

## **ES102 OC- Environmental Problems**

### **Module 1: Lessons 1**

**Carrying capacity** – maximize population size that can be supported

#### **The Millennium Ecosystems Assessment**

- o Initiated in 2001
- o The objective was to assess the consequences of ecosystem change for human well-being and the action needed to enhance the conservation and sustainable use of those systems
- o Was an attempt to create a global assessment of ecological impacts and trends

#### **Ecological services**

1. Supporting services
  - Necessary for the production of all other ecosystem services
2. Provisioning
  - Products people obtain from their ecosystem
3. Regulating
  - Benefits people obtain from the regulation of ecosystem processes
4. Cultural
  - Non-material people obtain from ecosystems through spiritual enrichment

#### **Sustainability**

- o Meet the basic resource needs of its people without degrading or depleting the natural capital that supplies the resources

### **Module 1: Lessons 2 & 3**

#### **Air pollutants**

- o Chemical compounds released into the atmosphere
- o Might cause humans harm or reduces human health
- o Natural sources include dust, chemicals released by plants, forest fires, volcanic eruptions and sea spray
- o Human related pollutants include carbon monoxide, aerosols, sulphur dioxide, nitrogen dioxide, ozone and lead

#### **Smog**

- o In the lower troposphere ozone because a health hazard and source of premature death
- o Brown-air smog is formed when nitrogen oxides and volatile organic hydrocarbon compounds react chemically
- o Industrial smog consists of sulphur dioxide, sulfuric acid and a variety of particles or droplets that give the smog its gray color
- o Smog is more common in developed countries that have high use of gasoline cars
- o Pollutants in the lower atmosphere will stay at the surface rather than disperse which extends the contact the population will have with them
- o Can lead to respiratory problems and loss of life

- o 4,000 deaths occurred in England in 1992 due to smog
- o This summer 700/day died in Russia due to the smog
- o 5900 premature deaths in 8 of the larger cities in Canada are linked to smog

### **Acid rain**

- o A concern in central Ontario where the effects of acid rain have had a serious impact on the ecology and the economics of cottage country
- o The primary sources are the burning of fossil fuels in industrial processes
- o When SO<sub>2</sub> and Nitrogen oxides combine with water, oxygen and oxidants acid rain occurs
- o Divided into dry and wet deposition
- o Wet deposition is snow, rain, fog and cloud vapor
- o Dry deposition include acidic particles
- o Can cause respiratory problems, leach toxic metals into water, damages statues, national monuments, buildings, parks, cars, can kill fish in lakes if the PH falls below a 6
- o Western Canada has a lower critical load or least resistance to acid rain
- o Southern Ontario and Southern Quebec have exceeded the critical loads between 1994-89

### **Arctic contaminants**

- o An example of long-range dispersion
- o Have two primary sources such as local pollution from previous land use and POP's which are transported to the Arctic from southern regions
- o POPs include pesticides and industrial chemicals
- o The build up of chemicals in the food chain impacts the human system especially where communities are dependent on local food source called country food
- o Medical conditions include a decrease in immune system, impaired child development and pregnant woman having health issues
- o Indirect impacts include global markets not wanting to purchase food from northern communities, switching to packaged foods and avoiding country foods

### **Governance**

- o Mandatory testing of vehicles for emissions has occurred in Ontario (drive clean program)
- o Combining a number of solutions to help improve conditions

### **Climate change**

- o Substantial melting of sea ice cap has taken place from 1979-2003
- o Loss of sea ice will impact the marine ecosystem
- o In the past 100,000 years the earth has experienced a number of ice ages as well as warmer periods which occur because of alterations in the earth's movement around the sun
- o Volcanic eruptions can cause climate change due to their ash cloud blocking or reflecting the rays

- o Irregular patterns of solar flares can alter the amount of radiation the earth receives
- o El Nino and La Nina have been recorded to cause short-term climate change

**Milankovitch cycles**

- o Eccentricity is the distance from the sun
- o Obliquity is the axial tilt
- o Precession is the change in orientation of the rotational axis

**Greenhouse gas effect**

- o Heat is trapped
- o Water vapor is the primary natural source leading to global warming
- o The concentration of the greenhouse gases has increased due to human activity
- o Carbon dioxide and methane are the two top gases

**Methane**

- o Greenhouse gas that is naturally found in the atmosphere but is increasing due to human activity
- o Human activities that release methane are fossil fuel production, livestock farming, landfills and biofuels

**Climate models**

- o Complex software which aims to reproduce a real climate system
- o Computer program
- o There are 15 different models
- o Trying to predict future climate change is difficult

**Predicting impacts of climate change**

- o Could trigger the shift of species from their traditional habitats and ranges to new ones
- o Extinction might occur if a species can't adapt
- o The boundary between trees and tundra in northern Canada is changing
- o There will be reduced or increased tree growth
- o Increased pests and disease
- o Increased risk of drought and wildfires

**Ozone depletion**

- o The breakdown of ozone occurs because of reactions between ozone molecules and gases such as chlorine
- o CFC is the most concerning compound that breaks down ozone
- o Thinning of the ozone allows more ultraviolet light to reach the earth's surface
- o Decreased ozone can lead to cataracts, immune system damage, reduction in phytoplankton, damage to DNA of life forms and skin cancer
- o The Montreal protocol in 1987 was an agreement globally to ban ozone depleting substances and phase out CFCs