Topic: Meaning and Importance of Agricultural Ecology

Lesson Objectives:

By the end of this lesson, students should be able to:

- Define **agricultural ecology** and **ecosystem**
- Identify **biotic and abiotic factors** in ecosystems
- Differentiate between **autotrophs and heterotrophs**
- Describe the **interaction of living and non-living things** in terrestrial and aquatic environments
- Explain examples of **cropping systems, fish ponds, and forest types** in agriculture

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1. Meaning of Agricultural Ecology

Definition of Ecology:

Ecology is the study of the **relationships between living organisms and their environment**.

Definition of Agricultural Ecology:

Agricultural ecology is the **application of ecological principles to agriculture**, focusing on how crops, animals, and the environment interact. It involves **using nature-friendly farming practices** to maintain balance in the ecosystem.

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2. Meaning of Ecosystem

Definition of Ecosystem:

An **ecosystem** is a **community of living organisms (biotic factors) interacting with their non-living environment (abiotic factors).**

Components of an Ecosystem:

Biotic Factors (Living things)	Abiotic Factors (Non-living things)
Plants, animals, fungi, bacteria	Water, soil, air, sunlight, temperature

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Examples of Agricultural Ecosystems:

- **Crop farms**
- **Fish ponds**
- **Pastures for grazing animals**
- **Agroforestry systems**

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3. Biotic Factors in Agricultural Ecology

a) Autotrophs (Producers)

- Organisms that **produce their own food** using **sunlight and carbon dioxide**.
- Examples: **Green plants, algae**

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b) Heterotrophs (Consumers)

- Organisms that **depend on other living things for food**.
- Types of consumers:
    - **Herbivores:** Feed on plants (e.g., goats, cows)
    - **Carnivores:** Feed on other animals (e.g., lions, hawks)
    - **Omnivores:** Feed on both plants and animals (e.g., humans, pigs)

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c) Decomposers

- Organisms that **break down dead plants and animals** into simpler materials.
- Examples: **Fungi, bacteria, earthworms**

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4. Interaction in Terrestrial and Aquatic Systems

Terrestrial Ecosystem (Land-based)

Examples:

- **Farms** (crop farms, plantations)
- **Forests** (rainforests, savannahs)
- **Grasslands and rangelands**

Features:

- Soil is the **main abiotic factor**
- Plants and animals interact for **food and shelter**
- Humans manage the land for **farming and grazing**

Aquatic Ecosystem (Water-based)

Examples:

- **Fish ponds**
- **Rivers and lakes used for aquaculture**

Features:

- Water is the **main abiotic factor**
- Fish, aquatic plants, and microorganisms live together
- Humans raise **fish (tilapia, catfish, etc.)** for food

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5. Cropping Systems in Agricultural Ecology

Cropping systems involve the way **crops are planted and managed** in the environment.

Type of Cropping System	Description
Monocropping	Planting only one type of crop (e.g., only maize)
Mixed Cropping	Planting two or more crops together on the same land (e.g., maize and beans)

Type of Cropping System	Description
Crop Rotation	Planting different crops on the same piece of land in sequence over time
Intercropping	Growing two or more crops in the same field at the same time but in separate rows
Agroforestry	Growing trees together with crops or animals

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6. Fish Ponds in Agricultural Ecology

- Fish ponds are **artificial aquatic ecosystems** for raising fish.
- They contain **biotic factors** (fish, algae, aquatic plants) and **abiotic factors** (water, temperature, oxygen).
- Fish farming helps provide **protein-rich food** and income for farmers.

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7. Forest Types in Agricultural Ecology

Type of Forest	Description
Rainforest	Dense forest with high rainfall, found in southern Nigeria
Savannah	Grassland with scattered trees, found in northern and central Nigeria
Mangrove Forest	Found in coastal areas with salty water
Derived Savanna	Grassland formed when forests are cleared for farming

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8. Importance of Agricultural Ecology

- Helps in **conserving natural resources**
- Promotes **sustainable farming**
- Maintains **balance between agriculture and nature**
- Reduces **environmental damage** (soil erosion, deforestation)

- Encourages **efficient use of land and water resources**

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9. Summary of Key Points

Concept	Meaning
Agricultural Ecology	Study of how farming interacts with nature
Ecosystem	Living and non-living things interacting together
Autotrophs	Organisms that make their own food (plants)
Heterotrophs	Organisms that feed on others
Cropping Systems	Methods of planting crops
Fish Pond	Man-made aquatic system for fish farming