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# Mission Creek

## Sustainable Watershed Indicators Workbook

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Canadian EarthCare Foundation  
[www.earthcares.org](http://www.earthcares.org)



Province of British Columbia  
Ministry of Sustainable Resource Management

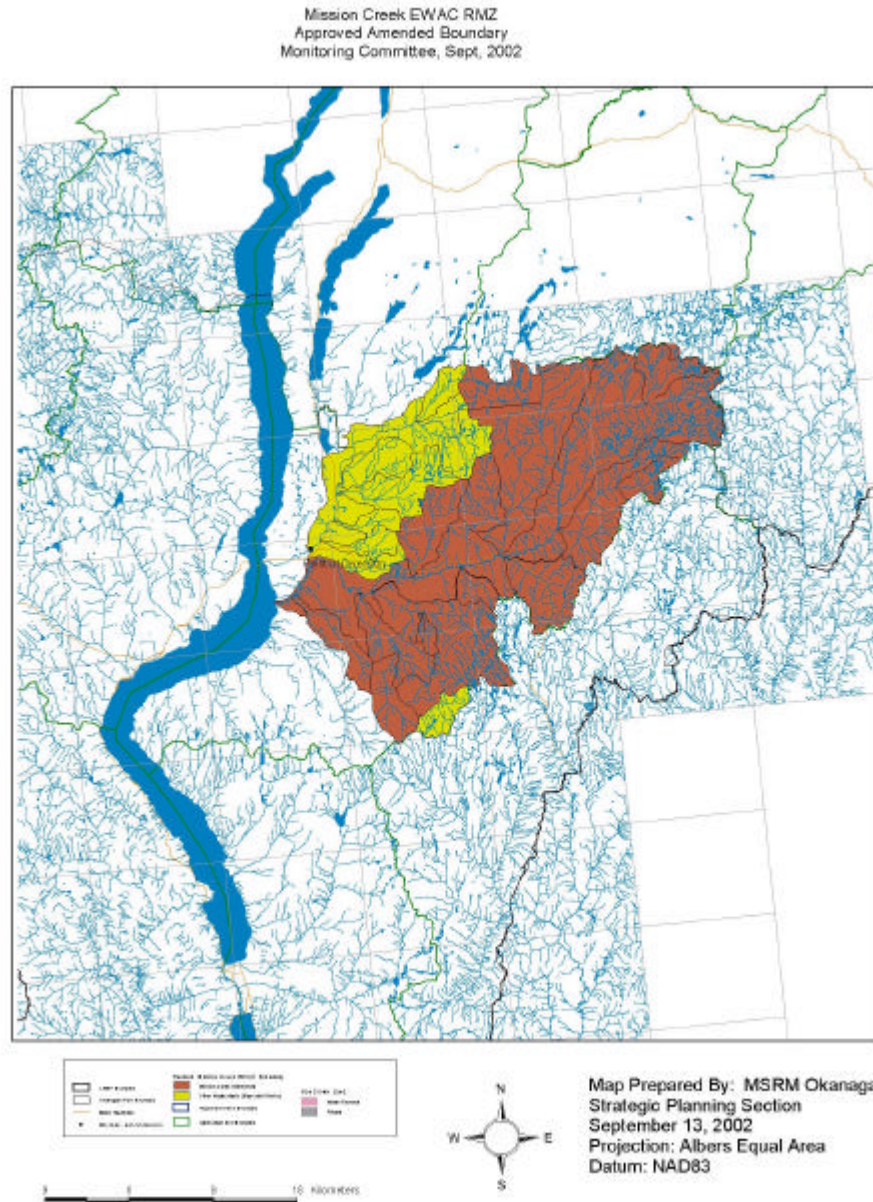
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### April 2003 Workshop Materials

April 15, 2003

## The Mission Creek Watershed

The Mission Creek watershed is the largest watershed in the Okanagan Basin at 859 square kilometres. Comprised of eight sub-basins, predominant uses of the watershed are forest harvest, urban settlement, agriculture, and drinking water supply. Significant fishery and recreational values are well recognized by the community at large.



## **The Mission Creek Enhanced Resource Management Zone**

The Okanagan Shuswap Land and Resource Management Plan designates the Mission Creek Watershed as an area of enhanced “RMZ” management. The goal is “to establish a process that will ensure that the Mission Creek watershed is managed in a holistic and integrated manner for all water-related resource values. Crown land and private land management activities pertaining to water resources and aquatic habitat need to be accounted for and effectively coordinated and integrated to ensure sustainability of key values”.

## **Mission Creek Enhanced Watershed Advisory Committee**

The Mission Creek Enhanced Watershed Advisory Committee (EWAC) will be responsible for coordinating and providing stakeholder advice to statutory decision-makers and acting as a central information repository for activities in the watershed. The Terms of Reference for EWAC require it to develop an integrated monitoring program for the Mission Creek watershed.

## **We need your help!**

On behalf of the Ministry of Sustainable Resource Management, the Canadian EarthCare Foundation and Regional District of Central Okanagan are hosting a workshop to develop a set of indicators that will help EWAC in monitoring sustainability in the Mission Creek Watershed. We need your help in selecting indicators that monitor not only the health of the watershed, but also the functions of the EWAC.

## **Objectives of the Workshop**

There are a variety of indicators used by different agencies and businesses to monitor activities in the watershed leaving many more to choose from. As organizations, we all have different perspectives that we want reflected in the indicators. We all use indicators to monitor the success of different management tools, objectives and programs. Members of the public have even greater expectations that activities are being adequately monitored according to a broad and diverse set of indicators.

The challenge for the workshop will be identifying a set of indicators that:

- Is reasonable in size and scope;
- Provides balanced consideration of the economic, social and environmental aspects of sustainability;
- Reflects directly on management of activities within the watershed; and
- Has relevance and support among all interests.

The choice of indicators will assist EWAC in determining what tools and mechanisms it needs in order to meet its objectives.

For example:

- Water Quality Index may be a good indicator of Mission Creek watershed sustainability.
- Issuing a 5 year Report Card on Watershed Sustainability may be a good indicator of coordination between statutory decision makers.

## **Who is at the Workshop?**

Workshop participants represent diverse groups and agencies that are identified as key stakeholders within the Mission Creek Watershed. They include representatives of federal, provincial, municipal, regional district, first nation governments, resource companies, irrigation districts, recreational, agricultural, environmental, and community representatives. Integrating stakeholders is critical to integrating watershed management.

Copies of the Indicators Workbook are available from Regional District of Central Okanagan  
Planning Department  
2<sup>nd</sup> Floor 1450 KLO Road  
Kelowna BC

or may be obtained through Canadian EarthCare Foundation through request to [www.earthcares.org](http://www.earthcares.org)

Information on the Mission Creek Enhanced Resource Management Zone is available from Ministry of Sustainable Resource Management. A copy of the text is available in Appendix D.

Reference copies of the Okanagan Shuswap Land and Resource Management Plan are available at <http://srmwww.gov.bc.ca/sir/lrmp/okan/index.html>

## How to Use this Workbook

This workbook is intended for use **before** and **during** the workshop. Participants are encouraged to use the workbook to:

- Become familiar with use of indicators;
- Consider criteria from which to select a range of indicators;
- Solicit input from others in the organization as to how relevant each indicator may be to achieving the goals of the Mission Creek RMZ;
- Prepare to participate in the selection of indicators.



## Acknowledgements

The workshop and this workbook are made possible through contributions from the following organizations:

Ministry of Sustainable Resource Management  
Habitat Conservation Trust Fund  
Canadian EarthCare Foundation  
Regional District of Central Okanagan

Resource materials and speakers are based on the learning's and experiences shared by:  
Fraser Basin Council

Ministry of Water, Land and Air Protection  
International Council for Local Environmental Initiatives  
Environment Canada  
City of Kelowna  
Okanagan University College Freshwater Science Program  
Riverside Forest Products Ltd.

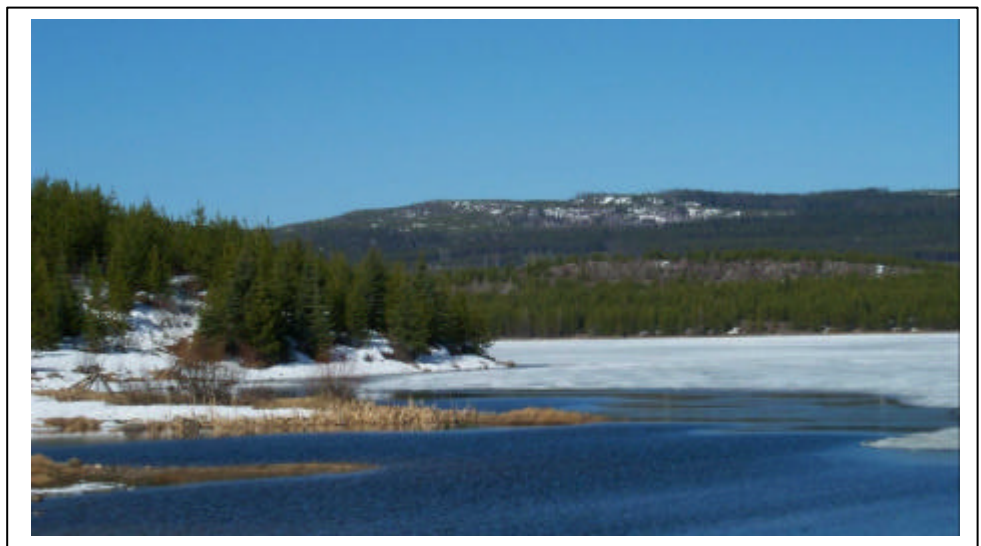
## Selecting Sustainability Indicators

The indicators presented in this workbook were selected from concurrent or recent monitoring programs in place within City of Kelowna, Fraser Basin Council, and the Okanagan Shuswap Land and Resource Management Plan.

### Selection Criteria

The following criteria may be used to guide the selection of Mission Creek Watershed sustainability indicators:

- Availability – Data is available and easily accessible. It is collected throughout the watershed and published on a routine basis; is made available to members of the public.
- Understandable – Data is easily understood by a diverse range of non-technical audiences.
- Credible – Data is supported by valid, reliable information and interpreted in a scientifically defensible manner.
- Relevant to Management of Activities in Mission Creek – Data reflects changes in management and in activities in the watershed. It can be used to measure changes over time.
- Integrative – Data demonstrates connections among the environmental, social and economic aspects of sustainability.



### How Indicators are used?

Indicators are sets of data or anecdotal reports used to identify and track outcomes of management decisions. Indicators are not solutions, but are measurements that trace whether or not the interaction of social, economic and environmental policies within Mission Creek watershed move us in a direction that will achieve or not achieve our goals. (Paraphrasing the Fraser Basin Council).

More information on the use of Indicators, including a number of relevant websites, is provided in Appendix A and Appendix B. Further reading on sustainability is provided in Appendix A and Appendix C.

## Indicators Measuring Watershed Sustainability or Environmental Health Chosen by Others

### Fraser Basin Council

Selected the following indicators to Measure “Caring for Ecosystems”

- Water Quality Trends
- Salmonid Stocks at Risk
- Forest Management Certification
- Sustainable Resource Management Plans
- Forest Pests
- Waterborne Disease Outbreaks
- Boil Water Advisories
- Fish and Wildlife Species at Risk
- Groundwater
- Age & Species Distribution of Forests
- Protected Areas Management
- Farm Environmental Management
- Energy Consumption
- Population Vulnerable to Flooding

### City of Kelowna

Selected the following indicators to Measure Drinking Water Quality and Quantity:

- Total Coliform and E.Coli bacteria
- Turbidity
- Dissolved oxygen
- Average daily water use per capita
- Water Quality Index
- Extent of community wastewater collection
- Public education programs
- Temperature
- Nutrient analysis
- Number of water meters installed
- Number of storm drain outfalls
- Extent of storm drainage systems
- Fish Stocks (measured by F&O & WLAP)

### Okanagan Shuswap Land and Resource Management Plan (LRMP)

Indicators to Measure Ecosystems, Fish, Riparian, Water and Community Watershed objectives

- Ecosystem representation
- Rare ecosystems
- Old Growth
- Stand Attributes
- Salmon Fishing
- Maintenance of Fish Stocks
- Riparian Management
- Amount and timing of flow
- Water Quality - Watersheds
- Vulnerable Aquifers
- Biodiversity Emphasis Option Location
- Seral stage Distribution
- Connectivity
- Aquatic land/foreshore
- Salmon Habitat
- Bull Trout & Broodstocks
- Stream Riparian Management
- Consumptive Allocation
- Water Quality- Wells

### International Council for Local Environmental Initiatives (ICLEI)

Suggests the following indicators for use by watershed forums:

- Ambient water quality
- Access to potable water supplies
- Average per capita consumption of water
- Leaked and/or unaccounted for water
- Reuse of nutrients from human excrement
- Density of hydrological monitoring networks
- Proportion of water costs paid by users
- Extent and frequency of flooding events
- Water metering
- Industrial water use
- Solid waste collection
- Type of sewage disposal
- Extent of solid waste reuse/recycling
- Rainwater harvesting
- Groundwater table levels
- Industrial water reuse/recycling


## Finding Commonality in Indicators

Indicator in Use (see previous tables)	Fraser Basin	City of Kelowna	LRMP	ICLEI
Water Quality (Ambient/ Trends/Index/ Watersheds)	♦	♦	♦	♦
Fish and Wildlife at Risk (Stocks at Risk/Salmonid/Bull trout & broodstocks)	♦	♦	♦	
Sustainable Resource Management Plans	♦			
Protected Areas Management	♦			
Farm Environmental Management	♦			
Forest Management Certification	♦			
Forest Pests	♦			
Age & Species Distribution of Forests / Ecosystem representation	♦		♦	
Energy Consumption	♦			
Boil Water Advisories/ Access to Potable Water	♦			♦
Total Coliform and E.Coli bacteria / Waterborne Disease Outbreaks	♦	♦		
Turbidity		♦		
Dissolved oxygen		♦		
Average daily water use per capita/ Average consumption		♦		♦
Type of sewage disposal / Extent of community wastewater collection		♦		♦
Public education programs		♦		
Temperature		♦		
Number of water meters installed		♦		♦
Number of storm drain outfalls		♦		
Extent of storm drainage systems		♦		
Rare ecosystems			♦	
Old Growth			♦	
Stand Attributes			♦	
Salmon Fishing			♦	
Riparian Management / Stream Riparian Management			♦	
Amount and timing of flow / Extent and frequency of flood events	♦		♦	♦
Vulnerable Aquifers/ Groundwater / levels	♦		♦	♦
Biodiversity Emphasis Option Location			♦	
Seral stage Distribution			♦	
Connectivity			♦	
Aquatic land/foreshore			♦	
Salmon Habitat			♦	
Consumptive Allocation			♦	
Leaked and/or unaccounted for water				♦
Reuse of nutrients from human excrement				♦
Density of hydrological monitoring networks				♦
Proportion of water costs paid by users				♦
Industrial water use				♦
Solid waste collection				♦
Extent of solid waste reuse/recycling				♦
Rainwater harvesting				♦
Industrial water reuse/recycling				♦


## Selecting Indicators

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Workshop participants are invited to use the following matrix as a guide to evaluating the following nine indicators used by two or more of the “others” (refer to pages 5 &6).

Indicator (s)	Criteria	Comments – Does this indicator meet the criteria?
Water Quality /Ambient Water Quality/ Water Quality Index/ Watersheds	Available/ Known Source of Data?	<hr/> <hr/> <hr/> <hr/> <hr/>
	Understandable	<hr/> <hr/> <hr/> <hr/>
	Credible Any pros or cons to using this indicator?	<hr/> <hr/> <hr/> <hr/>
	Relevant	<hr/> <hr/> <hr/> <hr/>
	Integrative	<hr/> <hr/> <hr/> <hr/>

Indicator (s)	Criteria	Comments – Does this indicator meet the criteria?
Fish Stocks (Stocks at Risk/ Salmonid/ Bull trout & broodstocks)	Available/ Known Source of Data?	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>
	Understandable	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>
	Credible  Any pros or cons to using this indicator?	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>
	Relevant	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>
	Integrative	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>


Indicator (s)	Criteria	Comments – Does this indicator meet the criteria?
Age & Species Composition of Forests / Ecosystem representation	Available/ Known Source of Data?	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>
	Understandable	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>
	Credible  Any pros or cons to using this indicator?	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>
	Relevant	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>
	Integrative	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>

Indicator (s)	Criteria	Comments – Does this indicator meet the criteria?
Boil Water Advisories/ Access to Potable Water/ Total Coliform and E.Coli/ Waterborne Disease Outbreak	Available/ Known Source of Data?	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>
	Understandable	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>
	Credible  Any pros or cons to using this indicator?	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>
	Relevant	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>
	Integrative	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>

Indicator (s)	Criteria	Comments – Does this indicator meet the criteria?
Average daily water use per capita/ Average consumption	Available/ Known Source of Data?	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>
	Understandable	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>
	Credible  Any pros or cons to using this indicator?	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>
	Relevant	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>
	Integrative	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>

Indicator (s)	Criteria	Comments – Does this indicator meet the criteria?
Type of sewage disposal / Extent of community wastewater collection	Available/ Known Source of Data?	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>
	Understandable	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>
	Credible  Any pros or cons to using this indicator?	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>
	Relevant	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>
	Integrative	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>

Indicator (s)	Criteria	Comments – Does this indicator meet the criteria?
Number of water meters installed	Available/ Known Source of Data?	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>
	Understandable	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>
	Credible  Any pros or cons to using this indicator?	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>
	Relevant	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>
	Integrative	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>

Indicator (s)	Criteria	Comments – Does this indicator meet the criteria?
Amount and timing of flow / Extent and frequency of flood events	Available/ Known Source of Data?	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>
	Understandable	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>
	Credible  Any pros or cons to using this indicator?	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>
	Relevant	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>
	Integrative	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>

Indicator (s)	Criteria	Comments – Does this indicator meet the criteria?
Vulnerable Aquifers / Groundwater/ Levels	Available/ Known Source of Data?	<hr/> <hr/> <hr/> <hr/> <hr/>
	Understandable	<hr/> <hr/> <hr/> <hr/> <hr/>
	Credible  Any pros or cons to using this indicator?	<hr/> <hr/> <hr/> <hr/> <hr/>
	Relevant	<hr/> <hr/> <hr/> <hr/> <hr/>
	Integrative	<hr/> <hr/> <hr/> <hr/> <hr/>

**Nominations:**

Workshop participants are invited to use the following matrix as a guide to nominating indicators (other than the above nine) that are important in measuring progress toward sustainability for Mission Creek watershed.

Indicator (s)	Criteria	Comments – Does this indicator meet the criteria?
Nominations:	Available/ Known Source of Data?	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/>
	Understandable	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/>
	Credible	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/>
	Relevant	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/>
	Integrative	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/>

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# Sustainable Watershed Indicators

## Appendix A

Extracts from Fraser Basin Council,  
Sustainability Indicators for the Fraser Basin: Workbook,  
October 2000

### What do we mean by Sustainability?

Sustainability can mean a variety of things to different people and after years of wrestling with the concept in nations around the globe, it is still difficult to assign the word a definition supported by everyone. However, most definitions of sustainability relate to the extent to which society can strike a balance, in our decisions and actions, between social, economic and environmental values.

The Fraser Basin Council defines sustainability as “Social well being supported by a vibrant economy and sustained by a healthy environment”.

### What is an Indicator?

Indicators are statistical data that can be selected and observed to gain insight into the functioning of a complex system.

Example: Body Temperature

Body temperature is a common indicator of human health. The body temperature of a healthy human being is 37°C. When body temperature is above or below 37°C, the person may be sick. If the indicator suggests that the person may be ill, then we may seek additional information on the illness (ie., in addition to a high fever, what are other symptoms?) Our knowledge of body temperature, combined with information about other symptoms, can give us insight into the specific nature of the illness and identify treatment options.

We already use indicators every day. For example, most people are familiar with indicators such as:

- Increase in unemployment rates;
- Large drop in the TSE 300; or
- Increase in housing starts

In these examples, the indicator itself tells us very little about why there has been a change, but instead prompts us to ask questions and learn more in order to understand what is happening and what the implications might be for ourselves and our communities.

**Sustainability Indicators are:**

Specific pieces of statistical information that can be used to measure critical trends in progress towards sustainability.

**Why use sustainability indicators?**

Sustainability indicators will be used to facilitate progress towards sustainability goals identified in the Charter for Sustainability by:

- Monitoring progress towards sustainability goals identified in the Charter for Sustainability;
- Increasing public awareness of sustainability issues;
- Informing and influencing policy development and enabling inclusive decision making;
- Assisting in the identification of FBC organizational priorities and work plans;
- Building partnerships among communities, governmental and non-governmental organizations including the private sector; and
- Identifying information gaps and research priorities.

**What can sustainability indicators do – or not do?**

On their own, indicators only show part of the picture, but they can prompt us to look for more information, especially if we suspect the interaction of our social, economic and environmental systems in not moving our communities in a sustainable direction.

Because indicators are data, changes and trends will be interpreted in different ways by different people. Identifying and tracking changes in indicators will not, on its own, bring consensus to groups of people with different values and interest. Indicators are not decisive measurements, but are windows that “provide a glimpse of the **big picture**” (Sustainable Seattle web site, 1999).

Indicators are not solutions and may not even be helpful in identifying “treatments” or options for addressing specific concerns that have been identified.

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# Sustainable Watershed Indicators

## Appendix B

Information on the use of Indicators may be found on the following websites.

Province of British Columbia

Information on *Performance Measures and Targets*

Found at [www.gov.bc.ca](http://www.gov.bc.ca) by following the links through *Key Initiatives, Revitalizing the Economy, Restore Sound Fiscal Management, to 3-year Ministry Service Plans*

Government of Canada

Information on *Sustainability*

Found at [www.environmentandresources.ca](http://www.environmentandresources.ca)

US Federal Forest Service

*2003 National Report on Sustainable Forests*

Found at [www.fs.fed.us/research/sustain/](http://www.fs.fed.us/research/sustain/)

Fraser Basin Council

*Sustainability Indicators for the Fraser Basin*

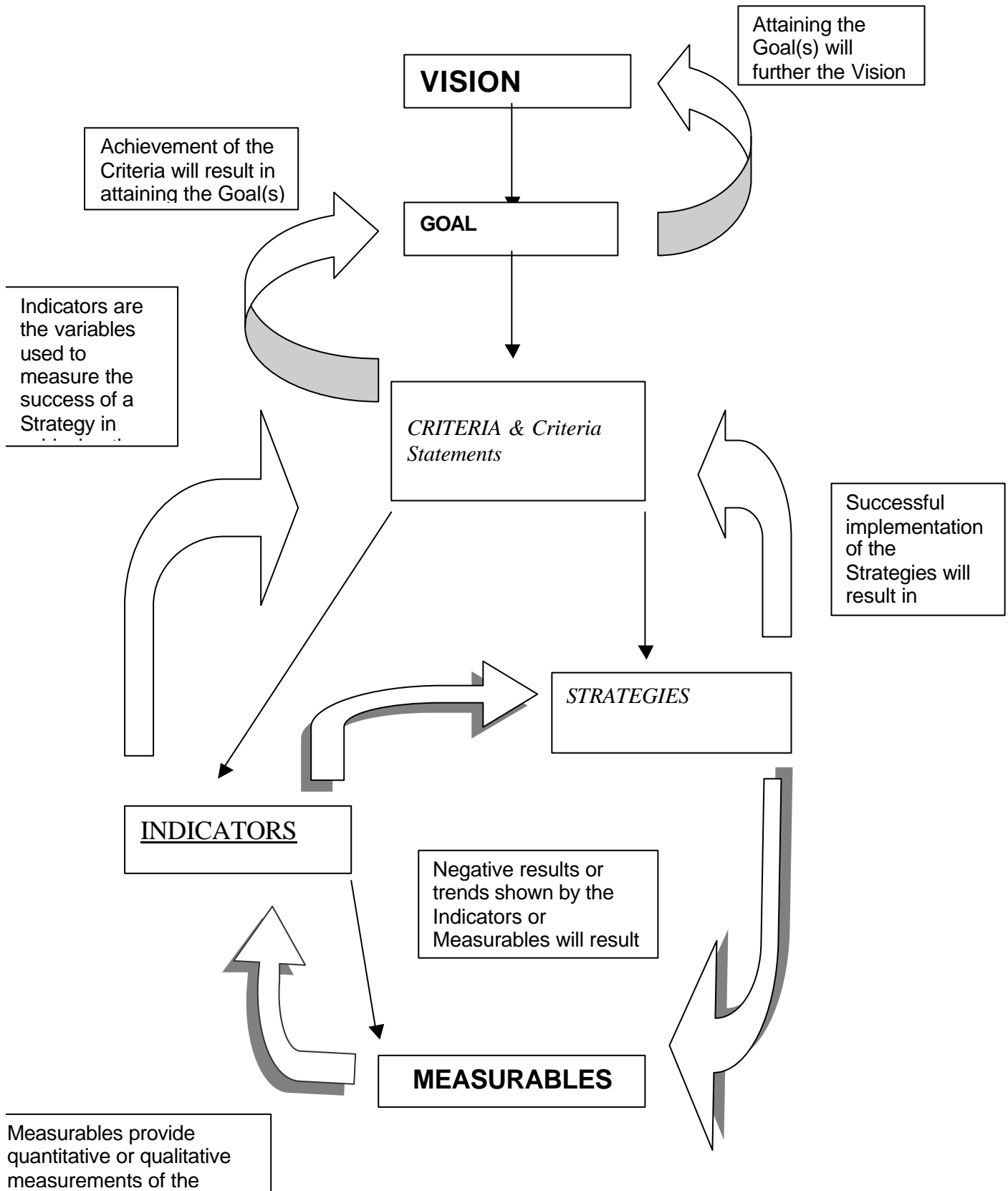
Found at [www.fraserbasin.bc.ca](http://www.fraserbasin.bc.ca)

City of Kelowna

*Environmental Indicators*

Found at [www.city.kelowna.bc.ca](http://www.city.kelowna.bc.ca) by following the links through *Departments, Works and Utilities, to Environment Division*

The process of using indicators to monitor goals and objectives is shown in the following graphic display, credit of Riverside Forest Products Ltd.



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# Sustainable Watershed Indicators

## Appendix C

Extracts from Westland Resource Group,  
Green Sustainable Economic Development, Okanagan Valley Strategy  
December 2002 draft

## 4.0 Green and Sustainable Development

### 4.1 Steps in Preparing the GSED Strategy

The strategy for green and sustainable economic growth has been developed in five stages:

1. Define what is and is not a green sustainable business
2. Identify businesses in the project area that can be said to be green and sustainable; compare this list with those businesses that are targeted by present economic development strategies and other businesses that fit within the Regional economic context; identify potential business targets
3. Identify the Region's strengths and weaknesses from an economic development perspective
4. Based on task 3, identify necessary elements for an economic development strategy that will target the businesses identified in task 2
5. Combine the elements into a strategy that can achieve enthusiastic support throughout the Region and that stakeholders will want to implement.

### 4.2 What is Green and Sustainable Development?

The concept of sustainability became widely used in the 1980s as a response to criticism of development projects that produced short-term benefits, but were long-term failures. Environmental, social, and even economic conditions were sometimes worse after these projects than they had been before. In North America, sustainable development (or, more recently, sustainability) came to be associated with enterprises that are successful in creating jobs without causing environmental harm and social impacts.

Environmental harm caused by human economic activity has been categorized as:

1. *Depletion* of resources such as water, clean air, fisheries, old growth forests, or productive soils,
2. *Pollution* of land, air, and water, and including eutrophication, ozone depletion, and climate change, and
3. *Expulsion* of species and ecosystems, characterized by declining biodiversity and extinctions, and including reduced cultural diversity (Winsemius and Guntram 2002: 27).

In response to the social and environmental weaknesses of prevailing models of economic development, the Brundtland Commission in *Our Common Future* (1987) penned the now-famous definition of sustainability:

“Sustainable development is development that meets the needs of the present, without compromising the ability of future generations to meet their own needs.”

Throughout the 1990s, others have elaborated on the meaning of sustainability.

"[Sustainable production and consumption is] the use of goods and services that respond to basic needs and bring a better quality of life, while minimizing the use of natural resources, toxic materials and emissions of waste and pollutants over the life cycle, so as not to jeopardize the needs of future generations"

Symposium: Sustainable Consumption. Oslo, Norway; 19-20 January 1994.

"Sustainable production and consumption involves business, government, communities and households contributing to environmental quality through the efficient production and use of natural resources, the minimization of wastes, and the optimization of products and services"

Edwin G. Falkman, *Waste Management International. Sustainable Production and Consumption: A Business Perspective*. WBCSD, n.d.

“Sustainability is an economic state where the demands placed upon the environment by people and commerce can be met without reducing the capacity of the environment to provide for future generations. It can also be expressed in the simple terms of an economic golden rule for the restorative economy: Leave the world better than you found it, take no more than you need, try not to harm life or the environment, make amends if you do”

Paul Hawken, *The Ecology of Commerce* 1994.

These definitions and descriptions of other terms that are commonly used in analysis of sustainability issues are contained in Appendix A.

These definitions have common themes of “doing more with less,” or, in some cases, “doing *less* with less,” and respecting the ecological and social realms that can be affected by our actions.

In the 1990s, British Columbia created the Round Table on the Environment and the Economy to examine sustainability issues. The Round Table concluded that:

- “our future economic prospects are lower than the level we have grown to expect;
- environmental and social factors have not previously been considered in the traditional measures of economic prosperity; and

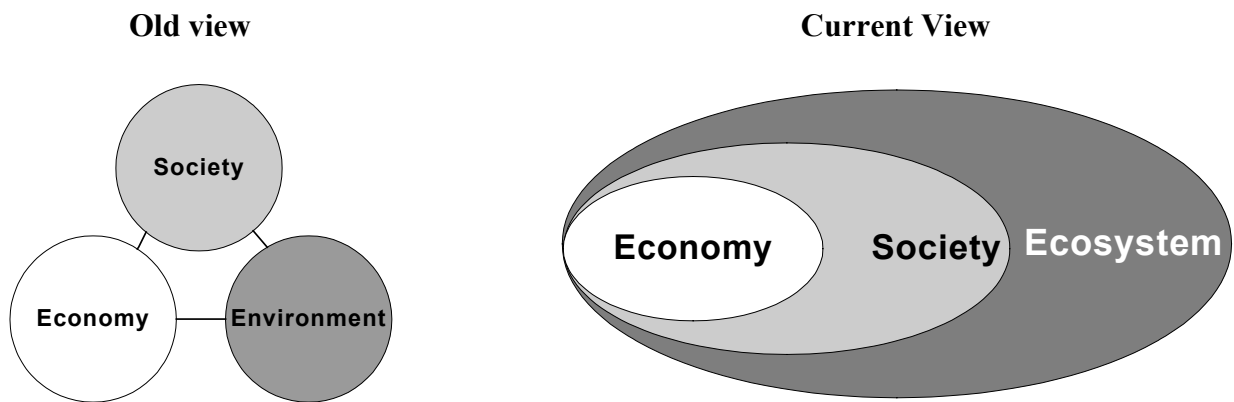
Although sustainability is often presented as a matter of prudence, even of common sense—that you should not destroy the basis of your own existence....concern about sustainability must be based on moral obligations toward future generations, not just personal self-interest.

Simon Dresner *The Principles of Sustainability*

- escalating conflicts over resource use, increasing population size, an aging population, disparity of wealth distribution, and the need to live within our ecological and social limits all indicate that present patterns of human activity and trends in expectations are not sustainable” (Round Table 1995).

The view of sustainability has evolved since the British Columbia Round Table identified the “three legs of a stool” model of the relationship between environment, economy, and society (Figure 4). In recent years, analysts have come to realize that the economy is only a part of human society and culture, and that both society and economy are “nested” in a much broader ecosystem that includes physical (soil, water, air, landscape) and biotic (plants and animals) components of the Earth. The move from an anthropocentric view, in which human desires trump ecological considerations, to a more holistic view of the world has not been painless, and the debate continues about humans’ rightful place in the ecosphere.

**Figure 4**  
**Old and New Views of Sustainability**



Society’s expectations regarding environment and economy tend to evolve over time. Maslow’s familiar hierarchy of human psychological needs has been reinterpreted to describe society’s “environmental hierarchy of needs” (Winsemius and Guntram 2002). The four environmental needs that people seek sequentially are:

1. *Food, clothing, and shelter*, provided by the use of resources from the environment, and jeopardized by non-sustainable use of these resources,

2. *Safety and security* that can be placed at risk by contamination, disease, and conflict over land and resources,
3. *Quality surroundings*, such as a green and healthy landscape or neighbourhood, that can be threatened by resource extraction, unwise industrialization, and urban sprawl, and
4. *Quality ecosystems* that grow in social importance as people recognize that we are part of the ecosystem, that our personal and social well being rely on healthy functioning ecosystems, and that protecting ecosystems is an ethical imperative.

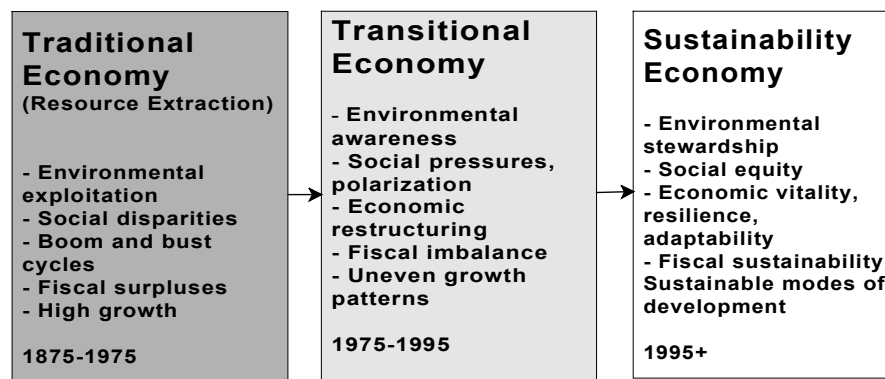
*For every person in the world to reach present U.S. levels of consumption with existing technology would require four more planet Earths.*

Edward O. Wilson, 2002

If the economy falters and people lose their jobs, then priorities can shift *down* the ladder as people (and governments) become more concerned with the ability to pay for food and shelter than protecting fish habitat or air quality.

Moving from present conditions to a more sustainable future will require profound evolution of our economic structure. Figure 5 shows three “categories” of economy: traditional, transitional, and sustainability. Although the British Columbia Round Table optimistically hoped that we would be entering the sustainability economy by 1995, it is clear that achieving sustainability is still a long-term goal in most places. Some regions are still struggling to base their economy on traditional resource extraction, even as they experience the social dislocation and environmental degradation that accompanies that course.

**Figure 5**  
**Evolution of British Columbia economy**



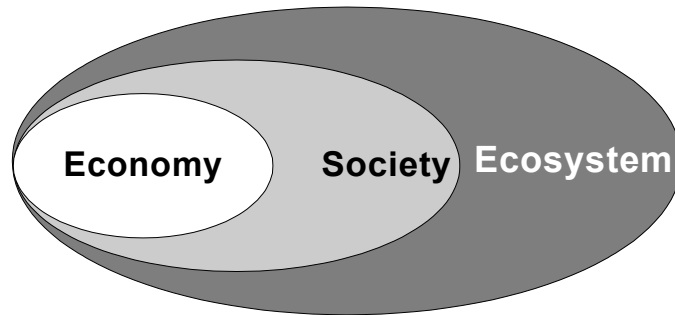
### **4.3 A vision of green, sustainable economic development in the OSV**

Respondents to the GSED survey provided many ideas about what would constitute a green and sustainable region. Clean water, clean air, less urban sprawl, less regulatory burden, more socially responsible businesses, more caring for the land were all themes raised by survey respondents. The survey revealed widespread understanding of the links between economy, environment, and society. The GSED program clearly needed to express the broad demand for achieving economic development that protects and enhances the “quality of life” in the OSV in all its richness. Quality of life in the OSV covers a wide variety of human perspectives, including:

- Well-paying, rewarding jobs that do not deplete the environment,
- Fish in the streams,
- Caring, inclusive, well-designed communities,
- Access to a healthy outdoor lifestyle—boating, hiking, skiing, fishing, golf—and healthy local foods and clean water,
- Maintaining the attractive agricultural landscape and a strong agricultural sector,
- Integrating tourism, agricultural, high-tech businesses,
- Caring for children—including job-oriented education and training—and seniors,
- Encouraging enterprises that respect the OSV’s values and commit to staying in the region, and
- Protecting the plants and animals that are indigenous to the OSV.

To provide clear direction to the GSED program, and to reflect the quality of life perspectives of OSV residents, the Steering Committee developed a vision of green, sustainable economic development in the OSV. The GSED Steering Committee discussed a variety of vision statement elements before agreeing that the following phrase and graphic described their vision best.

**Figure 6**  
**A vision of a green, sustainable future in the OSV**



## **The Environment IS Our Economy**

What will the future be like in the OSV be like as we move toward a green and sustainable economy? The following description of a desirable, attainable future is offered to provide some hints.

The economy in the Okanagan and Similkameen Valleys will be characterized by businesses that are non-polluting, invest in their staff, and have a long-term commitment to environmental stewardship and social responsibility in their communities. The agricultural sector will be a model of modern intensive, non-polluting farming that is profitable, wildlife-friendly, and water conserving. Agrotourism and ecotourism, based on a biodiverse natural and agricultural landscape, will complement cultural tourism events and attractions throughout the region. A local technology sector will support other industries and will be supported by research and development facilities in the region. Innovation and entrepreneurial spirit will characterize businesses in the region and attract investment from around the world.

Mixed use, compact communities will become common, fostering high-quality design, creating people-friendly neighbourhoods, reducing motor vehicle trips, and minimizing sprawl. Governments and First Nations will collaborate with each other and with business to achieve sustainability goals while reducing regulatory burdens and interjurisdictional conflicts. The region will be home to a stable, well-paid workforce with increasing education and skill levels. Progress toward a more sustainable future will be revealed in an active program of protecting and restoring the region's fragile yet productive ecosystems, with results that will attract visitors and support researchers into new environmental technology. The "Sustainability Charter," signed by all governments and most businesses, will be credited for motivating a regional partnership on their promising journey toward sustainability.



Investment in public facilities in urbanized areas and in greenways pays dividends in terms of jobs, pride in communities, fitness, and attractions for visitors.

#### **4.4 Growing Green Sustainable Enterprises**

All enterprises, whether public sector or private sector, for-profit or not-for-profit, must adopt the green sustainable ethic if the OSV is to truly become a green sustainable economy. Many enterprises--whether government department or corporate headquarters-- experience difficulty in making the transition to new ways of working. Responses to environmental issues typically move through a set of stages (Table 15).

*Reactive.* At the beginning of the response to an environmental issue, governments and businesses typically dismiss environmental risks as exaggerated, and publicize the cost (in dollars and jobs) of protecting the environment. Industry, special interest, and environmental groups lobby government for and against legislation. If new or more stringent regulations are imposed, public and private sector enterprises reluctantly apply “band aid” technical solutions (stack scrubbers, catalytic converters) to comply with regulations.

*Functional.* At the functional stage, private and public sector enterprises seek ways of reducing costs or gaining competitive advantage as they comply with escalating levels of regulation. Environmental protection responsibilities move from technical staff to a higher level of line managers.

*Integrated.* The integrated approach begins as enterprises see that cooperation with other groups (the public, special interest groups, NGOs, research institutes) is necessary to successfully manage environmental impacts. Government policy moves from regulation to more economic incentives (taxes, levies, deposits, tradable emissions rights) to integrate environmental costs into market pricing.

**Table 15**  
**Stages of corporate response to environmental issues**

Stages:	<i>1. Reactive</i>	<i>2. Functional</i>	<i>3. Integrative</i>	<i>4. Proactive</i>
Objective:	Comply with regulations	Cost effectiveness	Integration into “normal” strategy	Vision-driven culture
Activities:	Minimize cost and inconvenience through end-of-pipe measures	Optimize process solution	Stretch responsibility to product “shadow”	Need for harmony drives all actions
Lead responsibility:	Specialist staff	Line managers	Middle managers	Top managers
Time horizon:	Ad hoc	Investment cycle	3-5 years	10 years, dynamic

(Source: Winsemius and Guntram 2002)

*Proactive.* Finally, senior management (and shareholders in the case of private sector enterprises) realize the need for profound changes in the way businesses, governments and institutions operate if the vision of a sustainable future is to be attained. “The proactive response requires deep organizational change. It involves the transformation of the organization’s culture into one driven by an environmental vision, in which all management actions are directed by a quest for value through harmony with the environment. “The path to sustainability can be scary, since the very nature of the business might be challenged. Maybe the service or product—say, cars or detergents (as we know them today)—is inherently incompatible with sustainability if the global atmosphere or waters are not able to carry the burden” (Winsemius and Guntram 2002: 16-17). Government may find that the basic premise of their plans and policies is inconsistent with sustainability.

*We have to look at our assets that are here to stay and encourage and enhance them: clean air and water, agriculture, tourism, forestry and fisheries.*

Survey respondent

Growing green sustainable enterprises in the OSV depends on continuing education of business, government, and non-governmental organization leaders and managers, and then having the courage to institute change.

Managers must not only be convinced that enterprises that take the leap to proactiveness will see that sustainable operations make them more competitive and profitable. We must help these enterprises learn how to make the leap.

Companies need to be financially secure to revamp their approach to providing a product or service (see the four stages of the environmental hierarchy). “As a rule, companies are not successful because they are green: they are green because they are successful” (Winsemius and Guntram 2002: 20). These “green” companies are in a position to lobby for *more stringent* controls or enforcement, because it “levels the playing field” with lax competitors.

*Lack of profitability is the most severe obstacle to efficient environmental protection. Legislation by itself will not do the trick—a company will not be able to comply with environmental standards unless it can afford to make the necessary investments*

Helmut Maucher, CEO, Nestle

In establishing a vision in a proactive business, top management may need to consider radical departures from previous models. Can a car company deliver transportation without the internal combustion engine? Can a forest company provide building products without cutting trees? Can a developer provide housing without consuming more raw land? Can a government design and implement planning policies and tax regimes that encourage residential and commercial development without the by-products of sprawl and congestion? In moving toward this more proactively sustainable level, enterprises must consider the viability of new options, along with issues of competition, financing (often difficult for new concepts), and regulatory and bureaucratic obstacles to change.

Correctly reading the signals from government and society is important. For example, if a business assumes that regulation is coming and invests in actions to reduce environmental harm or to gain an early competitive advantage, the company may suffer financial damage if the regulation fails to materialize. If governments get too far “ahead of the electorate” in advancing a sustainability agenda, political ramifications at the polls could be significant.

BC Hydro and some other large firms have adopted a “triple bottom line” reporting program to track economic, social, and environmental performance. Such an approach to monitoring and reporting sends a message to top management and to shareholders about the company’s commitment to sustainability. Small firms may not be able to afford a formal triple bottom line reporting program, but considering the social and environmental implications (both direct and indirect) of a company’s activities can lead to increased awareness of issues and lay the groundwork for a more integrated or even proactive approach to sustainability.

*I find it amazing that new independent business can actually function in BC at all.*

Survey respondent

By improving operation of the physical plant, enterprises can realize environmental and economic benefits. Energy-conserving light bulbs, energy-efficient construction, and cogeneration of energy and heat can greatly reduce operating costs while reducing emissions and energy consumption. In the manufacturing sector, redesigning products can greatly improve material intensity, reducing costs of materials, storage, and shipping.

## 4.5 Criteria of Sustainable Enterprises

For the purposes of the GSED, the following criteria have been established to assess whether an enterprise operates in ways that are consistent with the principles of sustainability. These criteria will be used to help to develop a strategy for a green, sustainable economy in the OSV.

- a) Private sector enterprises achieve sustained profitability without reliance on resources specially provided by government, or externalized costs borne by the environment or the public.
- b) Government and non-profit enterprises make efficient use of taxpayer-provided finances.
- c) An enterprise's processes, use of materials, and products do not reduce the area of natural ecosystems in the region or elsewhere.
- d) An enterprise's processes, use of materials, and products do not impair the function of natural ecosystems, harm species, or contribute to socially harmful results.
- e) Industrial processes and products minimize the use of energy, materials, land, and water.
- f) Enterprises contribute to the creation and functioning of complete, compact communities.
- g) Enterprises invest in the safety, skills, knowledge, and well being of their employees.
- h) The physical plant and business operations consider and protect the interests of neighbouring land users.

The criteria apply to two aspects of enterprises:

- a. the characteristics of the enterprise's products or activities, and
- b. the way in which the enterprise operates.

Some enterprises are inherently unsustainable. For instance, coal-fired power plants consume too many resources and generate too much pollution to be considered sustainable. It is hard to conceive of the manufacture of internal combustion engines or military land mines could be sustainable, regardless of the manufacturing process employed or the treatment of a company's employees. For the purposes of this GSED study, the question of what kinds of products are consistent with sustainability will be left to the residents of the OSV. The GSED will focus instead on the way enterprises operate.

Poor management, facility location, or human relations could render any enterprise. For example, research institutes, consulting firms, or clean manufacturing plants located far from communities, so that all employees must drive to and from work, are not sustainable. Medical facilities that fail to dispose of waste carefully or that are poorly integrated into neighbouring communities are not sustainable. Recreation or tourism activities that result in noise or water pollution (such as some water craft) or destruction of native plants (such as off-road vehicles) are not sustainable. Agricultural operations that use wasteful irrigation techniques, excessive amounts of pesticides and fertilizers, or convert remnants of undisturbed ecosystems to farmland are unsustainable. Forestry based on logging of the few remaining stands of old-growth timber, clearcutting to stream margins, or cutting at rates above long range sustained yield is not sustainable.

**To be sustainable, then, an enterprise must focus on products and services that are environmentally benign, socially responsible, financially self-sustaining, and economically viable, and must conduct its operations in the same way.** Few existing enterprises (private or public sector) could satisfy all seven sustainability criteria. This failure is hardly surprising, given the relative newness of the sustainability concept, and the confusing signals sent by markets, regulators, and society with regard to the importance of sustainable methods of operation.

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# Sustainable Watershed Indicators

## Appendix D

Extracts from Province of British Columbia,  
Okanagan Shuswap Land and Resource Management Plan  
Mission Creek Enhanced Resource Management Zone  
April 2001

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## Polygon Specific Resource Management Zone



## Mission Creek Enhanced Resource Management Zone

### **Introduction**

The Mission Creek watershed is the largest watershed in the Okanagan Basin at 859 square kilometres. Mission Creek's significance for fishery values, for drinking water and for recreational values is well recognized by the community at large. This significance is reflected in its designation as a provincial "Heritage River".

Under the Interior Watershed Assessment Procedure (IWAP) of the Forest Practices Code (FPC), the Mission Creek watershed is divided into eight sub-basins. Riverside, Gorman Bros., Weyerhaeuser, Tolko and the Ministry of Forests Small Business Forest Enterprise Program (SBFEP) currently have forest harvesting activities in the area.

Local governments and community-based environmental action groups (South Slopes Society, Joe Rich Watershed Monitoring Committee, Canadian EarthCare Society, etc.) have identified the Mission Creek watershed as an important watershed that requires additional management direction in order to protect resource values and water quality. This management direction is intended to build on and supplement that provided by the Community Watershed RMZ.

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<b>Current Management</b>	<p>The community watershed provisions of the Forest Practices Code govern the Crown portions of the Mission Creek watershed. Provincial watercourse regulations and local government bylaws govern lower elevations. Citizens of Kelowna and the Regional District of Central Okanagan have become proactive participants in the management of lower Mission Creek, in part due to its size, fishery value, proximity to the urban core, visibility, contribution to domestic water supply, and historic events of flooding.</p>
<b>Current status of monitoring programs</b>	<p>Riverside has developed a monitoring program in the upper Mission Creek basin. This is a Forest Renewal BC program with the Ministry of Environment, Lands and Parks (MELP) as a partner. Monitoring consists of collecting snow accumulation and snowmelt rates, snow line hydrologic data, channel monitoring, estimation of peak flows, green up data and a total chance plan.</p> <p>Gorman Bros. has implemented a water quality monitoring program for the Joe Rich Creek sub-basin that will measure suspended sediment, turbidity levels, chemical and bacteriological parameters (periodic basis) at three locations. (Note: This sub-basin is a separate RMZ.)</p> <p>MELP is in the process of developing water quality objectives. Further, MELP is working with Riverside and Gorman Bros. to provide technical advice on monitoring programs.</p>
<b>Goal</b>	<p>The goal is to establish a process that will ensure that the Mission Creek watershed is managed in a holistic and integrated manner for all water-related resource values. Crown land and private land management activities pertaining to water resources and aquatic habitat need to be accounted for and effectively coordinated and integrated to ensure sustainability of key values.</p>
<b>Objectives and Strategies</b>	<p>1) Manage the Mission Creek watershed for sustainability of both consumptive and instream uses in an integrated manner for both Crown land (industrial, commercial and recreational) activities and private land activities.</p> <p>1.1) The Regional District of Central Okanagan (RDCO), in partnership with the Ministry of the Environment, Lands and Parks, (MELP) and the Ministry of Forests (MoF), is to create and support an Enhanced Watershed Advisory Committee (EWAC). The EWAC will provide advice on the management of land use activities (resource extraction, urban development, etc.) on both the Crown and private land components of the Mission Creek watershed. A Memorandum of Understanding (MOU) will be put in place to establish the respective support roles and to ensure the success of this process.</p> <p>Intent:</p> <p>i) Draft terms of reference for the EWAC are to be developed by the</p>

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RDCO, the City of Kelowna, MELP, MoF, and the Ministry of Agriculture, Food and Fisheries (MAFF). The LRMP Implementation and Monitoring Committee will have the ability to review the terms of reference for this committee once it is established.

ii) Participation is to include the RDCO, City of Kelowna, MELP, MoF, MAFF, forest industry representatives, agriculture industry representatives, members of the Mission Creek IWAP committee, general public, environmental organizations, citizen's groups and other government agencies as required.

iii) The RDCO is to provide administrative and technical support, including GIS support. The province (MELP and MOF) is to provide technical support.

iv) The EWAC is to provide advice to the Regional District and the City of Kelowna on management of the private land (and local government owned) component of the watershed. The EWAC is to provide advice on mitigating the impacts of land use development and agricultural activities on water resources and aquatic habitat.

v) The EWAC is to provide advice to statutory decision-makers (SDMs) on the Crown land component of the watershed. In particular, the EWAC is to provide advice on mitigating the impacts of industrial, commercial and recreational activities on water resources and aquatic habitat.

vi) See Figure 1 for the organization chart.

2) Develop an integrated monitoring program for the Mission Creek watershed.

2.1) Create effective and accessible information management for water quality, stream flow data, fish productivity and land use.

Intent:

i) Consolidate and make readily accessible to all major interests, including the community at large, current and historic water quality, stream flow data, stream temperature data, and fish productivity data for the watershed.

ii) Create a common and shared information data base for all water quality, land tenure and land use information being gathered in the system - i.e., data from both private operators, non-governmental organizations and public agencies

iii) Standardize data collection in the system to facilitate the common database and to allow comparative analysis across sub-basins and outside the watershed. The EWAC is to work with various groups including the forest industry in developing the database.

iv) The EWAC, with the support of RDCO, would be the repository for the information.

v) The EWAC is to seek outside funding as required. (FRBC or other outside funding may be required.)

vi) Other parameters of aquatic health (e.g., stream temperature) could

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be included in a monitoring program as required.

vii) Referrals for activities under the Mines Act that pertain to the Mission Creek (ERMZ) objectives, will be brought forward by MELP or MoF.

2.2) Evaluate monitoring approaches within sub-basins and in the lower reaches of Mission Creek and develop approaches for creating and supporting a system-wide monitoring program for water quality, stream flow and fish productivity, in partnership with other interests (provincial and local government, private companies, and the community) in the watershed.

Intent

i) To coordinate current efforts between public and private groups collecting data to standardize approaches.

ii) Consult with interests in the watershed to achieve agreement on a system-wide approach.

iii) Facilitate and coordinate additional monitoring activities for water quality, stream flow data, fish productivity where required.

2.3) The EWAC is to make recommendations regarding water quality and quantity objectives to the IWAP and statutory decision-makers.

2.4) The EWAC is to make monitoring information available to the all partners and to the community at large.

Intent

i) To develop a reporting system which makes monitoring information readily available to all interests in the watershed.

3) The EWAC is to provide advice to Statutory Decision-Makers, provincial water managers, local government and other interests (e.g., community based stewardship groups) on actions for watershed restoration.

3.1) The EWAC is to provide advice to Crown agencies, local government and private interests undertaking remedial actions for watershed restoration. Also, the EWAC is to support, and where feasible, develop remedial action plans in partnership with government agencies, private companies and community-based stewardship groups.

Intent:

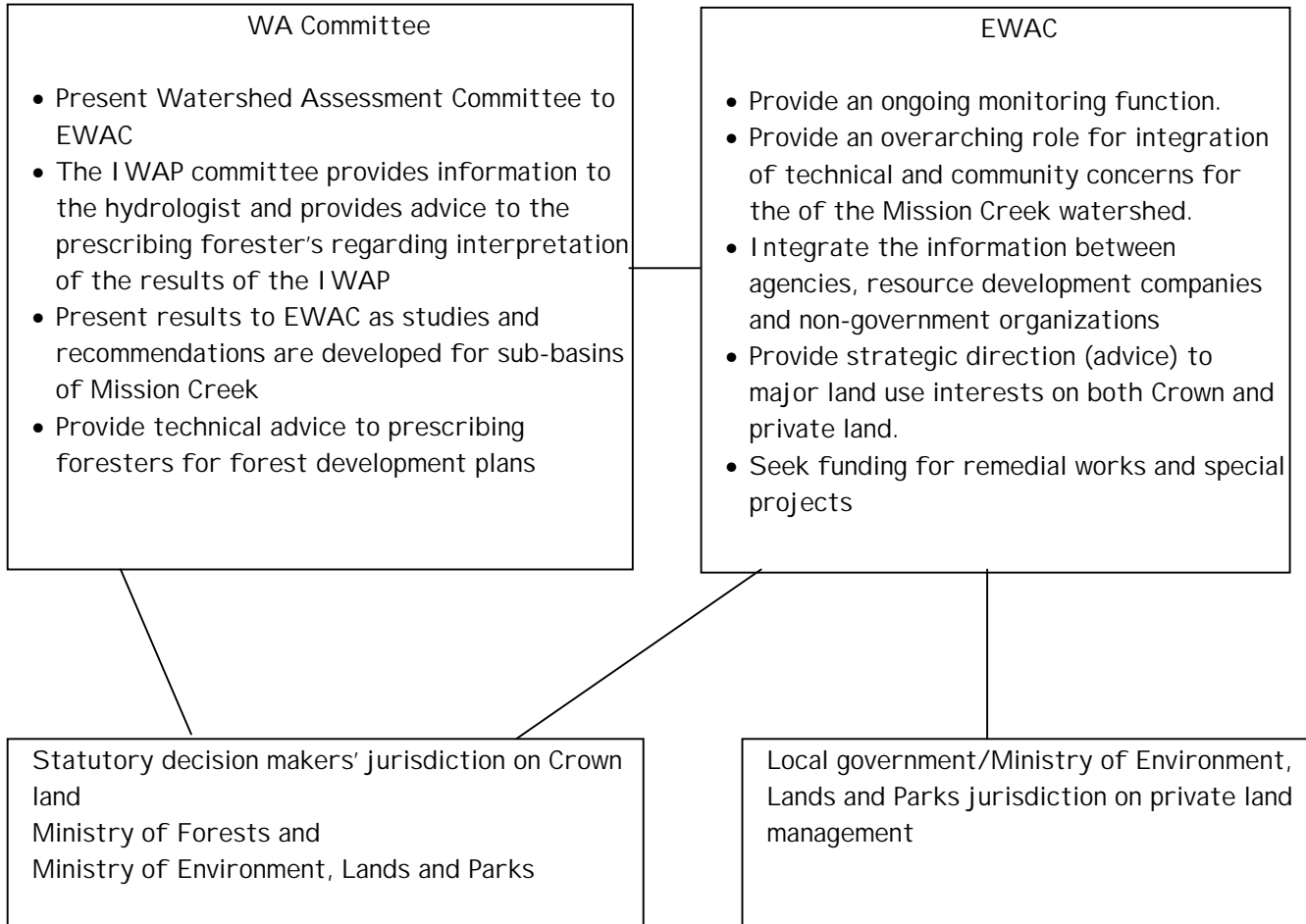
i) The EWAC is to seek funding to assist remedial actions and restoration on crown and private lands.

ii) EWAC recommendations must meet overall higher level plan (HLP) objectives.

3.2) The EWAC is to embark on a public education process in order to make landowners and users aware of the importance of riparian streamside vegetation management on private lands.

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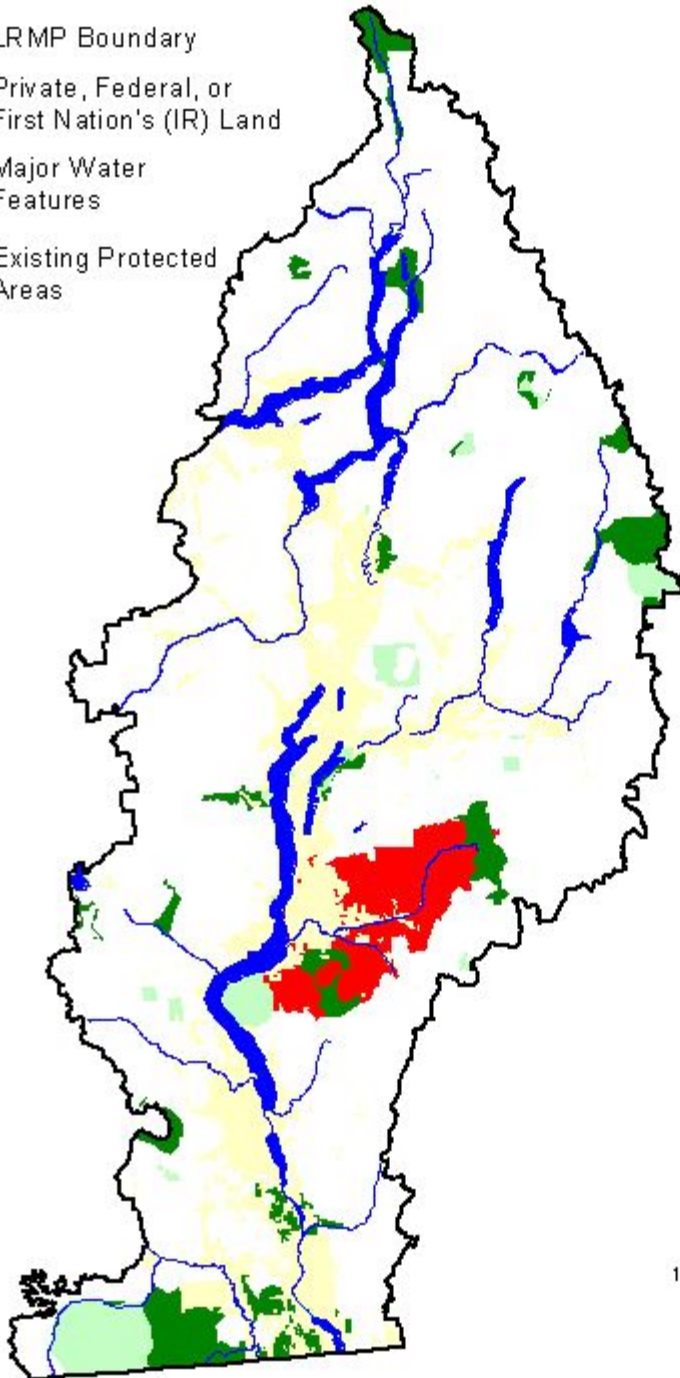
**Figure 1: Relationship Between the WA Committee and the EWAC**



### Mission Creek Watershed RMZ

Base Information

- ∕ LRMP Boundary
- Private, Federal, or First Nation's (IR) Land
- Major Water Features
- Existing Protected Areas



Mission Creek Watershed RMZ

Proposed Protected Area Package



10 0 10 20 30 40 Kilometers

Created by the LMRP  
DATA MANAGEMENT  
TEAM - March 2001  
File name: mission\_2.jpg