

Living & Working for a Sustainable Future

Module: Climate Change, Me & My Work

Learner Study Guide

Learning Outcomes


Upon successful completion of this unit, you will be able to:

1. Analyze the causes and effects of climate change including the historical components, models, events and impacts on humans and the environment.

Learning Activities

To complete this unit, students should:

- ✓ Complete the activities outlined in step 1: Looking Back
- ✓ Complete the activities outlined in step 2: Looking Within
- ✓ Complete the activities outlined in step 3: Looking Forward
- ✓ Submit the required assessment components to your facilitator

	Looking Back: INFORMATION & EXPERIENCE
---	---

NSCC's mission, vision and strategic plan are fundamentally aligned with the principles of sustainability. The College is committed to taking a leadership role in the journey toward sustainability for the benefit of all Nova Scotians. NSCC programs help learners to be able to apply sustainable practices that support economic, social, cultural and environmental stewardship.

This module relates to the causes and effects of climate change including the historical components, models, events and impacts on humans and the environment. Climate change is something that we hear a lot about in the mass media. You can rarely tune into a newscast without there being some form of report relating to climate change. Climate relates to weather and atmospheric conditions.

When we talk about climate change we are usually referring to changes in the Earth's climate on account of global warming

Think about what you know and have heard in the mass media about climate change.

To build on your previous knowledge, we are getting you started on your learning journey by providing a link to a related online video. You will have the opportunity to learn from the opening presentation at the October 2008 Canadian Round Table on the Environment given by Dr. David Suzuki. (CPAC – video on demand – search environment)

Take Action to view the online presentation on this topic by Dr. David Suzuki. You will be required to integrate your thoughts on this session into the required reflection for the experiential field trip you will be taking as a part of completing step 3 of this module.

Roundtable on the environment and economy.

- Dr. David Suzuki – Opening address to the conference

<http://www.cpac.ca/forms/index.asp?dsp=template&act=view3&pagetype=vod&lang=e&clipID=2099>

If you are really keen, here is another optional resource to explore:

- Thomas Homer-Dixon - Opening paper in round table # 3
(Securing Canada's future in a climate changing world)

<http://www.cpac.ca/forms/index.asp?dsp=template&act=view3&pagetype=vod&lang=e&clipID=2100>

Internet Research Activity: An Internet Scavenger Hunt

Take action by completing the following Internet Scavenger Hunt. Included below are a number of questions you can research via the web. Be sure to keep track of your references and sources of the information. It is important to know where the information is coming from to ensure it is a credible source.

Question one:

Provide definitions for the terms

- (a) Climate
- (b) Climate change
- (c) Global warming
- (d) Global warming predictive models

Question two:

The weather, or in other words the condition of the atmosphere at any particular time or place is expressed by a combination of five elements. What are these five elements and what is the impact of each element?"

Question three:

Find some of the scientific evidence related to climate change. Describe at least four different observations in the scientific evidence related to climate change.

Question four:

Find the definition of La Niña and El Niño. Based on your findings, which term fits each of the definitions below?

_____ represents a marked warming of the waters in the eastern and central portions of the tropical Pacific, as westerly winds weaken or stop blowing, usually two to three times every decade

_____ describes an extensive cooling of the waters in the tropical eastern Pacific Ocean. To qualify the cooling must persist for at least 3 seasons. These events are cyclical, recurring every 3 to 5 years, but the interval can vary from 2 to 10 years.

Question five:

What natural events may influence short term fluctuations in climate?

Question six:

Research global warming predictive models. What are some of the environmental components that are part of these climate model predictions?

Resource Exploration Activity: A Resource Scavenger Hunt

Nova Scotia Climate Change (CC) Action Plan – Towards a greener future

Website address is <http://climatechange.gov.ns.ca/doc/ccap.pdf>

Take the time to review this resource and then complete the following resource scavenger hunt to help you learn more about what the resource is all about.

Question one:

What are the two main goals of the Nova Scotia CC Action Plan?

Question two:

What will be the single biggest reduction and what are the two most cost effective ways of achieving this reduction?

Question three:

What is the second biggest source of green house gas (GHG) emissions and what are three ways in which that will be addressed?

Question four:

What is the triple threat Nova Scotia faces from climate change?

Question five:

Based on the Environmental Goals and Sustainable Prosperity Act, Nova Scotia's GHG emissions should be reduced to what level by 2020?

Question six:

What historical factors lead to Nova Scotia to being committed to producing electricity from coal?

Question seven:

What percentage of Nova Scotia's GHG is produced by transportation?

Question eight:

The goal by 2015 is to achieving GHG emission reduced by what percentage?

Question nine:

What are the five short term actions to be implemented by 2013?

Question ten:

By 2020 what percent of our electricity is targeted to be generated by renewable energy sources?

	Looking Within: REFLECT & SHARE
---	--

So far you have been doing a lot of investigative work. This is important.

Please take the time to review the information synopsis included below which provides additional context to some of the explorations you have been making so far.

The Nature of Climate Change

- Climate is naturally variable. It is never exactly the same from one period to another. Sometimes it can shift dramatically within a few hundred or thousand years, as it does when ice ages begin and end
- The world's average temperature was approximately 0.6° C warmer at the end of the twentieth century than it was at the beginning,
- Such changes may seem trifling, but the difference between global temperatures now and at the peak of the last ice age is a mere 5°C
- The condition of the atmosphere at any time or place, i.e., the weather, is expressed by a combination of several elements, primarily (a) *temperature* and (b) *precipitation* and *humidity*, but to a lesser degree (c) *winds* and (d) *air pressure*.
- The **weather** of any place is the sum total of its atmospheric conditions (temperature, pressure, winds, moisture, and precipitation) for a *short* period of time.
- Thus we speak of the weather, not the climate, for today or of last week.
- **Climate** is a composite or generalization of the variety of day-to-day weather conditions. It is not just 'average weather', for the variations from the mean, or average, are as important as the mean itself.
- **climate change** is defined as 'a long-term shift or alteration in the climate of a specific location, a region, or the entire planet'
- **global warming** addresses changes only in average surface *temperatures*. It does not address whether conditions are becoming wetter or drier

- An increase in average global temperatures drives alterations in atmospheric circulation patterns, which can contribute to some areas warming at higher rates, others at lower rates, and even others to become cooler.

What are the causes of climate change?

- The Earth's surface and atmosphere are heated differentially by short-wave radiation from the sun. The differences in heat and pressure between the poles and the tropics fuel the global circulation system as heat and moisture are redistributed around the world.
- The temperature balance of the Earth is maintained through the return of the continually absorbed solar radiation back to space as infrared radiation, consistent with the first law of thermodynamics
- Long-term temperature changes are a result of shifts in the amount of energy received or absorbed.
- These may be caused over long cycles (100,000 years) by factors such as the shape of the Earth's orbit around the sun, wobbles of the Earth's axis, and the angle of tilt.
- It is more difficult however, to explain some of the shorter-term fluctuations that occur.
- Natural events, such as the eruption of large volcanoes and changes in ocean currents such as El Nino, are known to have an influence on these short term fluctuations.
- **El Nino** represents a marked warming of the waters in the eastern and central portions of the tropical Pacific, as westerly winds weaken or stop blowing, usually two to three times every decade
- **La Niña** describes an extensive cooling of the waters in the tropical eastern Pacific Ocean. To qualify as a full-fledged La Niña, the cooling must persist for at least 3 seasons. La Niña events are cyclical, recurring every 3 to 5 years, but the interval can vary from 2 to 10 years.

Scientific Evidence Related To Climate Change

- The world has been warming, with the average global temperature at the Earth's surface having increased by about 0.6°C , with an error range of plus or minus 0.2°C , since the late nineteenth century
- The increase in the average temperature for the northern hemisphere during the twentieth century was the largest of any century in the past 1,000 years
- **Greenhouse** gas concentrations, especially those of carbon dioxide, methane, nitrous oxide, and tropospheric ozone, have been rising for several decades
- In most parts of the world, glaciers since 1980 have lost, on average, more mass than they have gained.

- In many areas of the world, reduced snow cover has been documented, as well as earlier spring melting of ice on rivers and lakes.
- Measurements show that permafrost is warming in many regions.
- The Intergovernmental Panel on Climate Change (2001) reported that the average rate of sea level rise has increased**
- In interpreting such findings, however, as it is recognized that in some areas land is still rebounding from the weight of the last glaciations.

It has been said that impacts of global climate change are important for all future generations but will be disproportionately heavier on people in less-developed countries. Why is this the case?

- The global climate system is enormously complex, mainly due to the many linkages and feedback mechanisms in the atmospheric system. Furthermore, the associated socio-economic system is complex and continuously changing.

The basic causes of global climate change are embedded in current values and lifestyles...

- In the developed world, including Canada, relatively high standards of living and materialistic lifestyles rely on extensive use of energy based on fossil fuels.
- a dilemma is created for any individual, city, province, or country to take action, because the scale of the challenge requires unprecedented collaboration
- As is often argued, the purpose of communication is not only to provide knowledge to raise awareness and increase understanding, but also it should lead to changes in attitudes and behavior.

Take the time to REFLECT on what you have read and the findings to your internet exploration activities and scavenger hunts.

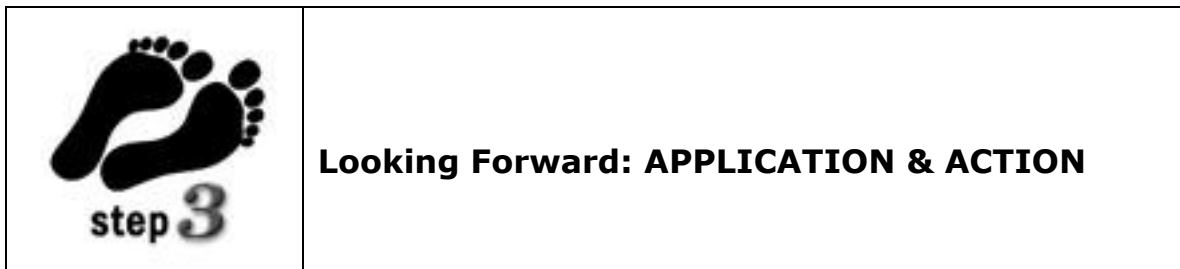
Think about what you have read and how it struck you.

What does all this mean to YOU?

Take Action and record your reflection in some form.

Learning takes on deeper meaning when it is shared. Take the time to SHARE your experiences and reflections with someone else. How are they similar? How are they different?

Take advantage of opportunities to engage in further dialogue with your co-learners and your facilitator about what you have been reading and discovering in the course to date.



Your next step is to take an “**Experiential Field Trip**” – this is a fancy way of saying – go out and explore and learn by doing.

Take Action and go outside and take a look around. Based on your research what are some of the forms of evidence of climate change that you see in your community? What are the related things you are doing, could be doing, or are thinking about doing, that support reducing the impact of climate change in your community?

Use your field trip as a springboard to a personal reflection on the Nova Scotia Climate Change Action Plan. Think about the things that the province has stated it will be doing (the province will take the following actions...). What are the related things you are doing, could be doing, or are thinking about doing, that support this action plan?

Think about these general activities and action avenues. Compare this to what you learned about from the David Suzuki online presentation.

Consider the action steps you envision taking (or are already taking) relating to climate change.

- **In addition to what you submit to your facilitator, you are also encouraged to participate in formal and informal dialogue opportunities with co-learners. Discuss the following question: How did this module impact YOU?**

Assessment

In order to receive credit for this module, you are required to submit to your facilitator your **reflection on your experiential field trip and how that related to the themes from the presentation by Dr. Suzuki** as well as a single page learning reflection. This reflection must include the components outlined below and fit on one single letter size page with a minimum 10 point type font.

- **Module Name:**
- **Learner Name:**
- **How did this module INFORM?** Based on your module readings, reflections and collaboration with others, provide a one paragraph summary of how the content from this module has informed you relating to the importance of sustainability action. What is the single most important thing you learned from this module?
- **How did this module INFLUENCE?** Knowledge is one thing, but learning takes on deeper meaning when it is reflected upon and shared. Throughout this module you have been encouraged to discuss, reflect, share and collaborate with other learners in your journey through the content and activities. Provide one paragraph of reflection evidence indicating how others helped to evolve your attitudes and /or how you have helped to change the attitudes of others.
- **How did this module INSPIRE?** Knowledge and attitudes are important but actions and behaviours are where change often most noticeably happens. Really think about the things you can do (and are already doing). Sum up the personal action steps you are currently completing and/or plan on taking based on this module.
- **Your learning is documented in many forms. Your submitted reflection pieces and the different pieces of evidence from the learning activities you completed are all important artifacts of your learning – they are representations of what and how you have learned.**
- **Your lifelong learning and action to help create a more sustainable future continues on from here...**