# Module 2: Biodiversity and Conservation

## What is Biodiversity?

Biodiversity refers to the variety of life on Earth at all levels: - **Genetic Diversity**: Variation within species - **Species Diversity**: Variety of species in an area - **Ecosystem Diversity**: Variety of ecosystems

## Importance of Biodiversity

### Ecosystem Services

Biodiversity provides essential services: - **Provisioning**: Food, water, medicine, materials - **Regulating**: Climate, disease, water quality - **Cultural**: Recreation, aesthetic, spiritual - **Supporting**: Nutrient cycling, soil formation

### Economic Value

- Tourism and recreation
- Pharmaceutical discoveries
- Agricultural diversity
- Ecosystem stability

## Threats to Biodiversity

### Habitat Loss

- Deforestation
- Urbanization
- Agriculture expansion
- Most significant threat to biodiversity

## Climate Change

- Shifting temperature and precipitation
- Sea level rise
- Ocean acidification
- Altered migration patterns

## Invasive Species

- Non-native species that outcompete natives
- Disrupt ecosystem balance
- Examples: Zebra mussels, kudzu, cane toads

## Overexploitation

- Overhunting and overfishing
- Illegal wildlife trade
- Unsustainable harvesting

## Pollution

- Chemical contaminants
- Plastic pollution
- Nutrient runoff
- Air and water pollution

# Conservation Strategies

## Protected Areas

- National parks
- Wildlife reserves
- Marine protected areas
- Habitat corridors

## Species Conservation

- Captive breeding programs
- Reintroduction efforts
- Habitat restoration
- Legal protection

## Sustainable Practices

- Sustainable agriculture
- Responsible fishing
- Forest management
- Renewable energy

# Measuring Biodiversity

## Species Richness

Number of different species in an area.

## Species Evenness

Relative abundance of different species.

## Biodiversity Indices

- Shannon Index
- Simpson Index
- Tools for quantifying diversity