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Original paper

## Measuring Progress on Climate Change Adaptation: Lessons from the Community Well-Being Analogue

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**Abstract** While research on assessing climate change adaptation (CCA) activities is in the nascent stage of development, measuring similar endeavours within the community well-being (CWB) field is well established across Canada and internationally through the use of indicators and associated measures. CCA activities are an important part of building resilience to climate-induced natural disasters, and reducing secondary hazards arising from damage to critical infrastructure and other essential facilities. This study evaluated the CWB analogue to provide lessons for the measurement of progress and adaptation to climate change at the municipal level. Since the impacts of climate change are experienced at the local scale and effective CCA is thought to require local scale engagement and targeted action, municipal scale measurement is key to understanding CCA progress.

Research involved an extensive review of CWB models and key informant interviews conducted with key Canadian municipal and international authorities who are leaders in spearheading CWB initiatives. In the paper we outline the major CWB models, our findings from the CWB analogue and the lessons learned for CCA measurement. In particular, we suggest that early engagement and participative processes, flexible and adaptable measurement tools, careful consideration of data requirements, mainstreaming CCA measurement into ongoing activities and the de-siloing of expertise will be important for the success of CCA measurement activities at the municipal scale.

**Key words** Community well-being, climate change adaptation, climate change indicators, municipal adaptation.

### 1. INTRODUCTION

This paper reports on research supported by the Climate Change Impacts and Adaptation Division (CCIAD) at Natural Resources Canada (NRCan), specifically in contribution to the Working Group: Measuring progress on climate change adaptation. The results of this study were presented at the 5th Conference of the International Society for Integrated Disaster Risk Management (IDRiM) at Western

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University (London, Ontario, Canada) on November 1st 2014. The theme of the conference was “building disaster resilient communities.”

The objective of the paper is to evaluate the community well-being (CWB) analogue to provide lessons for the measurement of progress and effective adaptation to climate change. While measuring climate change adaptation (CCA) activities is in the nascent stages, measuring similar activities within the CWB field is well developed across Canada and internationally through the use of indicators and associated measures. This study was an opportunity to learn from successful CWB approaches that help communities manage risks, set priorities, and engage local citizens. By gleaning lessons from this well-established field, CCA measurement approaches can avoid repeating mistakes and maximize the potential for more robust climate change resilience.

### **1.1 Roots of Community Well-Being**

A Community well-being is a conceptual assessment framework combining the dimensions of social, economic, environmental, cultural, and political conditions identified by individuals and their communities as accounting for the elements of life satisfaction that cannot be defined by economic growth alone. Well-being is influenced by personal perceptions (subjective well-being) and physical well-being (objective well-being). For place-based communities, well-being is typically understood as a physical setting within which the dimensions of well-being are evident. These include the social (including psychological, cultural, spiritual), economic, and environmental dimensions. Generally speaking, the social and economic dimensions of well-being have received more attention than the environmental domain (Murphy 2010; Hart 1999).

The measurement of CWB is a well-developed field in Canada and internationally with roots tracing back to the social reform period (1830s) in both Europe and the United States (see BC Healthy Communities 2013; Hak et al. 2007; Ramos and Jones 2005; Gahin and Paterson 2001; Christakopoulou et al. 2001; Besleme et al. 1999; Hart 1999). These early efforts were directed at understanding the way in which overcrowding, contaminated water, and poverty contributed to epidemics and other health problems. Continuing efforts in the area of health, combined with the growing need to manage the economy throughout the 1800s led to the development of other measurement tools including demographic data, crime rates, consumption levels, and unemployment rates (Gahin and Paterson 2001; Hart 1999). By the 1960s there was a call to develop social indicators to study and compare the quality of life (e.g. well-being) in both urban and rural settings. Whilst economic indicators continued to be prevalent measures of well-being (e.g. gross domestic product), the use of social indicators waned in the 1970s and 1980s as an important way Canadians understood development and progress (Moro et al. 2008; Land et al. 2011).

The recent revival in research and use of social indicators, along with the emergence of environmental indicators has been spurred by 1) the continuing dissatisfaction with economic indicators, 2) the growing international dialogue about the state of the world’s environment (e.g. 1972 Stockholm conference on the environment and the 1992 Rio Summit), and 3) the need to understand the impact of human activities that results from the interaction between the economic, social, and environmental dimensions (Agrawala and Fankhauser 2008; Gahin and Paterson 2001). The idea of measuring CWB in a more holistic way along these three dimensions was further developed through the Brundtland Commission and related efforts in the late 1980s and early 1990s, as the idea of sustainable development was popularized (Gahin and Paterson 2001). Many of today’s CWB processes largely follow the sustainable development model.

### **1.2 Community**

CWB evaluations need to consider the issue of scale and community. Carr (2013) states that communities can include the people living together in a district, municipality or neighbourhood, and/or

groups of people with a shared origin or interests (e.g. ethnic background, sport teams, online social networks, religion). Each of these twin features has been linked to the concept of “community” which Flint, Luloff and Finley (2008) describe is what people who care about each other and the place they live, create as they interact on a daily basis. Virtually all well-being evaluations are focused on place-based communities and understand “place” as the physical setting within which the dimensions of well-being are evident. These include the social (including psychological, cultural, spiritual), economic, and environmental dimensions (Hart 1999; Gahin and Paterson 2001).

Yet, it is also understood that all communities are intertwined and do not exist in isolation (Christakopoulou et al. 2001); they are always linked to other communities (e.g. environmental groups may also be part of a neighbourhood and/or broader umbrella environmental organizations) and to other scales (e.g. a local environmental organization could be part of a national environmental organization and a city exists within a province and within a country). Communities are encouraged by practitioners to think about these various dimensions and connections as they embark on assessing their CWB.

### **1.3 Well-Being**

The concept of well-being is often used interchangeably with such concepts as quality of life, and may also be framed in terms such as welfare, health, and sustainability (Hart 1999). Although achieving agreement on a specific definition is challenging, a widely accepted definition suggests that well-being consists of something beyond the absence of disease. Well-being accounts for elements of life satisfaction that cannot be defined by economic growth alone (Camfield et al. 2009; Paavola and Adger 2006). Well-being is influenced by both personal perceptions (subjective well-being) and physical circumstances (objective well-being) that can be measured for individuals, communities, countries, etc. The Institute of Wellbeing describes well-being as

“...the presence of the highest possible quality of life in its full breadth of expression focused on but not necessarily exclusive to: good living standards, robust health, a sustainable environment, vital communities, an educated populace, balanced time use, high levels of civic participation, and access to and participation in dynamic arts, culture and recreation” (Institute of Wellbeing 2015).

In the pursuit of measuring well-being, researchers and practitioners have developed a suite of quantitative and qualitative indicators that can be assessed using a range of well-being data sources. For instance, an indicator of air quality could be the number of smog-free days, particulate levels in the atmosphere or the number of asthma cases reported by hospitals. The information provided by indicators allows decision-makers – individuals, governments, businesses, and so on – to target resources to problem areas and get feedback regarding progress achieved towards well-being (CIW 2013; Hart 1999). Profile indicators describe the state of well-being, such as education levels, income levels, and urban forest cover, to capture a snapshot of well-being, or measure changes in well-being over time. Process indicators (such as the number/quality of volunteer organizations, feeling of connectedness to the community) examine what community residents do, rather than who they are. The relationship between groups, people’s perception of well-being and social processes to provide information regarding how the current well-being status could be influenced in the future (Hart 1999).

### **1.4 Indicators**

The idea of utilizing indicators to measure CWB has developed since the 1980s and 1990s to provide information to local decision-making at the grassroots-level. Deciding what indicators will be used to

measure well-being is a key task for a community as they undertake the assessment exercise. As Roy Romanow states, “The things we count and measure reflect our values as a society and determine what we see on the news, what we hear at the water cooler, and ultimately, what makes it onto the policy of agendas of governments” (CIW 2013). Others use the analogy of driving with road signs – having indicators helps decision-makers decide where they want to go and the path to get there.

Indicators are important for a variety of reasons including to: encourage democratic participation in visioning a community’s goals; measure progress towards achievement of those goals; raise awareness and focus attention on community priorities; provide a feedback and accountability mechanism for decision-makers; and actively choose future desired outcomes (Gahin and Paterson 2001). Undertaking activities towards visioning a community’s future well-being and choosing indicators that can assess both the current and future states of that well-being are excellent opportunities for a community to articulate its values and goals and foster community involvement (Sustainable Seattle 2013).

Indicators of community well-being, sometimes called “benchmarks” or “vital signs”, are now used extensively by nation-states, regional governments, urban and rural areas, and even neighbourhoods (Hilbrecht et al. 2012; Ramos and Jones 2005). The Community Indicators Consortium lists and provides links to community well-being projects from around the world, including twenty-seven from Canada alone (see CIC 2013). In the United States there are over two hundred municipalities using some form of CWB measurement (Harley et al. 2008; Gahin and Paterson 2001). One of the earliest and longest-running examples of efforts to track well-being is the Jacksonville, Florida Community Council Quality of Life indicator program. The council has tracked one hundred indicators of well-being covering nine themes since 1985 (see JCCI 2013). Other well-known examples include Sustainable Seattle and Sustainable Calgary (Sustainable Seattle 2013; City of Calgary 2010). Thus the current state of knowledge about indicators is both in-depth and extensive.

A Canadian example of the CWB process in action is the City of Calgary’s Indices of Community Well-Being for Calgary Community Districts program, which uses 196 neighborhoods (called ‘communities’) as boundaries for their local-scale CWB process. This approach uses nineteen economic, social and physical indicators to provide information for community leaders. The nineteen indicators are utilized to provide an understanding of relative well-being for individuals in communities with respect to economic, social and physical dimensions. Data is drawn primarily from custom tabulations based on the 2006 federal census (see City of Calgary 2010). For each indicator, an index value is ascribed to the community to represent the relative position of each community with respect to both the number and percentage of individuals exhibiting the indicator. Communities are then subsequently ranked based on their index value. A composite index provides a summary of the relative well-being of communities based on their rank for each indicator as measured against all other communities. This approach has yielded quality data which is used to assist community leaders and service providers in identifying strengths and needs within their own communities in order to respond effectively to local opportunities and challenges.

Given the plethora of approaches to studying well-being, communities can tailor their approach to well-being according to their own needs. Communities may choose to undertake a quick or in-depth analysis of one or more dimensions, a broader analysis across several dimensions, or any other combination that reflects that community’s values and needs. Communities may also decide to choose amongst the various types of indicators and measurement tools available. Indicator presentation styles vary from a “report card” design which provides information as a grade (i.e. A, B, C, etc.) or stoplight (red-yellow-green) (JCCI 2013). Other approaches use positive and negative symbols to indicate changes (Tasmania Together Progress Board 2002). The International Institute for Sustainable Development (IISD 2002) Dashboard of Sustainability<sup>3</sup> illustrates results along a coloured dashboard similar to a car dashboard’s gauges.

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<sup>3</sup> The Dashboard of Sustainability is available online: <http://www.iisd.org/cgsdi/dashboard.asp>

## 2. CLIMATE CHANGE ADAPTATION

Climate change is a reality and is having profound adverse effects on the environment, economy and society as a whole across Canada (IPCC 2014). Canada is vulnerable to a range of impacts associated with climate change, including rising temperatures, more frequent, intense storms and rising sea levels (Ontario Government 2015; IPCC 2014; Pearce et al. 2012; CIP 2010). These changes are already being felt in towns and cities across the country (FCM 2012; Bruce 2011; Infrastructure Canada 2006; Ontario Government 2015). The effects include thawing permafrost in the North, increased numbers of insect pests and expanding range of disease vectors as winters warm (Grothmann and Patt 2005; Smit et al. 2000). There is also an increase in urban flooding, which according to the Insurance Bureau of Canada now eclipses fire as the top insurance claim (IBC 2013). Both the cities of Toronto and Calgary experienced flooding in 2013 resulting from powerful thunderstorms, causing major losses (Feltmate and Thistlethwaite 2013). Adaptation is in its nascent stages, and there is no common methodology for adaptation planning (Foss and Howard 2015; Ontario Government 2015). The climate-policy debate has only recently turned its full attention to adaptation—how to address the impacts of the climate change that we have already begun to experience and that will likely increase over time (Foss and Howard 2015).

Since about half of the world's population currently live in urban centres and that proportion is set to rise further in future years, considerable effort is being undertaken to understand and address the impacts of a changing climate in urban areas (Ford and Smit 2004; Brooks 2003; Kates 2000). In addition, populated regions are centres of economic and political activity, contributing to the growing interest in considering municipal-level actions as a means to advance climate policy goals (Hallegate 2009; Parry et al. 2001).

In the climate change field, adaptation refers to adjustments in human systems in response to actual or expected climatic stimuli or their effects that can moderate harm or exploit beneficial opportunities (Measham et al. 2011; Smit and Wandel 2006; Ford and Berrang-Ford 2011). Denevan (1983) and Holling (1986) recognize that societies that are able to respond to, or cope with, change quickly and easily are considered to have high adaptability or capacity to adapt. CCA encompasses adjustments in practices, processes or structures in response to projected or actual climate and extreme weather events. This approach is different than mitigation, which focuses on activities that reduce or eliminate the release of greenhouse gases that contribute to climate change. Federal, provincial and territorial governments in Canada have acknowledged the importance of adaptation and are beginning to provide financial resources to facilitate adaptation planning for cities and municipalities (City of Toronto 2012; Ontario Government 2011, 2015; FCM 2012, 2009; ICLEI 2008; Infrastructure Canada 2006; City of Homer AK 2007; City of Keene NH 2009)

There is a need to develop effective strategies to measure local-level adaptation and track its progress (Wheaton and McIver 1999). Formal and informal institutions influence adaptation by structuring the way climate impacts are experienced, connecting individual and collective responses to these impacts and channelling external resources for adaptation. As such, it is widely recognized that adaptation needs to be based on an understanding of local contexts and in particular the pressures, obstacles and incentives confronted by local actors (ICLR 2010; Adger et al. 2009). Thus, while the drivers for adaptation in Canada may be outside the local context, adaptation and its measurement typically take place within the municipal and household levels (Bulkeley 2013; Aall et al. 2012; Measham et al. 2011; Wheeler 2008). Because climate change impacts are local and context specific, the role of local governments is seen as key to the success of adaptation efforts (see e.g. Adger et al. 2009; Adger 2001). Local-scale actors will ultimately have responsibility for implementing adaptation. To be successful, municipalities will need to collaborate with civil society, the private sector, and higher levels of government. There is, therefore, a pressing need to build institutional capacity at different levels, in particular with regards to: sharing

scientific knowledge and incorporating marginalized voices; identifying local needs; ensuring both horizontal and vertical accountability; efficiently transferring resources; coordinating policy across sectors; and cooperating across national boundaries (Pielke et al. 2007; Adger et al. 2004; Bruce et al. 2006).

In terms of planning for adaptation and measuring its effectiveness, Smit & Wandel (2006) note that productive adaptation initiatives are often incremental, modifying existing management strategies or plans. Adaptation to climate change is likely to be but one of a range of competing social, environmental and economic priorities facing local communities (e.g. access to markets, food security). When adaptation initiatives are incorporated into existing planning and risk management processes this is termed mainstreaming (Huq and Reid 2004). They note that successful climate change adaptation and vulnerability reduction is rarely undertaken with respect to climate change alone. Vulnerability reduction appears to be most effective if undertaken in combination with other strategies and plans at various levels and when it becomes an embedded part of policy decisions and measurement processes (Blaikie et al. 1994). Since mandated adaptation processes do not always anticipate the capacity constraints of local jurisdictions to take on new priorities, there is a strong case for greater mainstreaming of adaptation and measurement efforts with existing initiatives of local actors to deal with the threats and opportunities that they already face.

It is important to note that there are already some CWB approaches that incorporate a few CCA indicators such as the Canadian Index of Well-being (CIW 2013). Some Canadian communities are beginning to measure simple adaptation indicators (e.g. % of business units addressing climate change in business plans) during their CWB process, but measuring hard infrastructure (e.g. sea walls, culverts, storm water infrastructure, etc.) and more complex indicators (e.g. damage avoided by storms, etc.) is beyond the scope of most CWB processes.

### 3. RESEARCH DESIGN AND DATA COLLECTION

Based on information and findings from the literature review, a questionnaire consisting of eleven semi-structured questions was constructed. Questions were developed specifically for either CWB/CCA-experts or municipal officials to better tease-out the most relevant information from the participant. This cohort of individuals was selected because we were interested in providing insights into the measurement of CCA at the local scale and, as is the case with CWB, this task would typically be undertaken by municipal authorities. It was beyond the scope of the project to interview other stakeholders such as business and non-governmental organization leaders; their contribution to this process could be the focus on a subsequent project. Semi-structured interviews were conducted with twenty key informants who represented rural, small town and large Canadian municipalities (n=11) as well as Canadian and international experts (n=9). As part of the expert group, interviews with climate change adaptation specialists (n=3) contributed additional insight to help develop realistic and tangible lessons for the measurement of progress and effective adaptation to climate change.

Interview data were analysed using QSR NVIVO 10 software which is the tenth-generation of NUD\*IST (Non-Numerical, Unstructured Data Indexing, Searching and Theorizing) data analysis software. Two parent nodes (Table 1) were developed as the most suitable way to organize and analyse the data, following work by Braun and Clark 2006. Multiple sub-nodes served to structure lessons for the measurement of CCA.

**Table 1.** Interview Analysis Themes

<i>Parent Node</i>	<i>Sub-Node(s)</i>
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Strengths of Municipal-level CWB Measurement	Locally focused measurement; Community involvement; Sharing of information; Identify priority research areas and visioning; Indicator data
Challenges of Municipal-level CWB Measurement	Financial/resource constraints; Data collection; Buy-in and support for community well-being measurement; Siloing of municipal departments; Municipal election cycles

## 4. RESULTS

### 4.1 Strengths of Municipal-Level Community Well-being Approaches

#### 4.1.1 Locally-Focused Measurement

Study respondents indicated that a key strength of the CWB measurement approach is a focus on the local scale. Respondents maintained that the ultimate goal of any CWB measurement process is to ensure everyone has access to the services and supports they need to lead healthy, active lives. According to several respondents, determining what is important to measure at the local scale can be achieved by surveying a representative sample of residents, hosting town-hall meetings, collecting input online via a website, and active community outreach (e.g. handing out postcards asking what they love/hate about their city). Respondents emphasized that the results from local engagement helps to inform and improve services, policies, advocacy, and community-wide action focused on increasing the well-being of residents. Effective, efficient measurement requires focusing on locally-relevant issues.

Several respondents suggested that setting clear geographic borders (e.g. municipal boundaries, census tracts) is an important component of scoping CWB measurement initiatives. This is especially important in very large communities to keep the focus local and ensure that CWB findings can be influenced by local policy changes<sup>4</sup>.

When deciding on indicators, respondents also addressed the issues associated with local-broader scale connections. It was suggested that it is important to measure actionable indicators and avoid indicators outside of the community’s purview such as the condition of a federally-controlled waterway. One respondent noted that those leading the CWB process should be clear about these jurisdictional issues when relaying information to community members. In addition, several respondents noted that measurement at the local scale can contribute to broader scale assessments. One respondent indicated that in their province of Newfoundland, local scale measurements of CCA across more than 400 small communities are following a standard methodology, allowing for comparisons and inferences to be drawn for the whole region.

#### 4.1.2 Community Involvement in the Measurement Process

In general, respondents from this study indicate that a high-level of community engagement is a central tenant of CWB measurement processes. Dialogue about well-being is a key part of the process of community building and commitment to democratic participation. The focus on these processes, rather

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<sup>4</sup> The City of Calgary *Indices of Community Well-Being for Calgary Community Districts* uses 196 neighborhoods (called ‘communities’) as boundaries for their local-scale CWB process. This approach uses 19 economic, social and physical indicators to provide information for community leaders. Available online [http://www.calgary.ca/CSPS/CNS/Documents/indices\\_of\\_well\\_being.pdf](http://www.calgary.ca/CSPS/CNS/Documents/indices_of_well_being.pdf)

than just on end-points or outcomes, was a reoccurring theme expressed by study respondents. Municipal authorities and CWB experts stressed that the process of undertaking a dialogue about CWB has the potential, in and of itself, to contribute to improved quality of life. In many CWB undertakings, community involvement is actively sought through various means, including community meetings, web postings and blog posts, and other outreach by the municipality. In Ontario for example, the Guelph Community Wellbeing Initiative conceptualizes community participation through a ‘wheel of involvement’ with the core team at the centre, followed by ‘involved’, ‘supportive’ and ‘interested’ parties from community, private, government and service sectors. The wheel represents a continuum of participation, from ‘core’ stakeholders or individuals who are actively involved, meet regularly, and help develop the plan, to those ‘interested’ individuals at the periphery who wish to be updated on the progress (e.g. via newsletter) and informed of events, but are not directly involved in the work (see City of Guelph 2015).

The ability for CWB processes to bring together traditionally siloed groups, organizations, and citizens to focus on achieving common goals is an often overlooked aspect of the process that was considered important by several respondents. Similarly, discussions about CCA have been shown to foster increased collaboration and develop dialogue amongst various stakeholders involved in the process. One respondent described how discussions amongst people whom normally don’t work together (in this case the public health department, and the local hydroelectric utility) led to the establishment of cooling centres in the community that used donated air conditioning units and bottled water from the utility.

#### **4.1.3 Sharing of Information**

In general, respondents stated that information shared while undertaking a CWB measurement process in their community has been a key strength of the process. Discussions can lead to the identification of measurements or baseline data that already exist. In one example, a municipal respondent described that their city was looking to establish cooling centres to serve older residents. A CWB measurement meeting revealed that one local organization had data, which they shared, to help locate the cooling centres close to high concentrations of senior residents.

Discussions can lead to better informed decisions between organizations. A respondent representing a municipal utility emphasized the importance of meetings with local municipal planners to discuss CCA-informed infrastructure decisions. CWB discussions fostered dialogue and collaboration between these organizations resulting in the installation of larger municipal culverts on several projects.

#### **4.1.4 Identification of Priority Research Areas and Visioning**

Respondents from this study indicated that an important strength of the CWB process is to identify priority research areas and to develop a vision to guide the future direction of their community. The results of a visioning exercise serve as a basis to select, adapt or create indicators that are meaningful to the community’s understandings of their well-being. To develop their well-being measurement approaches, several municipal respondents described their community’s work to envision their community 10-15 years into the future and to establish long-term goals and guiding principles.

Another municipal respondent explained that CWB meetings improved the municipal government’s understanding of the community’s values, needs, and desires for the future, and helped develop more effective measurement tools. A key output has been the development of a novel project aimed at improving local air quality that involves a multitude of stakeholders and actors, including the municipal government, environmental and other NGO groups, local utilities, businesses and industries. The project is unique in that the focus is on “getting the right people to the table, to get the right measurements, and to challenge groups to put their territorial issues aside”. The respondent emphasized the innovation of the

project using the example of the local hydro company sitting at the table and committing resources to conduct free energy audits of people's homes. The respondent noted that although each group and business participating in the project has their own stake, that the overall goal of improving CWB has broken down some of the barriers and allowed for open discussions.

#### **4.1.5 Indicator Data**

Respondents, in general, maintained that the presence or absence of key sources of data influenced decisions on what the community chose to measure. Respondents noted that census data was often used as a key source of data. However, when data was unavailable to measure a particular indicator, communities often developed surveys to fill in the gaps. These surveys generally focused on collecting profile data (snapshot) and contributed to the initial base of information by providing current data that is tailored to the needs of the community. This survey data is most often based on scaled (Likert)<sup>5</sup> responses to produce quantitative data<sup>6</sup>. Respondents indicated that surveys were the easiest method of collecting snapshot information from the community. One respondent indicated that to ensure a good return rate on surveys, it is a good idea to start with an awareness campaign using social media, outreach at community events, media advertising and a re-vamped website. The same CWB respondent noted that it is important to assess survey data against census information to ensure the survey is geographically representative of the municipality and that the gender distribution matches the census profile. They also emphasized the importance of having highly-qualified researchers, rather than volunteers, analyse the survey data to ensure validity.

Other key sources of data used to inform Canadian CWB initiatives are quantitative data from Statistics Canada, including: health profiles (e.g. Canadian community health survey), crime data (e.g. Statistics Canada crime and justice research paper series; Statistics Canada police-reported crime statistics), and commuting time (e.g. Statistics Canada report on commute to work). Other agencies also provided a range of information, including Human Resources and Skills Development Canada (employment information), local health units, municipal government election results, local library data, and food banks. Municipal utility corporations often contribute data on energy and emissions monitoring. Conservation authorities contribute information on water conservation, as well as data on the quality and general health of the local environment. Research institutes that contribute or develop various CWB indexes are an important source of information, providing reports that describe how to measure indicators, what the indicators mean, and so on (e.g. leisure and culture; health populations; time use). Community foundation reports (e.g. vital signs reports<sup>7</sup>) also provide useful indicator information.

Respondents cautioned that sensitive or polarizing topics should be clearly defined and that any potential impacts needed to be carefully explained. A respondent used an example of presenting data on high school graduation rates from their city in a CWB meeting. They described that the extent a topic might be deemed controversial, could change depending on the context provided for comparing the information. For instance, a high school graduation rate of 85% can be seen as positive if comparable cities have lower graduation rates or negative if the graduation rate has decreased over the last couple of years. The respondent noted that putting the information in perspective is especially important when both gathering and communicating information on sensitive topics such as mental health, addictions, and

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<sup>5</sup> Likert-scale responses are a method of ascribing quantitative value (numbers) to qualitative data (e.g. agree, neutral, disagree) to make it amenable to statistical analysis (Marshall and Rossman 2010).

<sup>6</sup> Example likert-scaled surveys are available from the Jacksonville Community Council quality of life indicators project. Available Online: [www.jcci.org](http://www.jcci.org)

<sup>7</sup> Annual Vital Signs reports by Community Foundations of Canada provide a comprehensive look at how communities are faring in key quality-of-life areas. Available Online: <http://www.vitalsignscanada.ca/en/home>

marginalized populations.

Several respondents indicated that they are beginning to work with corporations and private industry to share proprietary data that could be used in CWB measurement (e.g. tonnage handled by shipping port as a local economic-vitality indicator; third-party flood hazard maps and other consultant reports). Several CWB practitioners noted success in obtaining data from utility corporations, but that private-sector data remained hard to obtain due to privacy and ownership concerns. Respondents did note some recent success in getting data (such as corporate air emissions) that has proved useful to the community in their development of a clean air initiative associated with their CWB process. On the CCA side, one approach that has proven useful has been to request that businesses incorporate climate change risk in business unit risk assessment, and report back to the municipality. This helps the municipal authorities gather business data, identify new risks, and help identify sources of funding to implement adaptation measures. Several respondents noted that the process also served to foster greater communication and collaboration between businesses and local governments in working towards a shared goal of preparing for climate change.

Many respondents indicated that the way indicator data were presented is one of the more important communication decisions in the CWB process. If the report is not immediately comprehensible and user-friendly, it may not be helpful to the policymakers, funders and citizens for whom it was designed. Several respondents noted success in communicating indicator information using colours (e.g. green, yellow, red) and graphs.

## **4.2 Challenges of Municipal-Level Community Well-being Approaches**

### **4.2.1 Financial/Resource Constraints**

In general, respondents in this study indicated a key challenge of conducting CWB assessments at the municipal scale is a lack of funding and lack of resources to complete the work. One respondent from a small northern Canadian community explained that work on CWB is done ‘off the side of desks’ because the day-to-day activities focus on addressing immediate problems in the community. The respondent also acknowledged that funding is available for short-term studies, but they lack support and funding from upper-level government to continue the work and address the identified issues. Some municipal officials also noted that human resource constraints were another problem that limited the capacity to implement results.

### **4.2.2 Data Collection**

Overall, respondents indicated it was easier to measure profile indicators (snapshot) because much of the data for comparison could be found in the census. Secondary quantitative census data was the most common input for CWB studies because it has been collected at regular intervals for a long period of time. When attempting to measure process indicators, several respondents noted it is difficult to agree on metrics (e.g. how to qualitatively measure the strength of volunteer community organizations). Several respondents conceded that their CWB process has not yet progressed to this level of measurement, instead focusing on quantitative measurement such as the number of community volunteer organizations.

Despite these challenges, communities in Canada undertaking CWB measurement are beginning to establish trends that can measure change over time as information is collected over the long-term. One respondent from a large community felt that within several years, some of the early adopters of CWB measurement could expect to have collected enough longitudinal data to begin to measure change over time and that this will affect policy decisions on important issues such as police funding, health care policies, and infrastructure decisions. The respondent noted the success of long-running CWB initiatives in the United States to affect public policy decisions, some of which have been on-going for several

decades.<sup>8</sup>

Regardless of data type (qualitative/quantitative; primary/secondary data sources), many respondents indicated a general shortage of data, missing datasets, data aggregation problems (e.g. assembling inconsistent data from various studies) and shortages of highly-qualified personnel to analyse data. Many respondents stated that much desired data simply does not exist, is fragmented, or is not available for long enough time periods to draw inferences. When data were not available for the preferred indicator, then other, perhaps less appropriate indicators were substituted. For example, a CWB respondent noted that median income for seniors was not available, so senior poverty and retirement income statistics were used instead.

On the CCA side, many of the same problems around data shortages and making data useful exist. One respondent described that municipalities are having difficulty using information about projected climate change impacts to develop effective adaptation strategies. In one example, the respondent explained that an initiative in a large Canadian city identified a series of problems associated with extreme weather focused on electricity delivery. The model predicted changes in the next 10-50 years with a change in magnitude of 2-4 degrees. They described taking this information to the city engineers and asking them how this would impact their projects in the next budget cycle. The engineers couldn't answer the question.

The translation of data into indicators was a common concern raised by many in this study, with several respondents noting that the census was never designed to capture the kinds of data needed for a CWB process. Several respondents indicated that census data was useful to establish baseline community information and identify trends which could then be further examined through a CWB measurement process, but cautioned that census data can be easily misconstrued and should be supplemented with primary data (such as a community survey) to allow for comparison and verification.

Collecting and analysing information in a consistent, acceptable format is a data collection challenge raised by several respondents. A CWB researcher noted that it is important to tailor data collection techniques to the community. In a community that has access to university researchers, for example, municipal officials could work directly with researchers to deploy students on projects to collect data from the community. Researchers can also work with local municipal practitioners to develop research instruments such as surveys and websites tailored to the needs of specific communities. This approach allows for consistent data collection across multiple communities and utilizes university resources in an innovative way to provide projects for students to complete as part of their studies.

### **4.2.3 Buy In and Support for Community Well-Being Measurement**

Respondents generally indicated that their community has supported and bought into the community well-being measurement process. However, they noted that it is necessary to invest resources and be transparent about the costs to taxpayers. Respondents from municipalities actively conducting CWB exercises explained that it is important to keep residents updated on the measurement process. This was done in a variety of ways, including town hall-style meetings; meetings in the community with participating groups and citizens; dissemination of research through mail and social media; and general communication of the project provided at local events.

Maintaining buy-in and support from the community to effectively measure CWB was described by one respondent as being “simultaneously our biggest advantage, and most difficult challenge” due to the

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<sup>8</sup> Examples of exemplary U.S. community indicator projects, such as Sustainable Pittsburgh, community indicators initiative of Spokane, the City of Santa Monica, and Boston Indicators can be found on pg. 360 in *Handbook of adult resilience* (Reich et al. 2010).

many relationships that must be maintained between various actors and stakeholders. To overcome this challenge, respondents indicated that it is important to keep the public informed of the process through multiple sources and find ways of including stakeholders at times when most can attend meetings.

#### **4.2.4 Siloing of Municipal Departments**

The siloed or disconnected nature of various municipal departments was identified as a problem facing CWB exercises by several respondents. Two respondents from communities conducting a CWB measurement process indicated that the CWB process has helped “de-silo” municipal departments, fostering new relationships and better matching the needs of residents to city resources. Despite these successes, other respondents acknowledged that siloed municipal departments continue to be a problem facing CWB measurement processes. One respondent emphasized that their planning department was completely disconnected from the utility department, which they felt was very problematic given that planning and design decisions were being made without the input of those tasked with building and maintaining various infrastructure.

#### **4.2.5 Municipal Election Cycles**

Several respondents in this study noted that the short-term nature of municipal election cycles has created a challenging atmosphere for CWB initiatives. Officials are pressured to keep taxes low, which can make it difficult to direct resources towards longer-term studies such as CWB assessments. One municipal representative explained that it is important to be transparent with the taxpayers about the costs. Other respondents raised concerns over maintaining funding for the measurement projects, noting the recovery effort from the 2008 recession.

### **5. INSIGHTS FROM THE COMMUNITY WELL-BEING MEASUREMENT PROCESS**

#### **5.1 Measuring Well-being**

Respondents noted that communities typically choose to use a measurement tool that is already available (e.g. Sustainable Livelihoods, BC Healthy Communities, Community Well-being Index). It is also common that the measurement tool will be synthesized or adapted to meet the needs of the community. Those looking to undertake CCA measurement could also use these approaches as their point of departure. In particular, the tools are typically adapted based on the types of indicators considered important to the local community and the availability of data. Several overall best practices were suggested by CWB experts. Respondents stated that sensitive or polarizing topics should be clearly defined and that any potential impacts needed to be carefully explained. Many respondents suggested that setting clear geographic borders, such as using municipal boundaries or census tracts, is an important component of scoping CWB projects. When deciding on indicators, respondents suggested choosing indicators that are actionable at the local level, while avoiding indicators outside of the community’s purview. They also suggested focusing on measuring indicators that are in the public realm and can be altered by public policy decisions. In addition, respondents cautioned that qualified personnel should be used to analyse the data and translate it into useable indicators.

As noted in the literature review, respondents from this study suggested that it was much easier to collect data on profile rather than process indicators because there is often existing quantitative census data that can be used. They maintained that it can take several years of data collection before the assessment of long-term trends is possible. Many communities found it useful to begin their assessment of CWB by developing a snapshot using easily available data and indicators.

Respondents suggested that, despite some drawbacks, census information was useful to profile the community, establish some baselines and trends, and served as a starting point to begin the CWB process. This approach allows communities to avoid starting from scratch and build a process of gathering information specifically tailored to the needs of the community. One respondent also noted the benefit of beginning with census data when establishing a CWB initiative, because it provides quick results for municipal councils and ratepayers who may be skeptical of the process or concerned about costs. Further, given municipal election cycles, some respondents felt it was important to expedite at least some initial results.

Beyond census data, other quantitative data was also commonly used. CWB experts suggested that particular sectors and disciplines may have existing data or standards which could be accessed during the design of an evaluation to avoid “reinventing the wheel”. This included a range of Statistics Canada data, information from Human Resources and Skills Development, as well as data from local health units, election results, libraries, food banks, local utilities, conservation authorities, research institutes and community foundation reports. In some cases, it was only through the information sharing that is a hallmark of the CWB process that needed data was revealed to be available. This included data held by private corporations, local utilities, school boards, health care networks, and community organizations such as the Red Cross, Salvation Army, etc.

When using available data, several measurement caveats were outlined by respondents. First, it is important to know if the methods or criteria for collecting those data change over time to allow for the accurate assessment of the associated indicator. Second, in some cases available data can be fragmented or not available over long enough time periods to show any valid trends or establish accurate baselines. Third, across all data types, many respondents indicated that needed data were often missing or could not be aggregated across data sets due to differences in data collection methods.

Two hurdles that need to be overcome to obtain needed data are the siloing of departments, agencies and organizations, and the need to deal with privacy and proprietary data concerns. Respondents noted that CWB activities were particularly effective at overcoming the problem of siloing. The CWB process helps break down barriers and provides a forum for more open discussions, allowing participants to understand how they can benefit while also contributing towards collective goals. Several respondents did mention some recent success in obtaining needed proprietary information through the CWB process. It is also important to note, however, that despite participative CWB processes, siloing remains an ongoing challenge.

According to respondents, a common method for gathering new or missing information was through community surveys. Surveys designs most often used Likert-scaled questions. It was remarked that to ensure validity, surveys should be reviewed for geographic representation within the municipality and gender distribution. Low return rates can be augmented by creating awareness of the initiative prior to distributing the survey. Other good sources of local data were interviews with long-term residents, data collected through town-hall meetings, collecting input online via social media and websites and soliciting feedback using postcards.

Respondents asserted that universities can play an important role in providing both resources and students to help with the CWB measurement process. Researchers can help develop survey instruments and provide expertise in analysing information. The key problem with this approach as well as other short-term grants was that there may not be any funding available to follow through from any suggested recommendations.

## **5.2 CWB Participation and Buy-in**

Our results reinforce the consensus in the literature that undertaking activities towards visioning a community’s future well-being and choosing indicators that can assess both the current and future states

of that well-being are excellent opportunities for a community to articulate its values and goals as well as foster community involvement and local democratic processes (Oswald and Wu 2010; Camfield and Skevington 2008; Hart 1999). Lessons obtained from CWB measurement processes indicate that initiatives with the strongest community buy-in are locally-developed, locally-focused, community-driven, include a diverse number of actors and stakeholders, and operate in a way that fosters collaboration and works towards a common goal (Hak et al. 2007; Ramos and Jones 2005; Gahin and Paterson 2001; Christakopoulou et al. 2001; Hart 1999). Additionally, a common tenant of successful and long-running CWB measurement initiatives is early, meaningful, and regular opportunities for people to participate in the process. Thus, in contrast to the comments made about expediting early results to justify the project to rate payers and politicians, others suggested that moving slowly to get the right indicators in place was needed to ensure buy-in.

However, sustaining community-buy-in was also described by respondents as being difficult and time consuming. Relationships between various stakeholders must be developed and maintained, organizing meetings and keeping the measurement process moving can present challenges, and the public requires constant updates. Processes with a heavy emphasis on citizen engagement might not be appropriate for communities with time or other resource constraints. Particularly in smaller communities, there is often a lack of funding and human resources to complete the work.

Communities communicate research findings and general information a variety of ways, including town hall-style meetings; meetings in the community with participating groups and citizens; dissemination of research through mail and social media; and general communication of the project provided at local events. The presentation format is one of the more important decisions to be made in the CWB process. If the report is not immediately comprehensible and user-friendly, it may not be helpful to the citizens, policymakers and funders for whom it was designed.

In contrast with CWB processes, respondents suggested that defining a vision and action plan for CCA measurement might prove more challenging. They maintained that there is limited agreement about what successful adaptation should look like. These experts suggested that CCA requires longer timeline planning, multi-stakeholder and multi-scalar involvement. That said, they also noted that lessons from CWB processes and best practices could be quite useful for bringing disparate stakeholders to the table and overcoming barriers. In particular, they noted that mainstreaming CCA measurement into other ongoing measurement processes, involving local leadership and existing CWB expertise and utilizing local knowledge provide particularly valuable opportunities to leverage the CWB analogue.

The final key lesson from many projects is that undertaking the CWB measurement process, in and of itself, contributed to improving the quality of life in communities (JCCI 2013; Sustainable Seattle 2013; City of Calgary 2010; Camfield and Skevington 2008; Cummins 2000). Respondents maintained that dialogue about well-being develops awareness, encourages community-building and contributes to democratic participation. Successful community indicator projects aim to create lasting changes in values and capacities, both in the community and in government agencies.

## **6. GUIDELINES FOR MEASURING CLIMATE CHANGE ADAPTATION**

In Canada, measuring the progress and effectiveness of adaptation has not yet become well integrated into adaptation planning. A range of programs have been successful at raising awareness of the need for mainstreaming of climate change into planning and policy, but no methodology has been accepted for evaluating adaptation, thus success has not yet been fully quantified. The following guidelines draw together insights from this study of the CWB analogue to provide specific lessons that would be applicable to the measurement of CCA.

*Focus on participation and process* – Dialogue on the development of CWB approaches and potential indicators is a key part of the process for measuring well-being. For CCA, focusing on these processes as well as the final outcomes has the potential to contribute to increasing the capacity to undertake CCA activities, deepen awareness and education about climate change adaptation, and encourage citizen participation in measurement initiatives.

*Develop flexible, adaptable measurement instruments* – There are a range of CWB measurement processes that are typically adapted to suit the needs of the local community. Developed CCA measurement processes can adapt existing tools and will also need to be flexible and include a range of indicators and measurement approaches.

*Define the scope of the project* – Since CCA projects are expected to be broader in scope and more complex than CWB initiatives, measurement efforts will require larger and on-going commitments of resources including money, time and personnel. Communities should clearly assess and define the temporal and geographic scope of their measurement processes as well as the sectors and dimensions that will be included.

*Aim for wide agreement on chosen indicators* – Prior to starting any CCA measurement processes, an assessment of which indicators are most important to the community should be undertaken. These indicators are often chosen as part of a visioning process and should reflect the range of perspectives about the community's values and aspirations. This can help ensure community buy-in for the CCA project and measurement initiative.

*Choose actionable indicators that can inform decision-making* – Choose indicators that can support and inform the development of new policies, programs or activities at the local scale. Indicators that only provide information, but no clear understanding of how to operationalize them, are not useful in moving towards CCA.

*Decide on the data types* – There are several choices to be made about the data that will be used to measure particular CCA indicators. This includes decisions about objective/subjective, profile/process and secondary/primary data. Objective, profile and secondary data are often more readily available, however, this information might not be appropriate for the measurement of some desired indicators.

*Find the right data* – It is important to know how well the data fits the desired CCA indicator. When the available data is poor, fragmented or compromised in any way, analysts should be cautious and transparent in how the results are evaluated.

*Access data from a wide range of sources* – Useful data for measuring CCA could be available from federal and provincial sources as well as from a plethora of local, public and private organizations. While privacy and proprietary issues might limit access to these data, this can sometimes be overcome through measurement processes that develop relationships amongst stakeholders and a focus on common goals.

*Ensure data accuracy and validity* – Particularly when secondary data is used to measure CCA, researchers need to understand how the information was collected and if that has changed over time. Caution also needs to be exercised when aggregating data from a variety of sources and time periods. Otherwise, the reported results for the associated indicators might be inaccurate.

*Develop buy-in and support for measurement initiatives* – Successful CWB measurement initiatives are those that are locally developed, community driven, include a wide range of stakeholders and work to foster collaboration. Before undertaking CCA data collection, it will be important to achieve local buy-in through extensive public outreach, both for data gathering and raising awareness about the program. Both traditional methods and social media can be important tools to connect with the community's target audiences and raise awareness about the measurement project.

*Work towards de-siloing to access needed data* – With its focus on process, participation and inclusivity, CWB measurement processes are often able to bring together traditionally siloed municipal

departments, organizations and citizens to focus on achieving common goals. Siloing is a measurement issue that restricts collaboration and data sharing. CCA measurement should strive to involve multiple stakeholders across various scales. Measurement exercises should facilitate the development of a shared vision, where everyone understands how they benefit from being involved.

*Be prepared for potential friction on sensitive topics* – In any measurement process, some topics can be polarizing or highly sensitive. These can often be addressed by developing collaborative processes, using neutral terminology and focusing on the assessment of the tactical issues most people would like to see resolved (e.g. poverty or flooding).

*Recognize conflicting priorities* – Community members might hold conflicting goals such as the concurrent desires for extensive collaboration, lower taxes and immediate results. To reduce the probability that such tensions will derail the CCA measurement process, the community should actively discuss and resolve any noted conflicts.

*Utilize university-based researchers* – Many successful CWB initiatives result from strong partnerships with university researchers. Fostering these relationships within a CCA measurement process can bring expertise, resources and funding for the project which may not otherwise be available.

*Assess opportunities for mainstreaming* – Mainstreaming is the practice of embedding additional processes such as CCA measurement, into activities already being undertaken by the community. Mainstreaming reduces the burden and maximizes the efficiencies of measurement exercises especially on small communities. Of note, some available CWB initiatives currently include the measurement of CCA, while other CWB approaches could easily be modified to include its measurement.

*Develop clear and understandable results* – It is important to present results and reports in a way that is accessible, easy to understand, and makes sense to the reader. Formats that use metaphors to present results, including dashboards and report cards, are very effective at disseminating measurement outcomes.

## 7. FINAL THOUGHTS

This paper has outlined the CWB measurement literature and reported on the results from the primary data collection with twenty CWB/CCA key informants. Lessons learned were then outlined for the development of measurement approaches associated with CCA. It is clear that successful measurement approaches provide communities with the opportunity to develop processes that reduce risk, are locally-relevant and foster relationships between myriad, often disconnected actors, stakeholders, and municipal departments. As CCA projects are undertaken and measurement approaches are developed, early successes will likely be more achievable using easily-accessible quantitative data and profile indicators. Since CWB measurement processes are well established and CWB will be profoundly affected by the impacts of climate change, a fruitful approach might also be to embed CCA measurement within existing CWB frameworks. In the long term, it is hoped that diligent CCA measurement could help motivate further proactive local initiatives and broader government policies toward addressing the impacts of climate change.

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