) the maintenance of people's well-being with a focus on forest dwellers, 2) the actions of people that affect the sustainability of the forest, and 3) the intergenerational distribution of benefits (Wollenberg and Colfer 1996).

Although the CIFOR project is meant to assess sustainable forest management more generally, it does include a number of indicators of the well-being of forest dwellers, as well as indicators for the other two social elements. Wollenberg and Colfer (1996) discuss the following measures of well-being of those living in forest areas:

- security and sufficiency of access to resources, now and in the future;
- economic opportunity;
- decision-making opportunity;
- justice, fair resolution of conflict and distribution of benefits, rights, responsibilities, and incentives;
- heritage and identity; and
- safety and health.

OTHER SUSTAINABILITY MONITORING EXAMPLES

Although sustainability monitoring for forest communities is limited, there is currently a great deal of work being done to address the sustainability of cities, regions, provinces, and even countries. The following examples represent just a few of the projects underway to assess the sustainability of cities and regions.

In 1994, the British Columbia Round Table on the Environment and the Economy produced a report based on their effort to monitor urban sustainability in the province using five cities (the Greater Vancouver Regional District, Greater Victoria, Prince George, Kelowna, and Cranbrook) which were chosen to represent the broad regions, and the variety of environmental, economic, and social conditions in British Columbia (BCRTEE 1994). Indicators were chosen to represent five major urban themes: human settlements and population growth, the urban environment, the urban economy, social well-being, and governance and responsible citizenship (BCRTEE 1994).

The criteria used in the selection of indicators included: comprehensiveness; data availability; understandability and accessibility; sensitivity to changes over time; capability for use at different levels of aggregation; validity; and reliability (BCRTEE 1994).

A group called Sustainable Seattle has also initiated a sustainability monitoring process for Seattle, Washington. Forty indicators were chosen. Each indicator was:

- reflective of something basic and fundamental to long-term economic, social, or environmental health of a community over generations;
- accepted by the community;
- attractive to local media;
- statistically measurable; and
- logically or scientifically defensible.

Their categories for indicators in the 1995 report are environment, population and resources,

economy, youth and education, and health and community (Sustainable Seattle 1995).

In the publication *Ontario beyond tomorrow: ideas for building a sustainable society*, the Premier's Council and the Ontario Round Table on Environment and Economy (1995) stress the importance of choosing a small number of key indicators for assessing the province's progress towards sustainability. The six core indicators they chose to report on as examples were:

- unemployment rate,
- state of children (child poverty),
- adult literacy,
- family income and income equality
- crime rate, and
- air quality.

Hodge's (1995) framework for assessing sustainability is made up of four interrelated strategic elements: ecosystem, interaction, people, and synthesis. The people element was designed to assess the well-being of people at the individual, family, community, and institutional levels. Hodge has applied aspects of this framework to the Great Lakes Basin, and the National Round Table on the Environment and Economy (NRTEE) has used it to develop a list of rudimentary sustainability indicators for Canada.

The United Nations Department for Policy Coordination and Sustainable Development (DPCSD) is currently developing a list of national sustainable development indicators to be completed by the year 2000. So far, they have generated 130 indicators based on a driving force-state-response framework. The driving force indicators represent human activity; state indicators represent the condition of sustainable development, and response indicators review policy options and other responses to change. Sub-categories of indicators in the DPCSD framework include social, economic, environmental, and institutional (United Nations Department for Policy Coordination and Sustainable Development 1997).

HEALTHY COMMUNITIES

The healthy communities movement is closely related to, but predates, efforts to monitor and measure community sustainability. Many of the goals and indicators are similar, so it is easy to make the case that they are part of the same research stream. Patterson describes the healthy communities movement as an attempt to integrate indicator research on quality of life with policy concerns related to sustainable development. His conception of the synthesis is a framework that addresses both the well-being of community residents and the health of the surrounding physical environment (Patterson 1995).

Hancock and Duhl define a healthy city as

> ". . . one that is continually creating and improving those physical and social environments and expanding those community resources which enable people to support each other in performing all the functions of life and in developing themselves to their maximum potential" (Lane 1989).

Based on this definition, the Canadian Healthy Communities Project was promoted from 1988 to 1991. Although funding no longer exists (the project was designed for completion in 1992), more than 200 Canadian communities continue to promote the concept (Lane 1989; National Round Table Review 1994).

A number of healthy community project participants use indicators in order to evaluate their progress towards becoming a healthy city. The goal in developing and implementing these measures of community health is to illustrate how factors such as socioeconomic status, education, social support, and clean and safe physical environments effect individual and community health. The importance of the healthy communities movement for sustainability monitoring has been the community-level and local efforts to recognize the linkages between human behavior and ecosystem and human system well-being (Burch 1994).

Sustainability monitoring has borrowed from past research on quality of life for some of its theoretical and methodological background. Quality-of-life studies emerged with the social indicators movement of the late 1960s, largely in response to dissatisfaction with traditional economic methods of measuring well-being. They recognized that economic progress is often accompanied by degradation of natural resources, increased poverty and other social problems among some population segments (Schatan 1990).

Although this line of scholarly inquiry spans 30 years, the literature has not developed in a linear fashion, with recent findings being built upon early advances in understanding the subject. Rather, the quality-of-life literature is often cryptic and fraught with different opinions on what constitutes quality of life or well-being, and disagreement on how to measure these concepts.[3]

Despite the mixed legacy of the quality-of-life literature, it has provided important models for the measurement of the human and social dimensions of sustainability. Anyone considering taking an indicator approach to measuring community sustainability should familiarize themselves with some of this literature.

There are three general types of quality-of-life studies:

1. Those done on a national or cross-national level to measure and compare the social progress (or development) of nations;
2. Those that focus on the quality of life in local communities; and
3. Those that focus on the more subjective, individual aspects of well-being.

Although they stem from the same intellectual background, social development approaches tend to take an international development aid perspective, while community approaches focus on comparing quality of life across communities (Holtz 1995). Subjective quality-of-life research has been more rare and is often undertaken in the context of health and illness.

Quality-of-life research has been used for a number of purposes including descriptive reporting of the state of society; analytic studies of social change; forecasting the future; evaluating social programs; setting goals and priorities; and developing a system of social accounts (Eyles 1994).

Most quality-of-life studies take an objective, sectoral approach to defining and measuring well-being. According to Hay and Rutman (1993):

> "Sectoral approaches to well-being take defined sectors of well-being (such as health, education, housing, employment, etc.), outline measures and indicators for each sector (mortality rates, number of students completing high school, housing starts, unemployment rates etc.), and then examine levels of achievement on the measures and indicators for each sector."

An example of such an approach is The United Nations Development Project's (UNDP) human development index (HDI). Since 1990, the UNDP has been reporting on the development and progress of the world's nations by combining indicators of life expectancy, educational attainment, and income. They conceive of human development as a process of widening all people's choices and level of well-being. Hence, one of the key features of the index is the use of disaggregation to highlight disparities and gaps among regions, urban and rural areas, and between sexes and ethnic groups.

The Human Development Reports also measure gender inequality using the Gender-related Development Index, which measures women's achievement in the same areas as the HDI, and the Gender Empowerment Measure, which examines progress in advancing women politically and economically (United Nations Development Programme 1997).

Estes' (1988) influential framework for measuring national and international social development also takes a sectoral approach to measuring quality

[3] The terms quality of life, well-being, and social indicators are often used interchangeably.

of life. The Index of Social Progress examines the domains of education, status of women, demography, political participation, cultural diversity, and welfare effort.

The Ministry of State for Urban Affairs conducted one of the earliest urban quality-of-life studies in Canada, in 1975. The objective of the work was to explicitly compare certain aspects of the quality of life across several Canadian cities. Furthermore, the hope was to discuss, develop, and implement indicators for identifying urban problems (Shulman and Bond 1978). Ultimately, 36 indicators in three categories (social development, economic development, and physical development) were selected based on five criteria: comprehensiveness, availability of data, reliability and accuracy, validity, and topicality (Shulman and Bond 1978).

The dynamics involved in defining and using quality-of-life indicators have been much the same as those involved with indicators of community sustainability. The primary concern has been the traditional, almost exclusive reliance on objective indicators. Recent debate on this issue has lead to a growing recognition that quality-of-life research should work to incorporate both objective and subjective indicators (Beesley and Russwurm 1989).

DISCUSSION

One fact should be clear from this review: there is great diversity in approaches to defining and measuring the concept of community sustainability. The dynamic tensions outlined at the beginning of this paper—between objective and subjective approaches, and between community-based versus academic and government sponsored initiatives—are partly responsible for this diversity.

In the most recent work, scholars, government policy-makers, and communities are trying to overcome these tensions by taking an inclusive approach. Kusel (1996), Beckley and Murray (1997), Crabbe et al. (1996) all advocate combining subjective and objective approaches. The work of the Willapa Alliance WISC Committee is an interesting case of a community advocating an objective approach. Some other community-oriented initiatives, such as Bauen et al. (1996) and Hart (1995), focus on subjective measures, or non-traditional objective measures that may be less well supported by existing data sources.

The appendix to this review includes the actual indicators put forward by some 22 different initiatives. These studies range from community-based initiatives to ones sponsored by the United Nations. Efforts by governments, academics, independent researchers, and non-government organizations (NGOs) are also included. The appendix includes more than a hundred different social indicators. Often, different language is used to convey similar concepts. Some indicators are widely agreed upon. Unemployment and poverty measures are referred to by more than two-thirds of the reports and studies. Other indicators are unique to single studies. Most of the indicators included are objective measures, though some, such as exposure to arts, or reliance on local resources, are either subjective or very difficult to measure in quantitative terms.

Many of the initiatives reviewed discuss selection criteria for indicators. In taking an indicator approach to community sustainability reporting, a number of factors must be weighed against one another. These include data availability, cost, reliability, validity, and resonance with the intended audience (especially study communities themselves). The goals, interests, and ideological leanings of authors do influence the types of indicators that they put forward. These are not value-free, non-political exercises, so any indicator list should be scrutinized for ideological biases. On the other hand, indicators that are advocated by a wide range of interest groups, including industry, environmental or community NGOs, government agencies, and academics are probably good indicators. Such indicators will have greater legitimacy with both expert and lay readers, and if they are used in many case studies, they may provide a more solid basis for future comparisons across communities.

CONCLUSION

Governments, academics, NGOs, natural-resource-based industries, and most importantly, local communities themselves are increasingly recognizing the utility in measuring, or otherwise assessing, indicators of community sustainability. The goal of much of the community indicator research is to establish baselines upon which future comparisons might be made. There may be widespread disagreement among these parties on what ought to be measured, or how indicators ought to be measured. However, there is growing consensus that indicator approaches are useful, at least for an initial attempt to measure community sustainability, or to provide a snapshot of community well-being at a given point in time.

This report is intended to familiarize groups interested in taking a social indicator approach to community sustainability with some of the current efforts underway. We have also reviewed and discussed some of the past research that has shaped the way we understand and attempt to measure community sustainability. Overall, there is great diversity in indicators advocated, though some indicators emerge as consensus picks across a range of authors. These should be given special consideration by newcomers to this field.

Recent work in social indicators of community sustainability is attempting to combine the strengths of both subjective and objective approaches. Indicators from existing secondary sources are certainly useful; however, new databases also need to be created. If policy decisions are to be made from indicator work, particularly at the local level, more subjective community self-assessments need to be built into sustainability monitoring efforts.

There is certainly room for future research and development in the area of community sustainability indicators. Our understanding of causal relationships and interactions between community well-being and environmental variables need to be strengthened. In the past, spurious assumptions were made regarding even flows of timber and community sustainability. While history has proved this simplistic assumption to be wrong, we have not ventured too far down the path toward explaining how ecological variation effects community well-being, or the implications of community variables for ecological well-being.

Many assumptions are made about the connections between healthy ecosystems and healthy communities, and many monitoring efforts still deal with environmental health and community health separately. Many of the indicators most commonly cited for community sustainability monitoring, such as poverty, unemployment, and income are likely to be negatively related to environmental health over the short term. Rapid exploitation of timber resources, for example, may reduce poverty, unemployment, and increase incomes, at a cost to the environment. Time frames for monitoring become critical in the interactions between ecological and socioeconomic indicators. Overcoming these shortcomings in current approaches will likely require interdisciplinary research that involves both social scientists and ecologists.

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Appendix 1. A Matrix of Indicator Approaches to Community Sustainability

		Forest-dependent community reports and studies									Other community reports and studies			Provincial reports		National reports		International reports and studies		Healthy communities report	Quality of life reports and studies		
		1. Canadian Council of Forest Ministers (1995)	2. Wollenberg and Colfer (1996)	3. Walter (1996)	4. Crabbé et al. (1995)	5. Schoonmaker and von Hagen (1995)	6. National Aboriginal Forestry Association (1997)	7. Force and Machlis (1997)	8. Beckley and Murray (1997)	9. McGinnis et al. (1996)	10. Sustainable Seattle (1995)	11. Hart (1995)	12. Maclaren (1996)	13. British Columbia Round Table on the Environment and the Economy (1994)	14. Ontario Round Table on the Environment and Economy (1995)	15. Interdepartmental Committee on Rural and Remote Canada (1994)	16. National Round Table on the Environment and the Economy (1995)	17. United Nations Department for Policy Coordination and Sustainable Development (1997)	18. Corson (1996)	19. Maclaren (1996)	20. Bollman and Biggs (1992)	21. United Nations Development Programme (1997)	22. Estes (1988)
Employment, income, and economic profile indicators	Common indicators			Unemployment rates; unemployment rate by gender/age/ethnic group	Employment vs. unemployment	Unemployment rates	Employment of Aboriginal peoples on- and off-reserve	% of civilian labor force unemployed	Unemployment rate	Unemployment	Real unemployment	Real unemployment	Real employment rate	% of labor force receiving unemployment insurance	Unemployment rate	Rates of employment and unemployment	Employment and unemployment rates	Unemployment rate	Unemployment rate	% of unemployment	Unemployment rates		
				% of families below low-income cut-off level	Population below the poverty line	% people under the poverty line		% of persons living below poverty level	Poverty rate	Poverty	Children living in poverty	% of population >125% below poverty line	% children living below poverty line	Proportion of low income households	Child poverty			Poverty gap index; squared poverty gap index		% of families living below the poverty line	Incidence of low incomes		
		Index of the diversity of the local industrial base		Industrial profile by sector; labor force by sector	Diversity of economic base	10 largest businesses by employment		Dominant manufacturing or extractive industry		Economic diversity	Employment concentration	No. of different types of businesses/industry	% of workforce employed by 10 largest firms/organizations	Jobs by sector/sources of income as a % of total community income		Employment by industry					Employment by industry		
											Housing affordability ratio	% housing set aside for low/moderate income	Waiting time for affordable housing	% of households spending more than 30% of income on housing		Housing (non-Native, off-reserve)		House price to income ratio		% of families without independent dwellings			
					Per capita income					Per capita income			Average 'real income' or 'real wages' in community			Per capita income; change in real per capita income, 1980-1990	Income levels						
				Average housing prices	Average value of dwelling vs. Canadian average	Assessed property values per capita			Real estate values			% of population affording median home sale price											
															Income equality			Gini index of income inequality	Income inequality		Quintile data and Gini coefficients		
					Home businesses, self-employed		Aboriginal owned and/or managed businesses					No. of people employed in locally owned business											
				Median income of families and unattached individuals											Family income						Average family income		
						Personal income per capita								Average personal income					Income per person				
					Incomes per household			Median household income				Median household income											
			Distribution of income by education attainment and field			Income distribution			Income distribution		Distribution of personal income	Distribution of wealth; distribution of personal income											
												Ratio of corporate assets to corporate debt		Number of bankruptcies and incorporations			Corporate bankruptcies						
	Additional indicators		Women's and men's incomes have increased with commercial forest use	Business profile (No. of employees)		Number of businesses, employment by sector		Gap between the incomes of population in the top and bottom quartile in income								Employment by age					Location quotients (employment)		Years since first law-work injury; years since first law-unemployment
			Forest actors have significant opportunity to work and receive training under company auspices without discrimination	Duration of unemployment; proportion of workforce part-time/temporary	Vertical mobility; No. of promotions		Overall economic well-being of Aboriginal communities; continuation of traditional economic activities					Employment by top 5 employers				Aboriginal socio-economic circumstances		GDP per person			Trends in employment		Per capita Gross National Product
				Advanced technology industries				% of labor force in professional occupations	Dependence on transfer payments			% of products/services local businesses buy from local business				Employment in primary industries					Taxes paid and transfers received by rural families		Military expenditures as a % of GNP
			Fair and effective mechanisms exist for sharing revenues from forest exploitation		Home ownership			Full-time workers; seasonal workers										Inflation rate			Expenditure patterns		GNP per capita annual growth rate
				Bankruptcy rate				$ value of monthly bank deposits				No. of people who work, shop, and live in the community					Level of indebtedness (individual, community, and nation)	Budget deficit or surplus as a % of GDP			Employment ratio	Real GDP per capita	External public debt as percent of GNP
																		Trade deficit or surplus as a % of GDP					Average annual rate of inflation
				Housing profile (types)	Personal savings/debt			$ value of local government expenditures per capita; % of housing units occupied by owner				Hours of labor required to meet basic needs						Floor area per person	Average number of persons per room				Per capita food production index
					Public debt			$ value of earnings in all industries				Average savings per household											Years since first law-family allowance
Population	Common indicators				Transient vs. permanent members	Net migration gain and loss			Demographic stability	Net migration	Population growth rate	Population flux		Net migration and natural population increase		Population migration		Net migration rate			Rural-urban mobility		
				Population distribution	Demographic history and profile			Total resident population		Rural population	Population			Population				Population density			Rural population trends; rural and small town population trends		Total population
			In-migration/natural population increase in harmony with forest		Population growth									Annual population growth rates		Rural population change		Population growth rate	Population rate of increase		Rural population growth rates		Rate of population increase
						Age structure		% of persons <18 and >64 years of age; % total population who are 70 years old or older				Age mix: No. of seniors to total population; age trends in population				Population age structure					Population dependency ratios		
				Birthrate per capita														Total fertility rate	Birthrate				Crude birthrate per 1000 population
	Additional indicators							Median age								Demography of Aboriginal populations							
								Ratio of females to males															
												Population living in urban growth management area									Trends in rural farm and non-farm population		
																					Preferred residential location		
Education	Common indicators			Education attainment levels	Level of schooling	High school graduation rates		% of adult population graduated from high school	Years of formal education		High school graduation	Years of school completed	% of workforce having completed post-secondary	Education level as a % of total population over 15		Level of schooling		Primary school enrolment ratio (gross and net); secondary enrolment ratio (gross and net)	Education per person		Education levels	Combined primary, secondary, and tertiary level gross enrollment (%)	School enrollment ratio, first level
				Language and literacy programs	Literacy levels						Adult literacy	Adult literacy	Adult literacy		Adult literacy		Literacy rates	Adult literacy			Literacy and numeracy skills	Adult literacy	Adult literacy
				% of employers in work experience/formal apprenticeship programs	Skill development - participation rates							Availability of educational resources for job skills needed	Average per capita hours of training per worker					Rate of change of school-age population					
	Additional indicators			Education field of study								Multilingual skills	% of adult population who don't speak English or French	English as a second language enrollments				Children reaching grade 5 of primary education	Schooling index		Less than grade 9 education		Pupil-teacher ratio, first level
				Proximity of post-secondary institutions	Formal education system			% of adult population who are college graduates				No. of schools in sustainable school program	% of eligible secondary school students participating in co-op programs					School life expectancy					% GNP in education
				Access to education-funding/ financing	Public vs. private education							Satisfaction with higher education		Graduates as a % of grade 12 enrollment				GDP spent on education					
				Employment programs (job training, job finding clubs)	Retraining opportunities						Arts instruction	No. of firms offering skills development opportunities											
Health	Common indicators			Life expectancy at birth	Life expectancy									Estimated life expectancy at birth			Infant mortality rates and life expectancy at birth	Life expectancy at birth	Life expectancy			Life expectancy	Male life expectancy at 1 year
				Low birth weight children per capita		% healthy birth weight babies					Low infant birthrate	Low infant birth weight	Low birthrate babies as a % of total	Low birth weight babies per 1000 live births				Adequate birth weight		Rate of babies born below 2500 g			
						Average infant, neonatal, and fetal mortality		Number of infant deaths per 1000 live births										Infant mortality rate	Infant death rate				Rate of infant mortality per 1000 live born
				Mortality rate/infant mortality	Mortality		Low levels of disease and mortality					Mortality rate by neighborhood											
					Hospitals, doctors, etc. per capita			Number of physicians per 1000 000 population								Hospital beds and physicians							Population in thousands per physician
											Health care expenditures	Health care expenditures	% of regional health care budget spent on health promotion, disease prevention					Total national health expenditure related to GNP					
	Additional indicators		The relationship between forest management and human health is recognized	Welfare case loads per capita	Occurrence of disease						Asthma hospitalization rate for children	Healthy diets for children	% of children on nutrition programs				Incidence of disease	Immunization against infectious childhood diseases		Potential years of life lost due to cardiovascular disease under the age of 70			
						Pacific County hospital admissions						Access to primary health care		Teenage mothers per 1000 live births			Obesity (adults) and malnutrition (children)	Maternal mortality rate	Access to birth control				
														Perceived seriousness of local pollution by community size				Contraceptive prevalence	% couples practicing contraception	Standard death rates due to AIDS / HIV positive tests per total number of tests performed			
				Hospital bed per capita								People identifying obstacle to health care						National spending on local health care		Proportion of daily smokers in the population			
																			Military spending as a % of spending for health and education	% of city budget devoted to public health for new health promotion activities			
				Crisis centers including 911	Characteristics of health care system (facilities, personnel, etc.)	Place of births to Pacific County mothers					Emergency room use for non-ER purposes	Health care system rating						Basic sanitation: % of population with adequate excreta disposal facilities		Average days of reported restricted activity			
												% of women receiving first trimester care/ethnic group					Caloric intake and the proportion acquired from local, Canadian, and foreign foods	Nutritional status of children		% of people reporting daily use of tranquilizers			Per capita daily calorie supply as % of daily requirement
				Single mothers as a % of all mothers		Mothers who received prenatal care during first trimester						Women under 18 having babies						Access to safe drinking water		Incidence of motor vehicle accidents			
Social pathologies	Common indicators			Crime rates	Crime	Simple assault arrest rates (age 18-24)		Number of serious crimes known to police per 100 000 population				Crime rate per 100 000 population		Crimes against persons per 1000 population	Crime rate		Degree of compliance with laws and regulations		Homicides per 10 000 people	Crime rates			
					Divorce rates			Number of divorces per 1000 population				Children involved in divorce	Per capita divorce rate										
												Suicide rate for different age/racial groups		Suicide rates per 1000 population									
	Additional indicators			Emergency responses	Law and order (police force, judiciary)			No. of police officers with arrest powers per 1000 population			Equity in justice	People feeling safe to walk alone at night		Capital expenditures per household for protective services, etc.									
												No. of neighborhood watch groups											
				Rehabilitation programs	Alcoholism							Rapes reported per 10 000 population											
					Substance abuse																		
Community cohesion	Common indicators			Voluntary agencies/ No. of volunteers	Unpaid work (housework, subsistence, voluntary associations)						Volunteer involvement in schools	No. of people who volunteer	% of adult population contributing time to community or service clubs, volunteer programs, sports, and recreation							% of people reporting involvement in health, social, peace, environmental groups	Volunteer and community work		
				Telephone and communications line, links, nodes	Communication networks, local news reporting							Information literacy	% of adult population who read a newspaper daily					Main telephone lines per 100 inhabitants	Newspaper circulation and radios per 1000 people				
					Libraries per capita			No. of books loaned by public libraries per capita per year			Library and community center usage	Public library book circulation	Library circulation per capita										
											Youth involvement in community service	Youth volunteer rate (1 hr/week)											
											Gardening activity	No. of community gardens											
											Neighborliness	No. of neighbors known by name											
															Degree of pride in community and culture		Degree of pride in community and culture						
	Additional indicators			No. of festivals; spaces or meeting places for community events	Chamber of Commerce						Public participation in the arts	Arts and culture exposure		General operating expenditures per household for protective services, transportation, recreation, and culture				Access to information					
				United Way or similar institution	Leisure activities and participation rates			% of population who claim adherence with an established religion															
				No. of cooperatives	Leisure organizations			Major religious group				Population with activity limited by disabilities								Perceived accessibility to local shops			
					Family and social services																		
				Mutual reliance: % of people who feel they can rely on other members of the community for help																% of people reporting the city as a good/very good place to live			
					Community features and events that lead to community identity and pride							Variety of available recreational/sport-sporting options											
					Hobby and sports groups, recreation for age groups		Practice of cultural and spiritual activities through cultural inventories													Self-perceived loneliness			
Women	Common indicators			Unemployment rate by gender	Male vs. female employment			% of adult women in the labor force										Women per 100 men in the labor force					
																		Difference between male and female school enrollment ratios	Years of schooling for females as a % of males				
	Additional indicators											Ethnic/gender diversity in business community		% of board or council members who are women or ethnic minorities				Ratio of average female wage to male wage	Parliament seats held by women			Women's share of parliamentary seats	% age eligible girls attending first level schools
				No. of women and aboriginal candidates for office	Male-female gap (women in non-traditional roles/programs)							Employment discrimination complaints										Women's share of administrative, managerial, professional, and technical positions	% adult female illiteracy
				Distribution of income by sex/single parent incomes	Male/female gap in wages							Births to mothers without 12 years education										Women's access to jobs and wages	
				Single mothers as a % of all mothers				% of households with children under 18 headed by single parents				Domestic violence reports to shelters											
Race	Common indicators										Ethnic diversity of teachers	Ethnic diversity of teaching staff											
	Additional indicators			Unemployment rate by ethnic group	Cultural characteristics of the population			% of total population in ethnic/racial groups				Schools with culturally diverse curricula						Representation of ethnic minorities and indigenous people in national councils for sustainable development					Largest % sharing same mother tongue; same or similar racial/ethnic origins
												Racial perception											
				Distribution of income by ethnic group								Racial/gender diversity of city council members											Largest % sharing same basic religious beliefs
Decision making	Common indicators			Voter turnout		Voter participation in general elections		% of population >18 years of age participating in presidential election			Voter participation	Voting rate of registered voters		% of eligible voters who voted in local elections					% voting in national elections				
			Effective mechanisms for two-way communication related to forest management	% of local public planning processes that require public participation	Amount of community participation and control in decision making									% of jurisdictions with a local round table or similar multi-stakeholder advisory planning group										
				Community visioning statement or process									% of jurisdictions with a community vision statement										
	Additional indicators	No. of communities with stewardship or co-management responsibilities	Forest use reflect the necessary complementaries and compromises among stakeholders				Aboriginal communities satisfied with their participation					Resident involvement in civic activities		No. of public meetings and hearings held				Expenditure on R&D as a % of GDP	Civil rights index				Violation of civil liberties index
			Stakeholders have detailed, reciprocal knowledge pertaining to forest resources, gender roles, and forest management plans prior to implementation	% of local public planning processes that provide public participation	Political associations		No. of Aboriginal people involved and their role in planning, implementation and monitoring of forest management	No. of elected positions per 1000 population				Citizens meeting with officials or neighbors		% of ratepayer or similar groups active in jurisdiction				Potential scientists and engineers per million population; scientists and engineers engaged in R&D per million population					Composite violations of human freedoms index
				Index of public participation	Empowerment: participation in the elements of civil society		Amount of control in decision making given to Aboriginal communities					No. of languages translated at public meetings		% of eligible voters who voted in provincial elections									
			Effective mechanisms exist for mutual monitoring when cooperative plans have been made, appropriate sanctions for non-compliance				Extent to which traditional knowledge is used in forest management planning												Ratification of global agreements					
			Agreement exists on rights and responsibilities of relevant stakeholders				Role played by Aboriginal people in the design of decision-making processes					Households participating in resident/ratepayer associations							Implementation of ratified global agreements					
																			Political rights index				Violations of political rights index
			Existence of acceptable mechanisms to judge and equitably punish transgressors				Which Aboriginal peoples participate in decision making and who they represent					Visibility of local issues		% of jurisdictions using defined environmental standards for evaluating development for government				Program of integrated environmental and economic accounting					
Natural resource use	Common indicators				Parks and protected areas						Open spaces in urban villages	Park/facility space per capita by district	Total % of ESAs 'protected'		Park area per capita		Park area per capita						
		No. of communities with a significant forestry component in the economic base		Resource or forest dependency				% of labor force in agriculture, forestry, fisheries, mining		Timber dependency			Reliance on local resources										
					Tourism					Recreation dependency		Total employment in travel/ recreation-related industries											
												No. of green jobs	% of workforce employed by 'environmental' industries										
	Additional indicators		Economic supplements and opportunities for forest actors are increasingly available		Shift work, seasonal employment, boom and bust	Local processing of timber	Absence of conflict over resource development	Ratio of $ value of crop products to livestock products		Wildland earnings change			Acres of active, sustainably managed forest			Forest disturbance							
			Inter-generational tenure/use rights to land/forest have been assessed and delineated			Key natural resource harvests	Traditional land use	% of land owned by federal government		Economic dependency and proximity to national forests						Agricultural land use intensity		Sustainable development strategies					
			Tenure and use rights are clear to all stakeholders			Value of key natural resources	Understanding of diversity of views in forest management planning	No. of people per acre of nonfederal land		Direct wildland dependency						Species at risk							
		Diversity of forest use at the community level	Effective mechanisms for resource management/conflict resolution				Practice of cultural and spiritual activities	% of occupied housing units heated with wood															
			Forest actors feel comfortable about the security of their rights				No. and variety of tenures held by Aboriginal individuals or communities	Acres of irrigated land		Federal wildland ownership													
			Environmental conditions stable or improving			Harvested timber in relation to standing stock	Co-management agreements with Aboriginal communities																

This table is intended to be used as a quick reference and summary document for identifying social indicators of community sustainability. The table is organized along several principles. Each vertical umn corresponds to an individual study, report, or policy initiative. The entire set of 22 studies and reports that we review are identified in abbreviated form in the numbered columns at the top of each table. l citations for these studies are listed in the literature cited section to the right of this text. They are listed alphabetically and are also numbered because some reports contain multiple indicator lists.

We are most interested in community sustainability in forest-dependent places; therefore, studies are grouped according to their relevance to this topic. Beginning with the left side of the table, forest-pendent community studies are listed first, then other community studies, then other indicator approaches related to increasing, hierarchically related spatial scales (provinces, nations, international). Finally, include studies from two social science areas (healthy communities and quality of life research) that pre-date, but are relevant to, the community sustainability literature. The review of only the first category, est community studies, is meant to be exhaustive (for Canada), though there are undoubtedly some studies that were missed. The other categories include only a sample of available studies.

Indicators that appear to measure similar or like concepts are grouped in rows. Indicators that are cited by more than one study are in the light-green shaded areas (common indicators) section of the cument. By reading across the rows one can see how many studies identify a particular indicator. Within each indicator category (e.g., population, education, health) we list indicators in descending order of pularity. For example, in the Employment, Income and Economic Profile Indicators category, employment/unemployment is listed first because this indicator was named in 18 of the 22 studies; poverty was med in 14 studies; economic diversity occurred in 12; with corporate debt or bankruptcy named in only three reports. The language used to describe the indicators may vary, but rows are meant to represent icators that use the same or similar data. Indicators that did not seem to be comparable to any others are in the white (additional indicators) section. The studies often give cursory descriptions of the icators, and many do not identify what data (if any) is available for measuring the concepts described. As a result, some subjective assessment was required in grouping the indicators.

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