

INDICATORS OF HUMAN CONSEQUENCES FOR ECOLOGICAL ECONOMIC PLANNING AND POLICY

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Keywords: indicators, quality of life, monitoring, sustainable development, community participation

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Summary

Human health, quality of life and well-being are embedded within the broader context of ecosystem health. To help guide planning and policy decisions and monitor the consequences of decisions and actions, many government agencies have established indicators as part of their strategy. Many physical, chemical and biological indicators have been produced. More recently, it has been recognized that the human dimensions are vital quality of life (QOL) and ecosystem health determinants. Subsequently, there have been efforts to produce indicators which provide information about social and economic conditions. By their nature, indicators to guide planning and policy decisions are top-down or policy-oriented. However, QOL is unique to each community. Therefore, not only are policy indicator efforts burdened with significant resource

expenditures, they also frequently overlook many important features of QOL and also, therefore, many opportunities to improve ecosystem health.

This chapter will explore both the nature of and how practical indicators might be applied to ensure that consequences for the human dimensions are consistently and holistically considered as part of government planning and policy, and to support the monitoring of projects and policy changes post implementation. The emphasis is on quality of life indicators at the community level and linking these with policy-oriented indicators to guide decisions towards sustainability, and monitor the effects of policy changes and projects and identify opportunities to improve QOL and ecosystem health. The objective of this approach is to generate a much more participatory, holistic, systematic and consistent assessment of human consequences and ecosystem health determinants during planning and policy considerations. It should also generate, through extensive community participation, desired behavior and lifestyle changes necessary for improved QOL and ecosystem health.

1. Introduction

Evaluating and monitoring the consequences from projects and policy changes for people and communities can consume significant resources and impose enormous costs. Frequently many essential elements of a community's quality of life are omitted from vital decisions, neglected or overlooked during the planning and decision making processes and follow-up monitoring stages. This is often due to the elusive nature of the many factors that contribute to quality of life (QOL). QOL is often characterized by intangible measures and differ considerably between communities and even people. These features make the characterization, evaluation and monitoring of human consequences through conventional practices burdensome and difficult.

Typically, it is common to observe efforts intended to characterize, assess or monitor QOL impacts that are unsatisfactory or incomplete; failing to meaningfully predict or monitor the consequences for people or communities resulting from policy changes or the implementation of projects. Frequently, policy indicators reflect the needs of specific policy goals determined by third parties removed from communities. Often they manifest the values of the professionals developing them and generally emphasize quantitative biophysical measures. On the other hand, community-focused indicators rarely guide policy decisions. The Environmental Impact Assessment process, Social Impact Assessments and Health Impact Assessments often reflect QOL issues yet are applied at the individual project level rather than more aggregate planning level and can be constrained by resource limitations and by initial terms of reference. Assessments vary considerably and their application can be inconsistent.

Sustainable development strategies endeavor to solve some of these challenges, improve upon decision making and support more sustainable planning, frequently incorporating a social dimension. Yet they remain constrained by policy oriented objectives which may not necessarily correspond to community objectives, values and the priorities which benefit a community's quality of life. Moreover, the inclusion of social elements are often variable and unpredictable, frequently lacking the necessary consistency and baseline information essential for appropriate and effective decisions and follow-up

monitoring. Furthermore, since sustainable development strategies are intended to generate sustainable decisions, activities, behaviors and lifestyles, inclusion of all stakeholders in the planning, decision making and monitoring processes is crucial to heighten awareness, learning and empowerment and to produce the desired motivation and behavior changes necessary for sustainable decisions and activities. This may only be achieved through enormous expenditure of resources from a top-down policy oriented perspective.

Improved tools for consistently and effectively assessing and monitoring the human consequences of planning and policy decisions are clearly needed. This suggests tools need to be developed and applied with the ability for inclusive planning which do not overburden already stressed government resources yet can deliver the required flexibility and information for effective planning, policy changes and follow-up monitoring in a consistent manner. Community generated human indicators are a valuable tool to help achieve these objectives. They can: effectively capture the consequences of planning or policy changes on people and communities; help guide decisions to improve QOL and achieve sustainable development goals; efficiently allocate resources; engage community members; and monitor the results post implementation.

2. Quality of Life

Recent research has demonstrated the tenuous and often counter-intuitive links between economic growth and standard of living on the one hand with quality of life and human well-being on the other. Human activities must deliver tangible benefits to the latter and not merely contribute to the former. Policy changes and planning decisions must reflect this fundamental fact. Given the environmental risks and uncertainties associated with increasing material and energy consumption from human activities, and the intimate relationship between QOL and ecosystem health, the ability to consistently and effectively predict, assess, understand, monitor and respond to the impacts of planning and policy decisions on quality of life, human health and well-being is becoming ever more essential.

Quality of life (QOL) can be broadly defined as the happiness and satisfaction of ones life and with ones physical and social environments including needs and desires, aspirations, lifestyle preferences and other factors determining overall well-being. Furthermore, the quality of life of any particular community is unique and largely defined by the particular social, political, economic, cultural and environmental characteristics of that community. Clearly, QOL includes many, sometimes quite elusive and intangible, characteristics. Nevertheless, these features are essential and need to be appropriately characterized and reflected in policy decisions and planning activities to benefit the local population, society in general and global sustainability. Conventional practices intended to measure, monitor, understand and manage the impact on our QOL and on the physical and biological environments from human activities cannot readily capture these characteristics and linkages.

Furthermore, fundamental concern for environmental quality and the effects on humans has been consistently reflected in public opinion polls. These facts combined with scientific data revealing an erosion of our quality of life due to human activity has

contributed to the realization of a need for more and better information to help guide decisions and monitor the consequences of our activities.

3. Indicators

3.1. What They Are

Indicators help fill this measurement and monitoring information gap. They are a process of monitoring and assessing change. Indicators improve our understanding of change and convey information on opportunities to better manage human activities, planning decisions and policy changes. An indicator is a repeatable measure of some phenomena which may be consistently measured over time to allow the identification of long-term trends, periodic change and fluctuations in rates of change. They must provide information about the state of the phenomena being measured and advance warning of possible problems. They may also help to clarify linkages between causes and effects and help reveal solutions consistent with determined goals and targets. An indicator may be either quantitative or qualitative. Both types are valuable for assessing change at the community level and guiding policy decisions.

Indicators can provide information about the state of, trends in and factors that affect the system under measurement. Several definitions of indicators exist. Indicators are considered a statistic or several statistics by some, whereas others have distinguished between a variable and an indicator. A variable represents a physical, chemical or biological quantity, while an indicator reflects an attribute derived from a specific variable. For example, an environmental variable may be the level of sulfur dioxide in ambient air, while a corresponding environmental indicator may be the number of days sulfur dioxide levels exceed air quality standards. Another definition considers an indicator a repeatable measure made of the same phenomena over time, where the time series permits the identification of long-term trends, periodic change and fluctuations in rates of change. From this definition, an indicator measures a single phenomenon while the combination of several indicators defines an index (such as the air quality index or the GDP).

Other definitions emphasize the quantifiable magnitude of stresses, exposures or responses attributed to the nature of indicators measured. Indicators are generally characterized as a single, or a combination of, measures that provide useful and reliable trend information. They provide a simplified method of recognizing changes that have occurred, or are likely to occur.

3.2. Types of Indicators

Indicators may be classified as individual, representative or composite. Individual indicators measure a single variable, representative indicators reflect the behavior of a large number of variables and composite indicators combine several variables into a single quantity or index.

Indicators may also be classified as objective or subjective. Objective indicators are quantitative data measures obtainable from a variety of sources. Subjective indicators are

qualitative measures obtained from the public. For example, an objective indicator may be a measure of the number of days the level of sulfur dioxide at a given time and location exceeds air quality standards, while a subjective indicator may be the number of complaints received concerning uncomfortable odors in a neighborhood. Objective indicators provide indirect measures, or surrogates, of QOL and environment linkages while subjective indicators provide direct measures of QOL and environment linkages.

Objective indicators have been successful in capturing general trends and standardizing these temporally and spatially. However, objective indicators have been criticized for their lack of social theory from which to guide indicator selection such as when readily quantifiable measures (ie. life expectancy) are selected as surrogates for vague concepts (ie. good health). Other criticisms include: lack of data consistency between local, regional, provincial and national levels; difficulties and controversies standardizing measurements and low accuracy of measurements and; the use of linear thought to define complex causal relationships.

Data for subjective indicators may be expensive to collect, such as in a survey or questionnaire and individuals may assign different meanings to various phrases, words and questions. Subjective indicators do, however, capture the community needs from the community perspective. In this sense, subjective indicators are more likely to capture an accurate assessment of QOL issues and changes. Data may be collected, for example, through solicited (eg. surveys or meetings) or unsolicited (eg. a complaint registry) means or participatory research methods.

It is necessary to include several indicators as well as a mix of indicator types in order to meet all the criteria of indicator selection. A combination of methods are necessary to capture the complexities of QOL issues; subjective tools to deal with the "messy background noise" which characterize the complex interactions and objective tools for generalizable knowledge. Chaos theory challenges the validity of the search for rational order. It suggests a new set of metaphors are required for thinking about what and how we observe, and what we may conclude as a result of our observations. Objective indicators alone only produce one element of a multi-faceted complex issue. Subjective perceptions are equally important. The complex social, political, economic and biological interactions demands the recognition of uncertainty for QOL and environment linkages. To effectively provide data about the state of, trends in and factors that affect the system under measurement, these complex interactions will require a variety of indicators and indicator types.

3.3. Indicator Selection

Indicators need to be carefully selected to be meaningful to the users. They need to address agreed upon goals and targets in an easily understood and transparent fashion while revealing credible information. Indicators must provide warning of possible problems by monitoring trends, help define linkages between causes and effects and help identify solutions consistent with determined goals and targets. This is clearly a challenging task: goals and targets must be agreed upon and specific issues may vary greatly between regions and partners; information may be incomplete, often diffuse between regions and missing for given time periods; standardized measurements or

definitions are often lacking; and information in the form of raw data may present methodological difficulties. Indicators, an indicator set or sets of indicators are developed for diverse conceptual frameworks and purposes. Furthermore, as policies and public views evolve, so may indicators.

3.4. Top-Down and Bottom-Up Indicators

Top-down or policy driven indicators, often developed through rigorous scientific methodologies by agencies and groups detached from the community, cannot alone effectively capture the complex and important characteristics of QOL as defined by the community. Factors such as the lack of available data sets and sources, financial constraints and the difficulty capturing community values prohibit policy oriented or top-down indicators alone, by their very nature, from resolving the granularity of community uniqueness.

We now understand that to achieve desired future changes towards improved QOL requires a clear vision of genuinely shared goals and priorities of community members. The requirements of a community must be understood to be effectively and appropriately described or modelled. In order to reflect QOL goals and priorities, a clear and common vision is essential. Therefore, to develop a holistic set of indicators, a key ingredient will be the definition of locally relevant indicators to capture the basic attributes of quality of life and well-being as defined by that community. In turn, this will generate the awareness, learning and empowerment necessary for dialogue and desired behavior and lifestyle changes.

The complex physical and social environmental interactions, along with our improved understanding of indicators, clearly demonstrate the importance of human indicators to effectively capture the dynamics between our QOL and the environment. The following section will provide an overview of human indicators.

4. Human Indicators

Since we are dealing with complex human interactions, perceptions and risks and their linkages with the natural environment when we discuss QOL issues, it seems sensible, in order to formulate a holistic, or transdisciplinary, perspective, to distinguish between human indicators on the one hand and human constructed environment and natural environment indicators on the other hand. In this regard, it seems more reasonable to express QOL values, goals and their priorities and produce measurements on the human environment rather than restrict, reduce or disaggregate these to social, economic, socio-economic, cultural, health, and similar components or surrogates such as biological, chemical and physical components. Afterall, indicators are a human construct in themselves, and therefore, reflect specific human values. Who better than those affected by the selected values, goals and priorities to define, measure and respond than those most likely impacted by the consequences of those decisions? Policy-oriented indicators produce results reflecting the values, goals and priorities of the professionals and stakeholders participating in their development. Therefore, from the policy level, community values must be implicitly assumed rather than articulated in broad public discourse. Furthermore, such indicators typically reflect abstract, reductionist methodologies with a high degree of compartmentalization and disaggregation between

issues and measures. Accommodating complexity and chaos to produce a holistic set of indicators is typically absent from conventional policy-oriented efforts. Furthermore, due to the intangible and elusive nature of QOL, people and communities are likely to be more receptive to and creative with broad classifications rather than constraining specialized terminology.

Rather than disaggregate the cornucopia of human constructed environments (social, economic, cultural, etc.) and add a cluster of natural (biological, physical, chemical, etc.) environmental indicator surrogates, human indicators provide a holistic web of indicators capable of linking the human and natural environments and are better capable to express quality of life at a community level. This approach is consistent with an ecological economics approach where human activities are viewed as a subset of a finite and closed biophysical system. Furthermore, natural systems and human social organization exhibit characteristics of complex systems. They are non-linear and demonstrate discontinuous and chaotic behavior. Linear cause-effect thinking fails to effectively represent the real world of complex interactions and relationships. Sustainability dictates confronting change, uncertainty and irreversibility and accounting for self-regulating and self-organising processes within natural and social systems. Human indicators reflect these complex linkages between and within the human and natural environments.

It has been widely recognized that the human economy and human social systems are embedded in, and dependent upon the natural environment; the latter in turn is impacted by human sub-systems. Our QOL and well-being results from complex social, economic, political, biological, genetic and physical environmental interactions. Environmental contaminants are only one category of variables that affect human health and our quality of life and well-being. Other variables include nutrition, adequate shelter, genetic make up, exposure to bacterial or viral disease agents, lifestyle factors such as smoking, drinking and fitness, social well-being and others. What is necessary is a holistic approach or a holistic set of indicators that encompass the entire ecosystem, avoiding restrictive and possibly misleading conclusions, decisions, actions and behaviors. An accurate characterization of QOL feedbacks and response mechanisms is vital if we are to avoid unexpected effects and responses from planning decisions, policy changes and project implementation. Enhanced conservation or remediation in one area may merely shift the burden of stresses to another area. Historically, insufficient measures of QOL have been employed to assess, guide, monitor and respond to change. The GDP, for example, employed as a broad measure of QOL has been widely criticized and generally acknowledged as an ineffective tool for guiding decisions towards improved well-being and QOL and assessing, monitoring and responding to social, environmental and even economic changes.

Many indicators developed to date have focused on physical, chemical or biological data. These indicators have often been developed to satisfy specific policy goals and evolved into quantifiable, scientific measures. This information is effective to help guide policy decisions on specific natural environmental matters. However, the nature of the information is often of little relevance to communities who have a holistic expectation of their particular quality of life. Policy approaches emphasize quantitative surrogate indicators as key to providing information to public audiences, thereby increasing knowledge levels. This approach has been central to behavior modification strategies

seeking to improve QOL. However, research has clearly demonstrated that attitudes and behaviors are not always congruent with levels of knowledge. Levels of knowledge can be quite high, yet individual actions and behaviors to enhance quality of life or minimize environmental damage is most predictable only after direct and immediate personal threats are perceived. In other words, communication of quantitative scientific data has limited impact on lifestyle and behavior changes necessary to improve QOL and achieve sustainability. Clearly the success of any indicator species is dependent on whether the general public values it. The immediate, tangible and practical value of an indicator to a community's quality of life will determine its success. Indicators must be relevant, valid and provide data about the state of, trends in and factors that affect the system under measurement. Successful indicators of quality of life will provide opportunities for learning, empowerment and increased awareness and stimulate dialogue leading to desired actions and behavior changes.

The differences between communities define their uniqueness. Unique community distinctions clearly influence QOL and responses to stresses. These differences establish QOL values and priorities that are specific to each individual community. To be effective, indicators must capture this distinctiveness to permit effective planning and policy guidance and results monitoring. Indicators must also reflect the complexity and linkages inherent in QOL. This can be accomplished through the utilization of human indicators.

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Biographical Sketch

Robert pursued formal studies at the University of Waterloo where he attained his BSc Honours Degree with a concentration in physics in 1989. This led to various positions within industry and government in the environment, health, energy, technology and resources sectors. Armed with this expertise, Robert returned to his 'environmental' passion, exploring urban development and sustainability with national and local NGOs, government agencies, and academic partners. This soon fuelled a greater exploration of sustainable development expanding into economics, social sciences, and ecological disciplines.

Gradually, this journey led to the study of ecological economics and ultimately to sustainable consumption, where much of Robert's current research resides. This work has a focus on forces that guide consumption choices, human and ecological consequences of modern consumer societies, and opportunities for more sustainable consumption, principally through societal and institutional transformations and individual behaviour changes. Much of this research applies key concepts from the social determinants of health, and population and ecosystems health frameworks.

Simultaneously, diverse consulting experiences have cultivated a better understanding and application of ecosystem sciences, impact assessments, indicator development, health research, and quality of life assessments across policy and program fields. This has enabled the integration of sustainable consumption into such areas as Health/Social Impact Assessment, tobacco consumption, technology development, globalization, and Aboriginal community well-being and resource exploitation.

Robert writes a weekly column on health and the environment, and continues to pursue sustainable consumption research while consulting for government agencies, NGO's and industry, and conducts various health and environmental community projects. Details on many of Roberts activities, areas of interest, publications, and projects can be found on his web site <http://www.ncf.ca/~at758>.