1.4 Sustainability

IB ESS

Read pgs

Learning Objectives

- Explain what is meant by sustainability and how it is possible to view a system
- Outline how sustainable development meets the needs of the present without compromising the future
- Describe what is meant by the terms ‘natural capital’ and ‘natural income’
- Describe how environmental indicators and ecological footprints are used to assess sustainability
- Outline the concept of sustainability in terms of natural capital and natural income
- Explain the importance of Environmental Impact Assessments (EIAs) in sustainable development
- Understand that biodiversity, pollution, population & climate can be used quantitatively as indicators of sustainability
- Describe how the ecological footprint is used to assess sustainability

Key Questions

1. What is sustainable development?
2. How are environmental indicators used?
3. Where and when are Environmental Impact Assessments (EIAs) used?

Sustainable System

- One that remains diverse & productive
- Will survive changes & return to natural state
  - Example: wetlands & forests that have existed unchanged for long periods of time
  - Important things for sustainability:
    - Ecology, economics, politics & environmental values
    - Sustainability = living within the means of nature
    - Reduce the level of climate change, overconsumption of natural resources, amount of damage degrading the environment = sustainable ecosystems

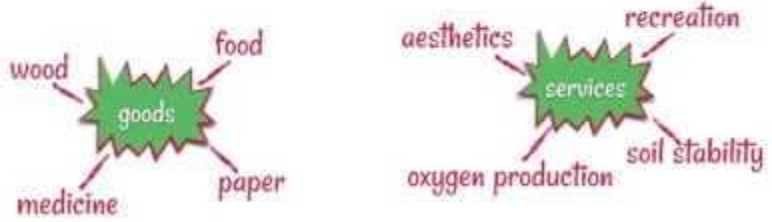
Natural capital

- Natural resources that produce a sustainable income of goods & services
  - Examples: water, timber, animals & plants used by humans
  - Stock in an ecosystem providing a flow of valuable goods & services into the future
    - Examples of goods: forest of trees to provide a flow of new trees, stock of fish to provide a flow of you fish, mineral deposits & fertile soil
    - Can be indefinitely sustainable if used & managed wisely
      - They can recover quickly after some of the resource has been removed
  - Natural income - the yield obtained from natural resources
  - If natural income prevents natural capital to provide resources at the same rate, sustainability is NOT POSSIBLE
  - The rate natural capital is used should never exceed the rate at which it is renewed

Natural capital provides...

natural income:

The annual yield of goods and services



Sustainable Development

- Development that meets current needs without compromising the ability of future generations to meet their own needs
  - Subject of considerable debate
  - Encompasses
    - Keeping population densities below carrying capacity of a region so humans don’t overwhelm an area
    - Doing everything possible to ensure the renewal of renewable resources to system can recover
    - Conserving & establishing priorities for the use of non-renewable resources such as coal & oil
    - Keeping the environmental impact below the level required to allow affected systems to recover and continue to evolve

Sustainability at different scales

- From individual to Earth as a whole
- Different geographical environments (like rainforests, temperate grasslands, urban areas)
- Individual economic activities (like tourism, agriculture, forestry)
  - Doesn’t require reduction in quality of life
  - Does require change in attitudes & values toward less consumptive lifestyles
  - Must embrace global interdependence, environmental stewardship, social responsibility & economic viability
    - Economic sustainability - maintaining income and employment
    - Social sustainability - maintaining social capital devoted to health, education, housing and rule of law

Millennium Ecosystem Assessment (MA)

-international assessment of the effects of human activity on the environment

- Scientific appraisal of the condition of the world's ecosystems
- 2001 launch (1300 individuals from 95 countries over 4 years)
  - UN, governments, NGOs, academics, business leaders, and indigenous peoples
- Findings:
  - ⅔ of services derived from natural systems are in decline
  - Environmental degradation = barrier to reducing global poverty

10 important themes of the MA

1. Everyone depends on ecosystem services for healthy life
2. Humans have changed ecosystems to meet growing demands for food, fresh water, fiber & energy
3. These changes have saved lives, but have weakened nature
4. Major problems identified: fish stock, drought areas losing water supply, climate change and nutrient pollution
5. Human-caused species extinction
6. Human-caused environmental strain is a barrier for the Millennium Development Goals to reduce poverty, hunger & disease
7. Further decline is inevitable unless human attitudes & actions change
8. Conservation is best if local communities are given ownership of their natural resources, share the benefits & are involved in the decisions.

9. Technology & knowledge is valuable for change. Understanding ecosystems are not free and limitless is critical.

10. It take a village. Better protection of natural assets require coordinated efforts across all sections of governments, businesses & international institutions. Productivity of ecosystems depends on policy choices on investment, trade, subsidy, taxation & regulation, and more.

Environmental Impact Assessment (EIA)

- Studies carried out before a development project is undertaken to assess the possible damage to the environment
  - Includes effects on environment, social aspects & economic aspects
  - Became legal requirement in USA in 1969
  - Include how abiotic & biotic environments would be changed with project

EIAs should include:

- A baseline study to record the current situation
- A survey - a report to assess the potential impact of the project
- A prediction to indicate the importance of the likely impacts
- A summary to consider how the effects can be limited to reasonable levels

Problems that impact an EIAs effectiveness:

- Each country has different rules about the use of EIAs
- Not certainty that proposals of an EIA will be implemented
- Socioeconomic factors influence the decision-makers (who may be influenced by local opinions & lobbying)
- No standard training for those who prepare the reports
- Difficult to define the boundaries of an individual project, which may cover a large area
- Indirect impacts of a project (influence on other areas) are not included

Ecological footprint

- Sustainability indicator that expresses the relationship between a population and the natural environment
- Area of land & water needed to sustainably provide all the resources at the rate at which they are consumed by a given population
  - Considers total use of natural resources by a country's population
  - Used to measure our consumption of natural resources (how it varies & changes over time)
  - 6 components used to calculate:
    - Built-up land
    - Fishing grounds
    - Forest
    - Grazing land
    - Cropland
    - Carbon uptake

Individual’s ecological footprint

...depends on

- Their country of residence (income levels factors in)
- Quantity of goods & services they consume
- Resources used
- Wastes produced