11.1A: Ecology, including humans and the environment.

## Topic: Ecosystems in the local area

Lesson Objectives

- Define ecosystem and the terms associated with it.

- Examine the components and functions of different ecosystems.

- Understand the significance of statistics in ecological research.

- Differentiate between research hypothesis and statistical hypothesis

Activity - Station

- Give definitions for the following terms

✔ Area

✔ Niche

✔ Food web

✔ Food chain

✔ Ecosystem

✔ Community

✔ Population

| Term	Definition
Ecosystem	all the organisms and the physical factors that influence them in an area, such as a forest
Area/ habitat	a place where an organism lives
Community	a group or collection of organisms that live together in the same location and interact with each other
Niche	role of organism in an ecosystem
Population	all the organisms of the same species in an ecosystem at the same time
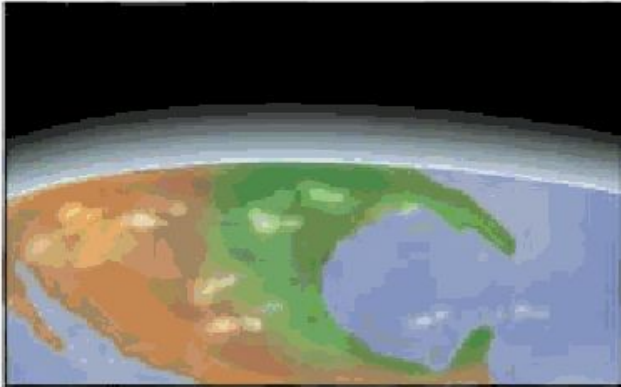
Biosphere

Ecosystem

Community

Population
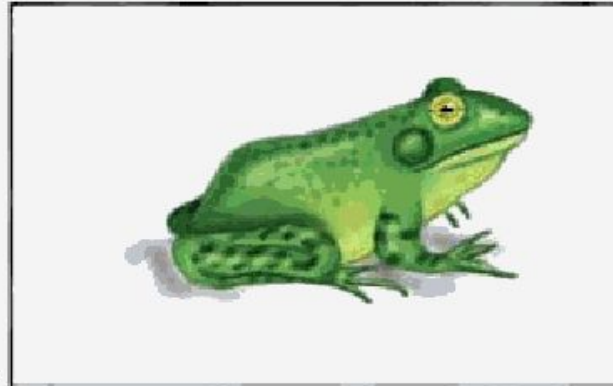
Organism

Earthworms

Detritivore examples

Wood Lice

Fungi

Dung flies

```
                        Types of
                        Ecosystem


            Natural                      Artificial


    Terrestrial           Aquatic
```
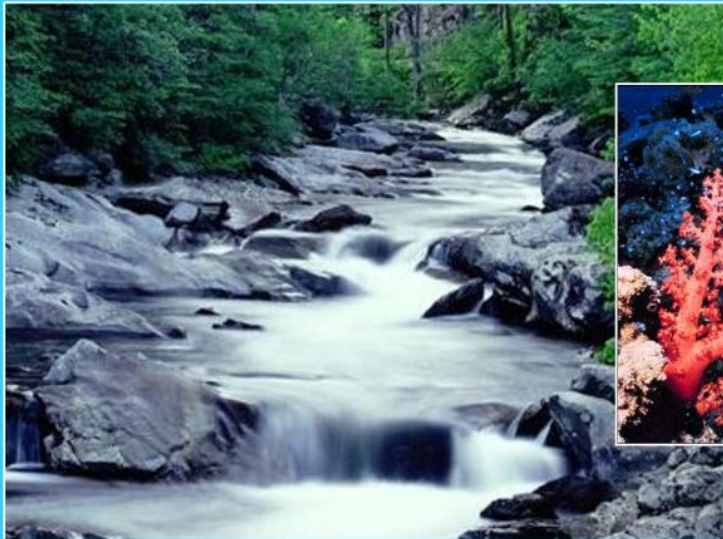
Terrestrial Ecosystem

Aquatic Ecosystems

Freshwater ecosystem (rivers, lakes, ponds, streams, lakes, and wetlands)

- **Biotic Components**
  - Phytoplanktons, zooplanktons, aquatic insects, fishes, reptiles, birds, and detrivores.

- **Abiotic Components.**
  - temperature, amount of precipitation, geology, soil, sunlight, Water, pH, and minerals.

Functions of the freshwater ecosystem

- Source of food.
- It supports the other terrestrial system by providing water.
- Purifies water supplies
- Store flood waters,
- Generate electricity with hydropower,
- Produce building materials such as timber and clay bricks,
- Provide places for recreation and attractions for tourists, and
- Deliver sand to replenish coastal beaches.

Group Activity

- Group 1: Steppe ecosystem
- Group 2: Band (Strip) Pine Forests ecosystem.
- Group 3: Irtysh river ecosystem.
- Group4: Marsh/swamp ecosystem.

What is research?
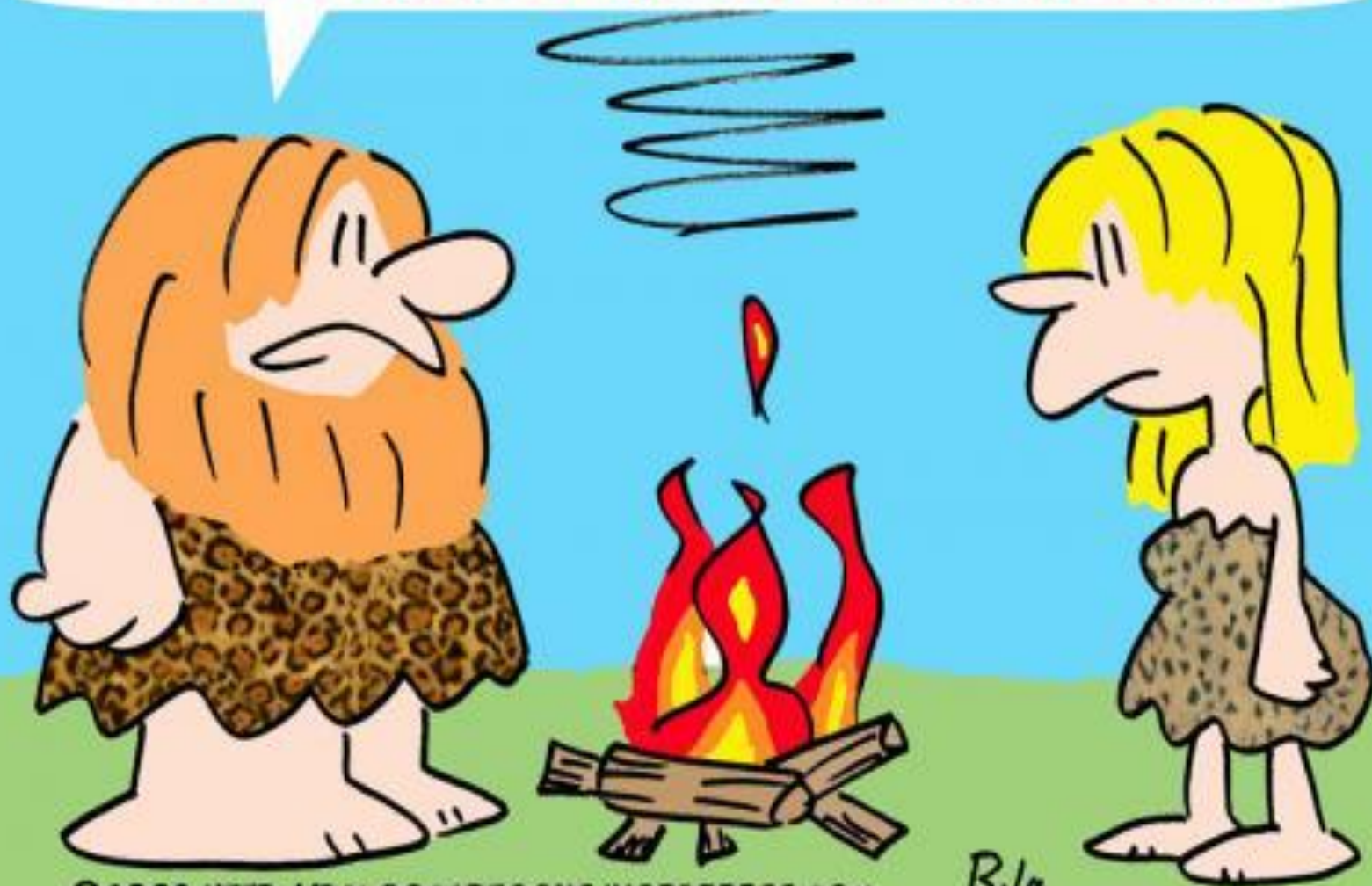
Scientific circle of logic

- Prior Knowledge -
- Questions -
- Hypotheses -
- Methods -
- Safety arrangements -
- Data collection -
- Data analysis -
- Conclusion -
- Communication -

Questions?

Hypothesis

Hypotheses

- A proposed explanation for a phenomenon based on your observations.

- A scientific hypothesis must be testable and based on previous observations or extensions of scientific theories.

Types

- Research Hypotheses

- Statistical hypotheses.

  Null hypotheses (H_0).

  Alternate hypotheses (H_a).

Research Hypotheses

- A prediction of study outcomes.

- Often a statement of the expected relationship between two or more variables.

Statistical Hypotheses

- Statement that you want to test.

- A statistical hypothesis test is a method of making statistical decisions using experimental data.

- The goal of statistical hypothesis testing is to estimate the probability of getting your observed results under the null hypothesis.

Null hypotheses (H_0)

Always – there is no difference
The null hypothesis is not rejected unless
there is strong evidence against it.

Alternate Hypotheses (H_a)

Always – there is a difference.

Example

- Which chickadee species (Mountain Chickadees vs. Black-capped Chickadees) is more abundant in Kazakhstan.

Mountain Chickadee

Black-capped Chickadee

Hypotheses

Research Hypothesis

More Mtn. Chickadees because they are more associated with conifer habitats

Statistical Hypotheses

Null Hypothesis

H_o – No difference in abundance of the 2 sp.

Alternate Hypothesis

H_a – There **IS** a difference in abundance

Area

Niche

Food web

Food chain

Ecosystem

Community

Population