DEVELOPING INDICATORS FOR HUMAN WELL-BEING IN AN ECOSYSTEM-BASED MANAGEMENT CONTEXT: A CASE STUDY OF HAIDA GWAII

by

Hannah Patterson Kent

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Abstract

Ecosystem-based management (EBM) includes both ecological integrity and human well-being, although it is not clear how human well-being should be measured in an EBM context. Despite efforts to view EBM holistically, the human component is often overlooked or reduced to economic indicators that do not capture the full range of values held by the people affected by EBM policies. The purpose of this case study is to explore, in a region recently participating in EBM planning and policy implementation, human well-being indicators of importance to local residents. Haida Gwaii, an island archipelago located approximately 90 km off the coast of British Columbia (B.C.), Canada provides a particularly compelling case study, as the implementation of EBM on Haida Gwaii includes comanagement between the Haida Nation and the Province of B.C. Using semi-structured interviews and constructivist grounded theory methodology, I identified seven categories important for human well-being on Haida Gwaii: employment and economic stability; relationship with the land, ocean and air; health; governance and access to services; culture and community; educated and engaged citizens; and overall well-being. Within these general categories, I also identified 46 specific human well-being indicators important to measure on Haida Gwaii. In addition, I identified concerns study participants had with human well-being indicators developed on the North and Central Coast of British Columbia. The important categories, sub-categories and indicators were integrated to produce three theoretical concepts that characterize what is important for human well-being on Haida Gwaii: 1) Relationship with the land, ocean and air 2) Access to benefits from natural resource development, and 3) Building resilient communities and human capital.

ii

Communities working to develop human well-being indicators in similar EBM contexts may find these concepts useful in their work.

Preface

This dissertation is original, unpublished, independent work by the author. All research included in this thesis was reviewed and approved by the University of British Columbia Behavioural Research Ethics Board (UBC BREB). The ethical review application was approved on October 31, 2012. The UBC BREB Number is H12-02031.

Table of Contents

ABSTRACT		ii
PREFACE		iv
TABLE OF	CONTENTS	v
LIST OF TA	BLES	vii
LIST OF FI	GURES	viii
ACKNOWL	EDGEMENTS	ix
1. INTRO	DUCTION	
1.1. Int	roduction to ecosystem-based management	
1.2. Res	search questions and scope	
1.2.1.	Problem statement	
1.2.2.	Statement of purpose and research questions	
1.2.3.	Rationale and significance	
1.2.4.	Organization of the dissertation	
1.3. Int	roduction to the case study	
1.3.1.	Land-use plannina in British Columbia	
1.3.2.	Evolving indicators for human well-being	
1.4. Rev	view of human well-being indicator frameworks	
1.4.1	Introduction	14
1.4.2	Disciplinary perspectives of human well-being	15
1.4.3.	Summary	
2. METH	ODOLOGY	
2.1. Int	roduction	
2.1.1.	Rationale for a case study approach	
2.1.2.	Rationale for a constructivist arounded theory approach	
2.2. Dat	a collection methods	
2.2.1.	Particinant selection	
2.2.2.	Interview methods	
2.2.3	Data analysis	29
2.3. Lin	nitations of the study	
3. RESUL	TS: A HUMAN WELL-BEING INDICATOR FRAMEWORK	
3.1. Int	roduction	
3.2. Cat	egories, sub-categories and indicators	
3.2.1.	Employment and economic stability	
3.2.2.	Relationship with the land, ocean and air	
3.2.3.	Health	
3.2.4.	Governance and access to services	
3.2.5.	Culture and community	
3.2.6.	Educated and engaged citizens	
3.2.7.	Overall well-being	50

3.3. Relationships between categories	52
3.3.1. Access narrative	
3.3.2. Resilience and sustainability narrative	56
4. RESULTS: CRITIQUE OF THE NORTH AND CENTRAL COAST INDICATORS.	59
4.1. Introduction	59
4.2. A critique of the North and Central Coast indicators	60
4.2.1. A few highly-ranked North and Central Coast indicators	60
4.2.2. Concerns with the access to resource indicators	63
4.2.3. Reflections on common economic indicators	65
4.3. Concerns with other indicators	67
4.4. Summary	69
5. DISCUSSION	71
5.1. Introduction	71
5.2. Relationship with the land, ocean and air	73
5.2.1. Connection with the concept of ecosystem services	76
5.3. Access to benefits from natural resource development	81
5.4. Building resilient communities and human capital	85
5.5. The North and Central Coast framework	
5.6. Ecosystem-based management and sustainability	93
6. CONCLUSIONS AND RECOMMENDATIONS	96
6.1. Relationship with the land, ocean and air	96
6.2. Access to benefits from natural resource development	97
6.3. Building resilient communities and human capital	98
6.4. Recommendations for other researchers	99
LITERATURE CITED	104
APPENDIX A: INTERVIEW GUIDE	
APPENDIX B: NORTH AND CENTRAL COAST INDICATORS	
APPENDIX C: INDICATORS SUGGESTED BY PARTICIPANTS	

List of Tables

Table 1: An indicator assessment tool based on the criteria participants used to evaluate the
indicators
Table 2: Categories and sub-categories of human well-being on Haida Gwaii
Table 3: Indicators suggested by participants by human well-being category and sub-category.
Table 4: North and Central Coast indicators and indicator rankings
Table 5: HWB indicators that are also ecosystem services or rely on ecosystem services80
Table 6: Comparison between the main categories of the Haida Gwaii indicator framework
and the North and Central Coast framework92
Table 7: Indicators recommended for monitoring human well-being on Haida Gwaii101
Table 8: Indicators suggested by participants119

List of Figures

Figure 1: Weighted code counts (%) of human well-being categories analyzed by gender and		
whether participants are Haida or non-Haida		
Figure 2: Human well-being template	53	
Figure 3: Access narrative		
Figure 4: Resilience and sustainability narrative		
Figure 5: Human well-being template and theoretical concepts	72	

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1. Introduction

1.1. Introduction to ecosystem-based management

Ecosystem-based management (EBM) is an approach to resource management that considers an entire ecosystem and the people who live in it. Rather than managing using administrative boundaries, EBM uses relevant ecological boundaries, which requires increased cooperation and coordination across jurisdictions. The central goals of EBM are sustainability, ecosystem health and quality of life (Arkema et al. 2006; Slocombe 1998a). Rather than being a concept, EBM is a practical approach to resource management that includes best practices such as using science-based information, stakeholder engagement, and adaptive management (Arkema et al. 2006). Important aspects of EBM, among others, are: 1) the consideration of ecological integrity and human well-being, 2) the inclusion of local knowledge and values, and 3) the use of systems thinking and ecological scales.

In addition to ecological integrity, EBM includes humans and an "implicit or explicit ethics of quality, well-being, and integrity" (Slocombe 1998b, p.32). The definition used in the EBM planning process on the North and Central Coast (NCC) of British Columbia (B.C.) was "EBM is an adaptive, systematic approach to managing human activities that seeks to ensure the co-existence of healthy, fully functioning ecosystems and human communities" (Price 2009, p.497). In a review of EBM academic definitions and principles, Arkema et al. (2006) identified the inclusion of humans in ecosystems as one of three general criteria for EBM, alongside sustainability and ecosystem health. They also identified several specific human dimension criteria including ecosystem goods and services, economic factors, and stakeholder engagement. Arkema et al. (2006) found that most scientific definitions of EBM focus on ecological criteria although the majority include at least one specific humandimension criterion. This differs from the findings of Grumbine (1994) who identified ecological criteria in his review of EBM definitions but did not identify any human-specific criteria, suggesting that the inclusion of humans in EBM is a recent trend (Arkema et al. 2006).

Local knowledge and values are important for EBM. The use of participatory stakeholder processes to develop ecological and human well-being indicators, objectives and goals is fundamental to EBM planning (Espinosa-Romero et al. 2011; Gregory et al. 2006; Slocombe 1998a; Tallis et al. 2010). Values should form the basis of decision-making processes (Keeney 1996) and the values of stakeholders should be considered (Tallis et al. 2010). According to Slocombe (1998a, p.33) "people think locally and personally; values, perceptions and participation are important." At micro-scale, goals need to be linked to "what people in a particular place at a particular time value" (Slocombe 1998a, p.490). This is consistent with the concept of post-normal science where natural systems are recognized as dynamic and complex and "the science appropriate to this new condition will be based on the assumptions of unpredictability, incomplete control and a plurality of legitimate perspectives" (Funtowicz & Ravetz 1993, p.739). Including local knowledge also has pragmatic benefits as it is impossible to ensure that indicators chosen by outside experts will be relevant to local situations (Fraser et al. 2006).

EBM evolved from ecosystem approaches, which among other things, include systems thinking, and the use of ecological, rather than political boundaries (Slocombe 1998b). EBM also evolved from ecosystem management, which is a resource management approach with

a more narrow focus on ecological integrity that does not consider human well-being (Slocombe 1998b). EBM has been used to address three common but overlapping concerns: increasing the effectiveness of protected areas management, facilitating collaborative management of an ecosystem, and responding to diverse interests in a region (Slocombe 1993). Slocombe (1993) demonstrates these areas using the examples of the management of the Waterton and Glacier National Park Biosphere reserve in Alberta and Montana (Zinkan 1992), the management of the Australian Alps across state lines and with multiple stakeholder groups (Worboys et al. 1991), and land-use planning processes addressing First Nations rights and stakeholder interests in the greater Kluane ecosystem of the Yukon (Slocombe 1992). An EBM process in Puget Sound, Washington, is an example of a current example of the application in a marine system that includes many of these elements (Tallis et al. 2010).

Although EBM definitions often include human well-being, the human well-being component of EBM is not fully developed. The human dimension criteria identified by Arkema et al. (2006) (ecosystem goods and services, economic indicators and stakeholder engagement) are limited and do not fully capture the broader concept of human well-being. A limited consideration of human well-being may be due to the basis of EBM in a scientific discipline, conceptual challenges, such as confusion over the role of social science, or structural challenges, such as a lack of social scientists on staff (Endter-Wada et al. 1998); it may also be due to a lack of socioeconomic data in remote regions with small populations (Endter-Wada et al. 1998; Slocombe 1993). The lack of social science in EBM theory may also be part of a more systemic problem in the separation of sciences and social sciences that have created a "nature-culture" divide (Berkes et al. 2008). However, there is

increasing recognition that understanding the ecological dimensions of conservation issues is insufficient as most of the drivers of environmental change are social and many of the biggest challenges facing conservationists are social, economic and political (Newing 2011). Our current understanding of social issues in conservation is fragmented and limited (Newing 2011) and this is also true of EBM.

1.2. Research questions and scope

1.2.1. Problem statement

Despite the inclusion of broad language on human well-being in EBM definitions and vision statements, often human well-being indicators are considered in basic or solely economic terms in EBM frameworks. In order to fully consider the social dimension of EBM, a better understanding of human well-being in an EBM context is needed.

1.2.2. Statement of purpose and research questions

The purpose of this case study was to explore what human well-being indicators are important on Haida Gwaii, an island archipelago that has recently participated in EBM planning and policy implementation. This case study engaged community members, referred to here as participants, to share their views on this topic. To shed light on this topic, the following research questions address the views of participants:

(1) a) What human well-being categories and indicators are important to measure on Haida Gwaii? And b) Does the importance of human well-being categories vary by gender and by whether participants are Haida or non-Haida? (2) What are the strengths and weaknesses of an EBM human well-being framework developed for the neighboring North and Central Coast (NCC) of British Columbia?

1.2.3. Rationale and significance

Well-being indicators are an essential part of measuring sustainability and EBM (Arkema et al. 2006; Hempel 1999). However, it is unclear how human well-being should be measured in an EBM context. Concepts of well-being have been found to be culturally and geographically dependent (Mathews & Izquierdo 2009) and there is increasing evidence that standard economic indicators are not sufficient to capture the complex cultural and contextual values of communities (Easterlin et al. 2010). The human well-being indicators and framework presented in this study provide a broader understanding of how human well-being can be measured in an EBM context.

Like many other EBM planning processes, the process on Haida Gwaii resulted in the development of ecological indicators but not human well-being indicators. The Haida Gwaii district of the B.C. Ministry of Forests, Lands and Natural Resource Operations (the Ministry) requires human well-being indicators to monitor the impacts of recent EBM policy changes within the context of continued learning and adaptive co-management with the Council of the Haida Nation. The Ministry suggested this project and contributed to the development of the research questions. In addition the Ministry provided logistical and in-kind support for this project. Therefore this research has both academic and practical dimensions and can be considered "use-inspired basic research" in the field of sustainability science (Clark 2007, p.1737).

1.2.4. Organization of the dissertation

In the remainder of this chapter, I will address two central aims: 1) I will introduce the case study and provide the relevant contextual information and 2) I will review the state of knowledge on human well-being indicator frameworks from various disciplines as they relate to this case study. In *Chapter 2* I will describe the methodology in detail. In *Chapter 3* I will present the study's main findings in a human well-being indicator framework with broad generalized categories, sub-categories and specific indicators. In addition, differences in perspectives of different participants groups are described in *Chapter 3*. An analysis of the strengths and weaknesses of the North and Central Coast (NCC) indicator framework, as viewed by participants, is presented in *Chapter 4*. A discussion of the key findings and recommendations are presented in *Chapter 5* and *Chapter 6* respectively.

1.3. Introduction to the case study

Haida Gwaii is a remote and ecologically and culturally unique series of islands located approximately 90 km from the west coast of B.C. It is the traditional territory of the Haida Nation and has two communities designated as reserves, Skidegate and Old Massett. There are also six other communities: Tow Hill, Masset, Port Clements, Tlell, Queen Charlotte, and Sandspit. The Old Masset Village Council and the Skidegate Village Council represent the communities of Old Masset and Skidegate, respectively. The Council of the Haida Nation is a national government that represents the Haida, including those not residing on Haida Gwaii. The land and ocean support diverse human activities including traditional gathering and cultural uses, forestry, tourism, and fishing. The communities on Haida Gwaii recently concluded an extensive land-use planning process that lasted about seven years and demonstrated the conflicting interests with respect to resource management (Takeda & Røpke 2010).

Haida oral histories and archaeological records trace the Haida's presence on Haida Gwaii back more than thirteen thousand years. For the Haida, the recent struggle for control of resources is an extension of the ongoing challenges the Haida have faced since the arrival of the Spanish in 1774 (Dale 1999). Disease epidemics, including smallpox in 1760 and 1862, and subsequent tuberculosis epidemics reduced the population from approximately thirty thousand to less than one thousand people by the end of the 1880s (Jisgang, Collison et al. 2011). The Government of Canada and missionaries had profound impacts on First Nations peoples, the Indian Act of Canada and the residential school system being important examples. The Indian Act outlawed the potlatch, an important part of the social, economic and political systems of coastal First Nations, and also stipulated that Native women and their children lost their status if they married a "non-status" individual (Jisgang, Collison et al. 2011).

The residential school system committed atrocities against First Nations children. Communities on Haida Gwaii were confined to two tiny reserves, while European settlers took the remaining land (Dale 1999). This devastating history has led to substantial personal and community trauma. Throughout this hardship, Haida communities have maintained and celebrated their culture and recently have put significant effort into teaching the Haida languages to the next generation (Jisgang, Collison et al. 2011). Over the past 30 years, the Haida, in partnership with environmental and community activists, have organized protests and lawsuits to demand greater control over their land (Takeda & Røpke 2010). A well-known example is the protests on Lyell Island in 1985. In addition, in 2000

the Haida Nation challenged the transfer of a forest tenure, Tree Farm License 39, between forestry companies without their consent and over their objections. This culminated in the 2004 Supreme Court case Haida Nation vs. British Columbia (Ministry of Forests), which established that the crown has a duty to consult and accommodate Aboriginal peoples prior to making decisions that adversely affect their as yet unproven Aboriginal rights and title claims.

Through the land-use planning process and the Supreme Court case, a new relationship formed between the Haida Nation and B.C. The land-use planning process began in 2003 and was guided by two protocol agreements (signed in 2001) between the Haida Nation and B.C. In 2005, the Haida felt B.C. was negotiating the land use agreement in bad faith; despite the recent Supreme Court Case (Haida Nation vs. B.C.), the province continued to allow the transfer of the forest license without their approval (Takeda & Røpke 2010). In response, the Haida and their supporters established a six-week blockade known as Island Spirit Rising. The blockade prevented the employees of the new forest tenure holder, Weyerhaeuser, from logging and prevented the Ministry employees from accessing their office building. The Haida also developed the Haida Land Use Vision (2005) to communicate "an attempt to balance the ecological, cultural and economic interests on Haida Gwaii" (Council of the Haida Nation 2005a, p.4).

To end the blockade, B.C. proposed an interim strategy that met the conditions of the Haida Land Use Vision. This interim agreement, known as the Letter of Understanding (2005), became the foundation of a new negotiation process (Council of the Haida Nation and Province of British Columbia 2005). When the land-use planning process reconvened in the spring of 2005, it was within the context of the new relationship and was based on

government-to-government negotiations. The land-use planning process led to the Haida Gwaii Strategic Land Use Agreement (2007), and the Haida Gwaii Land Use Objectives Order (2010). The Haida Gwaii Land Use Agreement was formalized by the Kunst'aa Guu-Kunst'aayah Reconciliation Protocol (2009) and then by the Haida Gwaii Reconciliation Act (2010). The Strategic Land Use Agreement established new forestry practices and protected areas that were consistent with Haida cultural values and reduced the annual allowable cut from 1.7 million cubic meters to around 800,000 cubic meters.¹ It also set in place the Haida Gwaii Management Council, a co-management decision body responsible for strategic decisions on forestry practices and the annual allowable cut. Importantly for this study, it also established a number of ecological indicators and criteria, but did not include human well-being indicators. The ecological indicators and criteria were on topics including: Haida traditional forest resources and traditional heritage features, monumental cedar, western yew, western red and yellow cedar, culturally modified trees, aquatic habitats, biodiversity, and wildlife habitat.

Haida ethics and values guided and continue to guide the land-use and marine planning processes on Haida Gwaii (Jones et al. 2010). Jones et al. (2010) describe the Haida values upon which the marine vision is built. These are Yahguudang or Yakguudang (Respect), Giid tll'juus ("The world is as sharp as the edge of a knife"), Gina waadluxan gud ad kwaagiida ("Everything depends on everything else"), Isda ad diigii isda (Giving and Receiving), Gina k'aadang.nga gii uu tl'k'anguudang (Seeking Wise Council), and 'Laa guu ga kanhllns (Responsibility). These values are reflected in the working definition of EBM used to guide

¹ The Haida Gwaii Management Council announced a new annual allowable cut of 929,000 cubic meters on April 4th, 2012, which is a 48% reduction from the previous AAC levels (Haida Gwaii Management Council, 2012).

the marine planning process: "Respect is the foundation of ecosystem-based management. It acknowledges that the land, sea, air and all living things, including the human community, are interconnected and that we have the responsibility to sustain and restore balance and harmony" (Coastal First Nations - Turning Point Initiative 2009, p.5 in Jones et al. 2010).

Improving human well-being was an explicit goal of the land-use planning process on Haida Gwaii. The Kunst'aa Guu-Kunst'aayah Reconciliation Protocol states that the parties are "committed to an approach which recognizes and strengthens the interrelationship between environmental, social well-being and economic development, which includes but is not limited to children and families" (Council of the Haida Nation and Province of British Columbia 2009, p.4). During the recent hearings for the Enbridge Northern Gateway Project, the former vice president of the Council of the Haida Nation (CHN), April Churchill, explained:

In 2009 after arduous negotiations, the CHN and B.C. signed the Kunst'aa Guu-Kunst'aayah Reconciliation Protocol Agreement. The meaning for this protocol is in the beginning, and for the Haida this protocol agreement is the beginning of the Haida Nation and province cooperatively and collaboratively caring for the land. For us it is the beginning of our people rebuilding health and social, economic wellbeing. Through this protocol the Haida Nation and B.C. work to achieve the land use and protocol agreement's objective (Government of Canada 2012, pp.l.20217–18).

This statement explains the significance of the agreements reached in the land-use planning process and the importance of human well-being to EBM implementation.

1.3.1. Land-use planning in British Columbia

EBM implementation on Haida Gwaii was part of a broader strategy by the province of British Columbia to manage the conflicting views of land management in British Columbia. In the 1980s and 1990s there was civil unrest due to unsustainable forest practices and technocratic government decision-making (Jackson & Curry 2004). Non-governmental organizations organized boycott campaigns, such as a campaign for the Great Bear Rainforest, to encourage consumers not to buy wood products that were logged unsustainably, and First Nations groups opposed the destruction of their traditional territory (Jackson & Curry 2002). To address this conflict, B.C. introduced the Commission on Resources and the Environment (CORE), followed by the Land Use Coordinating Office (LUCO) which supported the development of Land and Resource Management Plans (LRMP) (Gunton et al. 2003). British Columbia was divided into 25 regions and stakeholder groups engaged in planning processes to determine how the land would be managed. The land-use planning process on Haida Gwaii was part of this broader policy framework.

However, the LRMP process on the North and Central Coast (NCC) of British Columbia and Haida Gwaii took a different form to other LRMP processes. Firstly there was a focus on EBM, and this was chosen with the intent to measure both human and natural systems (Price 2009). Secondly, there was a high degree of power held by First Nations, which resulted in government-to-government negotiations between First Nations and B.C., and the formation of alliances among First Nations and environmental groups (Price 2009). Thirdly, an independent multidisciplinary group, the Coastal Information Team (CIT)², was

² The CIT was established and supported by the provincial and federal government, First Nations governments, the forest industry, and environmental groups to inform the development of the Land and Resource Management Plan for the North and Central Coast, including Haida Gwaii. The CIT had

established to provide information and analysis to support the planning process on the NCC of British Columbia, including Haida Gwaii (Prescott-Allen 2005).

1.3.2. Evolving indicators for human well-being

The CIT developed a human well-being framework that was based on Prescott-Allen's (2001) Barometer of Sustainability framework that included the following elements: Population and health; wealth, knowledge and culture and community. The CIT defined human well-being as "a condition in which all members of society are able to determine and meet their needs and have a large range of choices and opportunities to fulfill their potential." The wellbeing assessment work by the CIT can be considered a mixed success (Fraser et al. 2006). The process was time-consuming and expensive and finished a year late (Fraser et al. 2006). Significant data gaps, combined with the lateness of the report, made the final product less useful than it could have been (Fraser et al. 2006). There were also concerns related to methodological and communication issues (Smith 2004). Despite these concerns, the process has been recognized as successful in building relationships between groups with different views, increasing negotiation opportunities for First Nations and allowing for collaboration and learning (Fraser et al. 2006).

As part of the continued engagement in land-use planning, First Nations groups on the NCC signed agreements with B.C. to implement an EBM approach in 2006. The Turning Point Protocol (2006) (North Coast area) and the KNT Agreement in Principle (2006) (Central Coast area) described the foundation of a new relationship and approach. Out of

a budget of \$3.3 million and was operational between January 2002 and March 2004 (Prescott-Allen 2005).

these agreements, an EBM Working Group³ was formed and tasked with developing new human well-being indicators based on Schedule C and G of these agreements, alongside other responsibilities. The EBM Working Group consecutively hired two consulting firms to fulfill this task: Rubus EcoScience Alliance followed by the Sheltair Group. In 2007, Rubus EcoScience Alliance developed a human well-being framework based on the indicators listed in the Turning Point and KNT agreements and based on a literature review. In 2009, the Sheltair Group continued this work by reviewing the indicators, selecting a shorter list of indicators and collecting data using 2006 as a baseline year. The work by these two consulting firms did not include Haida Gwaii. The most recent set of human well-being indicators, produced by the Sheltair Group, was used as part of the methodology in my study. During my interviews, participants were asked to comment on this indicator framework.

The land-use planning process on Haida Gwaii was part of a broader provincial effort to manage conflict related to natural resource use and improve the management of forest resources. The process on the NCC was unique in that it involved government-togovernment negotiations, EBM and the CIT, which developed a set of ecological and human well-being indicators. This study seeks to inform the development of human well-being indicators within this context, and within the context of the new relationship between the Council of the Haida Nation and B.C. on Haida Gwaii. The next section will review current thinking on measuring human well-being in different disciplines.

³ The EBM Working Group was composed of representatives from First Nations governments, other governments, industry groups and non-profit groups.

1.4. Review of human well-being indicator frameworks

1.4.1. Introduction

Defining and describing human well-being or quality of life is a challenging endeavor. This challenge has been considered by some of the greatest minds across cultures: Aristotle explained the concept of eudaimonia, Emanual Kant considered universal laws and eastern philosophers wrote of restraining individual desires (Diener & Suh 1997). A recent and popular definition by the World Health Organization gives an indication of the current understanding of the term:

An individual's perception of their position in life, in the context of the culture and values in which they live and in relation to their goals, expectations, standards and concerns (WHOQOL Group, 1995).

Bell and Morse (2008) reflect that this definition says very little but does suggest that maintaining or enhancing well-being is really about maintaining or enhancing an individual's standards and concerns.

Human well-being indicators, sometimes called sustainability indicators, can have practical purposes and have been employed in a variety of policy contexts. One vision for human well-being indicators is that they can be used to integrate segmented government bodies under common goals (Christensen & Laegreid 2007; Pennock & Ura 2011). Human well-being indicators can also be useful tools for enabling a community to identify what it values; holding individuals and groups accountable for achieving goals; encouraging democracy; and allowing a framework for decision-making (Zachary 1995 in Bell & Morse 2008). These human well-being frameworks often contrast their metrics with the Gross

Domestic Product (GDP) (or Gross National Product (GNP)) indicator, suggesting that the GDP was never designed to, and fails to, measure "happiness" (Easterlin et al. 2010). Human well-being indicators have been used to inform government policies in a multitude of towns, cities, provinces and countries. Countries such as Canada, England, and Australia, provinces and states such as Nova Scotia, Newfoundland and Maryland, and cities such as Victoria, British Columbia, and Seattle, Washington, have developed and measured indicators of wellbeing. A famous example at a national level is Bhutan's Gross National Happiness framework (Ura et al. 2012). Recently, the United Nations encouraged all countries to develop and measure indicators for human well-being and happiness. Re-evaluating our priorities as a society, and recognizing the contributions of ecosystems to human well-being may improve the sustainability of our society (Costanza et al. 2007).

1.4.2. Disciplinary perspectives of human well-being

Human well-being research has evolved from a narrow field mainly focused on social indicators to a broader, more self-reflective field that includes a diversity of perspectives and interactions between human and natural systems. According to King et al. (2013), a "paradigm shift" has occurred in social indicator research from the consideration of narrow social indicators to the inclusion of complex, multidimensional indicators of human well-being. In forestry, early indicators were developed in an ad hoc fashion by experts who were usually not social scientists, and with limited involvement of communities (Beckley et al. 2002). Over time there has been a transition to greater involvement of local people in indicator development and a focus on indicators that reflect a broader quality of life or community well-being, rather than indicators associated with forest dependence (Beckley et al. 2002). The study of well-being is difficult to characterize because it has been studied

more or less independently in a range of disciplines (Land et al. 2012). Several key areas of research have emerged that have broadened the discussion of well-being in recent years: in psychology and sociology there has been new attention to subjective well-being; in anthropology and indigenous research there has been a new study of what well-being means in a specific cultural context; and in natural resource management there is a focus on developing indicators in a collaborative process to account for complexity and uncertainty.

Well-being indicators in sociology and psychology

In the fields of sociology and psychology, there are two complementary but distinct methods of measuring human well-being: social indicators and subjective well-being indicators (Diener & Suh 1997). Social indicators are based on statistics that consider a variety of domains. Common examples are infant mortality, life expectancy, crime rates, income, and high school graduation rates (Costanza et al. 2007; Diener & Suh 1997). Subjective well-being data relies on answers to self-reported survey questions on happiness and life satisfaction (Schwarz & Strack 1999). The majority of highly-cited studies on wellbeing between 1974 and 2003 address subjective well-being (Land et al. 2012), despite the majority of researchers affirming the importance of considering both social and subjective well-being indicators (Costanza et al. 2007; Diener & Suh 1997; Land et al. 2012).

Both social indicators and subjective well-being indicators have strengths and weaknesses. Many social indicators can be accurately measured, are based on normative ideals, and cover a diverse range of domains (Diener & Suh 1997). Weaknesses of social indicators include subjectivity in indicator selection and measurement and statistical accuracy (Diener & Suh 1997). The indicators may also be selected based on what data are available; thus there is a tendency to measure what can be measured, rather than what

should be measured (Bell & Morse 2008). Given these concerns, social indicators should not be seen as "objective" but rather as a series of decisions and value judgments made by researchers or policy makers (Diener & Suh 1997). Subjective well-being indicators also have certain strengths and weaknesses. Responses from subjective well-being surveys can be more easily compared across domains and aggregated into relevant groupings (Diener & Suh 1997). However, subjective well-being indicators suffer from similar concerns regarding accuracy and may be more subject to fluctuations in individual temperament and personal factors (Diener & Suh 1997). Furthermore, improving an individual's subjective well-being is not a universal value and may be more important in some cultures than others (Diener & Suh 1997). Despite the limitations of both approaches, many have recognized that it is important to use these measures to better understand our societies and to inform public policy (Diener & Suh 1997).

Well-being indicators in indigenous research and anthropology

Indigenous scholars and anthropologists have contributed to the field of human wellbeing and offer that well-being is experienced differently in different cultures (Mathews & Izquierdo 2009). Some suggest a western world-view is built into any understanding of well-being that focuses on individual rather than community well-being (Christopher 1999; Panelli & Tipa 2007). First Nations have called on researchers to promote well-being rather than to continue to characterize ill-being, an emphasis potentially internalized by communities, becoming self-fulfilling (Reading et al. 2007). Researchers engaged in partnerships with indigenous communities have characterized a holistic approach to measuring well-being which accounts for relationships among community members and with the natural environment (Mathews & Izquierdo 2009; Panelli & Tipa 2007). Many indigenous leaders recognize the poor health status of their people is connected to a loss of access to land and resources (Panelli & Tipa 2007; Richmond et al. 2005) and that participation in land management can improve well-being (Kingsley et al. 2009). Some researchers recommend "place-focused" research that considers cultural context and allows better integration of livelihoods, social systems, cultures and the environment into wellbeing assessments (Gesler 1992; Panelli & Tipa 2007).

Several indigenous well-being frameworks have characterized a more holistic approach to measuring well-being. The First Nations Regional Longitudinal Health Survey (RHS) developed a framework based on the concept of total health, total person, and total environment (Reading et al. 2007). The total person component includes body, spirit, mind and heart. Similarly, the Assembly of First Nations proposed a multilayered framework, the First Nations Holistic Policy and Planning model, that includes community at its core, components of the Medicine Wheel (spiritual, physical, emotional, mental), cycles of the lifespan (child, youth, adult, elder), four key dimensions of self-government, components of social capital and fourteen social determinants of health (Reading et al. 2007). A framework developed in partnership with the Maori include the following components: 1) analysis of personal and collective livelihoods, 2) social relations and structures, 3) cultural beliefs and practices and 4) human-environment specificity (Panelli & Tipa 2007).

Well-being indicators in ecology and natural resource management

Researchers in the fields of ecology and natural resource management have communicated the importance of livelihoods and ecosystems to human well-being. An important component has been the importance of stakeholder engagement and participatory development of indicators. Bell and Morse (2008, p. xviii) suggest that we

should move toward a more "holistic, realistic, participative and systemic approach" to measuring sustainability. In a systemic approach to indicator development multiple views of reality are considered, local perspectives are important, and input of technocrats is limited (Bell & Morse 2008). The concepts of resilience and self-organizing and embedded systems underscore we are operating in a world of uncertainty and complexity (Holling 1986; Kay et al. 1999; Waltner-Toews & Kay 2005). As explained: "we are faced with finding our way through a foggily perceived landscape rather than charting a scientifically determined course to a known end point" (Waltner-Toews & Kay 2005). To address this uncertainty and complexity researchers should use methodological pluralism, include both quantitative and qualitative methods, and incorporate multiple perspectives from stakeholders (Waltner-Toews & Kay 2005).

Several sustainability frameworks in natural resource management focus more on the process by which the indicators are developed, rather than the human well-being topics in the indicator framework. The AMESH approach (an Adaptive Methodology for Ecosystem Sustainability and Health) advocates for participants to collaboratively choose a vision and then promote, design and plan an adaptive program for realization of that vision (Waltner-Toews & Kay 2005). Although informed by science, knowledge, culture and values, the vision is still understood as a subjective choice. Walker and others (2002) advocate a similar process aimed instead at promoting and managing resilience in a social-ecological system. Other holistic approaches that account for this uncertainty and complexity are soft systems methodology (Checkland & Poulter 2010), and the Imagine Approach (Bell & Morse 2008).

Two notable human well-being frameworks in natural resource management characterize how human well-being could be measured. The Millennium Ecosystem Assessment (MEA) (2005) is based on the "voices of the poor" research (Narayan et al. 2000) which incorporated perspectives of the poor in 23 countries asked to reflect on aspects of a good and bad life. From this, five key components emerged: the basic materials for a good life, health, good social relations, security, as well as freedom and choice. Critical to this framework is the connection between these elements and ecosystem services (MEA 2005). Another framework, the sustainable livelihoods approach (Scoones 1998) is based on the idea of "capital assets", where each community has assets in the areas of human, social, financial, built and natural capital. The framework has likely been attractive to natural resource managers as it takes a systems thinking approach, and explicitly considers vulnerability and resilience (Bebbington 1999). It has been used broadly in the development and natural resource management literature (Allison & Ellis 2001; Campbell et al. 2001; Plummer & Armitage 2007).

In addition to these frameworks, other influential frameworks propose ways of characterizing the social and ecological aspects of a system. The social-ecological system (SES) framework provides a means of identifying the relevant factors that lead to increased likelihood of sustainable outcomes (Ostrom 2007; Ostrom 2009; Ostrom & Cox 2010). The "press-pulse dynamics" (PPD) framework (Collins et al. 2011) shows how human systems interact with ecological systems via human impacts and the flow of ecosystem services. These frameworks show how SES can be viewed comprehensively and considered across spatial and temporal scales. The Coupled Human and Natural Systems (CHANS) research

program (Liu et al. 2007a,b) and the Resilience Alliance⁴ are leading research partnerships focused on studying SES.

1.4.3. Summary

Two common trends emerge from the disciplines of sociology and psychology, indigenous research and anthropology, and ecology and natural resources management. These are: 1) inclusion of people and 2) consideration of connections between natural and social systems. In sociology and psychology the inclusion of people occurs through use of subjective well-being indicators; while in indigenous research and anthropology, a focus on cultural knowledge and values is used. In ecology and natural resources management, we see a focus on the development of indicators that includes people and their values and concerns. Indigenous scholars have brought new attention to how human well-being and natural systems are related. In ecology and natural resource management, several frameworks, such as the Millennium Ecosystem Assessment and the sustainable livelihoods approach, explicitly consider natural systems.

This study explored human well-being on Haida Gwaii through a qualitative case-study approach. It is embedded within the context of land-use planning in B.C. and EBM land-use planning on the NCC. This study identified human well-being indicators for Haida Gwaii to inform adaptive management on Haida Gwaii in an EBM context. Relevant literature on human well-being points to common elements in current well-being thinking including the inclusion of people and the consideration of the connection between natural and social systems.

⁴ For more information please see: www.resalliance.org

2. Methodology

2.1. Introduction

In this qualitative case study I conducted interviews with twenty participants asking what they thought were important measures for human well-being on Haida Gwaii. I also asked them to review and comment on human well-being indicators developed on the North and Central Coast (NCC) of B.C. The design focused on two central aims important in an EBM context. The first was to include all of Haida Gwaii, instead of one community or one cultural group on Haida Gwaii, as using ecological rather than political boundaries is an important aspect of EBM. The second was to base the study on Haida and local knowledge, as including people and their values is important in EBM. The approach best supporting these aims was a single case study approach using a constructivist grounded theory analysis.

2.1.1. Rationale for a case study approach

Case studies are a form of observational research as they do not involve active intervention, such as would be seen in experimental approaches (Newing 2011). They are usually most appropriate when "how" or "why" questions are used, however, exploratory "what" questions are acceptable uses of the case study approach (Yin 2009). A case study is a good research method for focusing on contemporary events the researcher is unable to control (Yin 2009). Yin (2009) defines a case study as "an empirical inquiry that investigates a contemporary phenomenon in depth and within a real-life context, especially when the boundaries between the phenomena and the context are not clearly evident" (p. 18). Case study research is undertaken for its own sake and to add to the broader theoretical understanding of an issue (Newing 2011).

My study can be characterized as an exploratory, single case study. A single case is appropriate in several circumstances, including when a case can be seen to be "extreme or unique" (Yin 2009, p.47). Haida Gwaii has several extreme and unique features with respect to the implementation of EBM. The most notable is the high level of power-sharing in the comanagement relationship between the Haida Nation and British Columbia regarding natural resources (Bird 2011). One example of this power sharing is the Haida Gwaii Management Council which facilitates joint decision-making. Secondly, Haida Gwaii exemplifies many aspects of EBM in one location. For example, Slocombe (1993) suggests that EBM is a useful tool to improve protected areas management, facilitate collaborative management between governments, and to reduce conflict between diverse stakeholders; on Haida Gwaii the EBM approach was utilized to meet all of these needs. The implementation of EBM on Haida Gwaii includes adaptive management and a near-continuous state of negotiation, allowing the case to be appropriately considered a contemporary phenomenon.

A case study approach is also a good fit with ecosystem approaches which use ecological rather than political boundaries. Case studies allow the consideration of all relevant information within a geographic area, in this case, the island archipelago of Haida Gwaii. In post-normal science, the time and place where the research takes place are no longer irrelevant to the findings, and a case study approach underscores this idea (Funtowicz & Ravetz 1993). The case study approach is also a good fit for recognizing that human wellbeing values are spatially and culturally specific' making this 'place-based research' appropriate (Gesler 1992; Panelli & Tipa 2007).

I considered using multiple data collection methods in the design of this study, as is common in case study approaches (Yin 2009). As the intent of the research was to identify indicators that could be used to measure human well-being, I was concerned it would be too easy to misinterpret other sources such as participant observation and text analysis. For example, if text analysis revealed that a topic was important to residents of Haida Gwaii, would this also mean that it was important to measure it for human well-being? Moreover, would it be possible to deduce how it should be measured? This concern was highlighted by the reality that I was working in a cross-cultural context.

Because of these concerns, I used interviews to address the research questions. This approach allowed me to directly ask participants what human well-being indicators were important to measure and how they should be measured. Despite not directly using other research methods, my experience living on Haida Gwaii for eight months aided my ability to interpret and understand my results. During my time on Haida Gwaii I attended many events, had many conversations about my project and read local media. This context allowed me to understand my results within my broader experiences on Haida Gwaii. In analyzing my data I compared my findings to Haida literature, local publications and academic literature using the process of triangulation.

2.1.2. Rationale for a constructivist grounded theory approach

Local values and stakeholder participation is an important aspect of EBM. It is also an important aspect of thinking about human well-being in ecology and natural resource management. As discussed in the introduction, current research in human well-being is moving toward inclusion of people and their values in diverse fields including sociology and psychology, anthropology and indigenous studies, and ecology and natural resource

management. Importantly, the Haida principle of seeking wise council (Jones et al. 2010) also influenced my study design, as I thought Haida Gwaii residents would be the best source of knowledge of the topic of what human well-being indicators are important to measure on Haida Gwaii.

As I was interested in the views and values of stakeholders, a qualitative approach was a better fit for this project. While quantitative methods are ideal for addressing focused questions concerning correlations or cause-effect relationships between different variables, qualitative methods are better at providing an in-depth understanding of different perspectives and providing an overview of an issue. Qualitative methods allow researchers to ask the question "what" and qualitative methods are often used to assess values (Winchester 2000). As this study addressed exploratory 'what' questions, and aimed to characterize a range of perspectives, a qualitative approach was more appropriate. Qualitative research often relies on inductive reasoning where researchers approach their study with limited theoretical framing of the issue and question (Newing 2011). In inductive research there is no hypothesis, data is gathered using broad questions and used to generate a theory (Newing 2011). This can be contrasted with deductive reasoning, which will often use hypotheses and the scientific method, and is common in scientific traditions (Newing 2011). However, this is unfortunate as qualitative and quantitative methods both have their role in research and researchers should choose the most appropriate tool for the research question (Newing 2011; Silverman 2000).

Qualitative methods may also be more consistent with several natural resource management approaches including resilience thinking and systems thinking, as they often rely on a constructivist approach rather than a positivist approach. A number of

epistemological and ontological aspects of research in science and social science can be linked to the philosophical approach of positivism (Newing 2011). Some basic underlying notions of positivism are that the world consists of a factual reality that can be broken down into discrete elements, that this reality can be observed objectively and that it is possible to develop general laws (Blaikie 2007). In contrast, some traditions in social science research rely on a social constructivist perspective where reality is viewed as holistic and complex (Bloomberg & Volpe 2012). In a constructivist approach, rather than seeking to find an objective truth, researchers seek to characterize a range of legitimate perspectives (Guba & Lincoln 2005). Tenets of social constructivism include the position that reality cannot be reduced to components, reality is socially, culturally and historically constructed, social phenomena can only be understood from a context-specific perspective, and that the researcher's role is to understand the multiple realities of participants (Guba & Lincoln 2005). Qualitative research can lead to context-bound extrapolations on the likely applicability of the findings to other situations under similar but not identical circumstances (Bloomberg & Volpe 2012). As systems thinking and resilience thinking rely on the view that there are multiple views of reality, and recognize that we are operating in a world of uncertainty and complexity (Waltner-Toews & Kay 2005), they may be more closely aligned with qualitative methods.

A constructivist grounded theory approach (Charmaz 2011) allowed me to explore the interview data and look for important categories. A constructivist grounded theory approach applies many tenets of grounded theory (Glaser & Strauss 1967; Strauss & Corbin 1997) but uses them as useful tools, rather than strict prescriptions. The constructivist perspective acknowledges the importance of the context of the research and views the

conceptual categories developed in the research as a product of the researcher's interpretation of the data, not an objective reporting of reality (Charmaz 2001). I used the grounded theory principles of simultaneous data collection and analysis, coding, and memo-making.

2.2. Data collection methods

2.2.1. Participant selection

Purposeful sampling is a form of non-statistical sampling. When using purposeful sampling, researchers will intentionally select people who are most relevant to the research question (Charmaz 2001). Relevant persons can be identified through conversations with community members about the research project, reports and newspaper articles. The principle of saturation can be used to decide when enough people have participated in the study. Saturation is the point in qualitative research when collecting more data produces little important new information or understanding (Glaser & Strauss 1967).

In my study, I identified residents of Haida Gwaii who could offer insights from different perspectives. I used elements of quota sampling in my design to recruit equal numbers of men and women and equal numbers of Haida and non-Haida community members. I also identified persons from communities across Haida Gwaii, to the extent possible. I identified participants through conversations with community members asking them whom they would recommend that I talk to after describing my research topic. This approach allowed me to identify long-standing and respected members of Haida Gwaii communities. The participants were well connected, representative and held a broad range of experiences. Many participants held positions of power and influence in the communities. The
participants included persons working in the fields of health, natural resource management, economic development, education, politics, and business management. One Haida elder and two hereditary chiefs participated in my study. Two young people, between the ages of 18 and 25 also participated. In total there were 20 participants, 10 men and 10 women. I was only able to recruit 8 Haida participants (5 women and 3 men). To ensure the anonymity of participants, I am not providing a more detailed description of the participants.

2.2.2. Interview methods

A semi-structured interview is an interview that uses an interview guide (Newing 2011). The interview guide may act simply as a checklist to make sure all the key points are discussed or it may be a list of questions (Newing 2011). I conducted semi-structured interviews with participants between December 2012 and April 2013. Interviews ranged from 30 minutes to an hour and 10 minutes, and most were about 45 minutes in length. I reviewed a consent form with participants prior to the interview and allowed time for them to review a slightly modified⁵ list of the human well-being indicators developed for the NCC.⁶ Some participants requested that I did not record the interviews so I took detailed notes and expanded them immediately following the interview. Participants were asked the difficult question: "what do you think is important to measure human well-being on Haida Gwaii"? After we discussed this for several minutes, participants were then asked to comment on the NCC indicators (see Appendix A for the interview guide).

⁵ I modified the NCC indicator list to improve readability by using common language, breaking complex indicators into parts and adding headings (see Appendix B).

⁶ The consulting company, the Sheltair Group, developed these indicators for the EBM Working Group in 2009 and they are the most recent and relevant indicators for the context of exploring human well-being on Haida Gwaii due to the geographic proximity and shared EBM objectives.

2.2.3. Data analysis

Analysis of the interview transcripts and notes consisted of four steps that were distinct but iterative:

Step 1: Coding of the interview data for categories and sub-categories

I used a constructivist grounded theory approach (Charmaz 2006) and the software Dedoose⁷ to identify codes in the interview data. Firstly, I transcribed the interviews and typed the interview notes. I began with the raw text and from this stage identified relevant text. I then focused on identifying repeating ideas, and especially repeating indicators. I used these repeating ideas and indicators as my initial open codes. Using the technique of memo writing, I found some codes could be grouped into sub-categories and categories. Through iterative review of the text, I also identified two theoretical narratives that I used to explain how the categories relate to each other. This process was undertaken using the iterative process of "making the text manageable, hearing what was said and developing theory" (Auerbach & Silverstein 2003, p.42). The categories and sub-categories were analyzed by gender and whether participants were Haida or non-Haida.

Step 2: Coding of the interview data for evaluation criteria

In the second step, I reviewed the interview transcripts and notes to identify any times when participants explained why they supported or did not support a NCC indicator or why they were suggesting alternative indicators. Through this process, I identified evaluation criteria that participants were using to assess the indicators. I identified the following criteria: important, accurate, informative, policy-relevant, and feasible (Table 1).

⁷ Dedoose is a qualitative and mixed-method data analysis software.

Step 3: Evaluation of indicators based on criteria

In the third step, I used the criteria I identified in Step 2 to evaluate the indicators. Firstly, I reviewed the interview transcripts and notes and noted every indicator suggested by participants. I combined these with the NCC indicators, creating a list of 119 indicators (see Appendix C). Then I assigned every indicator to a category or sub-category identified in Step 1. To create a shorter and more manageable list, I reviewed the 119 indicators using an indicator assessment tool I developed based on the criteria identified in Step 2 (Table 1). For the first criteria, importance, I reviewed the transcripts and for each participant I identified the two indicators that I felt they thought were the most important. I ranked these indicators as a 5 on a scale of 1-5. Some priorities overlapped, and despite having 20 participants, I only gave 25 indicators a score of 5. I also added a sixth criterion, to account for indicators that were suggested multiple times. I called this criteria "Normative" and included it in the indicator assessment tool. I assessed every indicator using the criteria in Table 1 producing a set of 46 indicators.

Step 4: Communication and validation

To verify that I had not missed anything important and to communicate my findings with participants, I circulated the list of 46 indicators to the participants, asking for their general comments. I received a limited response: two participants provided substantive comments and four provided brief comments. These comments were used to clarify the wording of the indicators and validate rankings of the indicators.

Criteria	Description	Scoring key for each criteria
Important	The indicator is	5: One of two top priorities for each participant;
	important to	4: Very important to at least one participant;
	participants.	3: Important to at least one participant;
		2: Neither important nor unimportant to participants;
		1: Not important to participants.
Normative	Many participants	1: At least 3 participants suggested the indicator;
	suggested the indicator.	0: Less than 3 participants suggested the indicator.
Accurate	The indicator data is	1: Participants think the indicator is accurate;
	accurate.	0.5: Some participants had concerns about accuracy
		while others did not;
		0: Participants expressed concerns that the indicator is
		not accurate.
Informative	The indicator is	1: Participants think the indicator is informative;
	informative.	0.5: Some participants had concerns about how
		informative the indicator is while others did not;
		0: Participants expressed concerns that the indicator is
		not informative.
Understandable	The indicator is	1: The indicator is understandable;
	understandable.	0.5: Some participants had concerns about how
		understandable the indicator is while others did not;
		0: Participants expressed concerns that the indicator
		would not be understandable, or asked questions
		about what the indicator meant.
Feasible	The data are available.	1: The data are readily available and likely to be
		available in the future;
		0.5: The data would be available with some effort;
		0: The data would require significant effort to collect (a
		study or community survey).

Table 1: An indicator assessment tool based on the criteria participants used to evaluate the indicators.

2.3. Limitations of the study

Innes and Booher (2010) suggest that "indicators' main influence is not primarily after they are developed and published, but rather during the course of their development" (p. 177), that "it matters how indicators are produced" (p. 178) and that stakeholders should reach agreement on both methods and concept. However, participatory research requires a high level of engagement and commitment from community members and therefore it is not always possible for researchers to do participatory research (Newing 2011). I observed many Haida Gwaii residents seemed fatigued by constant demands of researchers, including the new demands of an undergraduate program⁸ on Haida Gwaii. Many participants rescheduled our meeting several times and some cancelled indicating that they could not find time to meet with me. Through my involvement in community events, I often observed that many residents became frustrated by the mention of visioning, planning or even meetings. A participatory approach might have led to more benefits for residents and a greater opportunity for reflection on the results; however this was not possible for this project given the time constraints of research participants and my own limited budget and time. However, this study would have benefitted from a greater degree of review by Haida and long-term residents.

This study was a single case study, which used a constructivist grounded theory approach to identify categories and sub-categories deemed important for human well-being on Haida Gwaii. Two key aims were considered in the design of this research project. The first was inclusion of perspectives from across Haida Gwaii and the second was inclusion of

⁸ The Haida Gwaii Semester Program, an affiliate program of the University of British Columbia, offers 3rd and 4th year students the opportunity to study resource management on Haida Gwaii. Many leaders and community members volunteer their time for this program.

Haida and local knowledge and values. These aims were accomplished by using a case study approach and a constructivist grounded theory analysis. Data analysis involved four iterative steps: Coding of the interview data for categories and sub-categories, coding of the interview data for criteria, evaluation of indicators based on criteria, and communication and validation. This resulted in human well-being indicator framework, which includes categories, sub-categories and indicators. Another result was a ranked list of 119 indicators, including the NCC indicators. The human well-being indicator framework will be presented in Chapter 3 and the ranking of the NCC indicators will be presented in Chapter 4.

3. Results: A human well-being indicator framework

3.1. Introduction

Through qualitative analysis, I identified seven categories and fourteen sub-categories that characterize a human well-being indicator framework for Haida Gwaii (Table 2). The categories are: 1) Employment and economic stability, 2) Relationship with the land, ocean and air, 3) Health, 4) Governance and access to services, 5) Culture and community, 6) Educated and engaged citizens, and 7) Overall well-being. In this section I present these categories and their sub-categories as well as relevant quotes which help provide context and explain their importance. For each sub-category I discuss a few prominent indicators suggested by participants. While the combined list of indicators suggested by participants and those from the North and Central Coast (NCC) exceeds 119 indicators (Appendix C), I present the 46 indicators that best met the criteria (important, normative, accurate, informative, understandable and feasible), presented in the Methodology. Finally, I identify prominent connections between the categories and sub-categories.

3.2. Categories, sub-categories and indicators

Some categories appeared more important to some groups of participants than to others. The most important category for Haida participants was the second category: Relationship with the land, ocean and air. For non-Haida, the first category, Employment and economic stability, was the most important. When results were analyzed by gender, three categories were important to female participants: Relationship with the land, ocean and air, Health, and Governance and access to services. For males, Employment and economic stability was the most important. When analyzed by gender and Haida/nonHaida, the most important category for Haida men was Relationship with the land, ocean and air and the second was Employment and economic stability (Figure 1). For Haida women, the most important category was also Relationship with the land, ocean and air and the second, Culture and community, followed closely by Employment and economic stability, Health, and Governance and access to services (Figure 1). While non-Haida women felt strongly about the two categories Health and Governance and access to services, they felt less strongly about Employment and economic stability, the most important category for non-Haida men (Figure 1). Due to the small sample size in this study, these differences are descriptive rather than statistical and should only be seen to describe the views of the participants that participated in the study. In the following section I will explain these categories, and their sub-categories in more detail.

Category	Sub-category	Description
1. Employment and	1a. Access to jobs and	Whether Haida and long-term residents have
economic stability	resources	access to employment and business opportunities
		in the natural resource sectors and other sectors.
	1b. Personal and	Whether the economy on Haida Gwaii is stable and
	stability	sustainable and allows residents to meet their needs.
2. Relationship with	2a. Access to healthy	Whether Haida and long-term residents have
the land, ocean and	land, ocean and air	access to the forest and ocean resources they need
air		for their culture and livelihoods.
	2b. Protecting the	Whether residents and governments are
	land, ocean and air	responsibly managing the land, ocean and air for
		current and future generations.
3. Health	3a. Healthy behaviors	Whether residents are participating in behaviours
		that are beneficial for their health.
	3b. Access to health	Whether access to health services is adequate on
	services	Haida Gwaii.
	3c. Health statistics	Whether important health statistics show positive
		trends.
4. Governance and	4a. Access to	Whether residents have adequate access to the
access to services	government services	government services on which they depend.
	4b. Collaboration and	Whether Haida, provincial, band council, and
	engagement	municipal governments are working well together.
5. Culture and community	5a. Haida culture	Whether Haida culture is thriving and is prominent in communities.
5	5b. Participating in	Whether residents are participating in their
	community	communities by attending community events and
	5	volunteering.
6. Educated and	6a. Education and	Whether residents have sufficient education to be
engaged citizens	literacy	engaged citizens.
7. Overall well-being	7a. Population change	Whether the population of Haida Gwaii is stable.
	7b. Broad indicators	Whether people feel their overall well-being is high.

Table 2: Categories and sub-categories of human well-being on Haida Gwaii.



Figure 1: Weighted code counts (%) of human well-being categories analyzed by gender and whether participants are Haida or non-Haida.⁹

3.2.1. Employment and economic stability

Access to jobs and resources, the first sub-category under Employment and economic stability, concerns whether Haida and long-term residents have access to employment and business opportunities in the natural resource sectors and other sectors. Participants explained that in the past logging companies brought workers to Haida Gwaii rather than hiring residents; in addition it was difficult for mill owners on Haida Gwaii to access wood to process at their mills as tenures were awarded to larger companies. One important

⁹ These differences are descriptive rather than statistical and only describe the views of the participants that participated in the study, not that broader population on Haida Gwaii.

strategy expressed by many participants is creating jobs in wood processing at mills on Haida Gwaii by ensuring a percent of the wood harvested on Haida Gwaii is also processed on Haida Gwaii. To monitor these concerns, participants suggested measuring the number of jobs in each sector held by Haida and long-term residents (indicator E1, Table 3). Key sectors that were suggested were logging, wood processing, alternative energy, tourism, ecotourism, construction, fishing, and fishing lodges. This was the most important subcategory for men and seemed to be relatively more prominent for Haida men. This category was less prominent for women.

The second sub-category, Personal and business economic stability embodies whether the economy on Haida Gwaii is stable, sustainable, and allows residents to meet their needs. The concern for some non-Haida is that without a stable economy, living on Haida Gwaii would not be possible. As one participant explained:

So I think the first economic indicator should be diversity. Because a single industry town, they disappear. I think you have ridden up and down on the ferry here at least once and I don't know if you saw all the towns that are now ghost towns. So diversity should be the key economic indicator. If you don't have diversity you are dead so don't bother measuring anything.

It was also clear that participants felt that jobs and economic stability needed to be balanced with environmental concerns. As one participant explained:

On the Haida side of it now it is a matter of finding that clear balance, over the years it was about protecting, protecting what was needed but now that we are involved in the industry that balance is really, it is really like the edge of a knife.

Creating a stable and sustainable economy was a concern for many participants. Some indicators that were suggested that were assigned to this sub-category are: the cost of living (indicator E4), level of local food production (E5), and number of tourists (E6) (Table 3). This sub-category seemed to be more important to non-Haida men and women.

3.2.2. Relationship with the land, ocean and air

Access to healthy land, ocean and air, the first sub-category under Relationship with the land, ocean and air, concerns whether Haida and long-term residents have adequate access to the forest and ocean resources they need for their culture and livelihoods. An integral part of this category is whether the land, ocean and air are healthy so that they can support human well-being. One Haida participant explained that, "for me that is a real indicator of success on Haida Gwaii that we have protected enough of the resources that we can still access them." Regarding forest resources, the main concern seemed to be whether sufficient land had been protected to allow access to Haida cultural resources (e.g. monumental cedars, medicinal plants) for current and future generations of Haida. In addition to the availability of this land, an important concern was the accessibility of this land. Regarding marine resources, the more pressing concern seemed to be the health of the ocean and whether traditional foods were healthy and safe to eat. One Haida participant explained the importance of monitoring the health of shellfish that are an important part of the diet of Haida communities:

Yeah so I think, rather than wait until there are deformed babies or whatever, if we could set some money aside and check every five years or whatever, and measure what the animals are doing, and the shellfish, you know, and whatever happens in

the ocean comes up into the forest and the bears eat the fish and on it goes so I think that would be good.

The health of the ocean and the organisms that live in the ocean are the key factor in determining whether there is access to traditional foods. Haida participants discussed how this category relates to health, livelihoods, and culture. Important indicators in this category include: The proportion of diet coming from eating foods that are gathered and grown (A1), Access to traditional forest resources for food, art, medicine and construction (A2), and whether traditional foods are healthy and safe to eat (A3) (Table 3). This sub-category was the most important category for Haida women and was also very important to Haida men.

The second sub-category, Protecting the land, ocean and air, concerns the environmental impact of residents and whether residents and governments are responsibly caring for the land, ocean and air on Haida Gwaii. As one participant explained: "Well first and foremost the land, the ocean and the air has to be protected. It is because of our land that we are so well off." Electricity was a prominent issue and participant explained that "I think it is part of a human well-being thing as we would all feel better if there was less environmental footprint for the power we need." This sub-category was more important to Haida men, and also important to Haida women.

Category	Sub-category	Indicator #	Indicator	Overall Rating	Importance Rating (5)	# of participants who suggested
1. Employment and economic stability	1a. Access to jobs and resources	E1	Number of jobs in each industry and percent that are held by Haida and long-term residents. Key industries are: logging, wood processing, alternative energy, tourism, ecotourism, construction, fish processing and fishing lodges.	9	5	9
		E2	Number of businesses in each industry and percent that are profitable and owned by Haida and long-term residents.	9	5	5
		E3	Percent of the wood that is harvested on Haida Gwaii that is also processed on Haida Gwaii.	8.5	5	2
	1b. Personal and Business economic	E4	Cost of living.	9	5	5
		E5	Number of tourists per year.	8.5	5	2
	stability	E6	Volume of local food production from the land and ocean.	8	4	5
		E7	Satisfaction with current level of employment.	7.5	4	3
2. Relationship with the land,	2a. Access to healthy land, ocean and air	A1	Proportion of diet coming from eating foods that have been gathered or grown.	9	5	6
ocean and air		A2	Access to traditional forest resources for food, art, medicine and construction.	9	5	4
		A3	Whether traditional foods are healthy and safe to eat.	8	5	2
	2b. Protecting the	A4	Number of returning salmon to key waterways.	7	3	3
	land, ocean and air	A5	Percent of businesses meeting the highest environmental standard in their field.	7	3	1
		<i>A6</i>	Percent of electricity on Haida Gwaii that comes from renewable sources.	7	3	1

Table 3: Indicators suggested by participants by human well-being category and sub-category.

Category	Sub-category	Indicator #	Indicator	Overall Rating (10)	Importance Rating (5)	# of participants who suggested the indicator
3. Health	3a. Healthy behaviors	H1	Time spent doing physical fitness on a weekly basis.	9	5	3
		H2	Alcohol sales per capita.	9	5	1
		H3	Number of hard drug offences per capita.	8	4	4
	<i>3b. Access to health services</i>	H4	Satisfaction with the health services available on Haida Gwaii.	9	5	8
		Н5	Funding levels for mental health and social services relative to need.	8	5	2
	<i>3c. Health statistics</i>	H6	Percent of the population with the following conditions: diabetes, obesity, cancer and arthritis.	9	5	7
		H7	Life expectancy.	8	3	5
		H8	Domestic abuse rate relevant to other coastal communities.	8	4	1
4. Governance	4a. Access to	G1	Ferry ridership cost.	10	5	6
and access to services	government services	G2	Number of recreational programs per community with special attention to outdoor programs for kids and fitness programs for seniors.	9	5	6
		G3	Presence of a pool and rink on Haida Gwaii.	9	4	6
		G4	Number of spaces at senior's assisted living facilities relative to need.	8	5	1
		G5	Internet speed (internet bandwidth).	8	4	2
	4b. Collaboration and engagement	G6	Satisfaction with opportunities for meaningful engagement with governments.	8	5	1
		G7	Effectiveness of Haida Gwaii governance systems and the Haida Gwaii Management Council.	8	4	3
		G8	Percent of revenue from forestry staying on Haida Gwaii to support Haida communities.	8	4	1

Category	Sub-category	Indicator #	Indicator	Overall Rating	Importance Rating (5)	# of participants who suggested
				(10)		the indicator
5. Culture and	5a. Haida culture	C1	Number of people speaking Haida by age group.	9.5	5	5
Community		<i>C2</i>	Number of youth who know how to prepare	8	5	1
			and handle traditional food.			
		<i>C4</i>	Whether children are dancing and singing at	7	4	2
			events.			
		С3	Number of youth being supported in programs that take them on the land.	7	4	1
	5b. Participating in	С5	Percent of the population participating in	9	5	6
	community		voluntary community service organizations.			
		С6	Number of community events per community.	7	4	1
6. Educated and engaged	6a. Education and literacy	Ed1	High school graduation rate (based on students entering high school).	10	5	6
citizens		Ed2	Time students spend participating in outdoor education.	8	5	2
		Ed3	Percent of population with post-secondary education of any kind (trades, university, college).	8	4	5
		Ed4	Student test scores.	7	4	2
		Ed5	Number of positions available for youth in internship programs, particularly in natural resources management.	7	4	1
7. Overall well- being	7a. Population change	01	Change in total population by community and percent of the population that is Haida.	10	5	15
		02	Proportion of the population who is in their twenties and thirties.	10	5	4
	7b. Broad indicators	03	Level of optimism with the future.	8	5	1
		04	Percent of the population who would prefer to	8	5	1
			live on Haida Gwaii over any other location.			
		05	Number of youth returning to Haida Gwaii after post-secondary education.	8	4	4
		06	Level of satisfaction overall.	8	4	3

3.2.3. Health

Healthy behaviours, the first sub-category under Health, concerns whether residents are engaging in behaviours that are linked to positive health outcomes. As one participant explained:

If people are exercising and lots of team sports are happening then that is a good thing. We really need to get our young people healthy at least. It is too late for us. It is not too late for kids for sure. Nobody told us about diabetes when we were young. Smoking was allowed in the hospital.

Participants noted that regular exercise, healthy eating habits, and reduced alcohol consumption were healthy lifestyle options that should be promoted. Participants explained the connection between eating healthy food and economic conditions, as groceries are expensive. Although drug use is an issue, some participants were concerned about the accuracy of the data collected by the police. Participants were concerned about the unhealthy behaviours that young people engage in. As one participant explained:

Some of the kids I know should be dead but they have been lucky enough not to be dead so it is one of those things where, yeah you have statistics, but they don't really have statistics on close calls, where yeah you should have been dead but you are really lucky.

This participant also stressed that the younger generation was living less healthy lifestyles than their parents' generation. Prominent indicators for this sub-category are: the time spent doing physical fitness on a weekly basis (H1) and alcohol sales per capita (H2) (Table 2). This sub-category was most important to Haida women, Haida men and non-Haida men. 44 Access to health services, the second sub-category, concerns whether health services on Haida Gwaii are adequate. For example, one participant explained that, "I just had a talk with a friend... desperate to move because she is worried about her health. This is not just physical health condition but (her) access and ability to get (her) health treated." Another participant suggested that this was a particularly pressing concern for pregnant women who are having their first child, people with disabilities and the elderly. One participant suggested that anyone who has a long-term health condition has to move because it is expensive to travel to see specialists. When talking about access to health services, one participant exclaimed, "One wonders how much in terms of wellness, that increases the unwellness," highlighting how important access to health services are to residents. Important indicators for this sub-category are satisfaction with the health services available on Haida Gwaii (H4), and funding levels for mental health and social services relative to need (H5) (Table 3). This category was more important to non-Haida women.

The third sub-category, Health statistics, concerns whether important health statistics showed positive trends. One participant suggested measuring "how sick are people and for how long are they sick before they die. Sort of the burden of chronic disease in the community, which I think is pretty high." The sub-categories Health statistics and Healthy behaviours are closely connected and related to other areas of human well-being. Another participant suggested that incidence of disease does not necessarily correlate with well-being: "There are regular metrics that are used. Incidences of diabetes and obesity, these are surrogates for well-being. However there are plenty of diabetics that are doing just fine." An important indicator under this sub-category was the percent of the population

with diabetes, obesity, cancer and arthritis (H6, Table 3). This category was more important for non-Haida participants, and in particular non-Haida women.

3.2.4. Governance and access to services

Access to government services, the first sub-category under Governance and access to services, concerns whether residents have adequate access to the government services on which they depend. Government services are less available on Haida Gwaii and this affects the well-being of residents. As one participant explained:

But as a community, as a town... do we have a rink? No. Do we have a swimming pool? No. Do we have recreational facilities for our youth? Do we have program money in place to keep things going? It is volunteers half the time for our youth coordinated stuff. So those to me are indicators. Do you have running centers with programs, do you have non-volunteer things.

In addition to being a safety concern, as it is difficult to teach children to swim in the ocean, the absence of a swimming pool on Haida Gwaii symbolizes how the residents of Haida Gwaii have been denied services that were made available for logging crews and their families. As one participant explained:

There would be three hundred people in the logging camps and their families. There were swimming pools, and that was Dinan Bay. There were different places. All those places have died. But it is like they never put any of that money into any of the communities here.

According to the participants important services that should be monitored and considered are care for the elderly and Internet access. Prominent indicators in this category are: the ferry ridership cost (G1), the number of recreational programs in each community (G2), and the presence of a pool and skating rink on Haida Gwaii (G3) (Table 3). This category was the most important category for non-Haida women.

Collaboration and engagement, the second sub-category under Governance and access to services, concerns how well the Council of the Haida Nation, Band Councils, municipal governments, and provincial governments are working together. According to one Haida participant, "well what everyone wants to see at some point is island-wide governance. And I think developing a protocol was one step toward that. Because we all have to live together. But it is how we do it that makes a difference." Another participant explained, "there is co-management here that doesn't happen anywhere else. That's a pretty good well-being indicator. That is the first thing that comes to my mind: two governments, one team. It is very innovative."

Still some participants suggested that there is work that needs to be done to make government processes more efficient. Another participant stressed that "the most important thing to measure is are people living lives that are of value to them." He explained that governments should be facilitating a process by which people can be genuinely consulted and that governments should help individuals create lives that they value. Important indicators under this category are satisfaction with opportunities for meaningful engagement from governments (G6), the effectiveness of Haida Gwaii governance systems and the Haida Gwaii Management Council (G7), and the percent of revenue from forestry

staying on Haida Gwaii to support Haida communities (G8, Table 3). This category was more important to non-Haida women.

3.2.5. Culture and community

The sub-category Haida culture concerns whether Haida culture is thriving and prominent in the community. The Haida language is an important and growing concern. As one participant explained:

In the last five to six years we went from having over 40 speakers in each village and then a few years back there was this devastating time where between Old Masset and Skidegate, we lost 15 elders, it took a huge chunk of our speakers away. So the concern of the preserving the language became more urgent to everyone, which is a good thing. So measuring the language, measuring are your kids dancing and singing you know. Today they are.

The sub-category Haida culture is closely connected with the sub-category Access to healthy land, ocean and air that falls under the category Relationship with the land, ocean and air. For example access to healthy traditional foods is an important part of Haida culture. As one Haida participant explained:

You know of course that is what you want to see, how many kids do we have graduating and going on to university, that's a measuring thing. But as a Haida woman, that is not what's important to me. I want to measure, do they speak Haida? Do they know how to gather food? Do they know how to prepare it? I think for the majority, most of the children today, would not know how. Judging by what I hear at

potluck dinners they are not being taught at home. Even the basics of how to handle food.

Another Haida participant suggested that: "I guess under cultural indicators. For me it is always a big issue is getting our youth back on the land." While some non-Haida participants commented on indicators for Haida culture others did not feel comfortable doing so. One participant explained, "For the non-Haida community it's kind of like how included... I mean culture means Haida for most people here. We've left our cultures behind, that's why we are here." The most prominent indicator under this sub-category was the number of people speaking Haida by age group (C1, Table 3). This sub-category was very important to Haida women. The second sub-category, Participating in community, concerned whether residents were participating in community events, community programs and volunteer work. One prominent indicator was the number of people participating in volunteer organizations (C5, Table 2). This sub-category was most important to men.

3.2.6. Educated and engaged citizens

Education and literacy, the only sub-category under Educated and engaged citizens, concerns whether residents of Haida Gwaii have sufficient education to be engaged citizens. Some participants felt that educated citizens are better able to respond to a changing economy and influence decisions that affect their lives. According to one participant:

We have roughly 50% of the kids . . . not finishing high school as a statistic that should be the most compelling things that the school boards and the citizenry of this island should be working on. Nothing should be more important... We have people that are not ready to be engaged citizens of this community.

However residents seemed to have conflicting views about post-secondary education with some saying that trades should be seen as being as important as university and others suggesting we should focus only on high school. In addition others expressed that higher levels of education can be rewarding and enjoyable and also contribute to higher well-being. The most important indicator under this sub-category was the high school graduation rate (Ed1, Table 3). This category was most important to non-Haida men.

3.2.7. Overall well-being

Population change, the first sub-category under Overall well-being, concerns whether the population of Haida Gwaii is stable. Although an important sub-category, some participants suggested that this sub-category be approached with careful analysis. Some Haida participants suggested some communities were composed of more transient populations only here when there was "a job to be had." Therefore, if people left these communities it would reflect that jobs were gone, not that well-being decreased. As one Haida participant explained, "I find the non-Haida population a lot more transient. For me this is home. This is where I am going to die. I have no intention of leaving." Retaining youth and "bringing back people who have not lived here for a long time" was important to some Haida participants. One participant explained, "You know I have grandchildren and really making sure they can stay here if they choose." However, many non-Haida people are considered long-term residents or "local". In response to my question of how long a non-Haida person would have to stay to be considered a local, a Haida participant explained "... it would be like electricity... but what is constant and if they are part of that constant population. If they are here through good times and bad times." Non-Haida participants more frequently talked about critical mass and the need to have more people, one

respondent suggesting another 1,000 people on Haida Gwaii to "keep the stores open." A consistent category for participants was the desire to see more young people returning, especially after finishing post-secondary training. An important indicator under this sub-category was the change in total population by community and the percent that is Haida (01, Table 3). This sub-category was most important to men and Haida women.

The second sub-category, Broad indicators, concerns whether residents would rate their overall well-being as high. This category is composed of several subjective well-being indicators. One participant suggested asking: "... where would you rather live? That might be the best indicator. Would you rather live somewhere else and where? If you had just one question, that's the one." Other participants suggested that satisfaction questions are important to avoid imposing outside views of happiness on residents. As one participant explained, "And I think you just have to figure out how you measure their perception of happiness, not yours." Important indicators under this sub-category were percent of the population who would prefer to live on Haida Gwaii over any other location (04), the number of youth returning to Haida Gwaii after post-secondary education (05), and the level of satisfaction overall (06) (Table 3). This category was most important to non-Haida women.

3.3. Relationships between categories

I identified two prominent theoretical narratives present during the interviews that show how the categories are inter-related. To communicate the two theoretical narratives, I have developed a human well-being template (Figure 2). This template shows that natural resource governance on Haida Gwaii affects the access that residents have to a healthy environment, jobs and resources, and government services. This access then affects the community's ability to build resilience and human capital. The first theoretical narrative focuses on the importance of Access to healthy land, ocean and air for other aspects of human well-being. I will refer to this as the Access narrative (Figure 3). The second theoretical narrative focuses on the relationships between the categories and subcategories Employment and economic stability, Population and Access to government services. I will refer to this as the Resilience and sustainability narrative (Figure 4).

3.3.1. Access narrative

The premise of the Access narrative is that access to healthy land, ocean and air will lead to improved outcomes in other areas of human well-being. These areas include Haida culture, economic stability, health, education and other broad indicators. Participants recognized that governance systems affect access to healthy land, ocean and air and this is reflected in the Access narrative (Figure 3). Haida and non-Haida participants described this narrative.

There are evident links between the sub-category Access to healthy land, ocean and air and Haida culture (Figure 3). Access to healthy land, ocean and air provides Haida communities with the opportunity to practice their culture. Two indicators under Haida culture are the number of youth who know how to prepare and handle traditional food (C2) 52 and the number of youth being supported in programs that take them on the land (C3)(Table 2). It would be impossible to score well on these indicators if there was not adequate access to the land, ocean and air.



Figure 2: Human well-being template

This template shows the relationship between Governance, Access and Resilience and human capital. The co-management governance structure, which is measured by collaboration and engagement and is responsible for protecting the land, ocean and air directly affects access to the following subcategories: Access to healthy land, ocean and air, Access to jobs and resources, Access to health services and Access to government services. Access to jobs and resources affects population change, which in turn affects access to health services and access to government services. This affects other sub-categories under Resilience and human capital. Population change also directly effects and is affected by sub-categories under Resilience and human capital.



Figure 3: Access narrative.

Access to healthy land, ocean and air would lead to improved indicators in the sub-categories Personal and business economic stability, Haida culture, Healthy behaviours, Health statistics, Education and literacy, and Broad indicators. Access to healthy land, ocean and air is dependent on co-management in an EBM context.

Participants noted that a healthy economy is dependent on a healthy environment. Not only is this category important for paid employment, it is important for livelihoods. As one participant explained, referring to the proposed Enbridge Northern Gateway pipeline: "Enbridge would really make of mess of things. If we lose I can't imagine. I eat fish three to four times a week and seaweed and clams... It is a livelihood issue." Access to healthy land, ocean and air is also related to health. If traditional foods gathered from the ocean are contaminated, this contamination will directly affect the health of residents including indicators related to cancer rates under Health statistics. As one Haida participant explained: Well I really felt comforted with a study the health center did last year I think it was and they took sampling of all the food we eat and they checked for mercury and iron and lead and everything. We were pretty curious, you know, there is so much pollution and some people were catching fish that looked strange, or sick, but all our food came out good.

Another participant suggested that First Nations with less control over their natural resources tend to have more issues related to drug and alcohol abuse, which relates to the sub-category Healthy behaviours. This participant also suggested that students from First Nations who have control over their resources do better in school, which relates to the sub-category Education and literacy. There are also clear connections between the category Access to healthy land, ocean and air and the category overall well-being. This is particularly clear when the Enbridge Northern Gateway pipeline is discussed. According to one participant in this study:

And of course the land, and the air, you know I have heard, I have heard so many people say they would fight this pipeline, they would die fighting against it, there are so many people who feel so strongly. If we didn't have our food, we wouldn't want to live, it is that sort of a thing. There are a lot of people that feel very strongly, there is a new awareness I think, and an appreciation for what we have.

If the land, ocean and air were no longer healthy, this would be reflected in indicators of overall well-being of residents.

3.3.2. Resilience and sustainability narrative

The Resilience and sustainability narrative (Figure 4) focused on the relationship between jobs, services, population and other human well-being categories. Non-Haida participants expressed concern that Haida Gwaii will see a continued decrease in personal and business economic stability and continued, negative population change. Some non-Haida participants worry that this could lead to a loss of access to government services. The loss of access to government services would result in negative effects on outcomes in the areas of economic stability, health, education, culture and community and other broad indicators. As one participant explained, "In terms of wellness, if you don't have sustainability you won't have anyone here. And I try to be very positive about it but when you see the number of people leaving. Going out of business. Everyone you talk to right now they says it is so slow I don't know if I am going to make it." Another participant added, "Some of the schools are in danger. The Sandspit school has been teetering on the edge of being viable for quite a few years. That sort of critical mass issue, and the schools feel it first and feel it early."

Despite these concerns, many participants are optimistic and have ideas to increase employment and economic stability, which would in turn lead to a stable or growing population. These include increased wood processing (new mills), more tourism, and an increase in local food production. Other participants suggested that there should be new university education programs that showcase Haida Gwaii to build on the success of the Haida Gwaii Higher Education program. For example one participant suggested that the Emily Carr University of Art and Design should have a satellite campus on Haida Gwaii. Another participant suggested that recruiting entrepreneurs would be an important part of

transitioning to a new more diverse economy on Haida Gwaii. This optimistic future depends on increased access to jobs and resources and stable or increased access to health services and government services. The co-management governance structure can influence residents' access to jobs and resources and health and other government services.

This chapter outlined a framework for measuring human well-being on Haida Gwaii. The framework consists of seven categories and fourteen sub-categories that reflect areas where participants thought it was important to measure indicators. Importantly, there is a diversity of opinions on what the most important categories and sub-categories are and this has been described in the text and shown in Figure 1. Haida women were most concerned about the category Relationship with the land, ocean and air while non-Haida women seemed concerned about Health and Governance and access to services. Haida men were concerned about the category Relationship with the land, ocean and air, but also the subcategory Access to jobs and resources. Non-Haida men felt strongly about the category Access to jobs and resources. Characterizing the diversity of perspectives regarding categories and sub-categories will improve the ability to capture a range of values that are important to residents of Haida Gwaii. The final section of this chapter described some important relationships between categories and sub-categories in an Access narrative and a Resilience and sustainability narrative. These narratives communicate why the categories and sub-categories are important and how they are linked.



Figure 4: Resilience and sustainability narrative.

In this narrative, personal and business economic stability affects the population, which in turn affects access to health and government services, which are often based on population for funding. This then affects the other areas of human well-being including health, community participation, education and broad well-being indicators of residents. This affects whether people decide to leave Haida Gwaii. The co-management governance structure has some ability to increase access to jobs and resources as well as government services. This narrative was described by non-Haida participants but not by Haida participants.

4. Results: Critique of the North and Central Coast Indicators

4.1. Introduction

In addition to developing a framework to monitor human well-being on Haida Gwaii, which was presented in Chapter 3, I also evaluated the indicators suggested by participants as well as indicators from the North and Central Coast (NCC). In this chapter I will present my evaluation of the NCC indicators, highlighting some important and problematic indicators. This chapter will address the second research question, which is: What do participants think are the strengths and weakness of an EBM human well-being framework developed for the neighboring NCC of British Columbia?

The NCC indicators were developed for the EBM Working Group as part of the implementation of EBM on the NCC. In 2009, the EBM Working Group awarded a contract to the consulting firm the Sheltair Group to recommend and collect baseline data for a suite of indicators to monitor human well-being. These indicators were to be based on a previous study by Rubus Ecoscience Alliance (2007), which in turn was based on two protocol agreements between First Nations and B.C.: The KNT Agreement in Principle (2006) and the Turning Point Protocol (2006). The report produced by the Sheltair Group recommends 34 indicators (referred to here as the NCC indicators) and presents baseline data for most of the indicators. The indicators fall under the following seven categories: population, the economy (which is composed of the sub-categories: employment, income and access to resources), governance, culture, health, education and recreation (Appendix B).

4.2. A critique of the North and Central Coast indicators

As part of my study design, participants were presented with a copy of the NCC indicators during the interview. Many participants offered suggestions and comments when discussing this indicator set. During my analysis of the interview transcripts and notes, I identified several criteria used by participants to comment on the NCC indicators, which were: important, accurate, informative, understandable and feasible. Using interview transcripts and notes, these criteria, and the scoring rubric (Table 1) presented in Chapter 2, I ranked the NCC indicators (Table 4). This led to the following main findings: participants found fifteen of the thirty-four indicators to be reasonably good as indicated by their relatively high score; participants found the Access to resource indicators and several common economic indicators to be problematic for a variety of reasons; participants also found other indicators problematic, such as indicators under health, education and culture.

4.2.1. A few highly-ranked North and Central Coast indicators

Some of the NCC indicators ranked highly and were included in the human well-being indicator framework from the previous chapter (Table 3). Some of the NCC indicators touched on key priorities for participants including: the change in the total population and population demographics, the number of locally-owned businesses, the Haida language proficiency, volunteering, life expectancy, and number of salmon returning to key waterways (Table 4).

Table 4: North and Central Coast indicators and indicator rankings.The rankings are based on the criteria in the Indicator Assessment tool (Table 1) and add to the Overall Rating (Imp=Importance, Norm=Normative, Acc=Accurate, Inf=Informative, Und=Understandable, and Feas=Feasible).

NCC Code	Indicators	Overall Rating (10)	Imp (5)	Norm (1)	Acc (1)	Inf (1)	Und (1)	Feas (1)
POP-1	Change in total population by community and percent of population that is Haida (01).	10	5	1	1	1	1	1
POP-2	Proportion of the population who is in their twenties and thirties (02).	10	5	1	1	1	1	1
CUL-1	Number of people speaking Haida by age group (C1).	9.5	5	1	1	1	1	0.5
EMPL- 4	Number of jobs in each industry and percent that are held by local and Haida residents. Key industries are: logging, wood processing, alternative energy, tourism, ecotourism, construction, and fishing lodges (E1)	9.5	5	1	1	1	1	0.5
GOV-2	Percent of the population participating in voluntary community service organizations (C5).	9	5	1	1	1	1	0
ACC-4	Percent of revenue from forestry staying on Haida Gwaii to support communities (G6).	8	4	0	1	1	1	1
HEA-1	Life expectancy (H7).	8	3	1	1	1	1	1
GOV-1	Percent of land on Haida Gwaii covered by government-to-government agreements.	7.5	4	1	1	1	0	0.5
CUL-2	Number of returning salmon to key waterways (A4).	7	3	1	1	1	1	0
INC-3	Percent of an individual's income coming from employment compared to other sources.	7	3	1	1	1	1	0
INC-4	Percent of the population over 15 on employment insurance (EI).	7	3	1	1	1	1	0
ACC-3	Number of commercial and First Nation fish licenses held locally and total value of fish harvested from local and Haida fishing operations.	6.5	3	0	1	1	1	0.5
ACC-6	Percent of backcountry tenures, guide outfitter tenures, and sports fishing lodge licenses owned by local residents and percent of which are operational.	6.5	3	0	1	1	1	0.5
EMPL- 2	Employment rate.	6.5	3	1	1	0.5	1	0
INC-1	Median household income.	6.5	3	1	1	0.5	1	0
ACC-10	Ferry ridership and service.	6	2	0	1	1	1	1
ACC-9	Economic diversity index.	6	3	1	1	1	0	0

NCC Code	Indicators	Overall Rating	Imp (5)	Norm (1)	Acc (1)	Inf (1)	Und (1)	Feas (1)
		(10)						
HEA-2	Infant mortality rate.	6	2	0	1	1	1	1
ACC-5	Actual timber harvest level relative to the annual allowable cut.	5.5	2	0	1	1	1	0.5
ACC-8	Number of quarry tenures held by local residents and estimated production levels.	5.5	2	0	1	1	1	0.5
ACC-1	Percent of aquaculture tenures held by local residents and percent which are operational.	5	2	0	1	1	1	0
ACC-12	First Nation and local community tourism revenue and employment.	5	2	0	1	1	1	0
ACC-11	Percent of actual timber harvest level harvested by local and First Nations companies.	5	2	0	1	1	1	0
ACC-7	Number of local power generation tenures.	5	2	0	1	1	1	0
POP-3	Rate of population turnover due to people moving in and out of the area.	5	3	0	0	1	1	0
ACC-2	Percent of mineral exploration tenures owned by local residents and percent	4.5	2	0	1	0	1	0.5
	of mineral exploration activity conducted by local companies.	4 5	2	0	1	0.5	1	
INC-2	Individual income distribution.	4.5	2	0	1	0.5	1	0
CUL-3	Percent of cedar harvested relative to the proportion of cedar on the landscape.	4	2	0	1	0	1	0
CUL-4	Number of First Nation community members using traditional cultural resources for non-commercial purposes.	4	2	0	1	1	0	0
EDU-1	Education attainment (the level of education held by residents such as a high school diploma, a college degree, a trades certificate or a university degree).	4	2	0	1	1	0	0
EDU-2	Number of locally delivered skills training programs and number of people enrolled in the training programs.	4	2	0	1	0	1	0
EMPL- 1	Labour force, by sector, by age group, and by occupation.	4	2	0	1	0	1	0
EMPL- 3	Number of jobs in forestry and wood processing per cubic meter harvested.	3	2	0	1	0	0	0
ACC-8	Number of non-timber forest product tenures held locally.	2	2	0	0	0	0	0
REC-1	Number of different recreation opportunity classes and their accessibility.	2	1	0	1	0	0	0

In order to simplify the ranking process, I reworded some NCC indicators to match participant suggestions prior to ranking. For example, instead of measuring the percent of the population speaking Haida, participants suggested monitoring the total number of people speaking Haida and their age. Indicators in Table 4 have the same intent as the original NCC indicators, but I changed the language to reflect the wording used by participants. Although some NCC indicators are included in my human well-being indicator framework, others are not, as they were ranked lower than other indicators suggested by participants.

4.2.2. Concerns with the access to resource indicators

When I identified indicators most important to participants, I used the interview transcripts to note when they spoke most passionately about what was important to them. While many of the NCC indicators touched on topics important to participants, NCC indicators sometimes measured less meaningful aspects of these topics. This was most evident with the topic of access to natural resources. In the NCC indicator set used in this study, 22 of 38 indicators are economic indicators. Of these indicators, fourteen indicators address whether First Nations and long-term residents have access to resources, and many involve measuring tenures and licenses. For example one indicator measures the percent of commercial and First Nation fish licenses held locally and non-locally. In general these access to resource indicators did not score well in the criteria of being important or informative. I found many participants suggested that indicators that measure tenures and licenses would not be relevant to them. As one participant explained:
I think that it is important for people to be able to fish and hunt but I don't think they need aquaculture tenures and commercial fishing licenses. That's such a tiny proportion of our community these days. That was probably important ten or fifteen years ago but that resource economy has kind of passed us by. So can people get hand-logging licenses? No... I think it is a really small percentage of the population that is looking for this kind of access ... I think you would find a lot of people who would say they have no interest in an aquaculture tenure.

However, several participants thought that employment, personal access to natural resources, and the sustainable management of these resources was important. As one participant explained:

So if I was talking about resources I would be talking about the contribution to the local economy, direct and through employment. I would be into whether they have access to the resources that they need to sustain their lives here. And I would be interested in the third part of it which would be a general how well we manage those resources from an environmental sustainability perspective.

In particular, participants mentioned that indicators related to mineral exploration are not relevant on Haida Gwaii and many commented that another indicator regarding quarry tenures was not important. As one participant explained, "there are only one or two gravel pits on island and there is nothing very significant about either of them." Some participants thought fishing licenses were irrelevant, but thought the value of the fish caught was important. Although some participants viewed the power generation tenures as unimportant, the environmental impact and potential employment from renewable energy

was seen as important. Although this was a general trend, one Haida participant indicated that she thought all of these indicators were interesting and important.

4.2.3. Reflections on common economic indicators

Employment and income

Some participants suggested common economic indicators would not be informative to measure as they don't reflect the values of Haida Gwaii residents. These indicators include employment rate, median family income and individual economic distribution. As one participant explained:

We once tried... this was many years ago before Microsoft moved into Washington. They were looking for a place to set up a factory. And somebody tried to get them to come here. They were looking at the place in Masset where they had all those abandoned buildings, until we discovered that we couldn't get enough people to commit to working full-time. They wanted summers off. They just said "we go fishing ... we collect food, we cannot work all through the summer..." and Microsoft wasn't too interested. Are people working as much as they want? It is not only what money they are making or putting us up against B.C. standards. What is it that they want? Because some people are perfectly happy working off the grid, on a very parttime basis, and for others that is starvation.

However, other participants suggested that standard measures of income and employment were important to consider as "the cost of food is so high here" and "people have got to work." One participant suggested that the level of disposable income was important for

human well-being. In general, most participants thought measuring jobs was more important than measuring income. As one participant explained:

On Haida Gwaii it is more volume of jobs than any... because any job up here is going to be relatively high paying. Relatively. Because we are not going to get people up here for minimum wage. ... I mean it is an indicator, don't get me wrong. But maybe less so, more just the number of jobs is more important.

Regarding individual income distribution another participant suggested that the gap could be better understood through looking at employment as "it's interesting here on the one hand. There is sort of a gap. There is the unemployed and then there are the well employed. We don't have rich rich, but we have a bourgeois group." Although employment rate and income are important indicators to consider, more information would be needed to interpret these statistics. A better approach according to some participants is measuring the change in the number of jobs in each sector.

Subjective well-being measures for income and employment

Some participants suggested using measures of subjective well-being, or satisfaction, to understand whether income levels and employment were adequate. As one participant explained:

What does median household income tell you? It's just a number right but it is probably lower than lots of other communities but that doesn't mean that people are unhappy.... if people are satisfied then things were good, rather than trying to set bars above and below. Yeah so it's kind more like are you satisfied with your income level.

However, another participant suggested that there would be accuracy concerns in measuring people's satisfaction using survey questions. He explained:

You know there would be a tendency in a line of questioning like this for whining. Because you know they would say oh no things aren't great, give me more, more services, more money, more schools, more everything. If they thought of yeah I am given a choice here, of course I am not happy... if they start thinking your thing would result in bringing more money, more jobs. People do like complaining.

This participant also explained that "one of the troubles too is that it never seems to be enough. You know you go from \$30,000 to \$60,000 a year, then \$60,000 is not enough anymore."

4.3. Concerns with other indicators

It appeared that the NCC indicator framework did not capture the main concerns of participants. As one participant remarked: "Like I guess I am community based. So that is really interesting to me that all this stuff is so government type stat type stuff. And then under health and education it is sort of like...wow." After looking at the NCC indicators for a few minutes one participant turned the indicator list over and said "all they are talking about is stats. I don't see how they are talking about human wellness."

There seemed to be a broad consensus that measuring the high school graduation rate was important. Considering feasibility, one participant suggested that it would be "a complete waste" not to measure the high school graduation rate as this data is readily available. Some participants thought tracking post-secondary education was important but most felt that all forms of post-secondary education (trades, university, college) should be 67 seen as equally valuable. As the education attainment metric gives higher points for university education, some participants viewed it as less useful to include. As one participant explained:

I am prejudiced about education. I think education is a good indicator but maybe we should just be talking about high school and how many people have we got through high school. This is huge. When I first came very few people graduated high school. They went into the logging industry at 16 and made \$45,000 just like that. So anything, the diploma, the degree the trades certificate are all good indicators of future health.

Other indicators that participants found to be less informative were the NCC indicators on the number of locally delivered skills training programs. One participant explained that with such a small population, it was hard to fill the courses and then hard to find work for the students when they graduated.

Participants found other indicators to be less informative, suggesting that the indicator trends would be difficult to interpret. Very few participants could understand the indicator: "Number of different recreation opportunity classes and their accessibility." This indicator was based on the Recreation Opportunity Spectrum Assessment (2003), a government study that classified land areas based on the remoteness, naturalness and expected social experience of recreation areas. As one participant commented: "yeah because what are opportunity classes? Like it depends on what they call recreation. Like for some people it is just going for a drive on the beach. It's not something that fits in a profile as much."

The number of tourists was suggested as a metric because "very easily accessible are the number of people arriving by ferry on Haida Gwaii. The B.C. ferries will give their statistics very easily. And then the hotel occupancy." Other indicators seemed to be on the right topic but did not capture the concerns of participants. For example, although the NCC indicator on ferry ridership and service was not seen as important, the cost of taking the ferries was viewed as very important and I included this in the human well-being indicator framework (Table 3). Infant mortality rate didn't seem to be a concern for many residents as their understanding was that many women travel off of Haida Gwaii to deliver their first child. Many of the indicators in this category were less important than indicators suggested by participants and captured in my human well-being indicator framework (Table 3).

4.4. Summary

While some NCC indicators ranked relatively highly, many did not. The main concerns with the indicators that did not rank highly were that they were less important, less informative, less understandable and less feasible. Many of the NCC indicators under the sub-category "access to resources" focused on tenures. This did not seem to resonate well with participants who found many of these indicators were not interesting or important. Rather than measuring a large suite of economic indicators, many participants suggested that the indicators should focus on measuring the change in the number of jobs, and in particular the number of jobs held by Haida and long-term residents. Other indicators, such as income and the unemployment rate were not viewed as informative to some participants, as they didn't reflect the values of residents. While some participants suggested measuring subjective well-being indicators, others thought this could be problematic. Certain NCC indicators were not easily understood, such as the number of different recreation

opportunity classes. However fifteen indicators ranked highly and eight were included in the human well-being indicator framework (Table 3). These indicators were on topics including population demographics, the number of people speaking Haida by age group, volunteering, life expectancy and salmon populations.

5. Discussion

5.1. Introduction

This case study explored what human well-being indicators are important to measure on Haida Gwaii. There were two central research questions that this study addressed: 1) According to participants, a) what human well-being categories and indicators are important to measure on Haida Gwaii? and b) how do views of the importance of certain human well-being categories vary by gender and whether participants are Haida or non-Haida? And 2) What do participants think are the strengths and weakness of an EBM human well-being framework developed for the neighboring North and Central Coast (NCC) of British Columbia? The first research question was addressed in Chapter 3 with the presentation of the Haida Gwaii human well-being indicator framework. The framework consisted of seven categories, fourteen sub-categories and forty-six indicators. Throughout Chapter 3, I discussed how the importance of the well-being categories varied by gender and whether participants were Haida or non-Haida. The second research question was addressed in Chapter 4, where I presented some of the strengths and weaknesses of the NCC indicators.

There are three concepts that are important in explaining the results of this study, and these are: 1) Relationship with the land, ocean and air, 2) Access to benefits from natural resource development, and 3) Building resilient communities and human capital. The first concept is the same as the category of the same name presented in Chapter 3. I will explore the importance of this concept and how it relates to Haida knowledge and values. Combining three sub-categories created the second concept Access to benefits from natural

resource development. These categories were: Access to jobs and resources, Access to government services, and Access to health services. This concept speaks to how participants feel it is important that the wealth produced from sustainable resource development on Haida Gwaii should flow back to families, businesses and communities. The third concept, Building resilient communities and human capital, was developed by combining several sub-categories including those related to economic stability, health, culture and community, education, population and broad indicators.



Figure 5: Human well-being template and theoretical concepts

The theoretical concepts correspond to sections of the human well-being template (Figure 2). The concepts are: Relationship with the land, ocean and air (no shading), Access to benefits from natural resource development (light grey) and Building resilience and human capital (dark grey).

5.2. Relationship with the land, ocean and air

Relationship with the land, ocean and air was one of the most important categories in this study. This category was characterized as consisting of two components: Access to healthy land, ocean and air and Protecting the land, ocean and air. The purpose of this category is to characterize whether Haida and long-term residents have access to the forest and ocean resources they need for all aspects of their lives. It also includes a consideration of whether residents and governments are responsibly managing the land, ocean and air for current and future generations. Prominent indicators in this category were whether Haida and long-term residents have adequate access to traditional forest resources for food, art, medicine and construction (A2) and whether traditional foods are healthy and safe to eat (A3). This category was prominent for Haida participants. In addition, the Access narrative (Figure 3) suggests that Access to healthy land, ocean and air is directly connected to other areas of human well-being including Haida culture, economic indicators, health, education and overall well-being. Due to the importance of this category, I am suggesting that it is one of three concepts that are important in this research.

This concept was likely prominent in my study due to Haida traditional knowledge and wisdom that recognizes the value of ecosystems to human well-being and the close relationships between the use of ecosystems and cultural practices. Haida traditional knowledge and wisdom is an important source of information about the wealth humans receive from ecosystems. The Haida Land Use Vision (HLUV) states that "our physical and spiritual relationship with the lands and waters of Haida Gwaii, our history of coexistence with all living things over many thousands of years is what makes up Haida culture" (Council of the Haida Nation 2005a). At the Joint Review Panel Hearing for the Enbridge

Northern Gateway Pipeline, April Churchill explained "when you hear our people speak about the risk of loss of our food from oil spills and damage to the ecosystems, it is not only physical sustenance that you hear us speaking about. It is also the loss of relationship with the spirits of those life forces. These relationships are all at the very center of our culture" (Government of Canada 2012). The Haida concept of wealth also illustrates this point, as, "in Haida culture, wealth is a different thing than money, which is a currency for doing business in the modern economy. Wealth flows from the well-being of the land, and from having the opportunity, knowledge and capacity to support our families, raise healthy children, and organize the individual collective efforts of our clans and society" (Council of the Haida Nation 2005a). First Nations health and well-being includes land, water, culture and identity and the relationship between these elements (Greenwood & Leeuw 2007; Parkes et al. 2010). This traditional knowledge and wisdom was communicated in this study when I asked Haida participants what is important to measure for human well-being on Haida Gwaii.

In addition to the access to healthy ecosystems that all residents of Haida Gwaii require, the Haida require access to ecosystems to maintain their culture. During the Cedar Symposium (1996), leaders from the Haida community spoke about the connection between their access to cultural resources and Haida culture. Although this source predates the new co-management relationship on Haida Gwaii, it is useful to explain the relationship between Haida culture and access to healthy ecosystems. In response to an idea that trees could be planted for cultural purposes, Guujaaw (1996) explained that, "you know, if your people wanted to sit and wait for 500 years for those trees to grow, I think our culture would be long forgotten by the time those trees came to size" (p. 46). He also

explained that it is difficult to get access to material for canoes and cedar totem poles as "we have to pay the stumpage fees, we have to pay the transportation. But how do you pay when you don't have the natural resources or it's almost illegal to get this?" (Guujaaw 1996).

In addition, ensuring adequate access to resources is not a simple matter. When discussing Lootaa, a famous Haida canoe, Gitsga (1996) explained:

There aren't that many out there that are big enough to make a canoe like this. There never were. That's why you hear about so many CMTs (culturally modified trees) that have these holes bored into them. They were checking to see if the tree was sound enough to be made into such a vessel. More often than not, they would go onto the next tree because not very many of them were sound. As was stated this morning, cedar develops rot and you can't always see it from the outside...So how many trees would I like for canoes like this? I would like every one that is of this quality made available to us, the aboriginal people of Haida Gwaii (p. 38)

In addition, it is not just the use of cultural resources that is important for Haida culture but also the experience of being in an old growth forest. As Guujaaw (1996) explained "...basically it's the same trees that were there when the old people were out walking around looking for cedar, and the same trees that were there when the weavers went out looking for different qualities and selecting the pieces that they wanted...But to our own people, going out there is like being in the same surroundings and enjoying the same kind of experience, smells, and sounds that the old people had experienced"(p.46).

An indicator that reflects the importance of cultural access is already captured in the Haida Gwaii Strategic Land Use Agreement (2007). This agreement includes the indicator

"identify and maintain Haida traditional forest resources" and the target for this indicator is to "maintain traditional forest resources in sufficient amounts to support Haida food, social and ceremonial use of the forest" (Council of the Haida Nation and Province of British Columbia 2007, p.13). The indicators identified in this study may assist with further monitoring of this important topic. The category Access to healthy land, ocean and air was important to both Haida men and women in this study, but it was more prominent for Haida women. This reflects the importance of this access to women, who use this access to gather traditional food for their families, spruce roots for weaving, medicines and other cultural resources. Haida women were also concerned about the access for their families and communities.

5.2.1. Connection with the concept of ecosystem services

One of the sub-categories under the category Relationship with the land, ocean and air is Access to healthy land, ocean and air. This sub-category relates directly to the concept of ecosystem services. As characterized by the Millennium Ecosystem Assessment (MEA) (2005) humans receive an abundance of free services from ecosystems including provisioning services (such as food and fresh water), regulating services (such as climate regulation and water purification), cultural services (such as spiritual and recreational opportunities) and supporting services (such as soil formation). In the MEA framework, these free services from ecosystems, contribute directly to human well-being. Ecosystems "are part of people's wealth. Indeed, access to the benefits offered by ecosystems in communal ownership is frequently much more important to the poor than the rich" (Carpenter et al. 2009, p.1309). Although the MEA framework is useful for communicating

the findings of this study, it has some limitations. For example it does not reflect the reciprocal relationship that the Haida hold between ecosystems and humans.

The sub-category Protecting the land, ocean and air concerns the environmental impact of residents and whether governments and residents are responsibly caring for the land, ocean and air. This sub-category was likely important due to Haida traditional knowledge and wisdom that communicates that the natural world has intrinsic value (Jones & Williams-Davidson 2000). A Haida worldview is consistent with ecosystem justice and deep ecology and differs from western policy and law that are generally anthropocentric (Jones & Williams-Davidson 2000). According to Churchill (2012), "A core Haida principle is that the living generation holds the land, waters and life forces in trust for the benefit of future generations."

As explained by Terri-Lyn Williams Davidson (2002): "A very important principle in Haida belief is 'the world is as sharp as the edge of a knife'. And what I feel we are doing with the litigation is finding that very delicate balance on the edge of the knife, where we balance Haida traditional views with scientific evidence, with archeological evidence, with all of the peoples' worldview of how we are going to live together on this edge of a knife that is Haida Gwaii." This important Haida principle is reflected in the category Relationships with the land, ocean and air. This category includes a sub-category on access and a subcategory on protection, reflecting how both are important when creating a balanced approach to a relationship with the land, ocean and air. To reflect this balance and responsibility, the MEA framework would need to be modified to show the reciprocal nature of the relationship between human and natural systems. As the concept of ecosystem services does not include this sense of balance and responsibility, it may not be

consistent with a Haida worldview. In the Access narrative (Figure 3) it is evident that the protection of the land, ocean and air, facilitates access to healthy land, ocean and air.

Another substantial difference between the conceptualization of ecosystem and human well-being in my study, and that of the Millennium Ecosystem Assessment (2005) is that in my study I do not differentiate between what is an ecosystem service and what is an indicator of human well-being. In addition to the indicators assigned to the sub-category Access to healthy land, ocean and air, there are several indicators assigned to other subcategories that could also be characterized as ecosystem services. In my study, Haida participants spoke about access to healthy land, ocean and air as part of their well-being. For example, one Haida participant explained: "I do a lot of food gathering for my own purposes. So it is accessing fish, salmon, halibut, crab, everything I can get my hands on basically. Crabs, clams, berry picking. I mean for me that is what it is about... It is what I do." Access to healthy land, ocean and air is part of the well-being of the Haida, not just because it supports their culture, but for its own sake. Although there seems to be a contradiction with the MEA framework and the findings in my study, my findings are not inconsistent with current definitions of ecosystem services. For example Costanza (2009) emphasizes that the goal of ecosystem services is providing sustainable human well-being. Therefore ecosystem services are a means to that end (Costanza 2009). Fisher et al. (2009) suggest, "ecosystem services are the aspects of ecosystems utilized (actively or passively) to produce human well-being" (p. 645). Even the MEA (2005) definition of ecosystem services, that ecosystem services are the benefits people obtain from ecosystems, is not inconsistent with the findings of my study. It is therefore logical that indicators of use and enjoyment of ecosystem services are also indicators of human well-being.

Several researchers have explored the relationship between ecosystem services and poverty alleviation. Fisher et al. (2013) identifies prominent frameworks that can contribute to an improved understanding of how ecosystem services increase the wellbeing of people living in poverty. Among these are the MEA (2005) and the sustainable livelihoods approach (Carney 1998; Scoones 1998). Fisher et al. (In Press) proposed the ecosystem services and poverty alleviation (ESPA) framework. This framework builds on other frameworks but has a more specific focus on people and their ability to access ecosystem services. Like the framework proposed in my study, the ESPA framework highlights the importance of access to ecosystem services. Access to natural resources is a complex topic that depends on many factors. In their Theory of Access, Ribot and Peluso (2003) define access as "the ability to benefit from things – including material objects, persons, institutions, and symbols." They differentiate *ability* from *rights* to show the range of formal and informal circumstances that can lead to access to natural resources. Governance institutions are important in controlling access to natural resources in the Theory of Access, and the importance of governance is also reflected in my Access narrative (Figure 3).

The prominent category Relationship with the land, ocean and air, was elevated to a key concept in this analysis. This category is composed of two sub-categories: Access to healthy land, ocean and air and Protecting the land, ocean and air. This category and sub-categories come directly from Haida traditional knowledge and wisdom that participants shared with me during the interviews. Access to healthy land, ocean and air is similar to the concept of ecosystem services which are an integral part of the definition of EBM (Arkema et al. 2006).

Although the concept of ecosystem services is similar to my concept of Relationship with

the land, ocean and air, there are some important differences.

Table 5: HWB indicators that are also ecosystem services or rely on ecosystem services. Human well-being indicators identified in this study are also characterized as either a provisioning service and/or a cultural service using the descriptions provided in the Millennium Ecosystem Assessment (2005).

Indicators	Description
Volume of local food production (E6)	Food is a provisioning service.
Access to traditional forest resources for food, art, medicine and construction (A2)	Traditional forest resources are both provisioning and cultural services
Whether traditional food is healthy and safe to eat (A3)	This indicator is measuring the health of traditional food, a cultural and provisioning service.
Number of returning salmon to key waterways (A4)	This indicator is measuring the health of traditional food, a cultural and provisioning service.
Proportion of diet coming from eating foods that have been gathered or grown (A1)	This indicator is measuring the health of food, a cultural and provisioning service.
Number of youth who know how to prepare and handle food (C2).	This indicator relies on access to traditional food, a cultural and provisioning service.
Number of recreational programs per community with special attention to outdoor programs for kids and fitness programs for seniors (G2)	The experience of outdoor recreation and education is a cultural service.
Number of youth being supported in programs that take them on the land (C3)	The experience of outdoor recreation and education is a cultural service.
Time students spend participating in outdoor education (Ed3)	The experience of outdoor recreation and education is a cultural service.
Number of positions available for youth in internship programs, particularly in natural resources management (Ed5)	The experience of outdoor recreation and education is a cultural service.
Number of tourists per year (E5)	Relies on access to recreation, a cultural service.
Number of jobs in each industry and percent that are held by local and Haida residents. Key industries are: logging, wood processing, alternative energy, tourism, ecotourism, construction, and fishing lodges (E1).	Relies on the availability of a number of cultural and provisioning services.
Percent of the wood that is harvested on Haida Gwaii that is also processed on Haida Gwaii (E3)	Relies on access to wood, a provisioning service.
Percent of electricity on Haida Gwaii that comes from renewable sources (A6)	Depending on the approach taken, this may rely upon provisioning services such as wood.
Percent of revenue from forestry staying on Haida Gwaii to support communities (G6)	Forestry is based on access to wood, a provisioning service.

5.3. Access to benefits from natural resource development

Combining several prominent sub-categories led to the development of the second concept, Access to benefits from natural resource development. The sub-categories are: Access to jobs and resources, Access to government services and Access to health services (Figure 5). This concept includes a range of benefits that residents feel they should receive from resource development. The sub-category Access to jobs and resources addresses how access to jobs in resource development is important for individuals and families. For example, under this category a key indicator is the number of Haida and long-term residents working in key natural resource sectors. This sub-category also includes whether businesses, such as mills, have access to natural resources. However this concept also includes the benefits residents receive through government services. Many participants explained the connection between the resource royalties collected by governments from resource development on Haida Gwaii and the current level of government services they receive. As is described in the Resilience and sustainability narrative (Figure 4), this access is linked to other areas of human well-being including employment, health, culture, community, education and overall well-being.

Many participants felt that they should be seeing higher level of government services based on past and present government revenues from natural resource development. Despite the large volume of wood that has left Haida Gwaii in the past, and continues to leave Haida Gwaii, residents feel that they have not benefited from the wealth generated by the logging industry. Some of these results can be explained by staples theory (Innis 1930) and specifically by the characterization of the staples theory literature in British Columbia (Halseth 2010; Hayter 2000; Markey et al. 2005; Markey et al. 2008).

Staples theory is an informative way of understanding the relationship between the Province of B.C. and residents of Haida Gwaii. In a simplified form, staples theory involves the extraction of unprocessed resources from peripheral regions to core regions with limited reinvestment in the peripheral region (Gunton 2003). Among other things, a staples theory critique suggests the regions are viewed as a resource bank that the province can use to extract wealth without subsequent reinvestment (Markey et al. 2005).

Between 1880 and 1940, the forest industry in B.C. consisted of entrepreneurial businesses (Hayter 2000). Following the recommendations of the Sloan Commission in 1945, there was a transition to industrial and largely foreign-owned forestry, which is consistent with a staples theory approach (Hayter 2000; Markey et al. 2005). Large and foreign-owned businesses are easier for the province to deal with and allow for the more efficient and profitable extraction of resources (Markey et al. 2005). The extraction of resources was seen as a province building exercise where the objective was to bring wealth to the entire province (Markey et al. 2008). During the era of W.C. Bennett, a B.C. Premier (1952-1972) there was an initial period of investment in rural locations so that they would attract resource workers and their families (Markey et al. 2008). However, since the Bennett era there has been limited investment in communities in rural British Columbia (Markey et al. 2008). In addition, industrial forestry companies tended to bring in workers from other places, and only hired a small percentage of local residents (Markey et al. 2005). These aspects of staples theory explain why some participants didn't see the employment benefits for forestry and haven't recently seen a large reinvestment in services on Haida Gwaii.

The sub-category Access to jobs and resources was more important to male participants, while the sub-categories Access to government services and Access to health services were more important to female participants. The consideration of gender is important as it sensitizes researchers to the different "dimensions of diversity that may otherwise have been overlooked or ignored" (Mcdougall 2001, p.53). Traditional understandings of feminine and masculine roles can be strong in resource communities, with women providing a caregiver role for families and communities through volunteer work (Moser 1993 in Reed 2000). However Reed (2000, 2003) suggests we move away from these gender dichotomies and recognize the embedded nature of women in resource economies and the diversity of perspectives. Within the context of staples theory, the importance to women of the sub-categories Access to government services and Access to health services can be viewed as a political position, shaped by a variety of individual experiences.

There is some evidence that residents have a shared history of disenfranchisement on Haida Gwaii. First Nations experienced systematic exclusion from land and resources under the colonial system which led to economic marginalization (Markey et al. 2005; Peters 2000). Although this experience was different from the experiences of non-First Nations people, there seemed to be a common experience of disenfranchisement on Haida Gwaii. For example, the Island Spirit Rising in 2005 was inclusive of all 'island people' and the Haida had the support of many non-Haida residents during protests and court cases (Takeda & Røpke 2010). As described in a bulletin released by the Council of the Haida Nation during the Island Spirit Rising:

We are at a crossroads on the Islands. When you look to the future there are two paths and really only one choice. One path is the way it has always been done and has led us to the point we are at now. We all know the problems with no regular work and logging too much too fast etc. The other path is one where communities will survive and there will be enough work in a variety of jobs to employ all the people. To make that vision real we need the resources. We need resources for Islands people to make their living from and we need a system that considers what it takes to keep the land and resources healthy forever (Council of the Haida Nation 2005b).

This quote explains the problems with industrial logging that did not provide regular work for some residents or allow residents to benefit from these resources. The Haida have a complex history of resource use and exclusion. Staples theory may provide some insight on why residents found it difficult to find employment and small companies found it difficult to access resources for their businesses in recent years. Given this, it is not surprising that the Access to jobs and resources sub-category was an important sub-category for participants.

5.4. Building resilient communities and human capital

The third concept, Building resilient communities and human capital, is composed of the subcategories under the heading "Resilience and human capital" and population change (7b) in the human well-being template (Figure 2, 7). These sub-categories cover the topics of economic stability, health, culture, community participation and education. Some of these topics informed the use of the term *resilience* while others informed the use of the term *human capital*.

The term *human capital* was used in this concept to reflect the importance of health and education to participants. I chose the phrase building human capital, rather than maintaining human capital, as participants identified some concerns with current health and education conditions and the importance of investing in people and communities. The concept of human capital is integral to the sustainable livelihood approach (Carney 1998; Scoones 1998). Human capital allows people to improve their livelihoods, engage more meaningfully with the world, and importantly to also change or influence the world and their circumstances (Bebbington 1999). Health and education are key components of many human well-being frameworks (Alkire 2002; Narayan et al. 2000; Prescott-Allen 2001; Ura et al. 2012) and health is closely linked to other sub-categories under Resilience and human capital in the human well-being template (Figure 2). Education is also closely linked to the sub-categories, but also linked to the sub-category Collaboration and engagement, as education enables engaged citizens.

Before I discuss the indicators that relate to resilience I will provide a brief introduction to the concept of resilience. Resilience has three defining characteristics: 1) the amount of change the system can undergo and still retain the same controls on function and structure, 85 2) the degree to which the system is capable of self-organization and 3) the ability to build and increase the capacity for learning and adaptation (Carpenter et al. 2001; Holling 1973). A critical component of resilience is the adaptive cycle, which suggests that social-ecological systems (SES) move through various phases, some more resilient than others (Holling 1986). Another critical component of resilience is the concept of basins of attraction, where an SES can end up in different states, some more resilient than others and some more desirable (Walker & Salt 2006).

Walker and Salt (2006) identify several principles for the development of a resilient world and these include modularity, acknowledging slow variables and social capital. Modularity, or the degree to which a system can operate independently, is an important factor for resilience (Walker & Salt 2006). Highly connected systems can be susceptible to shocks and more vulnerable while systems that are only loosely connected are more modular (Walker & Salt 2006). The increasing interdependence of interactions at a global scale, is making our societies more vulnerable at local scales (Adger et al. 2009). One example of this is the over connectedness of food systems that can cause unexpected vulnerabilities when prices fluctuate (Adger et al. 2009). Acknowledging slow variables is another important concept in resilience thinking. Slow variables are variables that are integral to the social-ecological system and have thresholds that need to be monitored closely (Walker & Salt 2006). In addition, social capital is an important concept in resilience thinking and includes the social norms, networks of reciprocity, and relationships of trust (Armitage et al. 2009). Although not covered specifically by Walker and Salt (2006) cultural capital is also important for resilience and includes the intuitions, ethics (worldviews), and traditional ecological knowledge of societies (Berkes & Folke 1994).

There is evidence that the concept of resilience is important for human well-being on Haida Gwaii as it relates to modularity of food and energy systems, managing slow variables such as population change, and building social and cultural capital. When discussing local food production, an indicator under Personal and business financial stability, one participant explained, "... we have a community garden started here and another one which is being expanded into a community farm. I mean we have to learn how to be more selfsufficient here." Similar concerns were expressed regarding the production of electricity on Haida Gwaii and the need for renewable energy systems, an indicator under Protecting the land, ocean and air. Therefore increasing self-sufficiency seemed to be a topic that was important to participants. Increased self-sufficiency would lead to increased modularity for the Haida Gwaii SES. Participants identified population change as an important slow variable that should be monitored. As explained in the Resilience and sustainability narrative (Figure 4), the population, which is closely tied to the economy, affects the access to government services, which then affects outcomes in community well-being. The subcategories Haida culture and Participating in community reflect how cultural and social capital were important topics for participants. Resilience was likely an important topic for participants because Haida Gwaii is a remote island archipelago, with unique challenges.

Haida Gwaii may already be in a more resilient state due to recent policy changes. Since the 1950s Haida Gwaii has been part of an increasingly complex and connected system that involved relationships between industry, government and communities that facilitated the efficient and unsustainable extraction of forest resources. This came to a crisis point in 2005 during the Island Spirit Rising when the Haida took a stand against the worsening ecological and social conditions. A B.C. Ministry of Forests report in 1999 acknowledged that the rate

of harvest was 2.2 times the long run sustainable yield, confirming the unsustainable practices of the industry (Takeda & Røpke 2010). Without intervention, it is possible that Haida Gwaii could have experienced a regime shift characterized by overharvested forests that could no longer support a logging industry, resulting in serious social and cultural impacts. The crisis point in 2005 can be characterized as a release that resulted in the Haida Gwaii SES moving to the release and renewal (R phase) of the adaptive cycle. This aspect of the cycle, which Haida Gwaii may still be in, is characterized by uncertainty, novelty and experimentation (Walker & Salt 2006). This is a time where instability is high but when organizations or individuals can have a greater influence on the events to come. Haida Gwaii may have moved early to change the system and avoided a larger SES collapse later. If Haida Gwaii is in the release and renewal phase, it may be in good company as Holling (2004) suggests that we may be in this phase at a global level.

The release and renewal phase is often characterized as a more resilient phase. Since the Island Spirit Rising, Haida Gwaii may have also become more resilient in the other factors identified by Walker and Salt (2006) including diversity and the tightness of feedbacks. The Haida Gwaii Strategic Land Use Agreement (2007) and associated Land Use Order (2009) are moving the forestry industry toward more sustainable practices. In addition, the recent co-management arrangement increases the influence of the Haida in resource management, increasing cultural diversity, which can introduce new values, ideas and knowledge and promote shared learning, an important factor for resilience (Folke et al. 2008; Turner et al. 2003; Walker & Salt 2006). Tighter feedbacks can be achieved from decentralized governance such as the co-management system for natural resources on Haida Gwaii. While centralized governments and globalization often weaken feedbacks,

appropriate scales of governance strengthen them (Walker & Salt 2006). Decentralized systems are also more responsive to local needs and values (Walker & Salt 2006). The subcategory Collaboration and engagement reflects the importance of indicators for monitoring this decentralized relationship.

I used the concept Building resilient communities and human capital to communicate several important categories, sub-categories and indicators. Human capital was included in this concept to address the importance of health and education. Several sub-categories and indicators reflect the importance of building resilient communities to participants. These include indicators related to modularity in food and energy systems, monitoring population change and building social and cultural capital. While these indicators may help Haida Gwaii improve its social-ecological resilience, there is evidence that Haida Gwaii may already be in a more resilient state due to actions taken to implement EBM.

5.5. The North and Central Coast framework

Several differences exist between the human well-being indicator framework developed in my study and the NCC indicator framework (Table 6). I will describe these differences using the three concepts described in this chapter. Although the first concept, Relationship with the land, ocean and air, is essentially missing from the NCC framework, Access to benefits from natural resource development is included, but in a different way. Building resilient communities and human capital is included in the NCC framework but in a more limited way.

One of the most marked differences between the frameworks is the absence of the concept Relationship with the land, ocean and air in the NCC indicator framework. Although the NCC indicator framework did not include a section on the relationship or interactions

between humans and the land, ocean and air, the precursors to this framework did. The NCC indicators were based on the indicators found in the Turning Point Protocol (2006) and the KNT Agreement in Principle (2006). These agreements included the following indicator: Maintain access to cultural/traditional resources subject to measures for conservation and public health and safety. However, this indicator was not included in the Rubus EcoScience Alliance indicator set (which pre-date the NCC indicators developed by Sheltair (2009)). Rubus EcoScience Alliance instead measured the number of First Nations community members using cultural resource for non-commercial purposes and this indicator was included under the category Culture. The rationale for the exclusion of the original indicator was that the indicator was not useful for measuring change over time (Rubus Ecoscience Alliance 2007, p.xii). In the NCC indicator framework, Sheltair (2009) used the same indicator and also added an indicator on the proportion of cedar harvested. Rather than measuring access to the resource as was present in the Turning Point Protocol (2006) and KNT Agreement in Principle (2006), the NCC indicator set measured the use of the resource. The indicators proposed in my study under the category Relationship with the land, ocean and air are more similar to the original indicators.

The second concept, Access to benefits from natural resource development, is an interesting commonality between the indicator framework in my study and the NCC indicator framework. The NCC framework measured First Nations and local participation in logging, mining, quarries, energy, fishing and non-timber forest products using tenures and licenses. In my framework, I recommend a detailed focus on measuring jobs and companies held by Haida and long-term residents in these sectors. While the approach of tenures and licenses seemed to be of limited interest to most participants, two of the most prominent indicators in my proposed indicator framework are the number of jobs held by Haida and 90

long-term residents and the number of businesses owned by Haida and long-term residents in natural resource sectors. While the approach of measuring jobs and businesses seemed to be more relevant, informative and understandable, it still speaks to the same concern – the issue of First Nations and local access to jobs and resources. Part of the concept Access to benefits from natural resource development included sub-categories on access to government services and access to health services. These topics are notably absent from the NCC framework.

The third concept, Building resilient communities and human capital, is captured in a more limited way in the NCC framework. Interestingly, population change, an important sub-category in my framework, was also an important category in the NCC framework. However, food and renewable energy systems were not considered. Although culture was covered to some extent, participants suggested changes to the indicators in the NCC framework under the heading Culture. The indicators under the categories health, education, culture, and governance are less developed in the NCC Framework (Table 6).

Haida Gwaii Human Well-being Indicator	North and Central Coast Human well-being
Employment and economic stability	Economic
Includes access to jobs and resource and	Includes indicators under the sub-categories
nersonal and economic stability. The main	Employment Wages and income and Access to
indicator is the number of jobs held by	resources. This category is the most developed
Haida and long-term residents	category in the framework including 23 of the 38
haida and long term residents.	indicators Indicators related to tenures and licenses
	are included under the sub-category Access to
	resource.
Relationship with the land, ocean and air	No equivalent category. Under the category Culture
Includes indicators measuring access to and	there are indicators on the number of First Nations
use of forest and ocean resources and	community members using cultural resources for
whether the land, ocean and air are	non-commercial purposes.
protected. A prominent indicator is access to	
traditional forest resources for food, art,	
medicine and construction.	
Health	Health
Includes indicators under the categories	This category is more limited and only includes two
Healthy behaviours, Access to health	indicators: life expectancy and infant mortality.
services, and Health statistics.	
Governance and access to services	Governance
Includes indicators related to access to	This category is more limited and includes only one
government services and collaboration and	indicator: percent of land covered by government-to-
engagements between governments on	government agreements.
Haida Gwaii.	
Culture and community	Culture
Includes the sub-categories Haida culture	Includes indicators for First Nations culture related to
and Participating in community, which is	language and participation in non-commercial
measured by the number of people	activities. Under the category Governance there is an
attending events and volunteering. A	indicator for participating in volunteer activities.
speaking Haida by age group	
Educated and engaged citizens	Education
Includes the high school graduation rate	This category is more limited and only includes
nost-secondary education and opportunities	education attainment and the number of locally
for student internshins. It also includes time	delivered skills training programs
spent in outdoor education.	denvered skins training programs.
Overall well-being	Population
Includes population indicators and broad	Includes population indicators but does not include
indicators related to satisfaction.	indicators related to satisfaction.
No equivalent category although	Recreation
recreational programs are included under	Includes the distribution of recreation opportunity
the category Governance and Access to	classes.
services.	

Table 6: Comparison between the main categories of the Haida Gwaii indicator framework and the North and Central Coast framework.

5.6. Ecosystem-based management and sustainability

The indicators developed in my study could be used to measure whether human wellbeing is improving on Haida Gwaii. These indicators could also facilitate reflection on the effectiveness of EBM implementation on Haida Gwaii, which is administered through the government-to-government relationship between the Council of the Haida Nation and the province of B.C. This is consistent with academic definitions of EBM which includes comanagement (Arkema et al. 2006).

The term co-management implies the devolution of decision-making responsibility to a community or indigenous group, usually within a shared partnership with the government (Armitage et al. 2007). Benefits that can be expected from co-management include community-based economic and social development, decentralized resource management decisions, and reduced conflict (Armitage et al. 2007). People living under a co-management governance structure should expect their governments to have a greater ability to consider local interests over regional and global interests. They should expect to see greater benefits available to them, in the form of ecosystem services, employment and/or revenue from resource development. Therefore it is not surprising that the first two concepts considered in this Chapter are Relationship with the land, ocean and air (which includes access to the land, ocean and air) and Access to benefits from natural resource development. This reflects that participants expect to see this access and these benefits within the context of a co-management governance structure.

Adaptive management is also an important goal of EBM and includes continuous learning, learning-by doing and flexibility (Armitage et al. 2007). People living under an EBM governance structure should expect their governments to consider the resilience of the 93 social-ecological system in which they live. Monitoring is an important part of adaptive management, and these indicators could serve as an opportunity for monitoring to inform continuous learning. Rather than asking the difficult question of "where do we want to be" the indicators developed in this study can help ask the simpler and more manageable question of "how to we move from here towards the desired direction?" (Berkes 2001, p.131). Monitoring using indicators is also an important part of measuring sustainability (Meadows 1998), and sustainability is one of the key goals of EBM (Arkema et al. 2006). Without the use of indicators the concept of sustainability and EBM may be too vague to be useful (Arkema et al. 2006; Hempel 1999).

The EBM definition used on Haida Gwaii is "EBM is an adaptive, systematic approach to managing human activities that seeks to ensure the co-existence of healthy, fully functioning ecosystems and human communities" (Price 2009, p.497). This definition shares some commonalities with the definition of sustainable development presented in the Bruntland Commission (1987) which is: "...development that meets the needs of the present without compromising the ability of future generations to meet their own needs." Both definitions include a consideration of human needs and the needs of future generations either directly or through the management of ecosystems. The concept of sustainable development has been criticized for its inherent tension between the interests of human systems and natural systems (Meadowcroft 1999; Hempel 1999). This tension was present in my study and an important underlying question remains: can the human well-being indicators developed in this study be achieved without compromising ecological integrity or the needs of future generations? On Haida Gwaii, there is an existing set of ecological indicators in the Strategic Land Use Agreement (2007) that have been designed to monitor whether the environment

is being adequately protected for current and future generations. Therefore some of this tension can be reduced if my human well-being indicators are seen as secondary to these ecological indicators. My human well-being indicators also help reduce this tension as within my framework there is the recognition that access to ecosystem services contributes to human well-being.

When asked what was important to measure for human well-being on Haida Gwaii, participants offered a diversity of responses which varied by gender and whether participants were Haida or non-Haida. Responses included the importance of access to a healthy environment, economic opportunities, access to government services and good health. Many of these values would be similar in other communities around the world, however interesting and important trends emerged from this case study. This may be because this study: 1) Included Haida knowledge and traditional wisdom which allowed an understanding of the connection between ecological and social systems; 2) Involved participants who had direct experience with unsustainable resource management and growing experience with EBM; and 3) Took place on a remote island archipelago where participants have experience with unique challenges related to sustainability and resilience including the resilience of food and energy systems and a fluctuating population. While many communities would have an interesting perspective to offer, this study built on several layers of context and knowledge and can provide new insight to the field of human well-being and EBM.

6. Conclusions and Recommendations

Three concepts were instrumental in explaining the results of my study, and these were: 1) Relationship with the land, ocean and air, 2) Access to benefits from natural resource development, and 3) Building resilient communities and human capital. Under each concept I will present conclusions and recommendations for governments on Haida Gwaii. Although these recommendations are presented to governments, residents and other groups may also find these recommendations helpful. In addition, I am recommending a short list of priority indicators that are important and feasible to measure (Table 7). This short list was selected based on my concepts and the indicator rankings in my human well-being indicator framework (Table 3). If there is an opportunity to conduct a more extensive investigation, all 46 indicators presented in Table 3 should be measured.

6.1. Relationship with the land, ocean and air

This concept characterized the importance of the presence of healthy ecosystems on Haida Gwaii and was made up of two sub-categories, one that characterized access to a healthy environment (Access to healthy land, ocean and air) and another that characterized protection of the environment (Protecting the land, ocean and air). The access sub-category is similar to the concept of ecosystem services and is instrumental in integrating ecological and social concerns in this study. As depicted in my human well-being template (Figure 2), governance influences access to healthy land, ocean and air which in turn influences other aspects of human well-being. Given the important intermediary position of this subcategory, improvements in this area would likely have positive effects on other areas.

Recommendations for governments on Haida Gwaii:

- Monitor two prominent indicators from my human well-being indicator framework: Access to traditional forest resources for food, art, medicine and construction (A2) and whether traditional food is healthy and safe to eat (A3) (Table 7).
- 2. Maintain policies and programs that work toward these indicators and design and implement new policies and programs to address any areas of concern.
- Continue to communicate that access to a healthy environment is a vital part of human well-being on Haida Gwaii.

6.2. Access to benefits from natural resource development

The concept Access to benefits from natural resource development focused on whether residents of Haida Gwaii are receiving adequate access to jobs and natural resources. It also includes whether residents are seeing revenues from natural resource development invested in health and other government services on Haida Gwaii. This concept was also prominent in the NCC indicator set. Like the concept Relationship with healthy land, ocean and air, governments can more easily have a direct influence on whether residents have access to benefits from natural resource development. This access would in turn lead to benefits in other areas of human well-being. Realizing positive benefits in this area will be an important part of the successful implementation of EBM on Haida Gwaii.

Recommendations for governments on Haida Gwaii:

 Monitor two important indicators related to access to jobs and resources: The number of jobs in each industry held by residents (E1) and the percent of wood that is harvested and processed on Haida Gwaii (E3).

- Implement policies and programs to assist Haida and long-term residents in accessing jobs in natural resources and promote the processing of wood on Haida Gwaii.
- 3. Monitor the level of government and health services using two readily available and important indicators: Ferry ridership cost (G1) and the number of recreational programs per community (G2). If it were feasible, it would also be important to measure the level of satisfaction with health services (H4).
- 4. The presence of a pool and rink on Haida Gwaii (G3) was a prominent indicator under the sub-category Access to government services. Ensuring these facilities are built should be a priority for Haida Gwaii governments.

6.3. Building resilient communities and human capital

Resilience was an important concern for residents on Haida Gwaii. Many participants were concerned about self-sufficiency on Haida Gwaii including food and energy systems and population change. Increasing cultural and social capital was also a priority for participants.

Recommendations for governments on Haida Gwaii:

- Monitor three important indicators of resilience: Volume of local food production (E6), Change in population by community and percent of the population that is Haida (O1), and proportion of the population in their twenties or thirties (O2).
- 2. Support local food production initiatives and continue to work on the development of local renewable energy systems on Haida Gwaii.
- Monitor the number of people speaking Haida by age group (C1) and the number of youth supported in programs that take them on the land (C3). These indicators are 98

important and highly ranked indicators of Haida culture and also would increase cultural capital.

- 4. Ensure Haida language programs and programs that take youth on the land have adequate funding and support.
- 5. Monitor human capital using several indicators of health and education (Table 7).
- 6. Ensure ongoing support for health and education programs.

6.4. Recommendations for other researchers

Although it is important to avoid panaceas when working with social-ecological systems (Ostrom 2007), the indicators developed in this study could assist other communities in similar contexts in developing human well-being indicators. In particular other researchers should pay close attention to what access to healthy land, ocean and air are important to communities and whether this access is being adequately protected. Researchers should consider to what extent communities are benefiting from their natural resources, including access to jobs and revenues for government services. Finally other researchers should consider what should be measured to know if communities are becoming more resilient and increasing their human capital. Many of the concerns and priorities raised by participants fit well with the concept of resilience, which may be useful for conceptualizing human wellbeing in future studies. While these general concepts may be useful, other communities should also conduct independent studies to explore the specific concerns of residents. Community-defined criteria for well-being are valuable as they are developed within a specific social, cultural and geographic context.

Although the conceptualization of ecosystem services is relatively new, First Nations cultures have understood the relationship between human and natural systems since time 99
immemorial. There is a need for more research where researchers partner with First Nation communities to learn more about the reciprocal relationship between humans and natural systems and how this relationship relates to the concept of ecosystem services. There is potential to learn from First Nations traditional knowledge and wisdom to clarify and communicate the concept of ecosystem services.

EBM includes ecological integrity and human well-being, local values and ecosystem approaches. It also includes co-management, adaptive management and ecosystem services (Arkema et al. 2006). I considered how the concept of human well-being in an EBM context could be better understood by investigating what human well-being indicators are important to measure on Haida Gwaii, a place that has recently participated in EBM planning and policy implementation. Haida Gwaii is an extreme example of EBM implementation due to the degree of power-sharing in the co-management relationship between the Council of the Haida Nation and B.C. The concept of human well-being has become broader, and now includes the relationship between social and ecological systems and people and their values. I found that the main categories and indicators identified in this study fit into three concepts: 1) Relationship with the land, ocean and air, 2) Access to benefits from natural resource development, and 3) Building resilient communities and human capital. These concepts may be useful for other communities looking to develop human well-being indicators in an EBM context.

100

Indicator	Unit	Data Source	Desired Direction
1. Access to	Whether access is good, adequate or	Cultural assessments by the Council of the Haida	Access to traditional forest
traditional forest	inadequate (qualitative assessment).	Nation and/or surveys of artists, carvers and	resources should be
resources for food,		Haida community members.	consistently good over
art, medicine and			time
construction (A2).			
2. Whether	Level of contaminants in marine traditional	A marine contaminants study should be	Traditional food should be
traditional food is	foods.	conducted every five years. The study could build	healthy and safe to eat
healthy and safe to		on a recent study by the Skidegate Health Centre,	consistently over time.
eat (A3).		Xaaynangaa Naay.	
3. Number of jobs in	Change in the number of jobs in the	Survey of businesses. Researchers should ask	Increased number of jobs
each industry and	following industries: logging, wood	businesses how many employees they have and	held by Haida and long-
percent that are held	processing, alternative energy, tourism,	how many are Haida or long-term residents. The	term residents. Increased
by Haida and long-	ecotourism, construction, fish processing	definition of long-term residents will need further	economic diversity over
term residents (E1).	and fishing lodges. To measure economic	consideration and discussion. Data from the Haida	time (more jobs in new or
	diversity, it will also be important to	Gwaii community profile (Misty Isles Economic	under represented
	measure employment in other fields	Development Society 2011b) could be used as a	sectors).
	including technology and knowledge	baseline report to compare some companies and	
	industries.	sectors.	
4. Percent of wood	The percent of wood harvested on Haida	The mills on Haida Gwaii can provide information	The percent of wood
harvested on Haida	Gwaii that is also processed on Haida Gwaii.	on the volume of wood that is processed on an	processed on Haida Gwaii
Gwaii that is also		annual basis. The Ministry of Forests, Lands and	should increase over time.
processed on Haida		Natural Resource Operations tracks the total	
Gwaii (E3)		volume of harvested wood.	
5. Ferry ridership	The cost of a round trip ticket from	This data is readily accessible from the B.C.	The cost of ferry ridership
cost (G1)	Skidegate Landing to Prince Rupert.	Ferries website.	should decrease.
6. Number of	The number of recreation programs and	This data is available from Haida Gwaii Recreation	The number of recreation
recreation programs	their hours per community, recorded on an	and other sources.	programs should increase
per community (G2)	annual basis.		or stay constant.

Indicator	Unit	Data Source	Desired Direction
7. Number of people	The number of people speaking Haida and	The Haida language programs in Skidegate and	The number of speakers
speaking Haida by age group (C1)	their age. Haida language programs could give further consideration to what else could	Old Massett may be able to assist with this information.	should increase over time.
	be measured.		
8. Number of youth being supported in programs that take them on the land (C3).	The number of youth (Haida and non-Haida) who participate in outdoor programs such as Swan Bay Rediscovery Camp.	Outdoor programs could be asked to provide their enrollment numbers.	Enrollment numbers should increase over time or stay constant.
9. Volume of local food production (E6).	Volume of food produced from farmers and marine food produces.	Survey of food producers. Data from the Agricultural Strategy Background (Misty Isles Economic Development Society 2011a) could be used as a baseline.	Increased volume of local food production.
10. Change in total population by community and percent of population that is Haida (01)	The number of people in each community on Haida Gwaii and the number of Haida people in each community.	This could be tracked using census data.	Population should increase or stay constant.
11. Proportion of the population in their twenties and thirties (O2)	The proportion of each age group, per community on Haida Gwaii.	This could be tracked using census data.	The number of people in their twenties and thirties should increase over time relative to other age groups.
12. Exercise on a weekly basis (H1).	The numbers of hours of exercise individuals are participating in on a weekly basis.	This data could be collected through community surveys, schools or health centers.	Number of hours of exercise should increase over time.
13. Percent of the population with the following conditions: diabetes, obesity, cancer and arthritis (H6)	Incidents per capita of these conditions.	The local health authority may be able to assist with these statistics.	Incidents of disease should decrease over time.

Indicator	Unit	Data Source	Desired Direction
14. High school	This should be calculated based on the	The Haida Gwaii School District could be asked to	The High School
graduation rate	number of students who enter grade eight,	provide these numbers.	Graduation rate should
(Ed1).	rather than the number of students in grade		increase over time.
	12 who complete grade 12.		
15. Time students	The number of hours students spend in	Teachers could be asked to track this information	The number of hours
spend participating in	outdoor education (e.g. class trips). This	in the future.	should increase.
outdoor education	could be reported per class and per school.		
(Ed4).			

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Appendix A: Interview Guide

The following speaking points and questions were used as a preliminary basis for conducting interviews in this study. The interviews were conducted in a semi-structured conversational manner, which resulted in some deviations from this interview script that are not captured here.

Introductory comments and questions

- I am a graduate student working at the University of British Columbia to develop human well-being indicators for Haida Gwaii. The Haida Gwaii Forest District is supporting my project, as they would like to use the indicators that are developed to monitor the impact of their policies.
- The indicators will be more broadly useful, so that various organizations on Haida Gwaii can use them to track quality of life on Haida Gwaii.
- During the interview, I was hoping we could talk generally about what you think is important to measure for human well-being on Haida Gwaii and then look at the indicator list developed by the Sheltair Group, a consulting company, for the NCC of B.C. I will later use the comments I hear from everyone I interview to create a list of indicators that make sense for Haida Gwaii.
- Please note there is no right answer for what indicators we should measure.
 However, human well-being indicators are more useful if they are based on what is important to a certain place and culture.
- Did you have a chance to review the consent form? Do you have any questions about it? Would you please sign the consent form?

- Did you have a chance to review the NCC indicator set? Could you please take a few minutes and review it now?
- Would you mind if I record our conversation?

Interview questions

- (1) Could you tell me what you think is important to measure for human well-being on Haida Gwaii? For each topic or indicator suggested, ask the following follow-up questions:
 - a. Why is this important? How would you measure this? Should it increase or decrease?
- (2) I would like to go through the main topics in the NCC indicator set and hear your thoughts on whether the topic is important. For each topic (e.g. Population, Economic Indicators, Health) ask:
 - a. Is it important to measure these indicators? What do you think of these indicators? Is anything missing?
- (3) Do you have any questions or other comments?

Concluding remarks

Thank you for sharing your knowledge with me today. I will be talking with other people on Haida Gwaii and asking them the same questions we talked about today. Would it be okay if once I finish conducting interviews I send you a letter that includes a list of indicators for your review?

Appendix B: North and Central Coast Indicators

This list of indicators, referred to as the North and Central Coast (NCC) indicators, is based on the indicators presented on pages 14 and 16 of the ecosystem-based management human well-being indicators document (Sheltair 2009). These indicators were modified to improve readability by using common language, breaking complex indicators into parts and adding headings.

Population Indicators

- Total population and growth rate by community
- Percent of the population that is First Nations
- Total population in each age group
- Rate of population turnover due to people moving in and out of the area

Economic Indicators

Employment

- Labour force, by sector (e.g. fisheries and forestry), by age group, and by occupation
- Employment rate
- Number of businesses and number of jobs per business in each sector (e.g. fisheries and forestry)
- Number of jobs in forestry and wood processing per cubic meter harvested

Income

- Median household income
- Individual income distribution
- Breakdown of total income by source (e.g. employment, government transfer)
- Employment insurance (EI) recipients as % of labour force

Other

- Ferry ridership and service
- Economic diversity index (measures how dependent a community is on different sectors such as fisheries or forestry)

Access to Resources Indicators

Aquaculture and Fisheries

- Percent of aquaculture tenures owned by local residents (and percent which are operational)
- Number of commercial and First Nation fish licenses held locally and non-locally
- Total value of fish harvested from local commercial and First Nations fishing operations

Forestry

- Actual timber harvest level (compared to the Annual Allowable Cut)
- Percent of actual timber harvest level harvested by local and First Nations companies
- First Nations and local community forest sector revenues and employment

Tourism

- First Nation and local community tourism revenue and employment
- Percent of backcountry tenures, guide outfitter tenures, and sports fishing lodge licenses owned by local residents (and percent of which are operational)

Mineral Exploration

- Percent of mineral exploration tenures owned by local residents
- Percent of mineral exploration activity conducted by local companies

Other

- Number of local power generation tenures
- Number of quarry tenures (e.g. for sand and gravel) held locally and non-locally (and estimated production levels)
- Number of non-timber forest product tenures held locally and non-locally

Governance Indicators

- Percent of land area covered by government-to-government agreements
- Percent of population participating in voluntary community service organizations
- •

Cultural Indicators

- Percent of First Nation community members with knowledge of their First Nations language
- Number of returning salmon to key waterways
- Percent of cedar harvested relative to the proportion of cedar on the landscape
- Number of First Nation community members using traditional cultural resources for non-commercial purposes

Health Indicators

- Life expectancy at birth
- Infant mortality rate

Education Indicators

- Education attainment (the level of education held by residents such as a high school diploma, a college degree, a trades certificate or a university degree)
- Number of locally delivered skills training programs and number of people enrolled in the training programs

Recreation Indicators

• Number of different recreation opportunity classes and their accessibility (This is based on the Recreation Opportunity Spectrum assessment done in 2003 by British Columbia to measure the remoteness, naturalness and expected social experience of recreation areas)

Appendix C: Indicators suggested by participants

Table 8: Indicators suggested by participants

This table contains the full list of indicators suggested by participants and the North and Central Coast indicators. The rankings are based on the criteria in the Indicator Assessment tool (Table 1) and add to the Overall Rating (R) (#= the number of people who suggested the indicator, Imp=Importance, Norm=Normative, Acc=Accurate, Inf=Informative, Und=Understandable, and Feas=Feasible). Haida Gwaii (HG) Codes are the codes assigned in Table 3 and North and Central Coast (NCC) codes are the codes assigned in Table 4.

	Indicators	Possible Source of Knowledge	Trend Direction	R (10)	#	Imp (5)	Norm (1)	Acc (1)	Inf (1)	Und (1)	Feas (1)	HG codes	NCC codes
Ac	cess to jobs and resources												
1.	Number of jobs in each industry and percent that are held by local and Haida residents. Key industries are: logging, wood processing, alternative energy, tourism, ecotourism, construction, and fishing lodges.	Survey of businesses	Increase	9	9	5	1	1	1	1	0	E1	EMPL- 4
2.	Number of businesses in each industry and percent that are profitable and owned by local and Haida residents.	Survey of businesses	Increase	9	5	5	1	1	1	1	0	E2	
3.	Percent of the wood that is harvested on Haida Gwaii that is also processed on Haida Gwaii.	Survey of businesses	Increase	8.5	2	5	0	1	1	1	0.5	E3	
4.	For all government-building projects, percent of building materials purchased on Haida Gwaii and percent of employment that is local employment.	Survey of projects	Increase	7	1	4	0	1	1	1	0		

	Indicators	Possible Source of Knowledge	Trend Direction	R (10)	#	Imp (5)	Norm (1)	Acc (1)	Inf (1)	Und (1)	Feas (1)	HG codes	NCC codes
5.	Number of commercial and First Nation fish licenses held locally and total value of fish harvested from local and Haida fishing operations.	Department of Fisheries and Oceans and Band Councils	Increase	6.5	2	3	0	1	1	1	0.5		ACC-3
6.	Percent of backcountry tenures, guide outfitter tenures, and sports fishing lodge licenses owned by local residents and percent of which are operational.	BC Ministry of Forests, Lands and Natural Resource Operations (MFLNRO)	Increase	6.5	1	3	0	1	1	1	0.5		ACC-6
7.	Economic diversity index.	Economist	Increase	6	3	3	1	1	1	0	0		ACC-9
8.	Actual timber harvest level relative to the annual allowable cut.	MFLNRO	Increase	5.5	2	2	0	1	1	1	0.5		ACC-5
9.	Number of quarry tenures held by local residents and estimated production levels.	MFLNRO	Increase	5.5	1	2	0	1	1	1	0.5		ACC-8
10.	Percent of aquaculture tenures held by local residents and percent which are operational.	MFLNRO	Increase or stay the same.	5	1	2	0	1	1	1	0		ACC-1
11.	First Nation and local community tourism revenue and employment.	Survey of businesses	Increase	5	0	2	0	1	1	1	0		ACC- 12
12.	Percent of actual timber harvest level harvested by local and First Nations companies.	Survey of businesses	Increase	5	1	2	0	1	1	1	0		ACC-4
13.	Number of local power generation tenures.	MFLNRO	Increase	5	1	2	0	1	1	1	0		ACC-7

Indicators	Possible Source of Knowledge	Trend Direction	R (10)	#	Imp (5)	Norm (1)	Acc (1)	Inf (1)	Und (1)	Feas (1)	HG codes	NCC codes
14. Percent of mineral exploration tenures owned by local residents and percent of mineral exploration activity conducted by local companies.	MFLNRO	Stay the same.	4.5	1	2	0	1	0	1	0.5		ACC-2
15. Number of jobs in forestry and wood processing per cubic meter harvested.	Survey of businesses	Increase	3	1	2	0	1	0	0	0		EMPL- 3
16. Number of non-timber forest product tenures held locally.	N/A	N/A	2	0	2	0	0	0	0	0		ACC-8
Personal and business												
17. Cost of living.	Economist	Decrease	9	5	5	1	1	1	1	0	E4	
18. Number of tourists per year.	BC Tourism	Increase or stay the same.	8.5	2	5	0	1	1	1	0.5	E5	
19. Volume of local food production.	Survey of businesses	Increase	8	5	4	1	1	1	1	0	E6	
20. Number of people travelling on and off Haida Gwaii.	Ferry and airport	Increase	7.5	2	4	0	1	1	1	0.5		
21. Satisfaction with current level of employment.	Community survey	Increase	7.5	3	4	1	1	0.5	1	0	E7	
22. Number of students in post- secondary programs held on Haida Gwaii.	Survey of programs	Increase	7.5	4	3	1	1	1	1	0.5		
23. Average disposable income.	Community survey	Increase	7	1	4	0	1	1	1	0		INC-3

Indicators	Possible Source of	Trend	R (10)	#	Imp (5)	Norm	Acc	Inf	Und (1)	Feas	HG	NCC
24. Percent of an individual's income coming from employment compared to other sources.	Community survey	Increase	7	3	3	1	1	1	1	0	coues	INC-4
25. Percent of the population over 15 on employment insurance (EI).	Community survey	Decrease	7	3	3	1	1	1	1	0		
26. Satisfaction with income and whether income is sufficient to meet basic needs.	Community survey	Increase	6.5	2	4	0	1	0.5	1	0		EMPL- 2
27. Employment rate.	Community survey	Increase	6.5	2	3	1	1	0.5	1	0		INC-1
28. Median household income.	Community survey	Increase	6.5	4	3	1	1	0.5	1	0		
29. Number of community members giving and receiving services without accepting payment (in- kind services).	Community survey	Increase or stay the same.	6	1	3	0	1	1	1	0		
30. Individual income distribution.	Community survey	Decrease	4.5	0	2	0	1	0.5	1	0		INC-2
31. Labour force, by sector, by age group, and by occupation.	Community survey	Increase	4	0	2	0	1	0	1	0		EMPL- 1
Cultural and General Access												
32. Access to traditional forest resources for food, art, medicine and construction.	Community survey and Council of the Haida Nation	Increase or stay the same.	9	4	5	1	1	1	1	0	A1	
33. Proportion of diet coming from eating foods that have been gathered or grown.	Community survey	Increase or stay the same.	9	6	5	1	1	1	1	0	A2	
34. Whether traditional food is healthy and safe to eat.	Study	Should be healthy	8	2	5	0	1	1	1	0	A3	

Indicators	Possible Source of Knowledge	Trend Direction	R (10)	#	Imp (5)	Norm	Acc (1)	Inf (1)	Und (1)	Feas	HG codes	NCC codes
35. Access to wood for building and heating.	Community survey	Increase	6	1	3	0	1	1	1	0	coucs	coues
36. Satisfaction with access to outdoor recreation opportunities.	Community survey	Increase	6	2	3	0	1	1	1	0		
Protecting the land												
37. Number of returning salmon to key waterways.	Department of Fisheries and Oceans	Increase	7	3	3	1	1	1	1	0	A4	CUL-2
38. Percent of businesses meeting the highest environmental standard in their field.	Survey of businesses	Increase	7	1	3	0	1	1	1	1	A5	
39. Percent of electricity on Haida Gwaii that comes from renewable sources.	BC Hydro	Increase	7	1	3	0	1	1	1	1	A6	
40. Number of people composting.	Community survey	Increase	6	1	3	0	1	1	1	0		
41. Number of people recycling.	Community survey	Increase	6	2	3	0	1	1	1	0		
42. Percent of private land on Haida Gwaii that is reforested after harvest.	Survey of landholders	Increase	6	2	3	0	1	1	1	0		
43. Satisfaction with the stewardship of the environment on Haida Gwaii.	Community survey	Increase	6	1	3	0	1	1	1	0		
44. Water quality in the inlet.	Study	Increase	6	4	2	1	1	1	1	0		
45. Percent of cedar harvested relative to the proportion of cedar on the landscape.	Study	Decrease	4	1	2	0	1	0	1	0		CUL-3
46. Air quality in communities.	Study	Increase	3	1	0	0	1	1	1	0		

Indicators	Possible Source of	Trend Direction	R (10)	#	Imp (5)	Norm	Acc (1)	Inf	Und (1)	Feas	HG	NCC codes
47. Number of different recreation opportunity classes and their accessibility.	Study	Increase	2	0	1	0	1	0	0	0	coucs	REC-1
Healthy behaviours												
48. Alcohol sales per capita.	Liquor stores	Decrease	9	1	5	0	1	1	1	1	H1	
49. Time spent doing physical fitness on a weekly basis.	Community survey	Increase	9	3	5	1	1	1	1	0	H2	
50. Number of hard drug offences per capita.	RCMP	Decrease	8	4	4	1	0	1	1	1	H3	
51. Percent of population that is eating healthy foods.	Community survey	Increase	7	2	4	0	1	1	1	0		
52. Percent of the population that is smoking.	Community survey	Decrease	7	3	3	1	1	1	1	0		
53. Percent of population that is drinking too much alcohol.	Community survey	Decrease	6	4	3	1	0	1	1	0		
Health access												
54. Satisfaction with health services available on Haida Gwaii.	Community survey	Increase	9	8	5	1	1	1	1	0	H4	
55. Funding levels for mental health and social services relative to need.	Expert opinion	Increase	8	2	5	0	1	1	1	0	H5	
56. Average cost of travelling off of Haida Gwaii for health appointments.	Community survey	Decrease	6	1	3	0	1	1	1	0		
57. Satisfaction with health awareness and promotion opportunities.	Community survey	Increase	6	1	3	0	1	1	1	0		

Indicators	Possible Source of	Trend Direction	R (10)	#	Imp (5)	Norm	Acc (1)	Inf (1)	Und (1)	Feas	HG	NCC codes
Health statistics	Kilowicuge										coucs	coues
58. Percent of the population with the following conditions: diabetes, obesity, cancer and arthritis.	Northern Health	Decrease	9	7	5	1	1	1	1	0	H6	
59. Domestic abuse rate relevant to other coastal communities.	RCMP	Decrease	8	1	4	0	1	1	1	1	H8	HEA-1
60. Life expectancy.	Community survey	Increase	8	5	3	1	1	1	1	1	H7	
61. Rate of property crime.	RCMP	Decrease	7	1	3	0	1	1	1	1		
62. Suicide rate.	Northern Health	Decrease	7	2	3	0	1	1	1	1		
63. Percent of the population with mental health conditions.	Community survey	Decrease	6	2	3	0	1	1	1	0		HEA-2
64. Women's birthrate.	Community survey	Decrease	6	1	3	0	1	1	1	0		
65. Infant mortality rate.	Northern Health	Decrease	6	0	2	0	1	1	1	1		
Access to services												
66. Ferry ridership cost.	BC Ferries	Decrease	10	6	5	1	1	1	1	1		
67. Number of recreational programs per community with special attention to outdoor programs for kids and fitness programs for seniors.	Survey of programs	Increase or stay the same.	9	6	5	1	1	1	1	0		
68. Presence of a pool and rink on Haida Gwaii.	Survey of communities	Facilities should be present.	9	6	4	1	1	1	1	1		

Indicators	Possible Source of	Trend Direction	R (10)	#	Imp (5)	Norm	Acc	Inf	Und (1)	Feas	HG	NCC
69. Number of spaces at senior's assisted living facilities relative to need.	Expert opinion	Should be adequate	8	1	5	0	1	1	1	0	coues	coues
70. Internet speed (internet bandwidth).	Internet service providers	Increase	8	2	4	0	1	1	1	1		
71. Number of playgrounds per community.	Survey of communities	Increase or stay the same.	7	1	3	0	1	1	1	1		
72. Number of housing spaces available for at-risk populations relative to need.	Expert opinion	Increase	6	1	3	0	1	1	1	0		ACC- 10
73. Satisfaction with emergencies services for earthquakes.	Community survey	Increase	6	1	3	0	1	1	1	0		
74. Spaces available in daycare programs relative to need.	Expert opinion	Increase	6	2	3	0	1	1	1	0		
75. Ferry ridership and service.	BC Ferries	Increase	6	1	2	0	1	1	1	1		
Collaboration and engagement												
76. Satisfaction with opportunities for meaningful engagement with governments.	Community survey	Increase	8	1	5	0	1	1	1	0	G8	
77. Percent of revenue from forestry staying on Haida Gwaii to support communities.	MFLNRO	Increase	8	1	4	0	1	1	1	1	G6	ACC- 11
78. Effectiveness of Haida Gwaii governance systems and the Haida Gwaii Management Council.	Elder/Expert opinion	Should be effective.	8	3	4	1	1	1	1	0	G7	

Indicators	Possible Source of Knowledge	Trend Direction	R (10)	#	Imp (5)	Norm (1)	Acc (1)	Inf (1)	Und (1)	Feas (1)	HG codes	NCC codes
79. Percent of land on Haida Gwaii covered by government-to- government agreements.	Council of the Haida Nation and Province of BC.	Increase	7.5	6	4	1	1	1	0	0.5		GOV-1
80. Level of control over funding and policy decisions in government agencies in Haida communities.	Survey of organizations	Increase	7	1	4	0	1	1	1	0		
81. Percent of government workers taking training on First Nations colonial history.	Survey of organizations	Increase	7	1	4	0	1	1	1	0		
82. Satisfaction with municipal, Band Council, Haida, Haida Gwaii, regional, provincial and national governance.	Community survey	Increase	7	2	4	0	1	1	1	0		
83. Level of satisfaction with relationships between Haida and non-Haida communities.	Community survey	Increase	6	1	3	0	1	1	1	0		
84. Number of non-Haida people attending Haida events.	Haida Elders	Increase	6	1	3	0	1	1	1	0		
85. Number of people adopted by the Haida.	Haida Elders	Increase	6	1	3	0	1	1	1	0		
Haida culture												
86. Number of people speaking Haida by age group.	Haida Elders	Increase	9.5	5	5	1	1	1	1	0.5	C1	CUL-1
87. Number of youth who know how to prepare and handle food.	Haida Elders	Increase	8	1	5	0	1	1	1	0	C2	

Indicators	Possible Source of	Trend	R (10)	#	Imp (5)	Norm	Acc	Inf	Und (1)	Feas	HG	NCC
88. Number of youth being supported in programs that take them on the land.	Survey of programs	Increase	7	1	4	0	1	1	1	0	C3	coues
89. Whether children are dancing and singing at events.	Haida Elders	Increase	7	2	4	0	1	1	1	0	C4	
90. Art and culture is prominent in the community and schools	Haida Elders	Increase	6	2	3	0	1	1	1	0		
91. Availability of mentoring opportunities for carving and working with argillite.	Haida Elders	Increase	6	1	3	0	1	1	1	0		
92. Percent of students studying the Haida language in school.	Haida Gwaii School District	Increase	6	1	3	0	1	1	1	0		
93. Use of the cultural wood program.	MFLNRO	Increase	6	1	3	0	1	1	1	0		
94. Number of First Nation community members using traditional cultural resources for non-commercial purposes.	Haida Elders	Increase	4	2	2	0	1	1	0	0		CUL-4
95. Accessibility of Haida language program (hours).	Haida Elders	Increase	3	1	0	0	1	1	1	0		
96. Funding for Haida language program relative to need.	Haida Elders	Increase	3	2	0	0	1	1	1	0		
Participating in community												
97. Percent of the population participating in voluntary community service organizations.	Community survey	Increase or stay the same.	9	6	5	1	1	1	1	0	C5	GOV-2

Indicators	Possible Source of Knowledge	Trend Direction	R (10)	#	Imp (5)	Norm	Acc (1)	Inf (1)	Und (1)	Feas	HG codes	NCC codes
98. Number of community events per community.	Local advertisements	Increase or stay the same.	7	1	4	0	1	1	1	0	C6	coucs
99. Funding levels for art and music.	Survey of programs	Increase	6	2	3	0	1	1	1	0		
100. Satisfaction with social relationships.	Community survey	Increase	6	1	3	0	1	1	1	0		
101. Satisfaction with volunteer- based services.	Community survey	Increase	6	1	3	0	1	1	1	0		
Education and literacy												
102. High school graduation rate.	Haida Gwaii School District	Increase	10	6	5	1	1	1	1	1	Ed1	
103. Time students spend participating in outdoor education.	Haida Gwaii School District	Increase	8	2	5	0	1	1	1	0	Ed2	
104. Percent of population with post-secondary education of any kind (trades, university, college).	Community survey	Increase	8	5	4	1	1	1	1	0	Ed3	
105. Student test scores.	Haida Gwaii School District	Increase	7	2	4	0	1	1	1	0	Ed4	
106. Satisfaction with education opportunities and quality of education on Haida Gwaii.	Community survey	Increase	6	2	3	0	1	1	1	0		
107. Education attainment (the level of education held by residents such as a high school diploma, a college degree, a trades certificate or a university degree).	Community survey	Increase	4	0	2	0	1	1	0	0		EDU-1

Indicators	Possible Source of	Trend	R (10)	#	Imp (5)	Norm	Acc	Inf	Und (1)	Feas	HG	NCC
108. Number of positions available for youth in internship programs, particularly in natural resources management.	Survey of programs	Increase	7	1	4	0	1	1	1	0	Ed5	coucs
109. Mentoring program for local people for management positions.	Survey of programs	Increase	6	1	3	0	1	1	1	0		
110. Number of people completing training on Haida Gwaii who are able to find employment on Haida Gwaii.	Survey of programs	Increase	6	1	3	0	1	1	1	0		
111. Number of locally delivered skills training programs and number of people enrolled in the training programs.	Survey of programs	Increase or stay the same.	4	1	2	0	1	0	1	0		EDU-2
Population change												
112. Change in total population by community and percent of population that is Haida.	Census	Increase or stay the same.	10	15	5	1	1	1	1	1	01	POP-1
113. Proportion of the population who is in their twenties and thirties.	Census	Increase	10	4	5	1	1	1	1	1	02	POP-2
114. Rate of population turnover due to people moving in and out of the area.	Study	Decrease	5	1	3	0	0	1	1	0		POP-3
Overall well-being												
115. Level of optimism with the future.	Community survey	Increase	8	1	5	0	1	1	1	0	03	

	Indicators	Possible Source of	Trend	R	#	Imp	Norm	Acc	Inf	Und	Feas	HG	NCC
		Knowledge	Direction	(10)		(5)	(1)	(1)	(1)	(1)	(1)	codes	codes
116. we ov	Percent of the population who ould prefer to live on Haida Gwaii rer any other location.	Community survey	Increase	8	1	5	0	1	1	1	0	04	
117.	Level of satisfaction overall.	Community survey	Increase	8	3	4	1	1	1	1	0	05	
118. Ha ed	Number of youth returning to aida Gwaii after post-secondary lucation.	Community survey	Increase	8	4	4	1	1	1	1	0	06	
119.	Health of dogs in communities.	TBD	Increase	6	1	3	0	1	1	1	0		