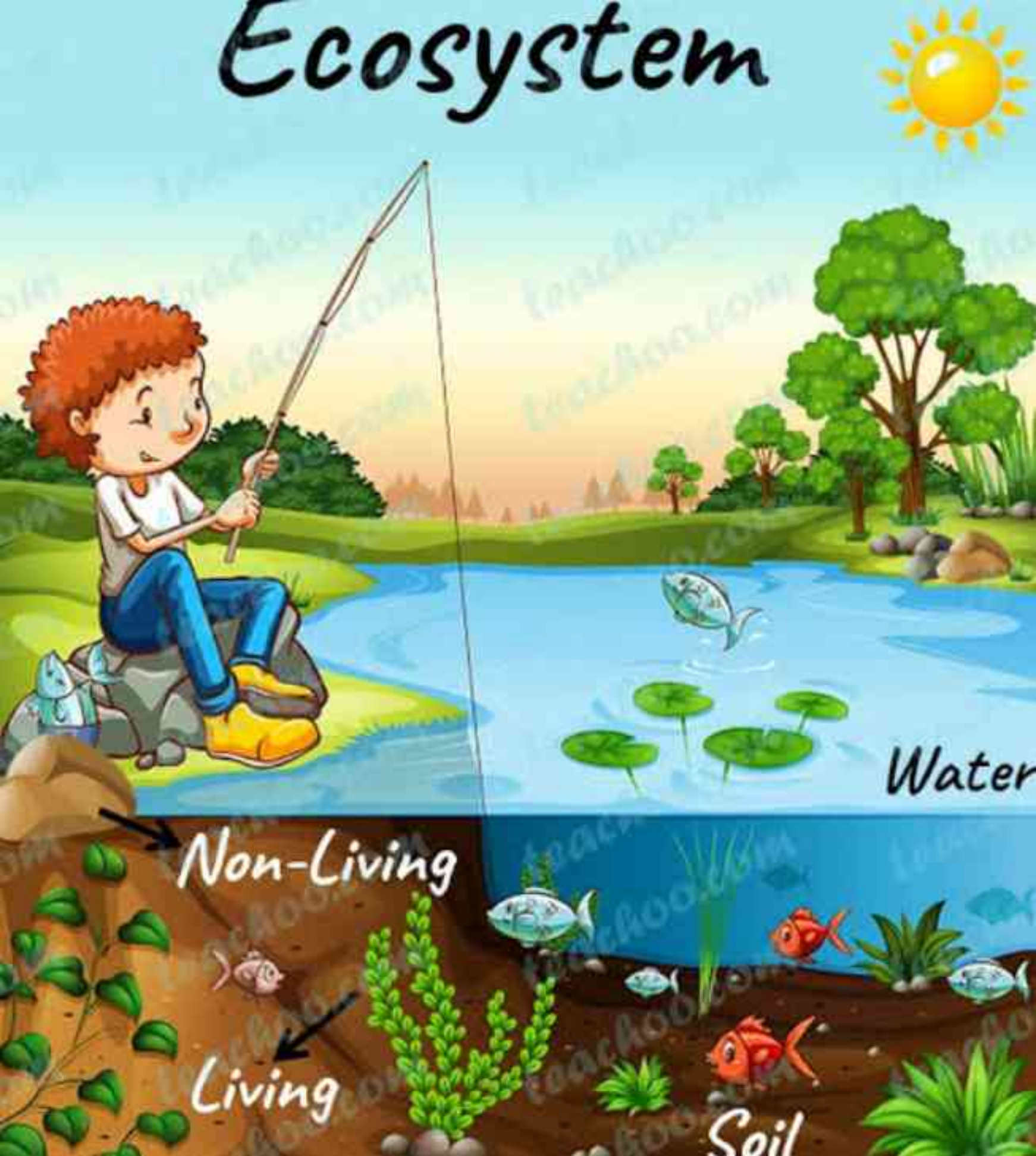
The term Ecology was coined by Earnst Haeckel in 1869. It is derived from the Greek words *Oikos*- home + *logos*- study. So **ecology deals with the study of organisms in their natural home interacting with their surroundings.** The surroundings or environment consists of other living organisms (biotic) and physical (abiotic) components. Modern ecologists believe that an adequate definition of ecology must specify some unit of study and one such basic unit described by Tansley (1935) was ecosystem. **An ecosystem is a group of biotic communities of species interacting with one another and with their non-living environment exchanging energy and matter. Now ecology is often defined as "the study of ecosystems".**

An ecosystem is an integrated unit consisting of interacting plants, animals and microorganisms whose survival depends upon the maintenance and regulation of their biotic and abiotic structures and functions. The ecosystem is thus, a unit or a system which is composed of a number of subunits, that are all directly or indirectly linked with each other. They may be freely exchanging energy and matter from outside—an *open ecosystem* or may be isolated from outside—a *closed ecosystem*.

Ecosystem



STRUCTURAL FEATURES

Composition and organization of biological communities and abiotic components constitute the structure of an ecosystem.

I. Biotic Structure

The plants, animals and microorganisms present in an ecosystem form the biotic component. These organisms have different nutritional behaviour and status in the ecosystems and are accordingly known as *Producers* or *Consumers*, based on how do they get their food.

(*a*) **Producers:** They are mainly the green plants, which can synthesize their food themselves by making use of carbondioxide present in the air and water in the presence of sunlight by involving chlorophyll, the green pigment present in the leaves, through the process of **photosynthesis**. They are also known as **photo autotrophs** (auto=self; troph=food, photo=light).

There are some microorganisms also which can produce organic matter to some extent through oxidation of certain chemicals in the absence of sunlight. They are known as **chemosynthetic** organisms or **chemo-autotrophs**. For instance in the ocean depths, where there is no sunlight, chemoautotrophic sulphur bacteria make use of the heat generated by the decay of radioactive elements present in the earth's core and released in ocean's depths. They use this heat to convert dissolved hydrogen sulphide (H_2S) and carbon dioxide (CO_2) into organic compounds.

(*b*) **Consumers:** All organisms which get their organic food by feeding upon other organisms are called consumers, which are of the following types:

(*i*) ***Herbivores*** (plant eaters): They feed directly on producers and hence also known as *primary consumers*. e.g. rabbit, insect, man.

(*ii*) ***Carnivores*** (meat eaters): They feed on other consumers. If they feed on herbivores they are called *secondary consumers* (e.g. frog) and if they feed on other carnivores (snake, big f-

(iii) ***Omnivores:*** They feed on both plants and animals. e.g. humans, rat, fox, many birds.

(iv) ***Detritivores (Detritus feeders or Saprotrophs):*** They feed on the parts of dead organisms, wastes of living organisms, their cast-offs and partially decomposed matter e.g. beetles, termites, ants, crabs, earthworms etc.

(c) **Decomposers:** They derive their nutrition by breaking down the complex organic molecules to simpler organic compounds and ultimately into inorganic nutrients. Various bacteria and fungi are decomposers.

In all the ecosystems, this biotic structure prevails. However, in some, it is the primary producers which predominate (e.g. in forests, agroecosystems) while in others the decomposers predominate (e.g. deep ocean).

II. Abiotic Structure

The physical and chemical components of an ecosystem constitute its abiotic structure. It includes climatic factors, edaphic (soil) factors, geographical factors, energy, nutrients and toxic substances.

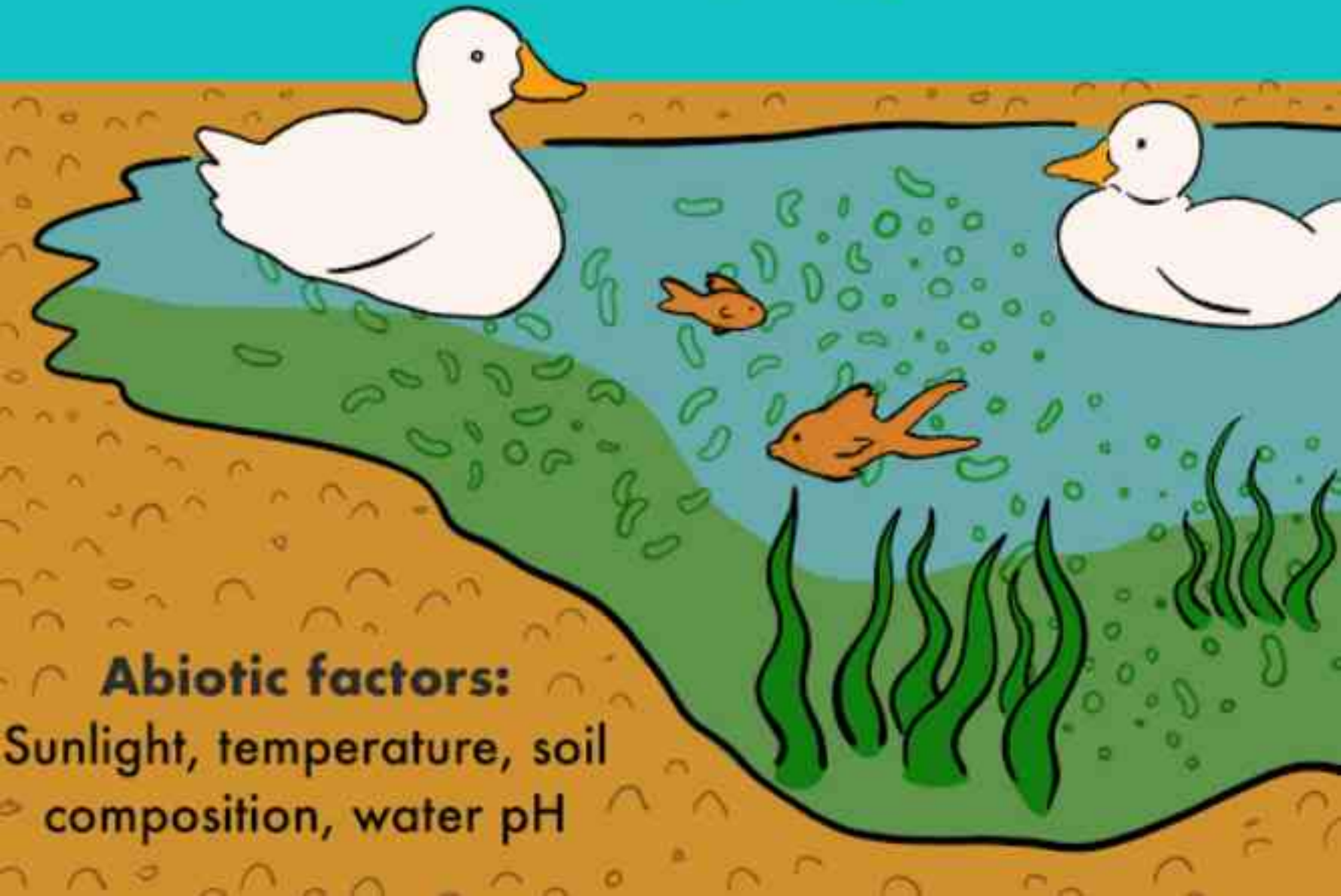
(a) ***Physical factors:*** The sunlight and shade, intensity of solar flux, duration of sun hours, average temperature, maximum-minimum temperature, annual rainfall, wind, latitude and altitude, soil type, water availability, water currents etc. are some of the important physical features which have a strong influence on the ecosystem.

We can clearly see the striking differences in solar flux, temperature and precipitation (rainfall, snow etc.) pattern in a desert ecosystem, in a tropical rainforest and in tundra ecosystem.

(b) ***Chemical factors:*** Availability of major essential nutrients like carbon, nitrogen, phosphorus, potassium, hydrogen, oxygen and sulphur, level of toxic substances, salts causing salinity and various organic substances present in the soil or water largely influence the functioning of the ecosystem.

A **biotic factor** is any *living* part of an environment.

Biotic factors:
Ducks, fish, plants, bacteria



Abiotic factors:
Sunlight, temperature, soil composition, water pH

Smith (1966) has summarized common characteristics of most of the ecosystems as follows:

1. The ecosystem is a major structural and functional unit of ecology.

2. The structure of an ecosystem is related to its species diversity in the sense that complex ecosystem have high species diversity.

3. The function of ecosystem is related to energy flow and material cycles within and outside the system.

4. The relative amount of energy needed to maintain an ecosystem depends on its structure. Complex ecosystems needed less energy to maintain themselves.

5. Young ecosystems develop and change from less complex to more complex ecosystems, through the process called succession.