



ENVIRONMENTAL SCIENCE

GRADUATE STUDIES
MAIN CAMPUS

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RELEVANCE OF ENVIRONMENTAL SCIENCE

Why study?



COURSE CONTENT

- Introduction: Relevance of Environmental Science
- Environmental Issues and Problems
- Sustainability and Sustainable Development Goals (SDGs)
- Environmental Policies, Laws and Regulations
- Ecosystem Interactions
- Water Quality
- Waste Management
- Air Quality
- Energy and Climate Change
- Biodiversity
- Other Environmental Issue

RELEVANCE OF ENVIRONMENTAL SCIENCE

Why study?



Relevance of Environmental Science



- Role of Environmental of Environmental Science in Society
 - Great change and challenges
 - Environmental issues: poverty, diseases, hunger, natural disasters
pollution
 - Opportunities – we can make a difference; we can do things differently
“Business not usual” – not sustainable
- Environmental Science is a applied science designed to help and solve the challenges the world faces
- Environmental Science is interdisciplinary field. Why?

Relevance of Environmental Science



- Environmental Science is interdisciplinary field. Why?
 - Environmental problems occur as a result of the interaction between human and the natural world
 - Scientific and social aspects – to seek solutions to environmental problems

ECOSYSTEM INTERACTIONS

Ecological relationships of organisms



Ecosystem Interactions



- Community – assemblage (group) of all the interacting populations of different species of organisms in an area (physical environment).
 - major role/minor role
 - Example: grasses: provide shelter to other insects and animals;
 - bacteria/fungi: break down the bodies of dead plants and animals to provide nutrients to the soil
- Ecosystem – is a defined space in which interactions take place between a community, with all its complex interrelationships, and the physical environment.
 - Example: banana trees – warm, moist, tropical area; kind of soil and the amount of moisture influence the kinds of organisms found in an area.

Major Roles of Organisms

- Producers – organisms that are able to use sources of energy to make complex, organic molecules from the simple inorganic substances in their environment.
 - plants, algae and tiny aquatic organisms (phytoplankton) use light energy from the sun to carry on “photosynthesis”
 - other organisms rely on producers as a source of food (directly/indirectly)
- Consumers – organisms that require organic matter as a source of food
 - respiration to break down organic material to inorganic matter
 - Herbivores: animals that eat leaf-eating insects and seed-eating birds
 - Carnivores: animals that eat other animals
- Decomposers – organisms that use nonliving organic matter as a source of energy and raw materials to build their bodies.
 - excretes waste products as source of food of many small animals, fungi & bacteria

Nutrient Cycles in Ecosystems



- Nutrient cycles – are also often as biochemical cycles. The activities involved in the cycle of atoms (matter) include biological, geological, and chemical processes.
- Carbon, nitrogen, oxygen, hydrogen, and phosphorous are found in important organic molecules such as proteins, DNA, carbohydrates and fats in all kinds of living things
- CARBON CYCLE – carbon + oxygen = CO₂
 - photosynthesis, CO₂ taken into the leaves of plants and combined with hydrogen from water molecules (H₂O) – then absorbed from the soil by the roots and transported to the leaves
 - formation of carbohydrates and released of Oxygen and H₂O to the atmosphere

Nutrient Cycles in Ecosystems



- NITROGEN CYCLE – 78% of the gas is made of molecules of nitrogen gas; Plants get Nitrogen it in the form of nitrates or ammonia;
 - dead organisms and waste products contain molecules such as proteins, urea, and uric acid that contains nitrogen
 - in agriculture – application of fertilizers
- PHOSPHOROUS CYCLE – Phosphorous is not present as a gas; main source – rock; phosphorous compounds are released by the erosion of rocks and dissolved in water – precipitated as deposit; waste products of animals have significant amounts of phosphorous

Human Impact on Nutrient Cycles



- Burning of Fossil Fuels – increase production of CO₂ in the atmosphere – cause changes in the climate of the earth; Oxygen and nitrogen in the air are heated in high temperature and produce a variety of nitrogen-containing compounds which plants used for growth
- Conversion of forest, wetlands, grasslands which tend to store carbon for long period of time – increase of CO₂ release to the atmosphere
- Increase of fertilizers to increase yields – altered several nutrient cycles; these nutrients were removed soils when crops harvested
- Agricultural runoff – presence of large amounts of these nutrients in freshwater or saltwater which trigger the increase of growth of bacteria, algae, and aquatic plants – some of these are toxic and human poisoning; lessen the oxygen concentration level in water.