

# BIODIVERSITY



## Unit 4

### Biodiversity and Conservation (8 lectures)

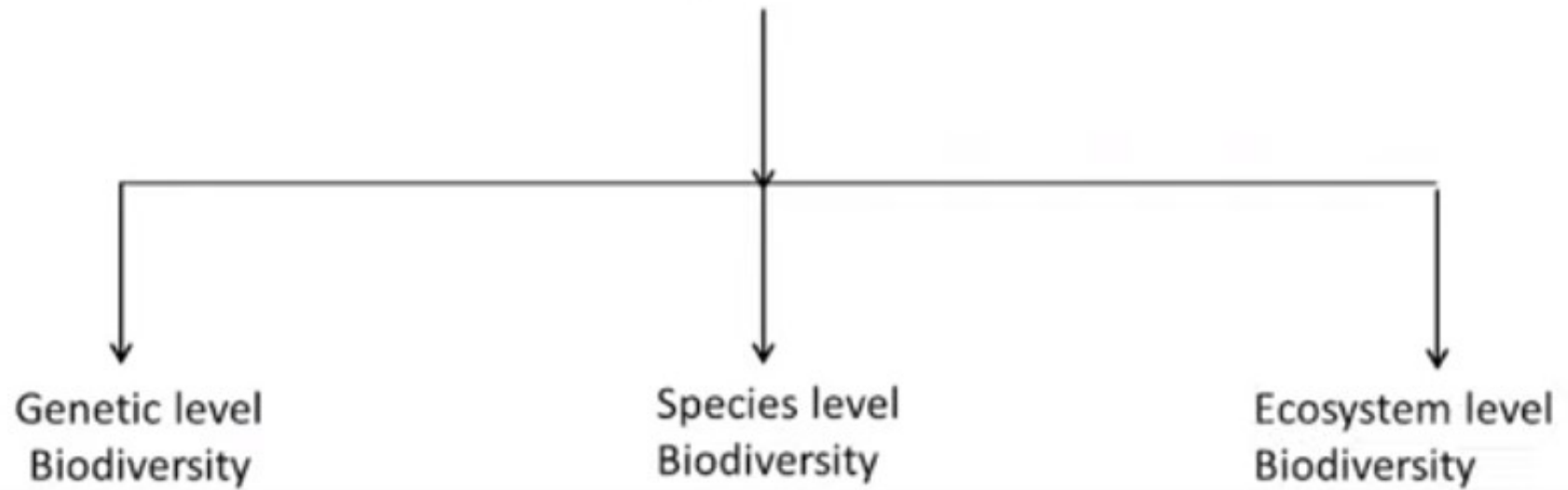
- Definition of Biodiversity; Levels of biological diversity: genetic, species and ecosystem diversity
- India as a mega-biodiversity nation; Biogeographic zones of India; Biodiversity hotspots; Endemic and endangered species of India; IUCN Red list criteria and categories
- Value of biodiversity: Ecological, economic, social, ethical, aesthetic, and informational values of biodiversity with examples; sacred groves and their importance with examples
- Threats to biodiversity: Habitat loss, degradation, and fragmentation; Poaching of wildlife; Man-wildlife conflicts; Biological invasion with emphasis on Indian biodiversity; Current mass extinction crisis
- Biodiversity conservation strategies: In-situ and ex-situ methods of conservation; National Parks, Wildlife Sanctuaries, and Biosphere reserves; Keystone, Flagship, Umbrella, and Indicator species; Species reintroduction and translocation
- *Case studies*: Contemporary Indian wildlife and biodiversity issues, movements, and projects (e.g., Project Tiger, Project Elephant, Vulture breeding program, Project Great Indian Bustard, Crocodile conservation project, Silent Valley movement, Save Western Ghats movement, etc)

# Biodiversity



Biodiversity is variability of living organisms from all sources including **terrestrial, marine and other aquatic ecosystems** and **ecological complexes** of which they are part.

# Biodiversity



# 1- Genetic Level Biodiversity

The genes found in organisms can form enormous number of combinations each of which gives rise to some variability.

Genes are the basic units of hereditary information transmitted from one generation to other.

When the genes within the same species show different versions due to new combinations, it is called genetic variability.



## 2- Species Level Biodiversity

This is the variability found within the population of a species or between different species of a community.

It represents broadly the species richness and their abundance in a community.

There are two popular indices of measuring species diversity known as Shannon-Wiener index and Simpson index.



### Shannon-Wiener diversity function

$$H' = -\sum_{\infty}^s (p_i) [\ln(p_i)]$$

$H'$  = Shannon-Wiener index of species diversity  
 $s$  = number of species in community  
 $p_i$  = proportion of total abundance represented by  $i^{\text{th}}$  species

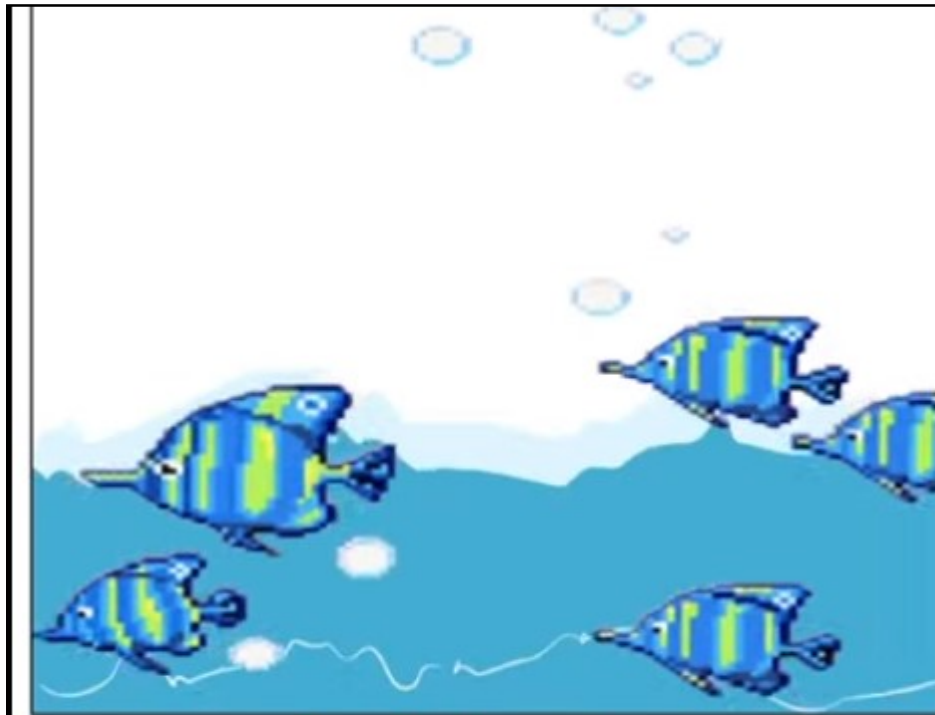
The current estimates given by Wilson in 1992 put the total number of living species in a range of 10 million to 50 million.

Till now only about 1.5 million living and 300,000 fossil species have been actually described and given scientific names.

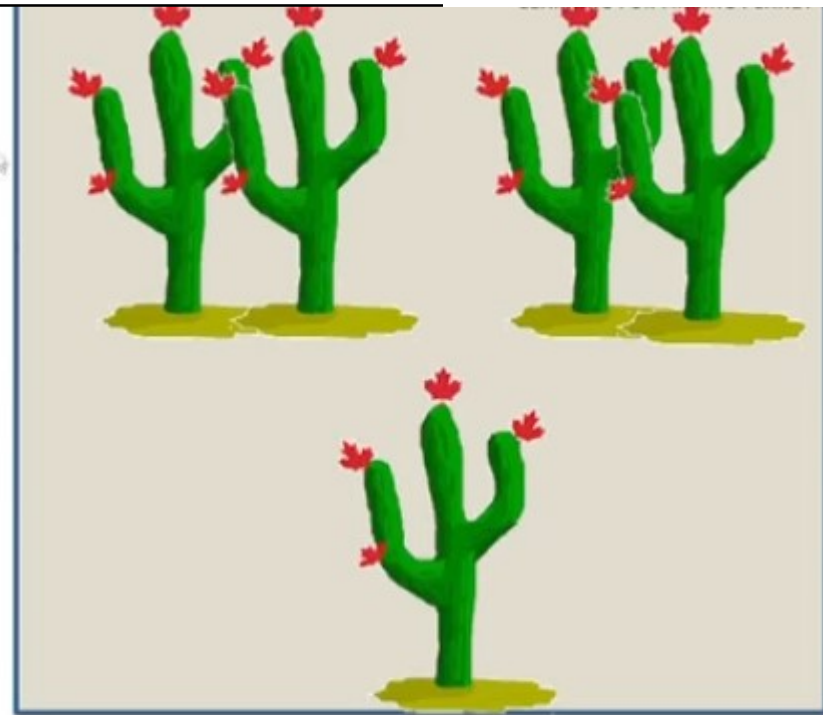
It is quite likely that a large fraction of these species may become extinct even before they are discovered and enlisted.



### 3- Ecosystem level Biodiversity



**Aquatic Ecosystem**



**Desert Ecosystem**



### **3- Ecosystem level Biodiversity**



**Grassland Ecosystem**



**Forest Ecosystem**

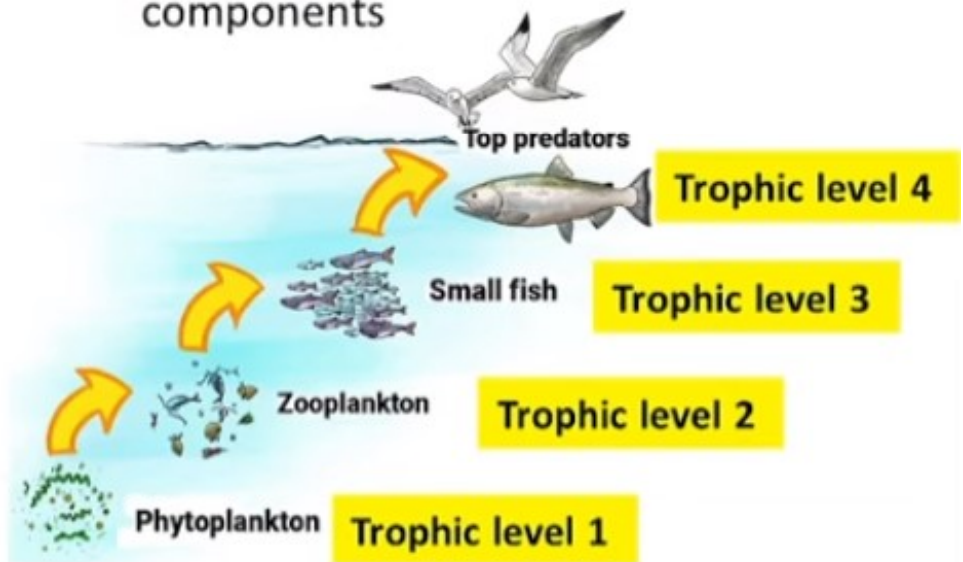
### 3- Ecosystem level Biodiversity



**Aquatic Ecosystem**

Ecosystem includes complexity in:

- Ecological niche
- Food chain
- Trophic structure
- Abiotic components and biotic components



### 3- Ecosystem level Biodiversity

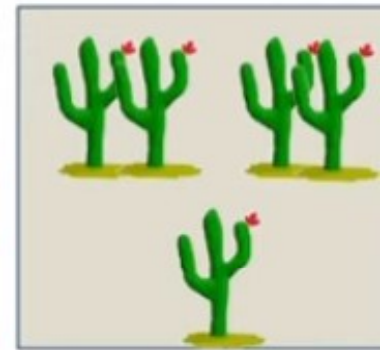
This is the diversity of ecological complexity showing variations in ecological niches, trophic structure, food-webs, nutrient cycling etc.

The ecosystems also show variations with respect to physical parameters like moisture, temperature, altitude, precipitation etc.

Thus, there occurs tremendous diversity within the ecosystems, along these gradients.



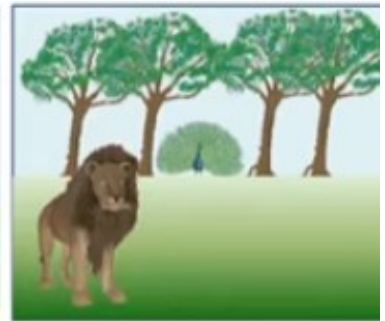
Aquatic Ecosystem



Desert Ecosystem

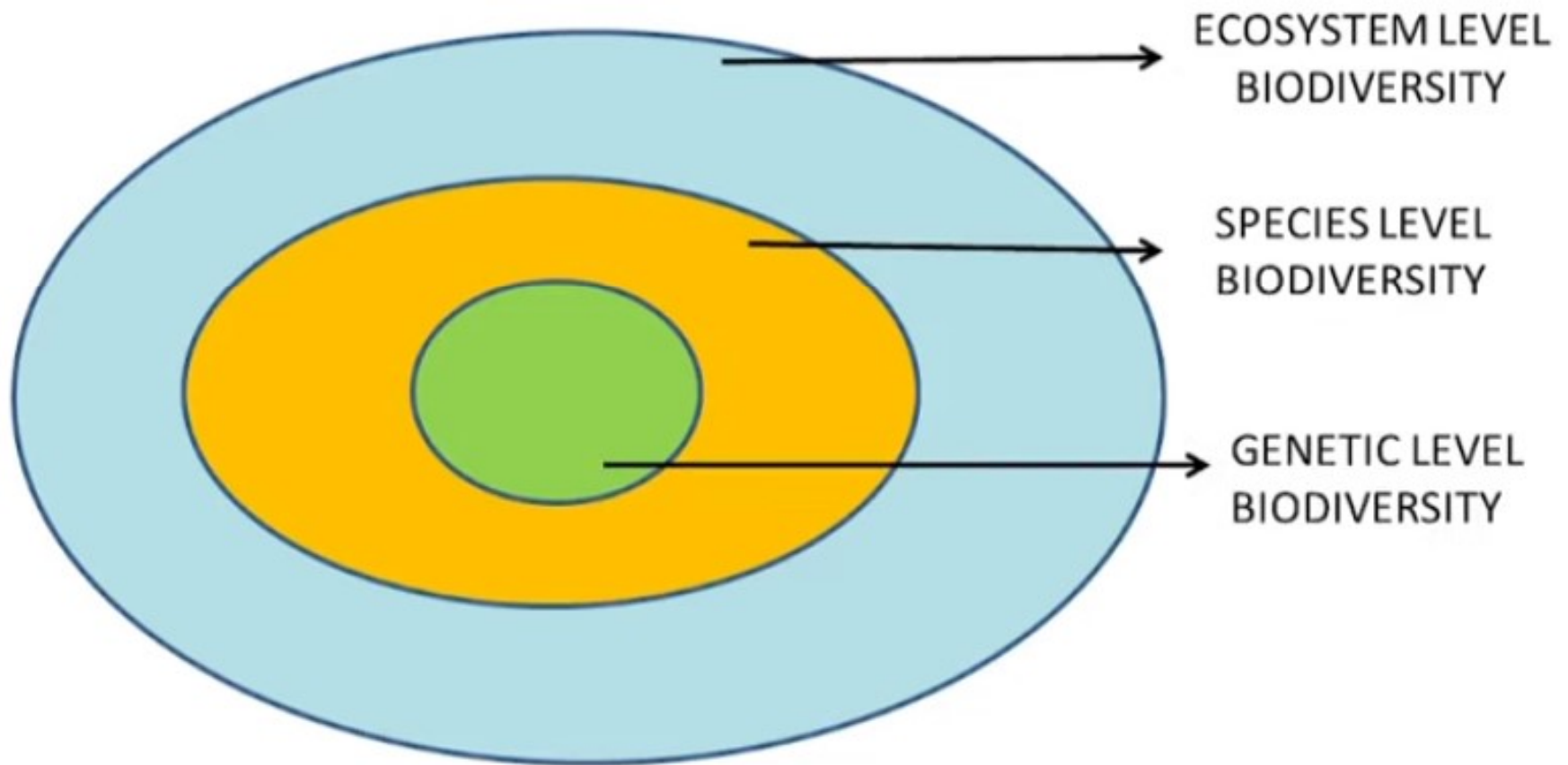


Grassland Ecosystem



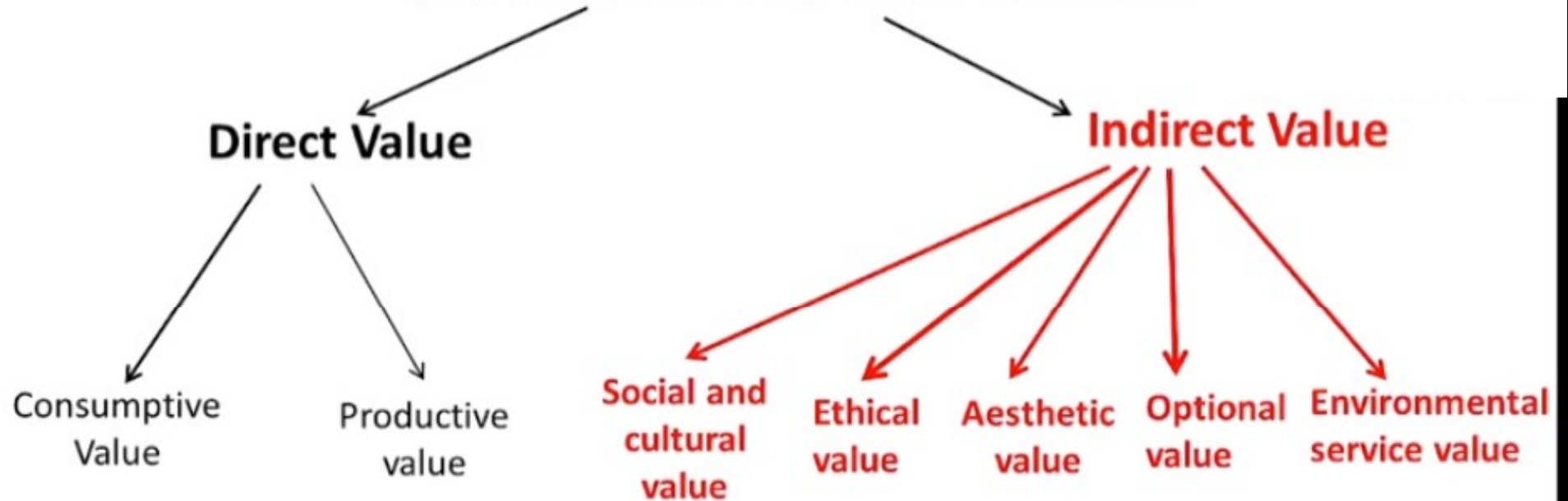
Forest Ecosystem

## Levels of Biodiversity



# **IMPORTANCE OF BIODIVERSITY**

# IMPORTANCE OF BIODIVERSITY



# IMPORTANCE OF BIODIVERSITY

(i) Direct Value



Consumptive Value

Productive value

1) FOOD



# IMPORTANCE OF BIODIVERSITY

(i) Direct Value



Consumptive Value

Productive value

2) Medicine



Penicillin



Digitalis



Catharanthus



# IMPORTANCE OF BIODIVERSITY

(i) Direct Value



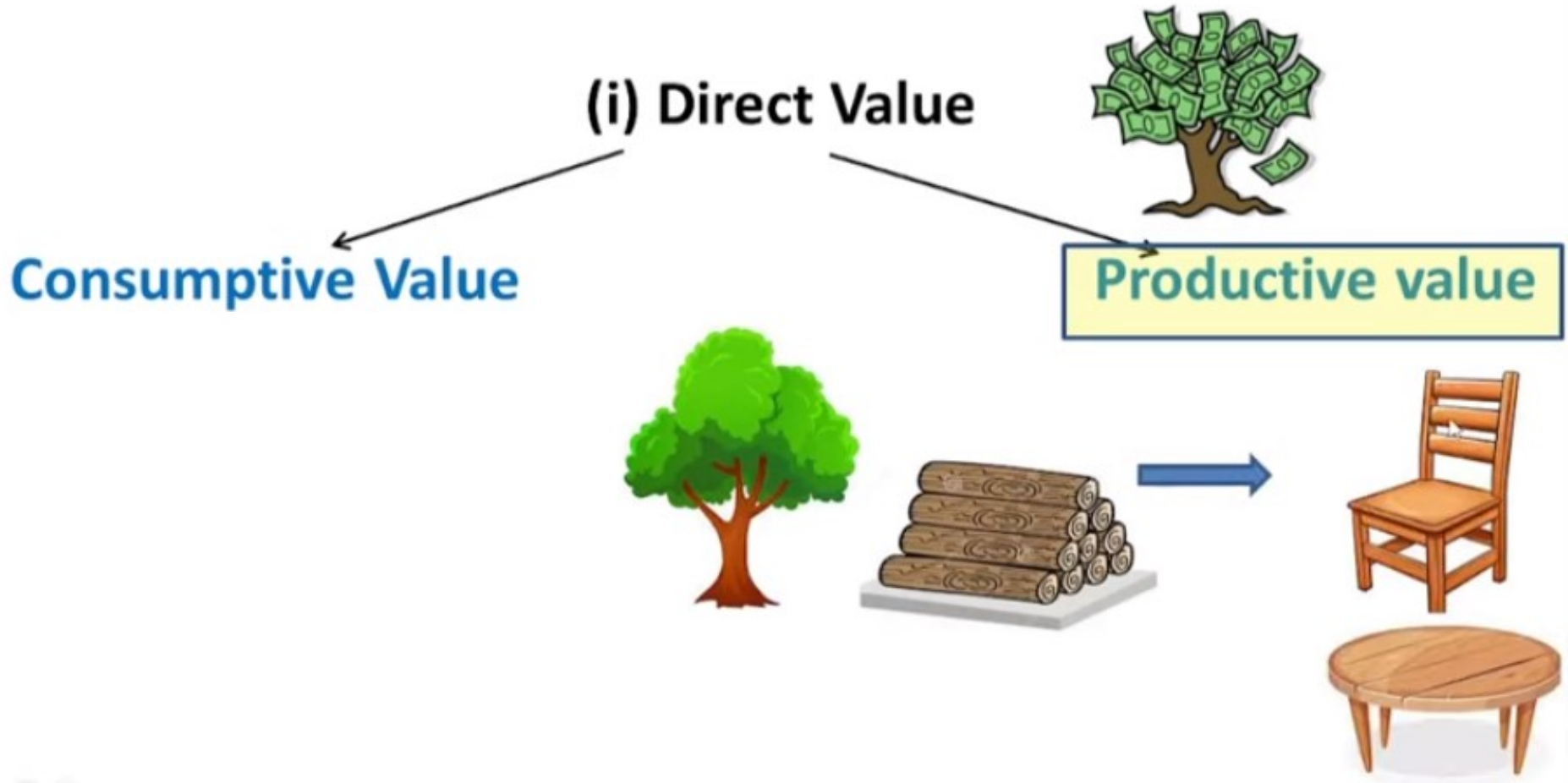
Consumptive Value

Productive value

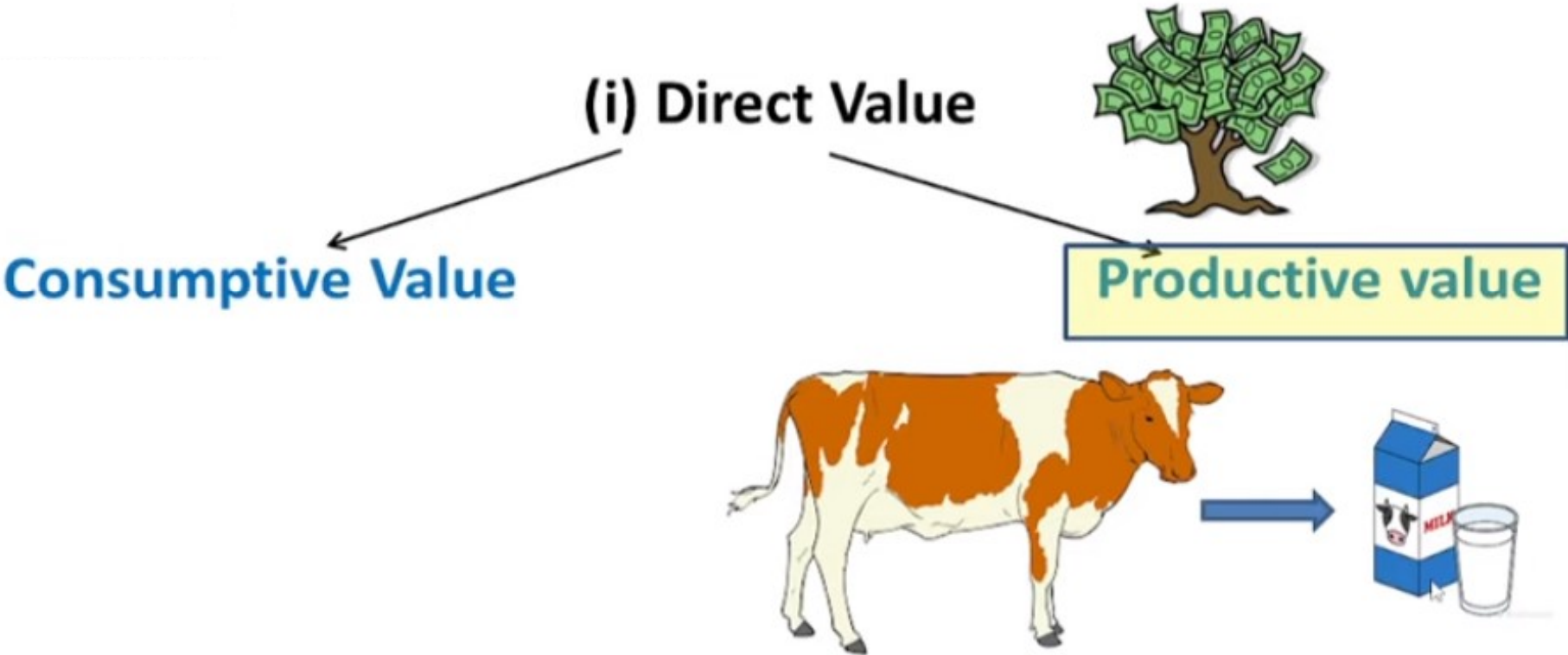
## 3) FUELWOOD



# IMPORTANCE OF BIODIVERSITY



# IMPORTANCE OF BIODIVERSITY



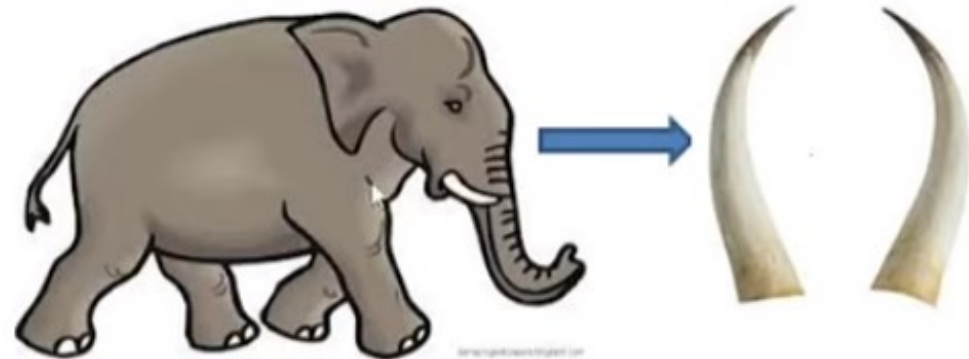
# IMPORTANCE OF BIODIVERSITY

(i) Direct Value

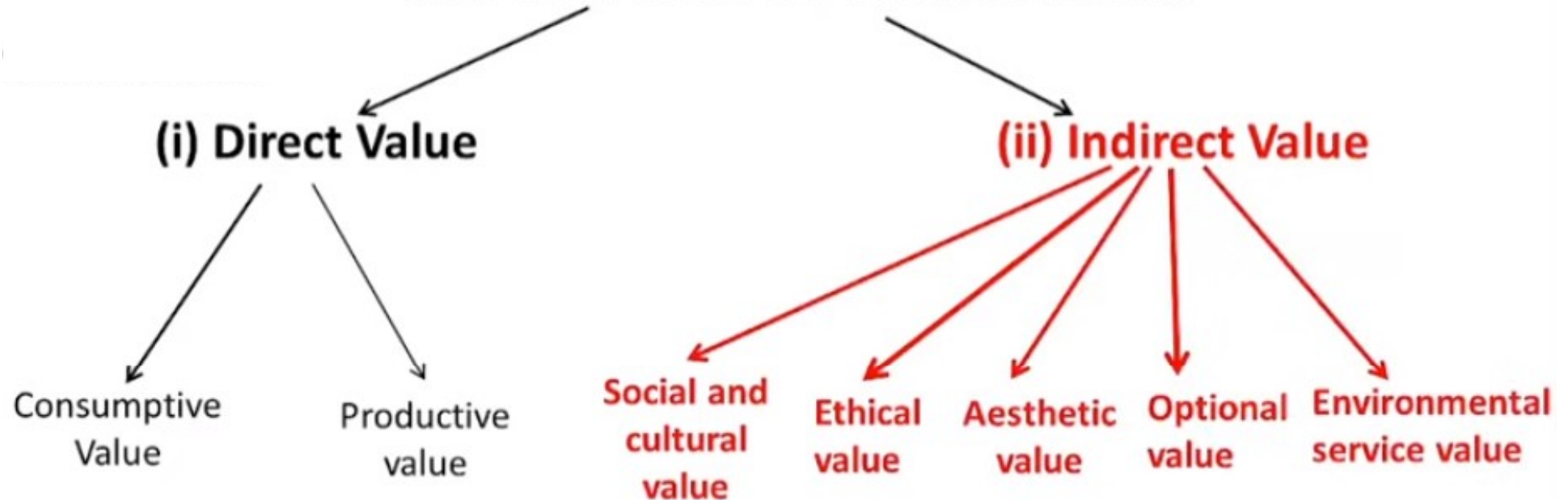


Consumptive Value

Productive value



# IMPORTANCE OF BIODIVERSITY



# IMPORTANCE OF BIODIVERSITY

## (ii) Indirect Value

### 1- Social and cultural value



# IMPORTANCE OF BIODIVERSITY

## (ii) Indirect Value

### 2- Ethical value



# IMPORTANCE OF BIODIVERSITY

## (ii) Indirect Value

### 3 - Aesthetic value







NEHA GREEN PLANET  
LEARNING FOR MAKING PLANET GREEN

# IMPORTANCE OF BIODIVERSITY

## (ii) Indirect Value

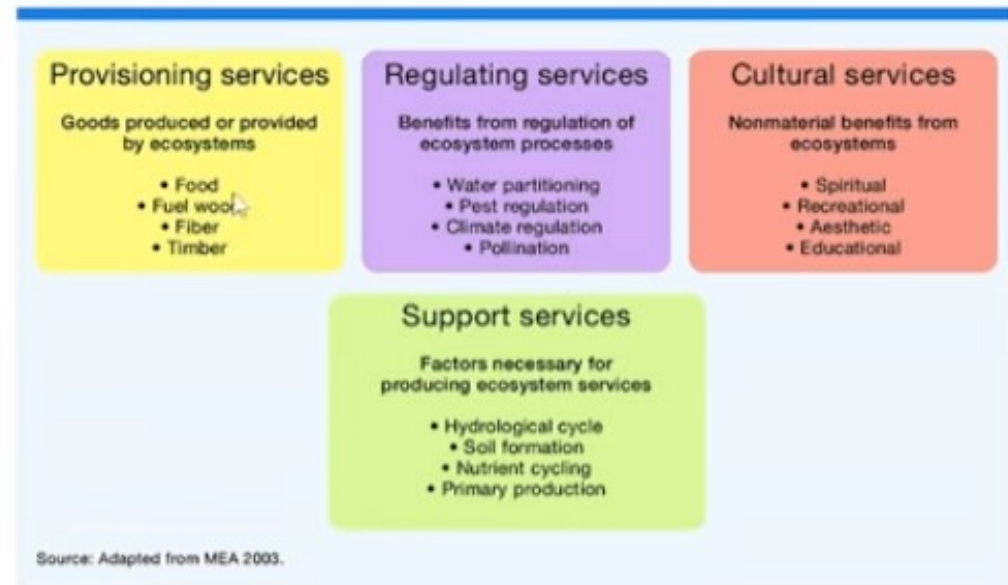
### 4- Optional value



# IMPORTANCE OF BIODIVERSITY

## (ii) Indirect Value

### 5- Environmental service value



# THANK YOU

## Acknowledgements

[https://youtu.be/OZtiOdH0 -E?list=PLIC0i9IRboHb19v2dF0yuenG7xDOGJLeP](https://youtu.be/OZtiOdH0-E?list=PLIC0i9IRboHb19v2dF0yuenG7xDOGJLeP)

[https://youtu.be/y515wYHJB\\_4?list=PLIC0i9IRboHb19v2dF0yuenG7xDOGJLeP](https://youtu.be/y515wYHJB_4?list=PLIC0i9IRboHb19v2dF0yuenG7xDOGJLeP)

<https://youtu.be/wNjIJaxATkQ?list=PLIC0i9IRboHb19v2dF0yuenG7xDOGJLeP>