



# Chapter 2

## Natural Capital, Linkages between the Economy and the Environment, and Pollution

ECON 260  
ENVIRONMENTAL ECONOMICS

# Learning Objectives

1. Describe the three components of natural capital and give specific examples of each type
2. Explain the intertemporal tradeoffs with natural capital use
3. Describe ways to reduce residuals in the economy
4. Describe the different categories of pollution and contrast the degree of complexity in reducing emissions

# What is Natural Capital?

- Canada's Natural Capital includes:
  - Natural Resource Capital – such as stocks of renewable and non-renewable resources
    - Minerals
    - Energy
    - Forests
    - Fish
  - Ecosystems or environmental capital
    - Watersheds providing fresh drinking and irrigation water
    - Pollution assimilation in the air, water and soil
    - Water run off control by wetlands
  - Land
- Natural Capital sustains life and economic activity

# Impacts of Natural Capital Use

1. Using Natural Capital draws down the stocks available for the future – catching too many fish today may leave fewer to catch in the future
2. Residuals or waste is created by use of Natural Capital – processing fish or raising fish may create ocean pollution
3. Waste products may degrade Natural Capital stocks – for example fish may not reproduce in a degraded environment

Sustaining the stocks of Natural Capital is important to sustain life and the economy

# Natural Resource Economics

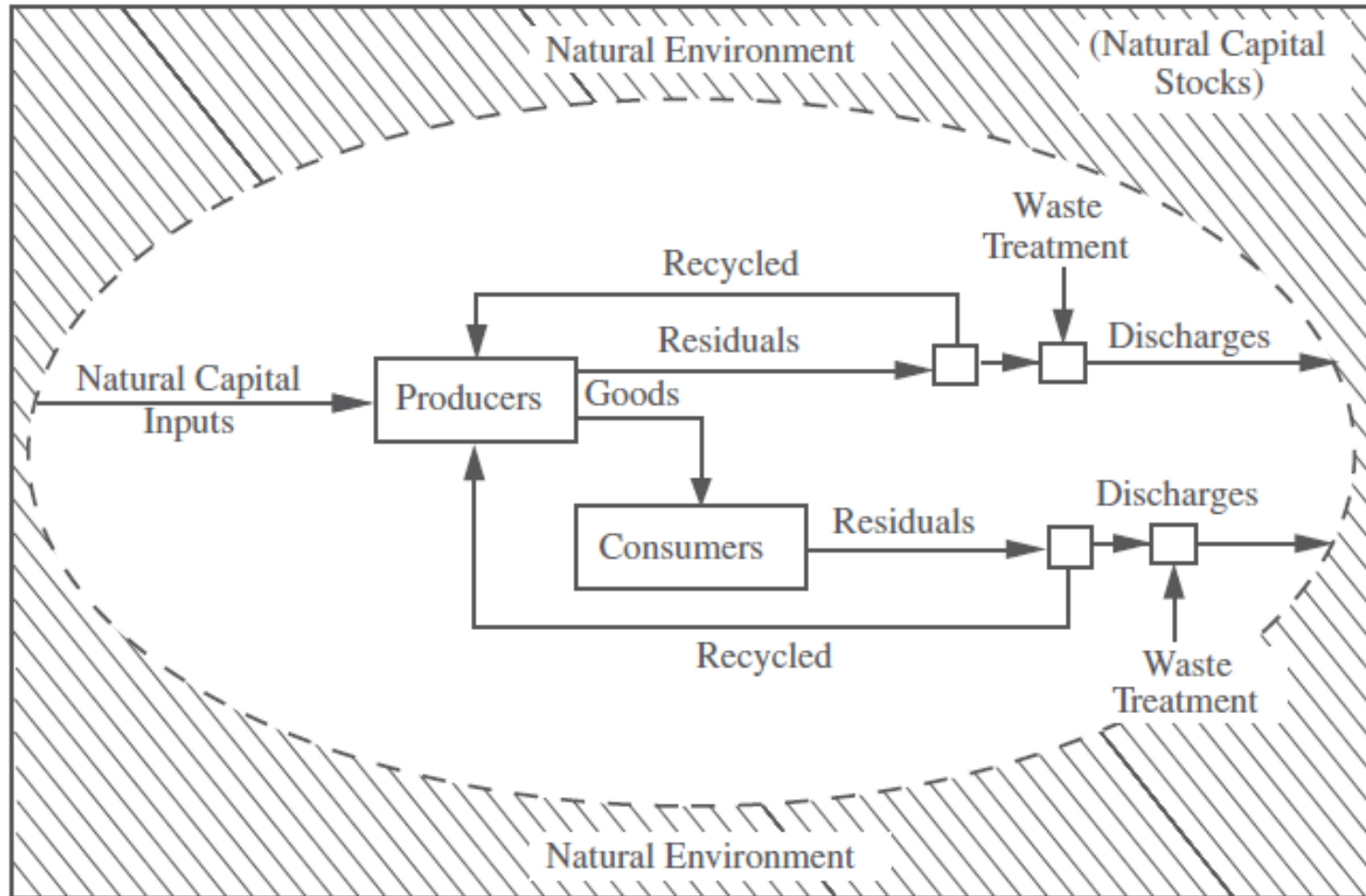
- **Natural Resource Economics** studies how to efficiently extract or harvest natural resources over time.
  - When should a forest company cut the trees it owns? They can let them grow longer and get bigger, or cut them sooner
  - How many fish can be caught from an area without threatening the overall species health?
  - Should a mining company dig up the ore from its mine over a long time, or try to produce as much from its mine as fast as possible?

Some resources are renewable and some are non-renewable.

# Environmental Economics

- **Environmental economics** examines the waste products or residuals from production and consumption and how to reduce or mitigate the flow of residuals so they have less damage on the natural environment and depletion of natural capital.

# Circular Flow for the Environment and Economy



# Reducing the Flow of Residual Wastes into the Environment

- Figure 2-1 shows “what goes in comes out”
- Therefore to reduce the amount of residuals, you have to reduce the input of natural capital into the system. There are 3 ways to do that:
  1. Reduce the quantity of goods and services produced
  2. Reduce the residuals from production
  3. Increase recycling



# 1. Reducing pollution by reducing production of goods and services

- The first option to reduce residuals, reducing the quantity of goods and services produced, is not popular with many people because it means people will have to live with less, or the total population will have to shrink.
- While people often say they can live with less, they are reluctant to give up income or material possessions.
- Would you be happy with a lower income?
- What possessions would you be happy to give up?

## 2. Reducing pollution by reducing residuals from production

The second option, to reduce residuals from production is more popular.

- It involves pollution prevention - making the production process less polluting.
- It can also mean a shift to consumption of less polluting goods – we can consume more overall with less pollution if we consume more environmentally friendly goods.
  - Examples are green products – Seventh Generation soap or organic produce

# 3. Increase recycling

The third option to reduce residuals from production is also popular: to increase rates of recycling.

- If we reuse goods that were once considered waste, we need fewer raw natural resources in production, reducing overall residuals.
  - Recycling an aluminum can means we use less bauxite from nature and less energy in production
- However recycling has its limits – not all goods can be recycled, goods are degraded in recycling and recycling still requires the input of energy and other natural resources

# Types of Pollutants

- It is important to have a good understanding of different types of pollutants, and understand how those characteristics affect policies aimed at reducing the harm they cause.

# Accumulative vs Non-accumulative

- **Accumulative pollutants** stay in the environment for a long time. New emissions are added to existing stocks of past emissions.
- Accumulative pollutants are harder to address as one must consider past, present and future emissions

Examples include:

- Plastics
- Radioactive Wastes
- GHG

- **Non-accumulative pollutants** are short-lived – they disperse and assimilate quickly in the environment.

Examples include:

- Noise

# Local vs. Regional and Global Pollutants

- **Local pollutants** only affect one small area. The pollution is usually produced in a specific area and the impact of the pollution does not travel to other areas. They are generally easier to identify and deal with because both the polluter and those affected are in one localized area.

Examples include:

- Noise
- Land degradation
- Ground Level Ozone (Smog)

- **Regional and Global pollutants** can travel long distances from their source. They are typically longer lived pollutants that can travel in the atmosphere or water.

Examples include:

- Acid rain
- GHG
- CFCs

# Point source vs Non-point source

- **Point source pollutants** come from one or a few specific sources. It is possible to identify the source of the pollution.
- Point source pollutants are easier to address as it is possible to identify and monitor the source of the pollution.

Examples include:

- Power plant emissions
- Pollutants from a major industrial facility

- **Non-point source pollutants** do not have a clearly identified source, or the sources are so numerous it is hard to tell which exact emitter produced the pollution.

Examples include:

- GHG
- Stormwater run off from roadways
- Nitrogen run off in waterways

# Continuous vs Episodic Pollutants

- **Continuous pollutants** involve a steady production of pollution. For example, your car will produce pollution from the moment it is turned on.
- Continuous pollutants are easier to address they can be more easily measured and monitored, and pollution control technology can be installed.

Examples include:

- Car emissions
- Power plant emissions
- Wastewater emissions

- **Episodic pollutants** only happen occasionally. They may happen rarely. The issue is to manage them to reduce the risk that an episode of pollution will occur. It may be hard to estimate the likelihood of catastrophic event, or to have the right supplies and equipment in place to deal with a situation that has not occurred before or only happens occasionally.

Examples include:

- Oil tanker spill
- Oil well blow out
- Pipeline rupture
- Chemical spill



# Emissions test

Describe whether the following pollutants are:

- Accumulative or non accumulative
- Local or regional/global
- Point source or non-point source
- Continuous or episodic

1. Automobile GHG emissions?
2. Sulphur dioxide emissions from a power plant?
3. A loud party next door?
4. Stormwater sewer overflow after a major rain event?

# Canada's Air Pollution

How do Canada's air pollution measures compare to:

- Other developed countries?
- Developing countries?

Is air pollution in Canada getting better or worse over time?

What is happening with GHG emissions in Canada over time? Why?

# Chapter Overview

This chapter provided an overview of how a country can sustain its economy and society.

- The concept of natural capital was introduced.
- Natural Resource Economics was contrasted to Environmental Economics
- A circular flow relationship was introduced that demonstrated that residuals (pollution) can only be reduced through a reduction in natural capital inputs. Three mechanisms for reducing residuals in the economy were outlined.
- Several types of pollution were introduced, with a discussion of how the types of pollution impact the difficulty of addressing pollutants.
- Finally, Canada's air pollution measures were compared to other world countries and across time.