Sustainability Course Content

A Curriculum Framework

BRITISH COLUMBIA
The Best Place on Earth

Ministry of Education

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Introduction

Sustainability concepts and learning outcomes are found in a number of Ministry of Education curriculum documents, especially in Science and Social Studies courses. *Sustainable Resources 11 and 12* are the only ministry curricula with sustainability as a major organizer. The course examines major BC resource industries, including agriculture, energy, fisheries, forestry, and mining.

Sustainability topics go well beyond natural resource extraction and use. They are linked to environmental indicators such as water quality and ecosystem diversity, and to social indicators such as human health and economic growth. Sustainability also touches on other topics such as design, urban planning, and transportation policy.

A list of sustainability topics was highlighted when researching content in Board/Authority Authorized courses taught by schools around the province. Four courses in particular focused on sustainability issues, and many of the topics and learning outcomes were similar. With this as a starting point, the ministry invited the teachers of these courses to a meeting to discuss key topics and learning outcomes that might support others wishing to teach similar topics or develop similar courses.

The discussions led to creation of this Sustainability Course Content Framework (2010), with modules that might be used individually or as an entire course. Each of the seven modules in this document lists topic areas and possible learning outcomes related to the topics.

Since many secondary schools already offer courses in the areas of leadership, environmental studies, and global issues, the team agreed that the modules should be designed so they can be adapted into existing Board/Authority Authorized courses. All content in the framework document is merely a starting point for teachers and schools wishing to offer students sustainability-focused course content.

The final sections of this document include a list of learning resources (print, multimedia, and websites) and a glossary covering all topic areas.

Teachers and schools are reminded that there is a development and approval process that must be followed when developing or rewriting Board/Authority Authorized courses. This information is on the ministry website at: www.bced.gov.bc.ca/graduation/boardauth.htm

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Module 1 — Introduction to Sustainability

Topic Areas:

- What is sustainability?
- Systems theory
- Ecological and carbon footprint and calculator
- Baseline audits – energy, waste, water, and transportation
- Case study: Easter Island

Possible Learning Outcomes:

- Explain how the concept of sustainability applies at a local, regional, national, and global level
- Explain how systems theory applies to sustainability
- Explain the concepts of ecological and carbon footprints and determine personal footprints
- Calculate baseline school audits on energy, waste, water, and transportation
- Analyse the effects of humans on the planet – past, present, and future

Module 2 — Environmental Ethics & Social Development

Topic Areas:

- Global sustainability initiatives (e.g., Brundtland Report, Kyoto Protocol, Earth Charter, United Nations, Copenhagen)
- Wealth distribution and poverty
- Education
- Population growth
- Health and the environment

Possible Learning Outcomes:

- Describe historical and current landmarks and models in sustainable development
- Compare Canada's standard of living to that of developing countries with reference to poverty, education, and health
- Assess measures taken to address poverty, education, and health inequalities
- Explain how the level of education influences population growth, standard of living, and health
- Apply the concept of social responsibility to local, regional, national, and global issues
- Investigate connections between health and the environment

Module 3 Ecology & Nature

Topic Areas:

- Ecology – population and resources, carrying capacity, humans as part of the ecosystem
- Climate change, greenhouse gases (GHG), carbon cycle
- Biodiversity
- Traditional Ecological Knowledge (TEK)
- Connecting with nature

Possible Learning Outcomes:

- Describe basic ecological systems and how humans have an impact on them
- Explain the role of carbon and the carbon cycle and how it relates to climate change
- Explain how climate change affects local, regional, national, and global ecosystems, landscapes, and weather patterns
- Analyse the importance of biodiversity and how it relates to sustainability
- Explain how TEK integrates the concept of sustainability
- Investigate outdoor spaces (e.g., school gardens, parks) and local flora and fauna

Module 4 Environmental Challenges & Sustainable Solutions

Topic Areas:

- Energy – coal, oil, nuclear, solar, geothermal, wind, hydro, biofuels, other
- Peak Oil Theory
- BC sustainability legislation and policy – cap and trade, carbon tax, low carbon fuel, vehicle emissions standard, landfill gas, green communities, Energy Plan, Climate Change Plan
- Sustainable food production – local, diet, food security, pesticides
- Sustainable water – potable, shortages, Living Watersmart, conservation
- Sustainable resources: forestry, fishing, agriculture, mining

Possible Learning Outcomes:

- Analyse the future viability of fossil fuels as an energy resource
- Compare alternative energy technologies
- Explain how past and current legislation helps reduce greenhouse gas emissions
- Identify sustainable approaches to local, regional, national, and global food production
- Identify issues related to Earth's supply of freshwater and describe methods to conserve it
- Analyse the environmental, social, and economic significance of natural resource extraction at a local, regional, national, and global level

Module 5 Sustainable Design & Transportation

Topic Areas:

- Transportation – automobile, mass transit (e.g., train, bus), bicycle, hybrid, electric, hydrogen, carshare, bikeshare
- Building – green building standards and models
- Urban planning – sprawl, density, transition towns
- Waste management – precycling, recycling, cradle to cradle, biodegradable, composting

Possible Learning Outcomes:

- Analyse the efficiency of different modes of transportation and compare resulting greenhouse gas emissions
- Describe elements of green building standards and models and explain how each reduces resource use
- Describe elements of a sustainable community and how each element reduces resource use
- Identify and compare strategies to reduce or eliminate waste going to landfills

Module 6 Balancing Ecology & Economics

Topic Areas:

- Economics – growth versus triple bottom line
- Effects of consumption
- Green economy – natural capitalism, fair trade, ethical purchasing, microfinance, conservation, greenwashing, employment

Possible Learning Outcomes:

- Compare "growth" economics with "triple bottom line" economics
- Evaluate how personal choices in consumption affect the environment
- Demonstrate an understanding of concepts related to the green economy, including natural capitalism, fair trade, ethical purchasing, microfinancing, conservation, and greenwashing
- Research future employment opportunities as we transition from a carbon-based economy to a green economy

Module 7 Sustainable Actions

Topic Areas:

- Personal and school audit results
- Social marketing and motivating behavioural change
- Action projects and activities
- Community volunteering/ outreach

Possible Learning Outcomes:

- Create and implement a plan to reduce personal/ school ecological or carbon footprints
- Identify and compare strategies to influence behavioural change
- Create or continue to implement an action plan/ activity to make schools and/or communities more sustainable
- Identify resources and organizations to help bring about environmental change in schools and communities

Resources

Print Materials

Title	*Author*
Collapse	Jared Diamond
Cradle to Cradle	William McDonough and Michael Braungart
David Suzuki's Green Guide	David Suzuki
Ecoholic	Adria Vasil
Environmental Learning and Experience: Guide, Videos and Curriculum Maps (online at www.bced.gov.bc.ca/environment_ed/)	Ministry of Education
Greening School Grounds: Creating Habitats for Learning	Tim Grant and Gail Littlejohn
Last Child in the Woods	Richard Louv
Plan B 3.0 Mobilizing to Save Civilization (online at www.earth-policy.org/Books/PB3/Contents.htm)	Lester R. Brown
Plants of Coastal British Columbia	Jim Pojar and Andy MacKinnon
Plants of Northern British Columbia	Andy MacKinnon
Plants of Southern Interior British Columbia and the Inland Northwest	Roberta Parish, Ray Coupe and Dennis Lloyd
Social Marketing	Doug McKenzie Mohr
Stormy Weather: 101 Solutions to Global Climate Change	Guy Dauncey
Teaching About Climate Change: Cool Schools Tackle Global Warming	Tim Grant and Gail Littlejohn
Teaching Green: The High School Years	Tim Grant and Gail Littlejohn
The Better World Handbook	Ellis Jones, Ross Haenfler, Brett Johnson
The Earth Charter in Action	Ed. Peter Blaze Corcoran
The Green Collar Economy	Van Jones
The Lorax	Dr. Seuss
The Omnivore's Dilemma	Michael Pollan
World Changing: A User's Guide for the 21st Century	Ed. Alex Steffen

Resources *continued*

Multimedia

A Journey to Planet Earth – Series

An Inconvenient Truth

Blue Planet

Nova, Global Warming – What's up with the Weather?

Power of Community: How Cuba Survived Peak Oil

Who Killed the Electric Car?

Websites

Title	*Link*
Al Gore's New Thinking on the Climate Crisis (27:51)	www.ted.com/index.php/talks/al_gore_s_new_thinking_on_the_climate_crisis.html
Breathing Earth Simulation	www.breathingearth.net
Calculating your Ecological Footprint	www.myfootprint.org
Captain Charles Moore on the Seas of Plastic (7:20)	www.ted.com/index.php/talks/capt_charles_moore_on_the_seas_of_plastic.html
Climate Change Education in Northern Canada	www.climatechangenorth.ca
Did you Know (Sonny BMG Rome 2008 (4:54)	www.youtube.com/watch?v=EOpA9kNb3fk&feature=fvst
GoodWork Canada (Green Job Site)	www.planetfriendly.net/gw.php
Holistic Lifelong Learning Models	www.ccl-cca.ca/CCL/Reports/RedefiningSuccessInAboriginalLearning/RedefiningSuccessReport.htm#models
Jaime Lerner Sings of the City (15:43)	www.ted.com/talks/lang/eng/jaime_lerner_sings_of_the_city.html
Janine Benyus Shares Nature's Design (24:00)	www.ted.com/talks/lang/eng/janine_benyus_shares_nature_s_designs.html
Peak Oil Visually Explained (3:06)	www.peakoilwatch.org/2009/07/13/peak-oil-visually-explained/
Resources for Rethinking	www.resources4rethinking.ca/en/home
Sea Choice	www.seachoice.org
Severn Suzuki Speaking at the Sharing the Dream Webcast 2009 (22:12)	http://bcelc.insinc.com/sharingthedream/20090430/
The Ecological Footprint (4:59)	www.youtube.com/watch?v=94tYMWz_Ia4
The Story of Stuff	www.storyofstuff.com
Traditional Ecological Knowledge	http://ankn.uaf.edu/IKS/tek.html
Waste = Food (49:23)	http://video.google.nl/videoplay?docid=-3058533428492266222
Workcabin (Environmental Jobs)	http://workcabin.ca
World Clock 2008	www.poodwaddle.com/clocks2.htm

Glossary

This glossary defines selected terms used in this framework. It is provided for clarity only, and is not intended to be an exhaustive list of terminology related to the topics.

Alternative Energy

Includes biofuels, geothermal, solar, wind, tidal, and other energy sources that are not carbon based.

Biodiversity

The variation of life forms within a given area. Biodiversity is affected by variety within species, number of species, and variety of habitats/ecosystems.

Brundtland Report

The report was published in 1987 under the title *Our Common Future*. It defines sustainable development and the change of politics needed for achieving it.

Carbon Cycle

Carbon is one of the basic elements on Earth. It is found and stored in different forms as living things, dead organic matter, dissolved carbon dioxide in the oceans, calcium carbonate in rock sediments, modified carbohydrates in fossil fuels, and carbon dioxide in the air. It cycles from the atmosphere to plants, to animals and other living things, to the soil and back into the atmosphere over a few hours to hundreds of years. Carbon from living things can become trapped in sediments and over thousands to millions of years become fossil fuels.

Carbon Footprint

Measure of the impact that human activities have on the environment in terms of the amount of greenhouse gases produced.

Carrying Capacity

The maximum population size of a certain species that a given habitat can support.

Cradle to Cradle

Design that uses materials made from high quality non-toxic synthetic and organic ingredients that can be recycled without any loss to their quality or integrity. "Cradle to cradle" designs have a continuous life cycle that results in zero waste and no negative effects on the natural environment whereas "cradle to grave" materials have an end-of-life cycle.

Climate Change

During the earth's 4.6 billion year history, global changes in climate patterns have occurred naturally due to influences from the sun, the earth's orbit, and volcanic eruptions. According to most scientists, it appears that during the past 150 years, human activities have significantly altered the composition of greenhouse gases in the atmosphere, resulting in a sudden change in the average weather patterns that occur regionally or globally.

Earth Charter

An international declaration of fundamental values and principles considered necessary for building a just, sustainable, and peaceful global society in the 21st century. The Earth Charter's ethical vision proposes that environmental protection, human rights, equitable human development, and peace are interdependent and indivisible.

Glossary *continued*

Ecological Footprint

Based on the concept of carrying capacity, the ecological footprint is a measure of how much humans use natural resources compared with Earth's ability to regenerate them. It is a measure of sustainability, taking into account the total number of Earths needed to sustain the world's population at that level of consumption.

Ecosystem

A network of interactions linking all living organisms with non-living parts of the environment such as water, air, and soil.

Fair Trade

A trading partnership based on dialogue, transparency, and respect that seeks greater equity in international trade. It contributes to sustainable development by offering better trading conditions to marginalized producers and workers.

Food Security

Local populations having physical and economic access to sufficient, safe, and nutritious food that meets dietary needs and food preferences for an active and healthy life.

Fossil Fuel

All deposits of organic material (e.g., coal, oil, gas) capable of being burned as fuel. Formed under pressure over thousands to millions of years by decomposition of plant or animal remains.

Green Building Standards

A systems approach to building design and construction that employs techniques to minimize environmental impacts and reduce ongoing energy consumption while contributing to the health and productivity of its occupants.

Green Economy

An economy that delivers better returns on natural, human, and economic capital investments, reduces greenhouse gas emissions, extracts fewer natural resources, and creates less waste.

Greenhouse Gas (GHG) Emissions

These include carbon dioxide, methane, nitrous oxide, and water vapour. While greenhouse gases occur naturally in the atmosphere, human activities also result in additional greenhouse gas emissions.

Greenwashing

The term is generally used when a business spends significantly more money advertising that it is environmentally friendly than it does on environmentally sound practices.

Growth Economics

A term used to indicate the increase of total gross domestic product. It refers only to the quantity of goods and services produced, with no consideration given to the way in which they are produced.

Kyoto Protocol

The Kyoto Protocol was adopted in 1997 in Kyoto, Japan. It contains legally binding commitments regarding the reduction of greenhouse gas emissions (carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulphur hexafluoride) by at least 5% below 1990 levels in the commitment period 2008 to 2012. Most developed countries and countries with economies in transition have signed the agreement.

Glossary *continued*

Microfinance
A provision of financial services for poor and low-income clients who traditionally lack access to banking and related services.

Peak Oil Theory
Peak oil is the point in time when the maximum rate of global petroleum production is reached, after which the rate of production enters a decline.

Precycling
The practice of reducing waste by avoiding the use of items that generate waste.

Social Marketing
Marketing to achieve specific behavioural changes for social good.

Standard of Living
Describes the ease with which people are able to satisfy their wants. It is generally measured by standards such as income per person, poverty rate, education, and quality of health care.

Sustainable Development
Development that meets the needs of the present without compromising the ability of future generations to meet their needs.

Sustainability
Sustainability is based on the efficient and environmentally responsible use of natural, human, and economic resources, the creation of efficient infrastructures, and the enhancement of quality of life.

Systems Theory
Originating as a biological term to describe how organisms are related in ecosystems, systems theory includes how any group of objects, whether an organism or organization, work together to produce results.

Traditional Ecological Knowledge (TEK)
A cumulative body of knowledge and beliefs by indigenous cultures, based on observations and interactions of living beings with their local environment. It tends to be holistic, viewing the world as an interconnected whole where humans are not regarded as more important than nature.

Transition Towns
A community working together to mitigate the effects of climate change and peak oil by reducing carbon emissions.

Triple Bottom Line
Also known as the "three pillars of sustainability," triple bottom line addresses economic, environmental, and social aspects in any project or approach.