

# Unit One : Sustainable Development

Chapter One - An Introduction to Environmental Science

Chapter Two - Sustainable Development

Chapter Three - Ecosystems, Ecoregions, and Biodiversity

Chapter Four - Protecting Species

Chapter Five - Protecting Spaces

Unit One introduces you to the nature of “Environmental Science” studies, and the idea of “sustainability”, which will be the main theme of the course throughout the year. You will be expected to participate in class discussions, and complete a number of smaller short assignments as the unit progresses. These assignments could include newspaper article reports, SMARTboard game making, lab activities, group presentations in class, web site development, and other ideas.

## Key terms From Unit One

You are responsible for knowing short simple definitions for each of these terms in your own words and providing at least one suitable example of each **before** the unit test is given. Use as few words as possible.

abiotic	Ecological Reserve	
alien species	Ecology	
Autotrophs	Ecoregions	
awakening	Endangered	National Marine
bioaccumulation	Environmental science	omnivore
Biodiversity	environmentalists	optimum range
biomagnification	experiment	paradigm shift
biotic	Extinct	Photosynthesis
carnivore	Extirpated	pollutant
carrying capacity	food chain	populations
Climate change	food web	Precautionary
community	Genetic Diversity	Principle
Composting	Ghost Nets	preservation ethic
Conservation Areas	global governance	primary consumers
conservation ethic	Habitat Degradation	producers
conservationists	herbivore	protected areas
constants	Household Hazardous	range of tolerance
consumerism	Waste	SARA
COSEWIC	hypothesis	scavenger
decomposer	independent variable	scientific process
dependent variable	limiting factor	secondary consumers
development	migratory bird	Stewardship
eco-citizen	sanctuaries	tertiary consumer
Ecological footprint	Monitoring	Threatened
	multidisciplinary	trophic level
	national parks	variable
		Vulnerable

## Waste Reduction

### Chapter One - Introduction to Environmental Science

(Earth as a Spaceship analogy....understand that Earth is a “closed system”)

The “biosphere” is the portion of earth where life is found, and can be subdivided into three parts:

geosphere (lithosphere) - the solid portion of the earth....rock, hills, soils and the resources contained there

atmosphere - the gas portion of the planet that protects, insulates

hydrosphere - the water portion of earth.....all freshwater and marine environments as well as groundwater and glaciers

When any one part of the biosphere is impacted significantly by human activity ( positively or negatively ) the impacts are often “felt” in the other parts.

Even though humans are only one part of this giant interconnected biosphere, our impacts often are far larger than our numbers. Our use of technology allows us to take a wide variety of resources more than any other organism. With the use of technology comes the responsibility to use it in ways that doesn't reduce the quality of our biosphere.

### Historically, how have humans affected the biosphere ?

Early humans lived in small groups, foraging, often moving around in search of resources ( called “resource extraction” ). Numbers were small, and impacts limited because of limited technology and spreading out your impacts as you moved around. Aboriginal groups of NL were examples of this lifestyle. ( Beothuck, Inuit, Innu, MigMaq )

Developing tools, clothes, and new strategies of cooperation meant we could start producing resources ( farming ).... “resource production”, and we moved around less. Instead of being controlled by nature, we were controlling more and more of the environment ourselves. Our impacts and range of activity grew quickly. As our numbers grew, so did the effect of these impacts. As Europeans settled in the “New World”, this lifestyle was introduced to Aboriginal cultures. Europeans harvested resources to not only meet their needs, but also to ship back to Europe for profit.

Europeans saw the “wild” environment as something to be “tamed” and “controlled”. “Resources were limitless” and there for the taking. This line of thinking creates many problems and issues. We are NOT entitled to use all of any resource. We are NOT the top of every food chain. We are NOT the most important thing in the environment. The natural environment has value the way it is. We can take and use resources in a smarter way ! Ways that don’t jeopardize other life and uses !

Resource examples would include.....

For direct use -

For processing -

For energy production -

People view these resources differently depending on what kind of ethics and values you have...

A developmental ethic - (egocentrism or anthropocentric attitude)  
Everything is about us....resources are only there for us to make money off of. We are the masters and users of the whole environment.

**IT IS THIS TRADITIONAL ATTITUDE THAT HAS RESULTED IN MANY OF TODAY’S ENVIRONMENTAL PROBLEMS !**

A preservation ethic - nature is beautiful and valuable as it is. All creatures have the right to live in a clean environment, regardless of what we need or lose. Nature can be used for quiet recreation or science. We should preserve its condition and quality, not drive our economy by destroying its natural beauty.

A conservation ethic - recognizes that we need a decent standard of living, and need to use resources, but we need to balance our needs with the health of the environment that sustains us. We need to look after the long term ability of Earth to support us....we need to be “sustainable”. (pages 18-20)

**A HUGE ENVIRONMENTAL PARADIGM SHIFT IS NOW UNDERWAY !**

The older once widely held traditional developmental ethic is slowly being

replaced with a conservation ethic.

- \* Resources are not limitless. Abuse them and they cannot support you long term.
- \* Utilitarian attitudes replaced gradually with conservation or environmentalist attitudes
- \* We are not masters of the environment, but a PART of it. We are “stewards” of our environment, we must practice “stewardship”.
- \* As our numbers and technology change, we must change the way we do business to avoid serious environmental damage
  
- \* Our new buzz word is SUSTAINABILITY..... our current activities need to provide us with a quality lifestyle, but not at the expense of our children or other people who need resources too. We must develop and use resources in a way that does not prevent them from being there in the future for others. We need to keep “ecosystems” stable as we use them.

Nonrenewable resources - practice the four “R’s”  
Renewable resources - harvest them at rates that allow them to replenish themselves

## What’s Causing these Paradigm Shifts ?

An “awakening” period ( 1960's onward ), during which time more and more people are realizing that we are all part of a bigger biosphere, and anything we do to it will come back to directly or indirectly affect us. Environmental studies gives us much information about this. Environmental tragedies / disasters also opened our eyes to what could happen when we don’t pay attention to the health of the environment or how we do business. (Pages 22-23)

- Ex. Cuyahoga River Fire, Ohio, 1969  
Species Extinctions / Resource collapses  
Gulf Oil Spill, 2010

A “global governance” period ( 1970's onward ), people began cooperatively working to create laws and agencies that control activities and people that could potentially harm the environment.

- Ex. The USA’s “Environmental Protection Agency” 1970  
Canada’s “Environment Canada” department 1971

## So What is Environmental “Science” ?

A mix of sciences (ecology, chemistry, biology, math) and social studies (municipal, Provincial, and National government, law, art, and politics). A study of how humans

relate to their environment and the impacts we have on it....both positive and negative. A study of the physical environment, and how its chemistry and life are impacted by us. A relatively new science, its grown out of “ecology” because of these paradigm shifts.

It is a “science” because it uses a “scientific method” to investigate issues and attempt to answer questions about the “biotic” and “abiotic” parts of the environment.

- what is a scientist anyway ?

Anyone who uses “observations” (gathered data) to check if what we think is going on is actually the case. Experiments prove or disprove these ideas. A “scientific method” is a planned, organized way of solving a problem or answering a question. It goes like this...

1. Identify a problem or pose a question
2. Suggest a hypothesis ( a suggested explanation ) that tries to explain your observations
3. Design an experiment that will prove or disprove your hypothesis

A good experiment.....

- Is repeatable, reliable, trustworthy

- Has only one thing in it changing each time it is done (the variable), so that you can make more accurate conclusions about what happens after the variable changed

(The part you change is called the “independent variable”, and the effect it has is called the “dependent variable”)

thing that stays controls.

- keeps every other part of the experiment the same each time it is done ( each the same is called a “control”). There can be a lot of

happens

- records measurements taken and observations made as the experiment

make

- data is organized into graphs, charts, or tables...used to look for patterns and conclusions

- might prove or disprove your hypothesis

Mini lab activity, pages 6 & 7 of the text

Remember : Science....

- can't SOLVE every problem. Often the proposed solution is NOT perfect, but it should be the best choice possible.

- always changes, we can be proven wrong sometimes, ideas / beliefs change with new evidence

- can be biased, or done for money, or influenced by politics, local people, or businesses with something to gain by it Science isn't just done to benefit everybody. It can be done to promote one viewpoint in an issue, or further some business or Government plan.

## What's the Role of Environmental Science ?

We know that our population is growing rapidly. We know we need to use

resources to sustain us. We know that 10 % of the world's population is using 90 % of the planet's resources through "consumerism". These people want more than just life sustaining food, shelter, and water. They want more energy, transportation, recreation, and luxury items to raise their quality of life.

The science process used by environmentalists and conservationists help ensure our use of the environment is sustainable. We consider the health of the environment before, during, and after human activity now.

Ex. More sustainable policy making, law making, and governing is expected by more people before we make important decisions

We carry out Environmental Impact Assessment studies and risk assessments before major projects are begun

We do environmental monitoring during human activity

So, environmental science allows us to understand what makes an ecosystem stable and strives to keep things that way as we use the environment. That's sustainable resource use.

## So What Makes an Ecosystem Stable ?

(briefly review)

1. Recycling of important nutrients like water, carbon, nitrogen (and others) between the living and nonliving parts of the environment.(because earth is a closed system remember !)
2. Healthy populations of organisms that do not increase or decrease dramatically. (Review carrying capacity, biotic potential, limiting factors) Ex. Moose, page 31
3. A wide variety of "biodiversity" that makes food webs stable if there is an environmental change
4. The ability to rebound from disturbances ( repair itself ) using "succession".
5. Balanced ecological pyramids.
6. Sustainable resource use.
7. No major disturbances.

## Chapter Two - Sustainable Development

(Define “closed system” and “conservation”)  
(Core Lab - How much Earth Do You Need ? Page 38)

Remember, this growing “sustainability “ paradigm’s goal is to keep a healthy long term balance between the needs of society, our economy, and the health of the environment.

### What Are Some of the Effects of this New Paradigm ?

1. We as a society act on a new “Precautionary Principle”....a moral, legal and political ideas which states : if an idea or policy might cause harm to the public or the environment, it is the responsibility of those pushing the idea or policy to prove that it will not cause harm, unless there’s a lot of scientific evidence to suggest its ok.

In other words, caution ahead of time, BEFORE we make decisions or take action. That’s completely opposite of the old development ethic. It applies to individuals, businesses, and Governments.

2. We have created legislation to guide people, businesses, and Governments to be more environmentally sustainable. Ex. NL's "Sustainable Development Act", hunting and fishing regulations, forestry planning requirements, industry clean up, limiting air pollution, protecting water, reducing carbon emissions.
3. We monitor human activity to ensure its sustainable. Being more aware of what you're doing will help make you more sustainable. (Ex. Any idea how much garbage your family puts out in a year? How much water your home uses? How much energy your family demands? How much earth is needed to support your lifestyle?)
4. We recognize now that our lifestyle choices have an "ecological footprint". Earth's resources DO have limits, and can only provide a certain amount of resources with today's technology. It is an estimate of how much land and sea space is needed to supply humans with resources and deal with our wastes under current technology.  
(Page 34)

(Core Lab - How much Earth Do You Need? Page 38)  
[www.myfootprint.org](http://www.myfootprint.org) online footprint calculator quiz

## Sustainable Development in Newfoundland and Labrador

Developing and using our resources has the potential to bring great prosperity, but that shouldn't degrade the quality of our environment. Our ties to the environment have been a core part of our culture. Using those resources wisely means that we'll be better able to meet the needs of our education, health system, social programs, AND the environment itself. Billions of dollars are generated each year through resource based activities.

Our NL Government must lead with sustainable examples, and decide how our resources are to be used. As a Province, we also work towards environmental goals set by national and international agreements or programs.

A Government's role is to protect our future, provide leadership, help make us better global citizens. That includes municipal Governments as well as our Provincial Government. The decisions and programs coming to or from them help us do that.

Ex. Passing and enforcing environmental protection

Giving money to projects and organizations aiming to help

improve the environment

Participating in global agreements

Industry's role is to comply with regulations and be a good community citizen ( supporting projects, hiring / buying locally ). Setting examples of sustainable resource use and concern for the environment.

Your role as an individual is called “eco-citizenship”. Being active in helping maintain a high quality environment through your decisions and actions.

How ?

By doing a course like this, you gain knowledge to help you make better informed decisions about issues and be aware of who's doing their part and who isn't. Build an attitude of awareness and concern. Practice doing things in a more environmentally friendly way.