

### Lecture 3

- 1994 Atlanta-based Interface Carpet was a leading seller of carpet tiles, led by Ray Anderson.
  - Over \$1 Billion/year sales
  - Petroleum based carpets, with significant amounts of air & water pollution
  - 6 tons of landfill waste per day!
- But, the company complied with environmental laws.

#### Did the company “get” environmental awareness?

- Founder Ray Anderson read “The Ecology of Commerce” by Paul Hawken
- Ray then had an epiphany:

**“You can’t go on consuming more than your environment is able to renew. We’re on the wrong side of history, and we’ve got to do something”**

**Ecological Footprint:** -land needed to provide resources and assimilate waste.

What was the Ecological Footprint of the Interface Carpet factory?

That is, how much land was needed to provide its resources and assimilate its waste?

The ecological footprint of a population is determined by its

- 1) size, and
- 2) amount of resources used per person

#### **Book: Confessions of a radical industrialist by Ray Anderson**

Goal: Build a sustainable, environmentally sound business.

Anderson began to recognize that we must not only minimize our impact on nature, but also understand that our resources come from nature.

- Change in normal business plan & increases in technology can save resources and money!
- One method Interface used was biomimicry; that products imitate nature
- They removed glues from carpets and replaced them with “gecko” lizard technology
- Between 1994-2006, Interface Carpets made major changes:
- Fossil fuel use declined by 55%
- Total energy use declined by 43%.

Only 5% of the 5 billion pounds of carpet pulled yearly was being reused; new technologies developed to recycle carpet. 100,000 tons of waste diverted from landfills!

#### **Ray Anderson’s pathway to sustainability:**

- |                   |                           |                       |
|-------------------|---------------------------|-----------------------|
| -Eliminate waste  | -Closing the loop         | -Redesigning commerce |
| -Benign emissions | -Efficient transportation |                       |
| -Renewable energy | -Sensitizing stakeholders |                       |

#### **Total economic value**

1. Use value

- Direct use value: Resources used directly:
  - + provisioning services (water, fish,...)
  - + Cultural and amenity services (recreation)

-Indirect use value: Resources used indirectly

2. Nonuse value:

- Bequest value: future generations’ possible use,
- existence value: right of existence example: blue whales and uninhabited lands have value just for existing.

Indirect use value of plants for flood control:

- Villagers in India planted 80,244 mangrove saplings to get into the Guinness Book of World Records, which created a kilometer wide belt of trees.
- A tsunami soon struck. Although much of the land around the village was flooded, the village itself suffered minimal damage.

**option value for medicines and drugs:** ~25% of pharmaceutical drugs are derived from nature

**Bequest value:** Do we own future generations the resources and conditions to exist?

**Existence values:** Blue whales and uninhabited lands have value just for existing.

**Sustainable development:** meet present needs without preventing future generations from meeting their needs

**Economic Discounting:** do we care more about the immediate benefits of some action, or do we give more weight to longer term benefits?

The unregulated exchange of goods or services that carry **externalities** will generate prices that do not reflect the full social cost or benefit of their transactions.

We call these types of **transactions inefficient**.

When marketplace inefficiency occurs, the result is **market failure**. Market failure may be caused by imperfect knowledge or environmental externalities, among other things.

Ecological market failure can happen when a resource does not have defined property rights attached to it, while too many users exploit the resource.

(Tragedy of the Commons Reading)

**Since 1994, Interface Carpet has:**

- Reduced greenhouse gas emissions by 35%
- Reduced energy consumption by 43% per unit of production
- Relies on recycled materials for 40% of raw materials

While, sales increased by 66% and earnings doubled

Green business can be profitable!

- 1) Green actions save money
- 2) Consumers willing to support sustainable businesses

## Lecture 4

**why did Dr.Cox choose Samoa to search for a cancer cure?**

- located in tropical region which is warm lush, close to the equator.
- it's this combination of environmental factors that gives areas like Samoa the greatest biodiversity on Earth.

**Biodiversity:** variety among organisms and ecological systems at all levels of organization

**Natural capital:** range of natural resources provided by ecosystems.

example: Oxygen/Timber, Energy/Fuel, Food

**The welfare of humans depends on maintaining ecological system functions**

*Ecosystem services:* conditions and processes of natural ecosystems and species that provide some human value.

For example: pollination by bees or wind

What should be a human goal? Sustain current standards and minimize negative impacts resulting from management, extraction, and use of resources?

- Chemical weapons in plants have evolved over millions of years as relationships and competition among plants and insects have been forged.
- Plants are continually evolving to stay ahead of pressures from herbivores

### **Why care about the Biodiversity?**

- Biodiversity benefits humans and other species
- Plants evolve to produce toxins as they adapt to other species.
- Chemical weapons in plants have evolved over millions of years as relationships and competition among plants and insects have been forged.
- Plants are continually evolving to stay ahead of pressures from herbivores.
- Plants may gain medicinal qualities as they adapt to other species.

**Ethnobotany:** The study of the relationship existing between people and plants, focusing on understanding how plants are used and managed across different societies and cultures

- Traditional healers use medicine derived from plants and insects to treat and cure disease. Like family recipes, these natural remedies are passed down through generations and learned through apprenticeships.

### **Searching for natural remedies:**

- Chemical weapons produced by plants were once the primary form of healthcare and inspiration for new drugs (aspirin, codeine, hypertension drugs,...)
- Western medicine has often replaced natural sources and inspiration for medicines with pharmacology and lab-based chemistry.
- International trade in medicinal plants topped \$100 billion in 2011.

### **Paul Cox Video?**

What might be a potential downside or challenge associated with the field of “ethnobotany”?

### **The ecological footprint of a population is determined by its:**

- 1) Size, and
- 2) amount of resources used per person.

### **USA**

- Population 300 million
- 2 billion acres of land
- Footprint of each of us ~ 24 acres/person

### **CHINA**

- Population 1.3 billion
- 2 billion acres
- Footprint ~ 2 acres/person.

Cowetta, NC: Hydrologic Station

### **Diverse forested habitats produce:**

- More water: trees prevent evaporation
- Cleaner water: healthy soils are filters
- more biomass: diversity promotes production
- less CO<sub>2</sub>: plants photosynthesize
- more O<sub>2</sub>: plants photosynthesize

### **Value of ecosystem services: Global GNP, Ecosystem services**

Ecosystem of services of honey bees.

Honeybee decline: Colony collapse disorder (CCD) has affected at least half of all U.S. commercial honeybee colonies. Honeybees pollinate more than \$15 Billion in crops each year in the U.S.

### **Symptoms of CCD:**