

Ministry of Higher Education  
Tishk International University  
Faculty Of Education  
Biology Education Department



## Introduction to Ecology

Third Grade

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### Lecture 1

1



## OUTLINE

- **Definitions of Ecology**
- **Basic Concepts of Ecology**
- **Ecosystem Ecology**
- **Basic Concepts of an Ecosystem**
- **Organization levels of biology**



2



# INTRODUCTION TO ECOLOGY

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3



## Definitions of Ecology

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- **Ecology** = from the Greek root OIKOS , ``at home``, and OLOGY , ``the Study of``
- **Burdon - Sanderson ( 1890 )** : Elevated Ecology to one of the three natural divisions of Biology: Physiology - Morphology – Ecology.
- **Elton ( 1927 )** : Scientific natural history.
- **Andrewartha ( 1961 )** : The scientific study of the distribution and abundance of organisms
- **Odum ( 1963 )** : ``The structure and function of Nature``



4



## Modern Definition

- Ecology is the scientific study of the processes regulating the distribution of organisms and the interactions among them , and the study of how these organisms in turn mediate the transport and transformation of energy and matter in the biosphere.



5



## Basic Concepts of Ecology

- 1.** All living organisms and the environment they live in are mutually reactive , affecting each other in various ways.
- 2.** Environment plays a major role in the critical stages of the life cycle of the species.
- 3.** The species reacts to the environmental changes and adjusts itself structurally and physiologically.



6



**4 .** The environment also changes according to certain species specific activities like growth , reproduction , death , decay , etc .

**5 .** All plants and animals are related to each other by their coaction and reaction on the environment .

**6 .** Under similar climatic conditions , there may simultaneously develop more than one community, some reaching the climax stage and others under different stages of succession.



7



## Ecosystem Ecology



- An ecosystem or an ecological system is the whole biotic community in a given area and its abiotic environment.
- It therefore includes the physical and chemical nature of the sediments , water and gases as well as all the organisms .

8



# Ecosystem Ecology



- An ecosystem can be any size , from an area as small as a pinhead to the whole biosphere.
- Ecosystem Ecology emphasizes the movements of energy and nutrients ( chemical elements ) among the biotic and abiotic components of Ecosystem.

9

## Biotic vs. Abiotic Factors



### Living

#### Examples

- ▣ Plants
- ▣ Animals
- ▣ Fungi
- ▣ Bacteria



### Non-Living

#### Examples

- ▣ Water
- ▣ Sunlight
- ▣ Soil
- ▣ Air
- ▣ Temperatu



10

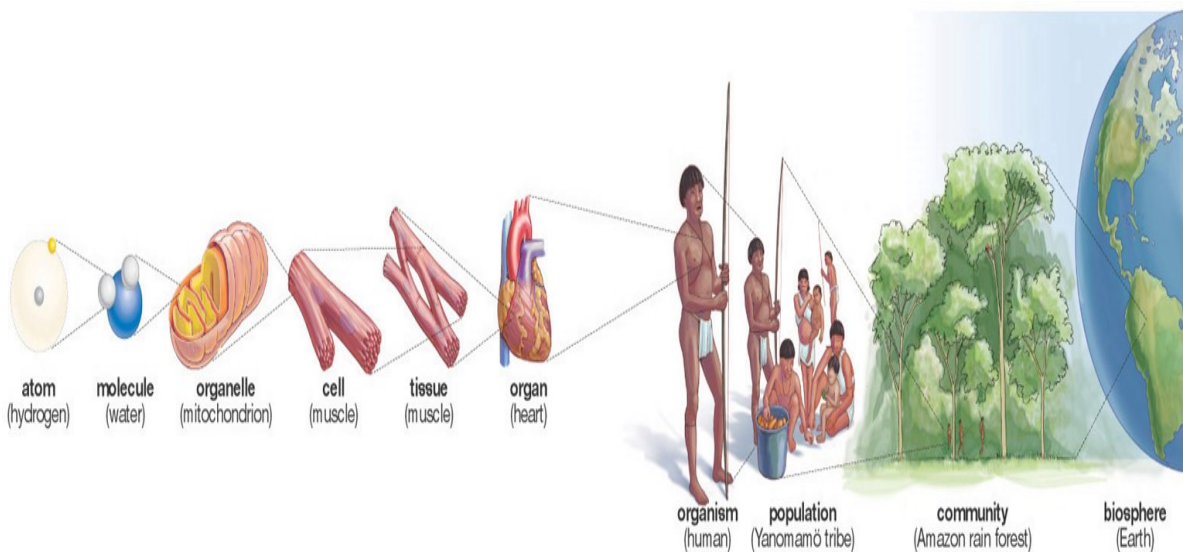


## Basic Concepts of an Ecosystem

1. When both **biotic** and **abiotic** components are considered , the basic structural and functional units of nature are ecosystems .
- 2 . There exist **varying** degrees of **positive** , **negative** and even neutral interactions among organisms at both inter - and intra - specific levels
- 3 . Energy is the driving force of an ecosystem which is unidirectional or non – cyclic.
4. The chemical components of the ecosystem move in a defined path called **biogeochemical cycles** .

11

## Organization levels of biology



12



# Biosphere

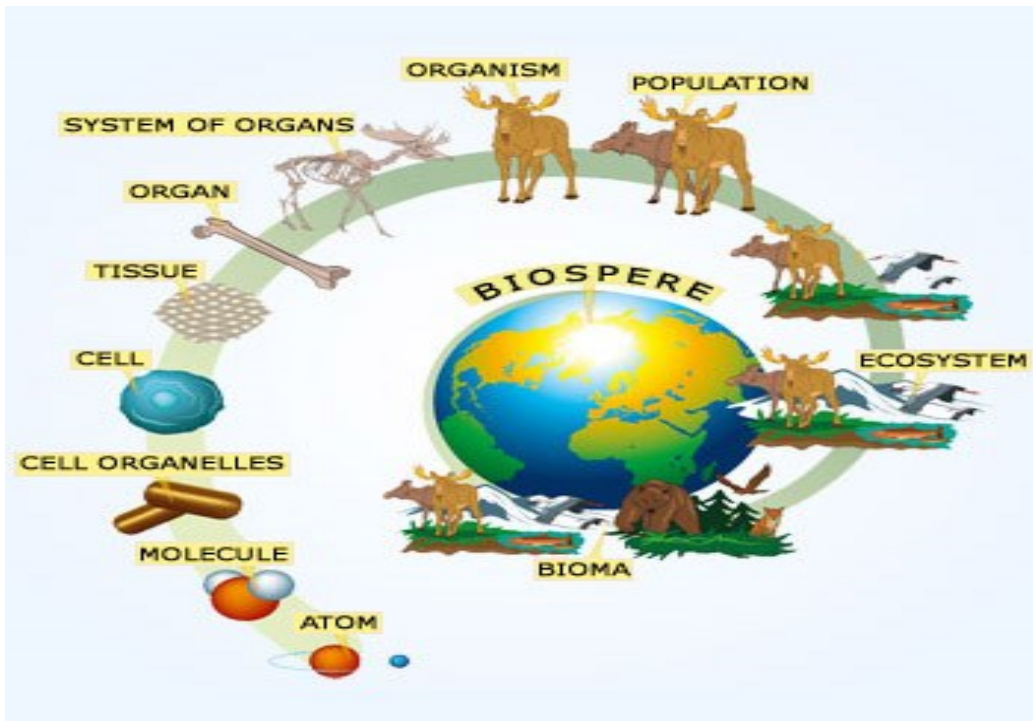
## Ecosystem

### Community

#### Population

##### Organism

13



14



## Organism

Any unicellular or multicellular form exhibiting all of the characteristics of life; an individual.



15

## Population



A group of organisms of one species living in the same place at the same time that interbreed and compete with each other for resources (ex. food, mates, shelter)



16

## Community

Several interacting populations that inhabit a common environment and are interdependent.

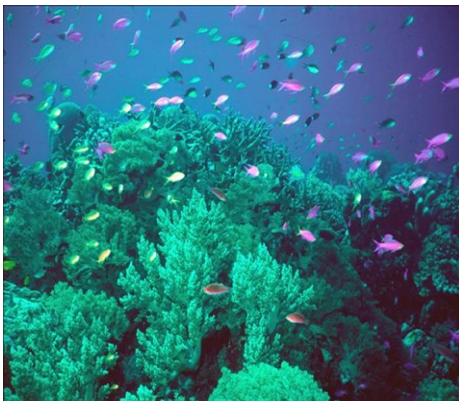


17

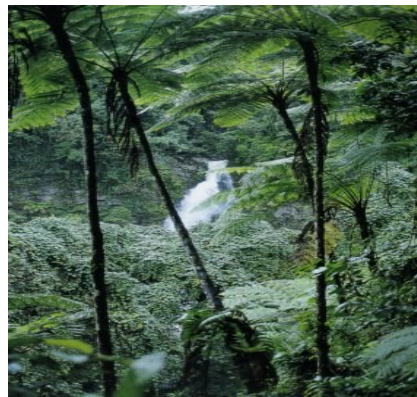
## Ecosystem

Populations in a community and the abiotic factors with which they interact

### Marine



### Terrestrial



18



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- **Biosphere**

- The region on earth where life exists.
- This includes air, land, fresh water, and salt water.
- The highest level of organization.

19



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- **Biodiversity**

**The variety of species living within an ecosystem, biome or planet.**

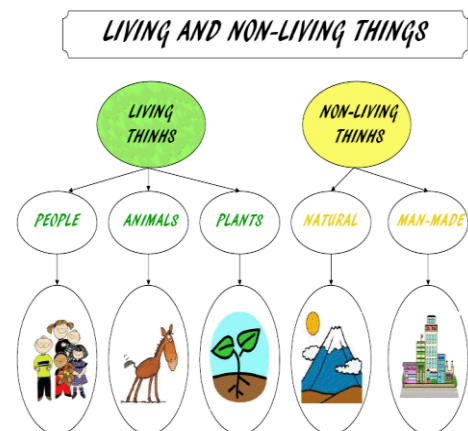
20



Some parts of the world have greater biodiversity than others

21

- Ecology is study of interactions between:
  - **Non-living components in the environment such as...**
    - Light
    - Water
    - Wind
    - Nutrients in soil
    - Heat
    - Solar radiation
    - Atmosphere, etc.
  - **And Living organisms such as...**
    - Plants
    - Animals
    - Microorganisms in soil, etc.



22



## Study Ecology involves:

### For non-living (abiotic)

- Climatology
- Hydrology
- Oceanography
- Physics
- Chemistry
- Geology
- Soil analysis, etc



### For living (biotic)

- Animal behavior
- Taxonomy
- Physiology
- Mathematics (population studies) etc.



23

Kumar, P. ; U. Mina. 2018.  
Fundamentals of Ecology  
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Reference

24

