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INTRODUCTION TO ENVIRONMENTAL SCIENCE

BIODIVERSITY

DR. EMMANUEL AMANKWAH

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Biodiversity

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Biodiversity – It is the degree of variation of life forms on earth and it's a measure of the variation in plants and animal genes including microorganisms in the ecosystem.

The UN Convention on Biological Diversity (1992), article 2 defines biodiversity as

the variability among living organisms from all sources including, inter alia, terrestrial, marine, and other aquatic ecosystems and the ecological complexes of which they are part; this includes

diversity within species, between species and of ecosystems."

Types of Biodiversity

1. **Genetic diversity -** It is the genes that exists within and between species. It corresponds to the variety of genes contained in plants, animals, fungi, and micro-organisms.

Individuals possess genes that makes them unique. Eg. Human face, types of animals (German shepherds and golden retrievers have different colour, looks and abilities)

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The diversity in wild species make the ‘gene pool’ from which crops and domestic animals have been developed over thousands of years.

Types of Biodiversity

2. **Species diversity** - the variety of different species of plants, animals, fungi, and organisms that are present in a region.

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About 30 million species are on earth and vary from ecosystem to ecosystem. A tropical ecosystem are more diversified than in temperate ecosystems.

Areas that are rich in species diversity are called ‘hotspots’ of diversity.

3. **Ecosystem diversity** - It is a measure of the number of different kinds of ecosystems present in an area. Refers to the variety of ways that species interact with each other and their environment.

Tropical or temperate forests, grasslands, hot and cold deserts, wetlands, rivers, mountains, and coral reefs are instances of ecosystem diversity.

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Facts about Biodiversity in Ghana

- Ghana has about 16 legally constituted wildlife reserves and over 280 forest reserves.
- Ghana has about 3,725 species of indigenous plants, 504 fishes, 729 birds, 225 mammals, 131 reptiles and 90 species of amphibians.
- Ghana has 308 protected areas covering around 35,000 km^2, or 15% of its total land area. In 2008, about 174 species of wildlife were threatened in Ghana.
- About 3.9% of the 206 known breeding birds and 6.3% of mammals were threatened in 2002.

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- About 13% of the endangered species in Ghana are unprotected.
- By the mid –1970s, more than 90% of Ghana's high forests had been logged since the late 1940s.

Extinction

Biodiversity loss leads to extinction.

Extinction – death of species or elimination of all individual of a particular kind.

Complete extinction is when all individuals of a species are eliminated

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Many species are currently threatened with extinction and many ecosystem services are being degraded or used unsustainably.

For instance: fresh water and air are being polluted and land resources are being degraded or exploited unsustainably.

The impact of this changes is mainly on the poor especially in Africa and Asia.

Even though extinction could be a natural phenomenon but human activities have influenced this over the years.

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Importance of Biodiversity

- It provide ecosystem services such as air and water purification, climate regulation and generation of moisture and oxygen
- Provides ecological and economic services
- Small animals like earthworms, mites, insects and millipedes help give soil its texture, fertility and for aeration.
- Vegetation help recycle moisture into the atmosphere thus playing a crucial role in the hydrologic cycle

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- Biodiversity serves as a source of food, medicine and employment

Importance of Biodiversity

- Soil microorganisms and fungi are responsible for recycling essential nutrients like nitrogen, phosphorous and sulphur for higher plants

- A gram of fertile agricultural soil may contain 2.5 billion bacteria, 400,000 fungi, 50,000 algae and 30,000 protozoa.

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- These organisms have a particular role to play to ensure the soil is fertile.
- Soil organisms can slowly decompose food items, paper products and other organic wastes.

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Rainforests harbor the

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greatest gene pool in the
world.

The rainforest has nurtured this "pool" to become home for 170,000 of the world's 250,000 known plant species.

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The threat to Biodiversity

1. Habitat loss

- Conversion to agriculture
- Forestry practices – deforestation
- Rangeland and grazing practices
- Conversion to urban and industrial uses

2. Overexploitation

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- Overfishing and poaching
- Unsustainable harvest of wildlife and plants

3. Pollution

4. Population growth

Valuable Services of Biodiversity

1. Protects water resources from being depleted, contaminated, or polluted.
2. Helps in soil formation and protection.
3. Helps in nutrient storage and recycling.
4. Helps check pollution.
5. Contributes to climate stability.
6. Helps an ecosystem in recovery from unpredictable events.

1. Provides biological resources such as food, medicinal resources, and pharmaceutical drugs, wood products, ornamental plants, breeding stocks, etc.
2. Provides recreation and tourism facilities.
3. Helps in research, education, and monitoring.
4. Preservation of biological resources is essential for the well-being and long-term survival of mankind.
5. It regulates different cycles eg. Carbon, hydrologic, nitrogen cycles

Causes of biodiversity loss

- Population growth
- Poverty
- Indiscriminate burning especially in the north
- Conflict – results in resettlement, wildlife and forest destruction
- Poverty- people illegally hunt animals and cut down trees for charcoal production
- Population growth (2.5%) - results in increased demand for land, food and energy

Causes of biodiversity loss

- Over exploitation of fisheries, wildlife and forest products
- Introduction of waste, pollutants and effluents into the environment
- Poor agricultural practices. Eg. Burning, pesticides, etc.
- Lack of law enforcement on biodiversity
- Over grazing

Addressing biodiversity issues

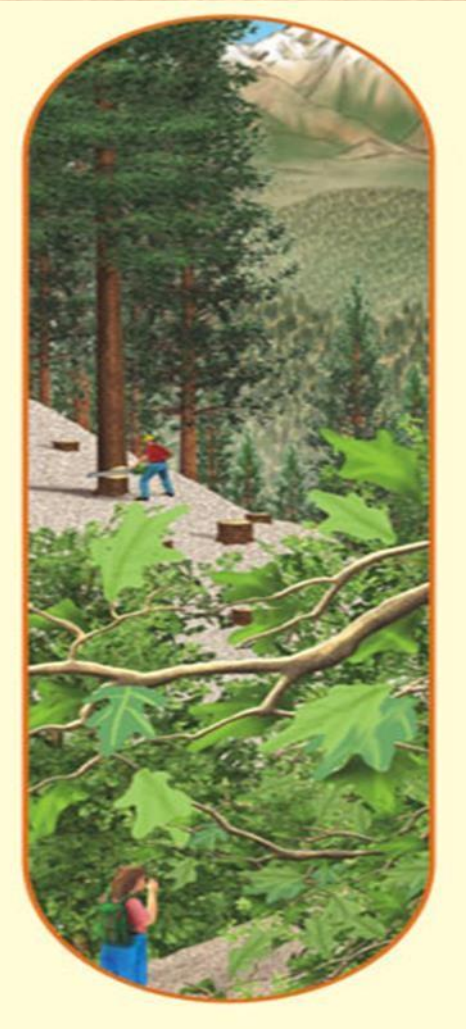
- Addressing biodiversity loss and extinction will require attitudi

lifestyle changes.

- Address climate change and global economic challenges to reduce biodiversity loss and degradation of the ecosystem.
- The sustainability and productivity of the ecosystem will require policy changes in the area of trade, investment, taxation, subsidy, regulation, etc.
- Monitor and protect biological diversity systems
- Rehabilitate and restore degraded ecosystems

Addressing biodiversity issues

- To protect biodiversity and natural assets will require coordinat



all levels of governance , business, institutions both local and abroad.

- Legal protection by enacting national laws and international treaties/agreements (international Biodiversity Treaty)
- Management of the use of species and the ecosystems at sustainable level.
- Develop national strategies for consideration and sustainable use of biological diversity.
- Sustained awareness and public education on biodiversity

What we can do

- Avoid bush burning and killing of animals irresponsibly
- Various communities should form a watch-dog committees to preserve the forest
- Enforcement of biodiversity laws and policies
- Control of grazing, exploitation of wildlife and forest products
- Reduce poverty through youth employment
- Avoid cutting down trees and initiate tree planting in your communities/campuses

- Encourage backyard gardening and domestic animal rearing
- Encourage the plant of woodlots and trees on farms to serve as fuel wood and environmental protection