FRAMEWORKS FOR ASSESSING COMMUNITY SUSTAINABILITY: A SYNTHESIS OF CURRENT RESEARCH IN BRITISH COLUMBIA

N. A. MacKendrick and J. R. Parkins

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ABSTRACT

This report describes five recent research projects identifying indicators of community sustainability in rural British Columbia. A sustainable community, as understood by this body of research, is one that strives to maintain a healthy and thriving economy, society, and environment; adapts and responds to external and internal stresses and opportunities; provides a high quality of life for residents; and persists through time. A synthesis approach is developed that combines elements from all five projects into an overarching framework for indicators research. More specifically, the framework organizes indicators derived from the projects into four basic types of capital: natural, economic, social, and human. It also identifies five specific outcomes: ecological integrity, economic vitality, civic vitality, physical and mental health, and recreational opportunities. This framework may serve as a useful organizing tool for indicators research in rural communities within British Columbia and beyond.

RÉSUMÉ

Le présent rapport décrit cinq projets de recherche récents qui ont permis d'identifier des indicateurs de durabilité communautaire dans des régions rurales de la Colombie-Britannique. Une « communauté durable », telle que définie dans le cadre de ces travaux, est une communauté qui s'efforce de maintenir la santé et la vigueur de son économie, de sa tissu social et de son environnement, qui s'adapte et répond aux stress externes et internes et aux possibilités qui se présentent, qui permet à ces membres de jouir d'une bonne qualité de vie et qui persiste dans la durée. L'approche synthétique élaborée combine des éléments de chacun des cinq projets afin d'établir un cadre obligatoire pour la recherche sur les indicateurs. Ce cadre de travail organise en particulier les indicateurs issus des projets en quatre types de « capitaux » de base : naturel, économique, social et humain. Il identifie également cinq résultats distincts : intégrité écologique, vitalité économique, vitalité civique, santé physique et mentale et possibilités de loisir. Ce cadre de travail pourra servir d'outil organisationnel pour les travaux de recherche sur les indicateurs dans les communautés rurales de la province et ailleurs.

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The assessment of community sustainability has become increasingly widespread, especially in forest-based communities facing internal and external pressures from, among others, changes in international markets for forest products, shifts in local demographics, and investments in technology to replace labor. As research in this area expands, approaches to measuring community sustainability are gradually becoming more sophisticated, which has generated a more detailed understanding of the antecedents, contributors, and processes central to an application of sustainability principles. The International Institute of Sustainable Development's compendium of indicator initiatives lists more than 35 projects either recently completed or ongoing in Canada (IISD 2003). Each initiative examines a different subset of sustainability issues and employs a distinct approach to measuring and evaluating sustainability. Because of the diversity of these approaches and the constant development within this area, it is difficult to identify a single best method of studying community sustainability.

The study of community sustainability in British Columbia mirrors the expansion of indicators research across North America. Research in forest-dependent communities is particularly active, because of dramatic policy changes in the past decade and the sheer number of heavily forest-dependent communities—77 in total (a number derived from the number of forest-dependent census subdivisions, according to 1996 census data from Statistics Canada; when a community has 50% or greater personal income from base activities in the forest sector, it is considered heavily forest dependent [White, W.; Watson, D. 2001. Natural resource based communities in Canada: an analysis based on the 1996 Canada census. Nat. Resour. Can., Can. For. Serv., North. For. Cent., Edmonton, AB. Unpubl. rep.]). Conflict in British Columbia's forest sector was particularly pronounced during the 1980s and 1990s as evidence documenting the environmental impacts of forest management activities on forest ecosystems began to emerge (Hoberg 2001). Influential environmental groups threatening international boycotts and mounting local education campaigns, an increasingly environmentally aware public demanding improvements in forestry practices, and a change in provincial government leadership were all significant in transforming this conflict into policy change (Hayter 2000; Hoberg 2001). At the foundation of this policy change were criticism of the sustained-yield timber management paradigm and the emergence of an alternative paradigm more commonly referred to as sustainable forest management. Central to this latter notion is ecosystem sustainability, as well as community sustainability. Concerns about the sustainability of forest-based communities, particularly "instant towns" (Marchak 1983), emerged in response to observations of negative social impacts from the cyclic forest industry and the substitution of technology for labor in these communities (Marchak 1995). The policy shift to sustainable forest management coincided with dissatisfaction expressed by forest-dependent communities grappling with the local effects of economic recessions in the early 1980s and early 1990s and critiques of the globalizing forest industry (Marchak 1995; Hayter 2000). More recently, several forest certification schemes emphasizing the sustainability of ecosystems and, to some extent, social systems have become increasingly prominent and have motivated an industry-wide interest in the development of indicators of community sustainability (FSC 2000; CSA 2002; SFI 2003).

In British Columbia, several studies of community sustainability are under way or have been recently completed, each taking a unique approach to assessing sustainability. Of these many initiatives, five studies can be identified that examine natural-resource–based communities, adopt a broad project scope, and are characterized by significant conceptual rigor. Two initiatives, the Wellbeing Assessment and the Resilient Communities Project, focus on coastal communities. While the first of these two projects (CIT 2002) is developing a series of quantitative measures of ecosystem and human system well-being, the second (Resilient Communities Project 2003) combines qualitative and quantitative approaches to assess community resilience to economic stress. A third initiative, the New Rural Economy Project (NRE 2003) is a cross-national examination of community capacity that includes three British Columbia communities. In the Robson Valley Forest District, a fourth initiative, entitled the Sustainability of Human Communities, was recently completed (Parkins et al. 2004). This project

developed a suite of indicators allowing communities to track their progress on a range of social, economic, and ecological indicators. The fifth initiative, a landscape visualization project (Sheppard 2003) is also included in this overview; although not a study of community sustainability, it assesses the visible evidence of sustainable forest management and could be incorporated into a broader sustainability study. Because of the sheer pace of development in the field of community sustainability, however, it is possible that other key projects with similar scope have recently emerged and are not covered by this overview. Two initiatives not included here, for example, are the Community Economic Development Project undertaken by researchers at Simon Fraser University (CEDC 2003) and the indicator study in the Morice and Lakes timber supply areas (M&L IFPA 2003). The Community Economic Development Project defines tools and approaches for community capacity assessments but does not actually measure community capacity, whereas the Morice & Lakes Innovative Forest Practices Agreement (IFPA), an agreement between major forest companies and the BC Ministry of Forests to promote new approaches to forest management, has developed socioeconomic indicators appropriate for forest industry applications but with limited application for broader community sustainability.

The purpose of this report is to describe the five projects listed above, highlighting their general approach and identifying how these frameworks could be combined to generate a synthesis approach applicable to other regions. As a preface to this overview, the disconnection between dominant forest sector approaches to assessing community sustainability and more recent social science approaches to this assessment is briefly discussed.

APPROACHES TO MEASURING COMMUNITY SUSTAINABILITY

Early studies of community sustainability focused on the goal of community "stability." From the late 1940s to the mid-1980s the concept of community stability received considerable attention when negative social impacts were observed in boomtowns and forest-dependent communities suffering from extreme fluctuations in resource flows and market demand for natural resources (Kusel 1996, 2001). During that period ideal communities were thought to have stable industries supported by a constant supply of timber, employment, and labor (Beckley et al. 2002b). It was soon evident, however, that technology could replace labor without destabilizing the local forest industry (Beckley et al. 2002b) and that desirable communities also required functioning social systems and ecosystems, as well as viable economies. Although the community-centered approach within the social sciences has stimulated research on a broad range of indicators associated with social and economic systems—evidenced by many of the projects described in this report—the forest sector has taken a significantly different approach to forest-dependent communities. Initiatives that recognize human communities as an important dimension of sustainable forest management are increasingly being adopted by forest companies. In contrast to the social science approach, the forest sector has identified indicators associated with community sustainability that are controlled or managed by forest companies or provincial natural resource agencies. For example, the indicators of community sustainability developed for the Morice & Lakes IFPA region include many that are categorized under the value of "community stability," such as the percentage of public comments on forest management receiving a response from licensees and the amount of government revenue directed into the local economy as the result of stumpage payments (Tesera Systems Inc. 2003. Morice and Lakes IFPA indicator list. Prince George, BC. Unpubl. rep.). As indicators research evolves, however, the orientation of forest sector measures of community sustainability remains fairly distinct from most of the social science work in this area. The forest sector approach to community sustainability tends to focus first on the forest, only

later incorporating a social angle that typically explores the ways in which the forest sector contributes to community life. The resulting community sustainability indicators often contain forest-related contributions such as jobs and recreation opportunities. The Canadian Standards Association guidelines (CSA 2002) are a good example of such an approach, in that they recognize public participation in forest management and the economic and recreational benefits and drawbacks of forestry development as key to assessing community sustainability. Similarly, the national status report on sustainable forest management of the Canadian Council of Forest Ministers (CCFM 2000) identifies three forest-based measures of community sustainability: number of communities in the economic base with a significant forestry component, index of the diversity of the local industrial base, and diversity of forest uses at the community level.

In contrast, the dominant social science approach, represented by the projects described below, recognizes the social processes and community capabilities, in all aspects of community life as keys to sustainability (Farrell and Hart 1998; Parkins et al. 2001). In other words, the social science approach starts with the community and, among many other factors, looks for ways in which the forest contributes—through jobs but also through a wide range of nontimber benefits—to community well-being. Although this distinction between the forest sector and the social sciences is fairly significant, in the most recent version of its criteria and indicators, the CCFM (2003) has modified the indicators dealing with forest communities to express a more direct link to community well-being and resilience. The indicators associated with forest communities include economic diversity, education attainment, employment rate, and the incidence of low income. This most recent set of indicators represents a significant policy shift toward community-centered measures of sustainability and may provide a basis for a more universal approach to the assessment of sustainable forest-based communities.

For most of the projects described in this report, a sustainable community is one that strives to maintain a healthy and thriving economy, society, and environment; adapts to internal and external stresses; takes advantage of internal and external opportunities; provides a high quality of life for residents; and persists through time. This notion of community sustainability is employed throughout this report, particularly in a latter section, which discusses a synthesis approach to the study of community sustainability.

OVERVIEW OF CURRENT COMMUNITY SUSTAINABILITY PROJECTS IN BRITISH COLUMBIA

British Columbia is currently host to numerous community sustainability research projects, and demand for similar research appears to be growing steadily. Five key projects are currently under way or have been recently completed in this province. Four of the five projects target community sustainability, and the fifth is being used to evaluate the social dimensions of ecosystem sustainability. However, all of the projects contribute to a comprehensive, synthesis approach to studying community sustainability that can be applied in other regions of the province. The following section describes the five projects and the key relationships that are being examined, as well as certain variables—and in some cases indicators— that are being measured. Table 1 lists these projects and the key concepts driving their research.

Wellbeing Assessment

The Wellbeing Assessment (WA), or the "barometer of sustainability," is a quantitative approach to evaluating human and ecosystem well-being. Developed by Prescott-Allen and published under the title The Wellbeing of Nations: A Country-by-Country Index of Quality of Life and the Environment (Prescott-Allen 2001), the WA was first used in a comprehensive international comparison of human and ecosystem well-being. The premise behind the WA is that both human well-being and ecosystem well-being are key to regional or national sustainability. Ecosystem well-being is defined as "a condition in which the ecosystem maintains its diversity and quality—and thus its capacity to support people and the rest of

Table 1. Five projects on community sustainability under way in British Columbia

Project	Principal investigator	Key concepts	Status
Wellbeing Assessment	Robert Prescott-Allen	• Ecosystem well-being • Human well-being	Ongoing
New Rural Economy Project	Bill Reimer	• Community capacity • Natural, social, economic, and human capital	Phase I complete
Resilient Communities Project	Ralph Matthews	• Community resilience • Social cohesion • Social capital	Ongoing
Sustainability of Human Communities	John Parkins	• Community sustainability • Community capacity	Complete
Landscape visualization and visible stewardship	Stephen Sheppard	• Visible stewardship	Complete

life—and its potential to adapt to change and provide a wide range of choices and opportunities for the future" (Prescott-Allen 2001, page 5). Human well-being is "a condition in which all members of society are able to determine and meet their needs and have a large range of choices to meet their potential" (Prescott-Allen 2001, page 5).

The WA method is currently being used in a Coast Information Team (CIT) project encompassing the central and northern coast of British Columbia. The CIT was formed in 2002 as part of a joint agreement between the provincial government, First Nations governments, environmental nongovernmental organizations, communities, and the forest industry. The purpose of the CIT is to bring together scientific, environmental, traditional, and local knowledge and expertise to provide independent information and analyses for the development and implementation of ecosystem-based management along the northern and central coasts of British Columbia (CIT 2002). The following summary of the WA is based on the CIT approach.

The WA uses four indexes to measure human and ecosystem well-being: a human well-being index, an ecosystem well-being index, a combined ecosystem and human well-being index, and a fourth index quantifying the impact of improvements in human well-being on ecosystem health. The first two indexes are broken down into a suite of indicators tied to specific data sets. The human system, for example, is broken down into five dimensions: health and population, wealth, knowledge and culture, community, and equity, each further divided into their component parts, which results in a series of indicators allowing the measurement of specific features of human well-being. As an example of this process, Table 2

Table 2. Wellbeing Assessment indicators: the example of the wealth dimension within the human subsystem[a]

Individual wealth				Societal wealth					
Individual needs and income		Contributors and constraints		Size and productivity of economy		Contributors and constraints			
Food and shelter	Income	Emloyment and access to resources	Financial commitments	Size of economy	Productivity or productive potential	Owner-ship and invest-ment	Business diversty and viability	Infra-structure	Debt

[a]Adapted from Coast Information Team preliminary documents. The process of dividing a dimension into its critical component indicators is applied to all other dimensions in the human and ecosystem subsystems.

illustrates the subdivision of the wealth dimension into indicator groups. The core components of ecosystem well-being are land, water, air, species and genes, and resource use, and each of these components is also divided into specific indicators.

The WA includes numerous indicators in both human and ecosystem well-being. Each indicator is linked to a specific objective defined by the researchers and community advisory groups, which allows the researchers to determine if a community is meeting certain stated objectives. If, for example, individual income is an indicator of wealth, the objective might be defined as "individuals within the region earn sufficient income to secure their material well-being." Researchers would then obtain data describing individual income for the region being assessed and determine to what extent the objective is being met. The WA uses a great deal of secondary data, such as census data, as well as primary data collected from a random sample survey administered in the study communities.

Once each indicator has been defined and measured, it is also rated according to a common unit of measurement called a performance score. Performance scores are based on regional standards and expert opinion. A high performance score indicates that the objective for a particular indicator has been achieved, whereas a lower score indicates that the objective has not been achieved. For example, in a region where few people have an income to meet their basic needs, the indicator for income would receive a low performance score. The performance scores for human well-being are then combined as a single index, and the same is done for the performance scores for ecosystem well-being. The human well-being and ecosystem well-being index scores are then plotted as coordinates on a two-dimensional scale to yield a visual representation of the two index scores. This two-dimensional scale is called a barometer of sustainability.

New Rural Economy Project

The New Rural Economy (NRE) Project is an ongoing research and education program examining changes in rural communities across Canada (NRE 2003). The project is studying 32 communities, including Tumbler Ridge in northeastern British Columbia, Mackenzie in the north central region of the province, and Port Alice on Vancouver Island. The first phase of this two-phase project was completed in 2002, and the second phase is currently under way. The second phase identifies requirements for, responses to, and processes for building capacity in rural communities (NRE 2003). The following summary is drawn from several key publications discussing community capacity that arose from the first phase of this research (Beckley et al. 2002a; Reimer 2003; Martz, D.; Sanderson, K. 2003. Four capitals and four capacity outcomes in four prairie agricultural communities. Centre for Rural Studies and Enrichment, Saskatoon, SK. Unpubl. rep.). The NRE Project also examines rural community communication and services, but these aspects are not discussed here.

The NRE Project is examining the notion of community capacity, where the capacity to prosper and respond to exogenous and endogenous stresses is thought to be central to sustainability. More formally, the NRE researchers define community capacity as "the collective ability of a group (the community) to combine various forms of capital within institutional and relational contexts to produce desired results or outcomes" (Beckley et al. 2002a, page 7). This definition of community capacity suggests that communities require certain capital and resources, as well as the ability to mobilize them through social organizations and relationships to produce desired results and outcomes. The NRE researchers have brought forward four specific capacity outcomes:

- The capacity to maintain or enhance economic vitality
- The capacity to access resources from the state
- The capacity to create or maintain a vital civic culture
- The capacity to subsist or persist.

Figure 1 illustrates the NRE Project capacity model and demonstrates how NRE researchers envision the production of these four outcomes. Although the model presents the process as linear, Beckley et al. (2002a) maintain that it is cyclic, with feedbacks between the capacity outcomes and the various forms of capital.

The model identifies several forms of capital central to community capacity: natural, human, economic, and social. Researchers attempt to measure each of these forms of capital separately, as well as the four capacity outcomes. Natural capital

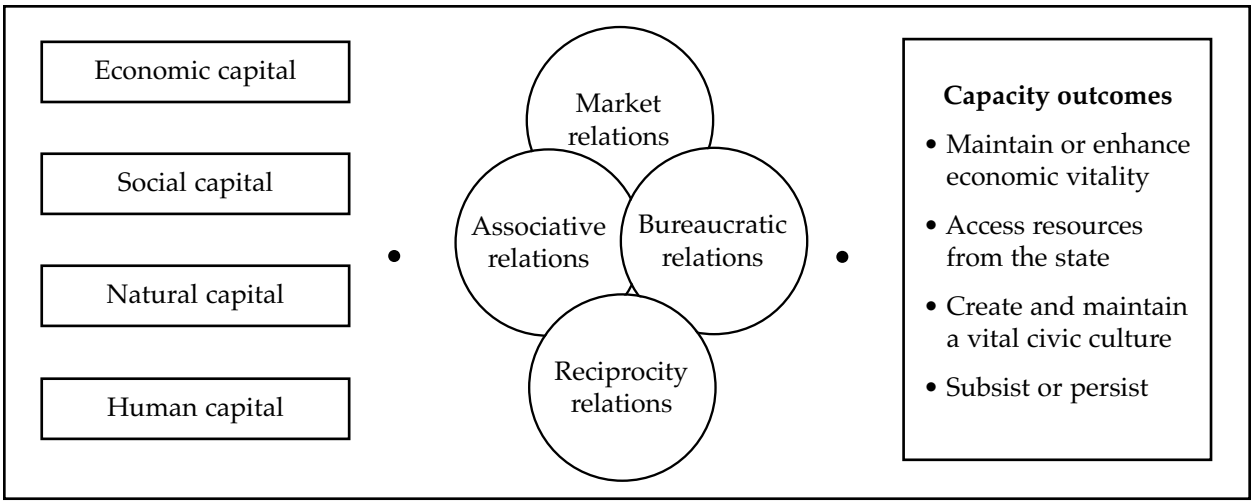

Figure 1. Community capacity model. Adapted from Beckley et al. (2002a).

is produced by the natural environment and sustains the community. It includes environmental services, such as clean air and water, as well as natural resources, such as forests and fossil fuels. Human capital refers to the skills, education, and health of individuals within the community and ultimately contributes to the skill base and the economic performance of the community. Economic capital is the physical infrastructure, such as road networks, water treatment facilities, and administrative buildings, as well as the liquid assets, or financial capital, such as organizational budgets, operating funds, and household savings. Social capital is a slightly more abstract concept with many different definitions, several of which have been adopted by the various initiatives documented in this current report. The NRE researchers view social capital as comprising the relationships between community members and relate it to the norms and networks facilitating collective social action.

The NRE Project is examining the contribution of four overlapping spheres of social relations—market, bureaucratic, associative, and reciprocity—to each of the four forms of capital and the four capacity outcomes. The NRE researchers define market relations as the social relations producing income and employment, in addition to transactions intended to produce goods and services, such as labor, financial capital, property rights, and natural capital. Bureaucratic relations are thought to encompass public service and other institutions designed to provide governance and law and order and to control property rights. Organizations that come together to produce capacity outcomes not provided by the bureaucratic and market spheres are called associative relations, where these relations are the product of shared interests organized to act toward a common goal producing mutual benefits. Examples of organizations within the associative sphere include churches, recreational groups, and organizations providing voluntary services. Reciprocity relations are perhaps more difficult to define and less structured than the other three spheres. Transactions within this sphere are based on trust, loyalty, and reciprocity, and produce networks of support among individuals.

Community capacity is measured by means of variables representing the four forms of capital and the specific capacity outcomes. Each form of capital and capacity outcome is assigned a number of variables that measure its core components. Secondary data, such as census data, as well as primary data obtained from a household random sample survey, are used to measure these variables. The performance scores for these variables are plotted separately on a diagram for each community, to illustrate the community's relative performance in the capital and capacity outcome areas.

Resilient Communities Project

The Resilient Communities Project is a 3-year study that has been undertaken by a team of researchers from the University of British Columbia to examine social cohesion and resilience to economic change in the province's coastal communities. This project

has observed a crisis in these communities, where community existence is threatened by depletion of natural resources and changes in global markets. Rather than framing the research in terms of sustainability, this project views resilience, or adaptability to economic stress, as a desired outcome for rural communities.

To explore both social cohesion and resilience, the project examines the extent to which social capital enables or prevents adaptation to economic decline. The research model, illustrated in Figure 2, predicts that social capital produces community resilience and leads to economic well-being. Two aspects of social capital are explored in this model: the community social psychological component, involving trust between individuals and personal identification with, and commitment to, the community; and the community social organizational component, consisting of interpersonal relationships and obligations between community members, as well as the social norms enabling positive contributions from community members to their communities. Community resilience, considered an intervening rather than a dependent variable, is defined as a community's ability to respond positively to internal and external economic stresses that threaten the community's economic viability or existence (Matthews, R. 2003. The resilient communities project in British Columbia: identifying the relationship between community social cohesion and economic change. Univ. British Columbia, Resilient Communities Project, Vancouver, BC. Unpubl. rep.). Economic well-being is assessed with an economic performance index consisting of several community-level employment and income measures, including overall income, occupational composition, job loss, and economic growth.

Research for the Resilient Communities Project is taking place in three stages. The first stage is a macro-level community profiling exercise to construct the economic performance index and to assess the relationship between economic performance and various social indicators. The second stage involves a more detailed analysis of approximately 20 communities. Researchers have designed a questionnaire to be administered to a random sample of 120 individuals within each of these communities to measure social cohesion and social capital. The survey contains questions measuring the social psychological and social organizational aspects of social capital, as well as questions assessing individual economic and employment history, migration behavior, political participation, community relations, and individual health. Data from the questionnaire will be analyzed and used to describe the function of social capital in buffering the negative impacts of poor economic performance and enabling a positive community response promoting future economic growth. The third stage of the research involves an intensive ethnographic study of eight communities to generate a detailed understanding of the formation and use of social capital, as well as the cultural, generational and gender dynamics within the community and perceptions of the future of the community.

Sustainability of Human Communities

Since the mid-1990s, the Canadian Forest Service (CFS) has been studying rural forest-based community sustainability and developing indicators of sustainability. Early indicators research developed thick descriptions (rich, detailed accounts of an observation [Neuman 2000]) of community conditions by linking census profile data on indicators such as income,

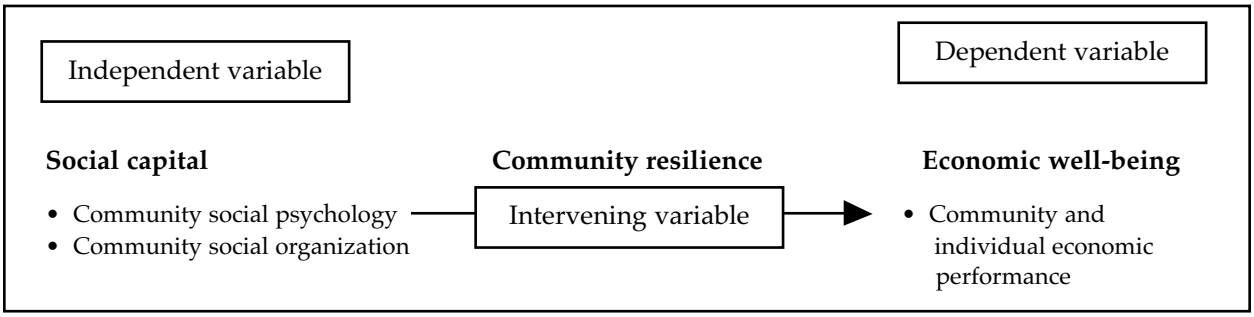

Figure 2. Causal model of community resilience.

employment, and education attainment with individual interview data from the community (Parkins and Beckley 2001). Since that time, indicators research at the CFS has led to methods of identifying local-level indicators that require extensive contact with communities and primary data collection through workshops and surveys. In general, indicators of sustainability used in CFS projects are locally defined and provide baseline data that can be used to track a community's progress toward future desired conditions. Indicators of sustainability are defined as "the social, economic and environmental factors that are deemed crucial for measuring a future desired state" (Parkins et al. 2004). In recent years, this focus on indicators of sustainability has expanded to include some community capacity measures that are more consistent with the NRE Project.

The CFS Social Science Research Group recently completed a study of community sustainability in the Robson Valley Forest District in the northeast interior of British Columbia. The following summary is based on the Robson Valley work. The Robson Valley project took advantage of three approaches to the study of community sustainability: quality of life, community capacity, and a specific sustainability evaluation framework. By integrating these three approaches, researchers were able to generate conceptually grounded, but locally relevant indicators sensitive to the community in question. The quality-of-life approach led to the development of indicators evaluating personal life, such as family life, leisure, and friendship networks, as well as general societal conditions, particularly housing, employment, and recreation. Indicators in this area were generated locally using information provided by residents of the Robson Valley. Drawing on the community capacity literature, key measures of human and social capital were also developed. Similar to the NRE definitions, human capital was conceptualized as the collective skills and abilities of community members, whereas social capital was defined as the social relations within the community, particularly trust and reciprocity between community members and attachment to the community.

Finally, researchers used a sustainability evaluation framework developed by Hart (2000) to assess quality-of-life and capacity indicators according to their relevance to sustainability. According to Hart's framework an indicator must meet the following criteria:

- Address the carrying capacity of natural resources, ecosystem services, and the esthetic quality of the environment
- Address the carrying capacity of the community's social capital, built capital, and human capital
- Be understandable and usable by the community
- Take a long-term view of progress
- Address economic, social, or biological diversity
- Address intra- and inter-generational equity
- Show linkages between social, economic, and environmental factors
- Monitor use of natural resources
- Address the state of ecological services
- Address the beauty and life-affirming qualities of nature
- Address social, built, or financial capital
- Examine whether sustainability comes at the expense of other communities.

Indicators were generated after several stages of data collection, analysis, and evaluation. Data collection began with workshops asking residents to discuss quality-of-life priorities in their communities. During the workshops, specific social indicator themes were developed. Personal interviews were used to expand on and validate some of the themes generated during the workshops. On the basis of these themes, a random-sample community survey was developed to prioritize indicators identified during workshops and interviews. Using information from workshops, interviews, the survey exercise, and the social science literature, researchers were then able to identify specific indicators and measures of sustainability. Most indicators were based on local data collection; however, a few were included because of their importance in the social science literature. Profile indicators and process indicators, for example, were drawn almost entirely from the literature. Beckley et al. (2002b) described profile indicators as descriptive and static, usually consigned to socioeconomic or demographic aspects of the community. Process indicators, on the other hand, explore social processes and behavior, allowing more precise determination of the causes of certain social phenomena. In other words, process indicators help to answer questions such as, "How did this community achieve these social and economic conditions?"

Measures for the suite of indicators were identified and evaluated according to several criteria, including their relevance to the indicator, how well they allowed researchers to understand

the indicator, and the accessibility of data to go along with the measure. The final product of this research was a locally relevant suite of indicators of community sustainability, rooted in the literature, which could be employed to track progress toward specific community goals and aspirations.

Landscape Visualization and Visible Stewardship

The landscape visualization approach and the concept of visible stewardship are not designed specifically to assess community sustainability; rather, they can be used as tools and variables within broader studies of community sustainability. The landscape visualization technique is becoming more widely used in forest planning and perceptual research; for example, the Collaborative for Advanced Landscape Planning at the University of British Columbia has applied it to public participation and sustainability assessment in a pilot project that is part of the Arrow IFPA study in the West Kootenay region of British Columbia. Scenario planning, like the work undertaken by the Morice & Lakes IFPA (Tesera Systems Inc. 2003. Morice and Lakes IFPA indicator list. Prince George, BC. Unpubl. rep.), is also becoming an important component of sustainable forest management planning. As computer models become more sophisticated, visual renderings of future forests can be presented for public consideration during the planning process. Both the landscape visualization approach and the concept of visible stewardship described here suggest a way in which this major component of forest planning can be incorporated into a broader community sustainability framework.

In the landscape visualization approach, computer-simulated visual representations of existing landscapes under various change scenarios (e.g., change under a specific harvest regime over time) are presented to a group of individuals, who are asked to rate their preferred scenario according to certain criteria (Sheppard, S.R.J.; Meitner, M. 2003. Using multi-criteria analysis and visualisation for sustainable forest management planning with stakeholder groups. Univ. British Columbia, Collaborative for Advance Landscape Planning, Vancouver, BC. Unpubl. rep.). For example, researchers have taken a computer-simulated image of a hillside familiar to community residents and shown, using computer-simulated projections, how that landscape might change over time under a certain timber harvesting method with various ecological, economic, and social consequences. Viewers compare images of the same landscape under several different harvest scenarios, together with mapped and tabular data from technical evaluations and choose the scenario that they believe demonstrates the highest level of sustainability. Using this information, researchers or forest managers can then evaluate how closely the public's preferred harvest regime matches scenarios determined by experts to be the most ecologically or economically sound and how strongly various harvest scenarios communicate to the public a commitment to sustainable forest management.

This latter determination is also called visible stewardship (Sheppard 2001). Visible stewardship has the potential to inform forest-based community sustainability studies, particularly given that sustainable communities are dependent on healthy ecosystems and sustainable forest management depends on public satisfaction with management practices. Visible stewardship takes into account the relationship between actual forest stewardship and the visible evidence of stewardship, where esthetically acceptable landscapes must also be deemed by experts to be sustainable (Sheppard 2001). According to Sheppard (2003), the concept of visible stewardship entails three tests to determine whether a landscape is communicating sustainable forest management to the public: determine if there is visible evidence of forest management and planning, determine if the visible evidence looks "good," and verify—with expert opinion—whether the visible evidence actually reflects sustainable performance or good management. The concept of visible stewardship therefore links more conventional management or community objectives for visual quality to criteria of ecosystem health and broader assessments of sustainability; it also addresses aspects of transparency in communication with communities and social learning.

MELDING APPROACHES: A POSSIBLE STRATEGY FOR FUTURE INITIATIVES

With the exception of the last approach described, the studies reviewed in this report can be described as studies of community sustainability, although some use other distinct terms to describe their work (i.e., well-being, capacity, or resilience). Again, based on a general view taken by these projects, a sustainable community is one that strives to maintain a healthy and thriving economy, society, and environment, adapts to external and internal stresses, takes advantage of internal and external opportunities, provides a high quality of life for residents, and persists through time. On the basis of a review of some of the literature on community sustainability and our overview of the five BC projects, we propose a synthesis approach to the study of community sustainability, to take advantage of the strengths offered by these individual projects. Figure 3 illustrates the conceptual model we propose for this synthesis approach, and Table 3 lists indicators under consideration.

A Synthesis Approach

Several guidelines for developing appropriate measures of sustainability, as derived from the literature, can also be used in developing a synthesis approach to assessing community sustainability. In general, all indicators of community sustainability should have a clear conceptual basis and should measure not only the symptoms of social phenomena, but also their underlying causes (Cobb and Rixford 1998). Moreover, Kusel (1996, 2001) has recommended using indicators that assess structural conditions and institutional arrangements (e.g., concentration of power, land ownership), while not confusing income or wealth with well-being. Kusel also believed that indicators should recognize the importance of individual and community capabilities and functioning (i.e., capacity). When a set of indicators is applied to a community, Kusel recommended using sociodemographic and subjective data together, such that the basic community conditions can be described and these conditions explained according to local social relationships and processes.

Following these guidelines, we believe that the capacity approach used by the NRE Project, the Resilient Communities Project, and the Sustainability of Human Communities project could serve as an "umbrella" approach to the study of community sustainability. This model is illustrated in Figure 3, where community capacity is the central concept and a focal point for a study of community sustainability, with process indicators, quality-of-life concerns, and a sustainability evaluation framework included during the process of indicator development.

Capacity, an attribute that allows communities to adapt to stressful periods and take advantage of opportunities (Kusel 1996, 2001), is built on several forms of capital (Kusel 1996, 2001; Beckley et al. 2002a). Hence, our model includes indicators for all these forms of capital. Although certain projects reviewed in this report do not present their variables as measures of capital, we used Reimer's (2003) definition of capital as the resources and assets that can be invested to achieve certain outcomes and found that many variables could be categorized under these various forms of capitals.

Although the study of community capacity should identify these assets and resources, capacity can also be observed by determining whether certain conditions enabling sustainability are being met within the community. Consequently, we suggest that a synthesis model also identify indicators for specific capacity outcomes, where outcomes relate to community goals and describe community conditions. We have identified five capacity outcomes related to the NRE Project and the Sustainability of Human Communities project: ecological integrity, economic vitality, civic vitality, physical and mental health, and recreational opportunities. From our review of current sustainability projects, we consider these outcomes relevant in most resource-based communities.

Once indicators for these forms of capital and capacity outcomes have been defined, we recommend identifying process indicators to describe the social phenomena and social relationships within the communities being

studied. Process indicators, such as leadership, resilience, and sense of place, help to explain how communities are able to mobilize various forms of capital to produce sustainability. By including process indicators in their research, investigators can begin to explain why some communities excel in certain indicator areas and others do not.

In Table 3 we provide an extensive list of indicators suitable for a synthesis approach; this list would need to be condensed or shortened for practical application. The list of indicators in Table 3 could be presented to a community for local input to generate a list of locally relevant indicators. Community feedback is also crucial for the identification of quality-of-life indicators. By discussing quality of life in the community in the context of the list of indicators, residents can highlight certain indicators as representing quality of life and identify new quality-of-life indicators not already included. This local input also contributes to the development of indicators relevant to certain specific communities, such as First Nations communities, which might define capacity outcomes differently from those identified by non–First Nations communities. We recommend that researchers use community feedback and prioritization of indicators to develop an initial indicator suite, keeping in mind the need to include relevant indicators identified by the literature, particularly process indicators.

As a final step, we suggest checking this initial suite against a sustainability evaluation framework to ensure that all indicators are representative of community sustainability and are well distributed between the four forms of capital and the five capacity outcomes. This evaluation framework could be similar Hart's (2000) evaluation framework used in the Sustainability of Human Communities project.

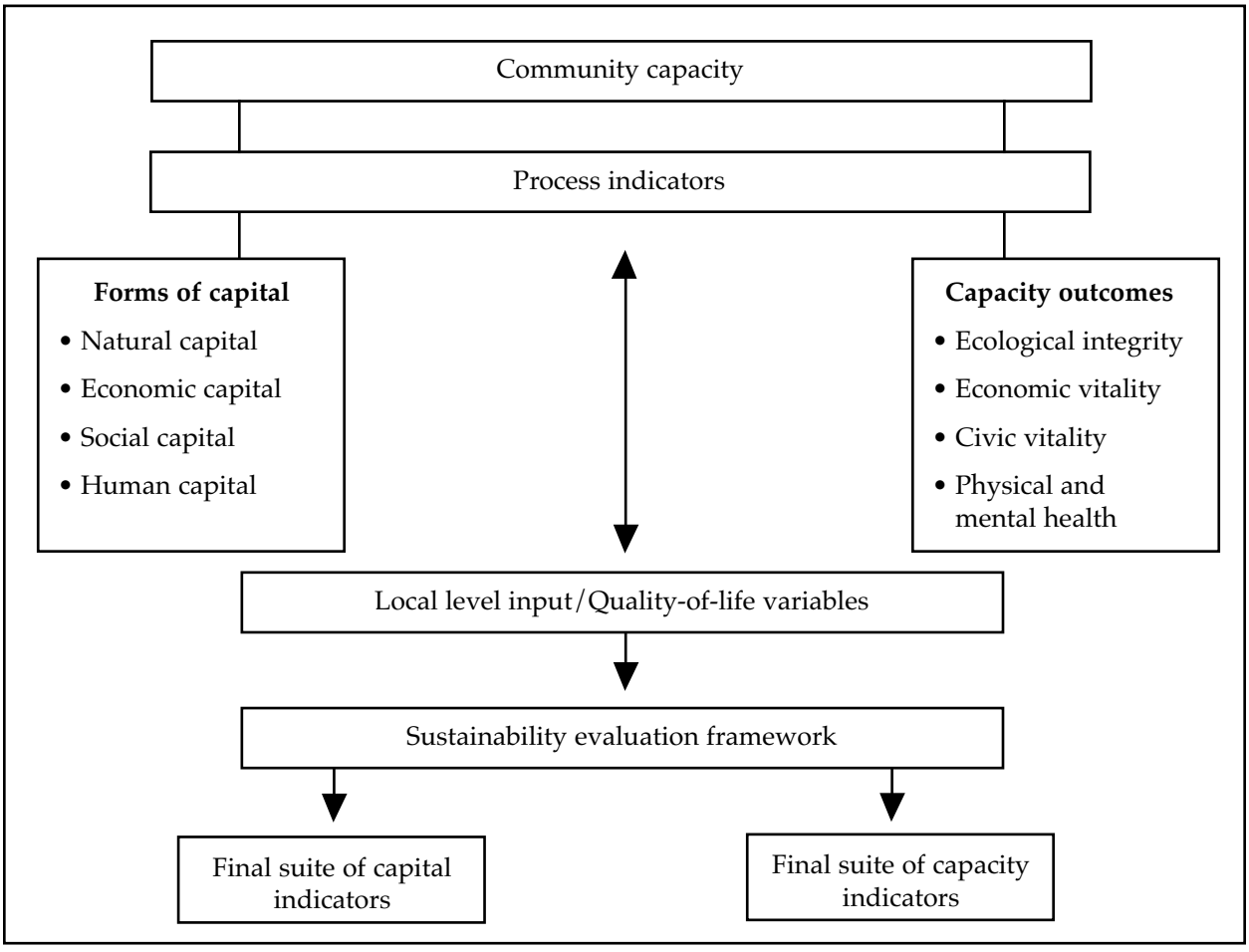

Figure 3. Synthesis approach to measuring community sustainability.

Selecting Indicators

Using the synthesis model described above, we can begin to identify specific indicators within the various categories of capital and capacity outcomes for application in a study of community sustainability. Table 3 presents indicators derived from the projects reviewed here according to the form of capital or capacity outcome to which they relate, along with references to the projects themselves and related literature. Process indicators are presented as a separate category in this table, although some of these could be categorized under certain forms of capital or capacity outcomes.

Under human capital we have grouped indicators that assess education attainment and training, as well as personal health. Within natural capital, we have listed many of the ecosystem well-being variables used in the WA, as that project provides a balanced and comprehensive assessment of the core components of natural capital, particularly resource and species inventories. Economic capital includes indicators measuring financial capital (the stock and flow of money), physical capital (the physical infrastructure supporting the economy), and access to state funds for infrastructure, as well as labor force recruitment and retention. Within social capital we have included a large number of indicators to ensure that the numerous approaches to measuring social capital are addressed. Consistent with the approach of the Resilient Communities Project, some of these indicators relate to social capital at the community organizational level, whereas others characterize social psychological components. We have also included indicators that measure the organizational and service infrastructure supporting social networks within communities.

Indicators for the five capacity outcomes have also been identified. Under ecological integrity, we have included many of the WA variables used to assess overall ecosystem well-being, such as degree of land modification and protection and quality of land and water. Also included is visible stewardship, which is used to assess whether local landscapes are perceived by various groups to be sustainably managed. Whereas economic capital includes measures of the resources and assets contributing to economic activity, economic vitality includes indicators that assess the activity and diversity of the economy in terms of economic diversity, employment, and income diversity. Civic vitality is understood as the degree to which community members are involved in and feel attached to their community (Martz, D.; Sanderson, K. 2003. Four capitals and four capacity outcomes in four prairie agricultural communities. Centre for Rural Studies and Enrichment, Saskatoon, SK. Unpubl. rep.), as well as citizens' satisfaction with the community. Within this category, we have included indicators assessing social organizational aspects of social capital, individual commitment to the community, and the quality of local leadership and local services. Physical and mental health refers to the health of individuals within the community, specifically strong physical and mental health with little incidence of disease or physical or mental disorders, particularly among the younger population. This category includes general measures of physical and mental health as well as infant and adult mortality rates. We have also included measures of perceived or self-reported health as in the Resilient Communities Project. Recreational opportunities within the community are also thought to be key to community sustainability. This category includes indicators documenting actual recreational opportunities, such as the number of outdoor and indoor recreational facilities and programs, as well as satisfaction with these opportunities.

The final category in this table is process indicators, such as leadership, resilience, and community cohesion, which mobilize human, economic, natural, and social capital. Water quality, for example, is an indicator under natural capital, yet it may depend on a certain degree of leadership encouraging the protection of watersheds.

Many indicators within Table 3 reflect quality-of-life concerns and as such this notion is not presented as a separate category. Quality-of-life indicators (e.g., water quality, opportunities for education, and community support) will be generated locally and will likely overlap with many of the indicators already included in Table 3.

Table 3. Examples of indicators for a synthesis approach

Form of capital or capacity outcome	Examples of indicators	References
Human capital	Education	• Beckley et al. 2002a; Parkins et al. 2004
	Professional training	
	Demographic information	
	Student enrollment	• Parkins et al. 2004
	Individual health	• Beckley et al. 2002a; Mattherws 2003[a]
	Access to health care	
	Access to household services	
	Access to state services	• Beckley et al. 2002a
Natural capital	Flowering plants, other plants,	• Prescott-Allen 2001
	Mammals, birds, reptiles, fishes, amphibians	
	Invertebrates	
	Fungi, protists, bacteria	
	Resource stocks	
	Hydropower and water supply	
	Tourism	
	Minerals, oil and gas, energy	
	Materials	
Economic capital	Business and property values	• Beckley et al. 2002a
	Community license to natural resources	• Prescott-Allen 2001; Beckley et al. 2002a
	Access to money for infrastructure	• Beckley et al. 2002a
	Financial capital	• Prescott-Allen 2001; Patriquin et al. 2003
	Gross domestic product	
	Labor force recruitment and retention	• Beckley et al. 2002a; Matthews 2003[a]; Parkins et al. 2004
	Household income	• Beckley et al. 2002a; Matthews 2003[a]; Parkins et al. 2004
	Physical capital	• Beckley et al. 2002a
	Transportation infrastructure	
	Schools	
	Health care infrastructure	
	Hosting of government facilities	
	Internet	• Beckley et al. 2002a; Matthews 2003[a]
	Community service infrastructure	• Parkins et al. 2004
Social capital	Social psychological aspects	• Beckley et al. 2002a; Matthews 2003[a]; Parkins et al. 2004
	Trust in other community members, leaders, civic groups	
	Social networks	
	Migration history, likelihood of future migration	• Beckley et al. 2002a; Parkins et al. 2004
	Average number of years in community	• Parkins et al. 2004

Table 3. Continued

Form of capital or capacity outcome	Examples of indicators	References
Social capital	Social organizational aspects	• Reimer 2003
	Social cohesion	
	Population health	• Matthews 2003[a]
	Religious institutions	• Beckley et al. 2002a
	Local representative in provincial or federal government	
	Institutional embeddedness	• Matthews 2003[a]
	Social capital infrastructure	• Reimer 2002
	Financial services, institutions	
	Communication services, bureaucratic services, commercial services, community organizations and services within 30 min drive of community	
	Community integration events	
Ecological integrity	Visible stewardship	• Sheppard 2003
	Land conversion, modification	• Prescott-Allen 2001
	Land protection	
	Forest and soil quality	
	Inland aquatic ecosystem diversity	
	Inland and marine water quality	
	Marine ecosystem diversity	
	Global and local air quality	
Economic vitality	Ownership of household dwellings	• Beckley et al. 2002a; Matthews 2003[a]; Parkins et al. 2004
	Rates of entrepreneurship	• Beckley et al. 2002a; Parkins et al. 2004
	Sources of income	• Beckley et al. 2002a
	Low economic leakage[b]	• Parkins et al. 2004
	Diverse economic base	• Parkins et al. 2004
	Unemployment	• Beckley et al. 2002a; Matthews 2003[a]; Parkins et al. 2004
Civic vitality	Personal identification with community	• Beckley et al. 2002a; Matthews 2003[a]
	Personal commitment to community	• Matthews 2003[a]
	Views about community leadership	• Beckley et al. 2002a; Matthews 2003[a]
	Family dimensions of community life	
	Support from community	
	Views about community efforts to effect change	• Matthews 2003[a]
	Social support	
	Satisfaction with community services	• Parkins et al. 2004

Table 3. Continued

Form of capital or capacity outcome	Examples of indicators	References
Civic vitality	Associational behavior	• Beckley et al. 2002a
	Civic participation	• Matthews 2003[a]; Parkins et al. 2004
	Political participation	• Matthews 2003[a]
Physical and mental health	Personal health (self-reported)	• Matthews 2003[a]
	Stress (self-reported)	• Beckley et al. 2002a
	Population mental health	• Veenstra 2002
	Infant mortality rate	• Prescott-Allen 2001
	Mortality rate	• Veenstra 2002
	Life expectancy	• NIRHB 2001
	Cancer (all sites)	
	Low birth weight	• Prescott-Allen 2001
Recreational opportunities	Outdoor recreational areas	• Parkins et al. 2004
	Recreation facilities	
	Recreation programs	
	Participation in recreational activities	
	Satisfaction with recreational activities	
Process indicators	Leadership	• Beckley et al. 2002b; Matthews 2003[a]; Parkins et al. 2004
	Volunteerism	
	Entrepreneurialism and entrepreneurship	
	Sense of place: meanings, satisfaction, and attachment	• Beckley et al. 2002b; Parkins et al. 2004
	Resilience	• Matthews 2003[a]

[a] Matthews, R. 2003. The resilient communities project in British Columbia: identifying the relationship between community social cohesion and economic change. Univ. British Columbia, Resilient Communities Project, Vancouver, BC. Unpubl. rep.

[b] Parkins et al. (2004) measure economic leakage by assessing the proportion of spending in local and non-local businesses.

Limitations

There are some limitations to the synthesis approach. First, certain indicators, such as spiritual and cultural values, are not covered, mainly because they have received only limited attention in the existing sustainability literature. We recognize, however, that these variables would make a significant contribution to the synthesis approach and may emerge in future studies, as research in community sustainability continues to develop. Second, although our framework presents a large suite of indicators on which a study of community sustainability might draw, it does not elaborate on their relative importance. Realistically, however, community leaders or policymakers will assess these indicators on the basis of their relative value in representing and addressing the important issues within their own communities. Third, the synthesis framework does not discuss potential trade-offs between indicators, for example, between increased economic activity and poorer environmental quality (economic and social development inevitably draws on natural capital and alters the natural environment). Similarly, this synthesis approach does not discuss the notion of an ecological carrying capacity or environmental threshold. Although local ecosystems do have limits to the level of community development they can support, these limits are not well understood, and few benchmarks exist at this time. The proposed synthesis framework does not attempt to measure or evaluate these trade-offs between economic progress and ecological limits, although this will be an important area for future research.

CONCLUSIONS

Studies of community sustainability have expanded in recent decades, particularly in British Columbia, where there are a large number of heavily forest-dependent communities. We have reviewed five studies addressing community sustainability in this province, drawing on their theoretical foundation and methodological approaches to develop a synthesis approach to community sustainability that could be applied in other regions. This synthesis approach recognizes community capacity as an overarching concept guiding the study of community sustainability.

The synthesis approach differs in several ways from previous forestry-based and community stability approaches. Indicators included in this approach relate primarily to community well-being, while allowing for measures characterizing the local economy and resource base. The focus on sustainability, rather than stability, is also a key benefit of this approach, as this notion emphasizes functioning natural, economic, and social systems, rather than stable economic systems and labor forces. With the synthesis approach, communities can be actively involved in generating indicators that are locally relevant and reflect local quality-of-life concerns.

Finally, there is the question of how these indicators could be used by the forest sector. In general, the synthesis framework can be used as a guide for strategic investments in community well-being. If a community is observed to be deficient in some aspect of human or social capital, then concerted efforts can be made to invest in and improve those forms of capital. For example, strategic investments by local industries and government agencies in entrepreneurial training might play an important role in contributing to the human capital, and therefore the sustainability, of a host community. In this way, the indicators framework can be used to identify important areas of concern and can facilitate decisions about appropriate and targeted investments in a community.

Our approach has identified numerous indicators that could be used to measure a community's performance in generating and maintaining human, economic, natural, and social capital, as well as indicators assessing the social processes that mobilize these forms of capital into desirable outcomes. This model of community sustainability can be used to guide the work of future community sustainability studies, and with that in mind we have outlined a general methodology for indicator development and have provided an extensive list of indicators reflecting the current state of practice in the province of British Columbia.

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