



General Biology Lecture - 5

Kidney Dialysis Techniques Department

Living Organisms in Ecosystem & Levels of Ecological Organization

Types of living organisms in ecosystem

Connection to Human Health and Kidney Function

Learning Objectives

- **Define ecosystem and its components**
- **Identify different levels of ecological organization**
- **Classify types of living organisms in ecosystems**
- **Understand the relationship between environment and urinary system health**
- **Connect ecological concepts to dialysis technology specialization**

What is an Ecosystem?

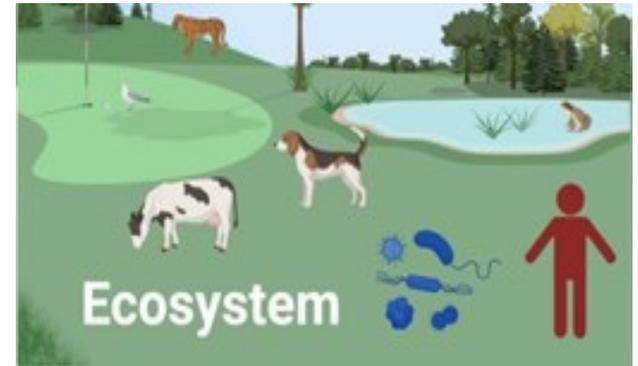
Definition: A community of **living organisms** interacting with their **abiotic environment**

Components:

Biotic: Living organisms

Abiotic: Soil, air, water, light, temperature

Example: Pond, forest, even human body as a micro-ecosystem



Levels of Ecological Organization

1- **Organism:** Individual living being

2- **Population:** Group of same species

3- **Community:** Different populations interacting

4- **Ecosystem:** Community + Abiotic environment

5- **Biome:** Similar ecosystems

6- **Biosphere:** All ecosystems on Earth

► **Living Organisms in Ecosystem (by Function)**

Producers: Make their own food (plants, algae)

Consumers: Feed on other organisms

Primary consumers (herbivores)

Secondary consumers (carnivores)

Tertiary consumers

Decomposers: Break down organic matter (bacteria, fungi)

Slide 6: Living Organisms in Ecosystem (by Energy Source)

► **Living Organisms in Ecosystem (by Energy Source)**

1- Autotrophs: Depend on non-living sources (sunlight)

2- Heterotrophs: Depend on other organisms

3- Mixotrophs: Use multiple methods

Food Chains and Webs

- **Food Chain:** Energy transfer from producer to consumer
- **Food Web:** Interconnection of multiple food chains
- **Ecological Pyramid:** Quantitative representation of energy/biomass

🌀 **Example:** Plant → Grasshopper → Frog → Snake → Hawk

♣ **Ecological Relationships**

♠ **Competition:** For limited resources

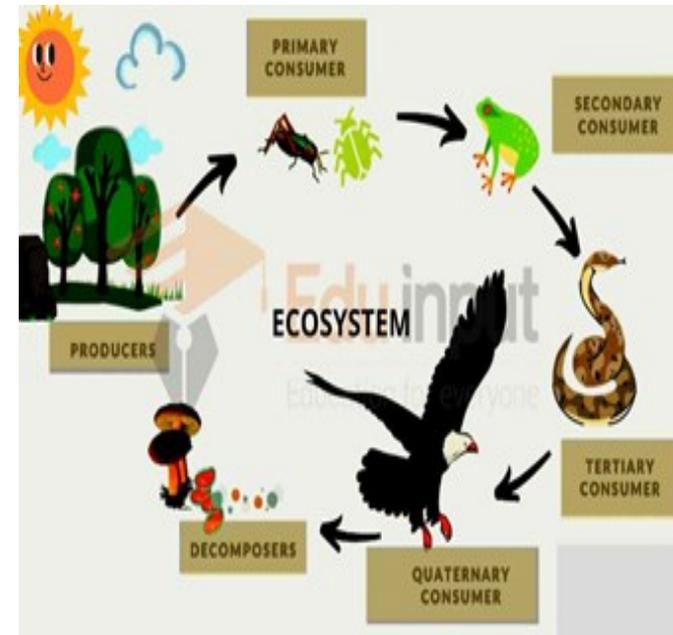
♠ **Predation:** Predator-prey relationship

♠ **Symbiosis:** Living together relationships

– Mutualism

– Commensalism

– Parasitism



Environment-Kidney Health Connection

Pollution Impact: Heavy metals in water affect kidney function

Nitrogen Cycle: Importance of urea balance in body

Homeostasis: Similar to ecological balance

Body's Ecological Balance: Similar to fluid/electrolyte balance maintained by dialysis

Connection to Dialysis Techniques

▶ **Body Ecosystem:** Fluid and electrolyte balance

▶ **Natural Decomposers:** Beneficial bacteria in body

▶ **Internal Ecological Balance:** Similar to artificial kidney function

▶ **Environmental Impact on Kidney Diseases:** Water pollution, heavy metals

▣-Arsenic contamination in drinking water

- ▶ **Impact: Chronic kidney failure in a community**
- ▶ **Analysis: How arsenic moves through food chain**
- ▶ **Role: How dialysis technologists assist in such cases**

Review

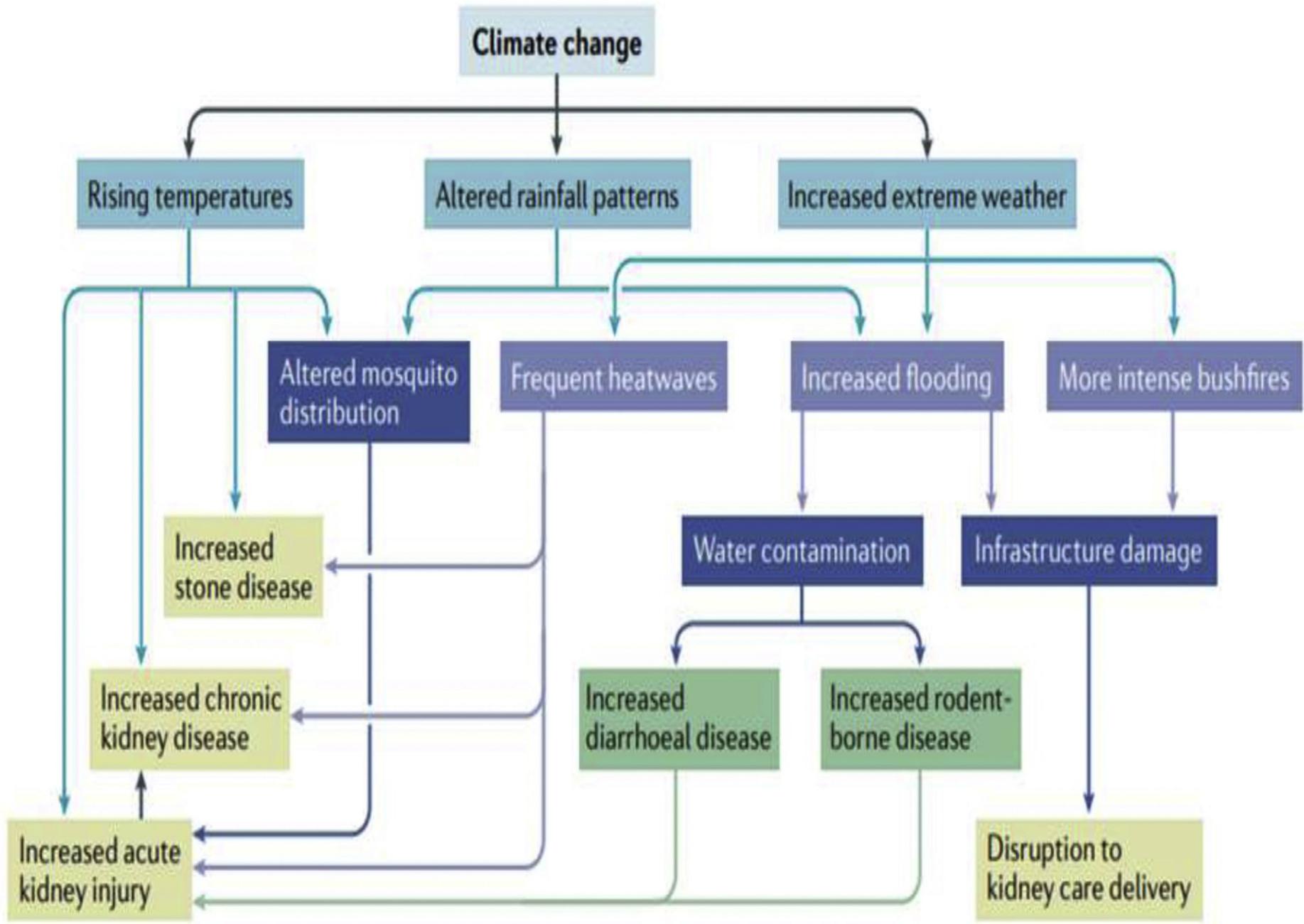
- ⊗ **Ecosystem = Biotic + Abiotic components**
- ⊗ **6 levels of ecological organization**
- ⊗ **3 main types of organisms by function**
- ⊗ **Close relationship between environmental health and kidney health**

Questions

- 1- What is the difference between community and ecosystem?**
- 2- How can environmental pollution affect kidney health?**
- 3- What is the relationship between nitrogen cycle in nature and kidney function in body?**

References & Resources

- 1- Fundamentals of Ecology, Dr. Mohamed Abdelkader**
- 2- World Kidney Association website**
- 3- Research on environmental pollutants' effects on kidneys**



Climate Change | | | **Rising temperatures** | | | **Altered mosquito distribution** | | | **Increased stone disease** | | | **Increased acute kidney injury** | | | **Increased chronic kidney disease** | | | **Increased acute kidney injury** | | | **Altered rainfall patterns** | | | **Frequent heatwaves** | | | **Increased water contamination** | | | **Increased diarrhoeal disease** | | | **Increased rodent-borne disease** | | | **Increased extreme weather** | | | **More intense bushfires**

Climate Change

- Rising temperatures

- Altered mosquito distribution

- Increased stone disease

- Increased acute kidney injury

- Increased chronic kidney disease

- Increased acute kidney injury

- Altered rainfall patterns

- Frequent heatwaves

- Increased water contamination