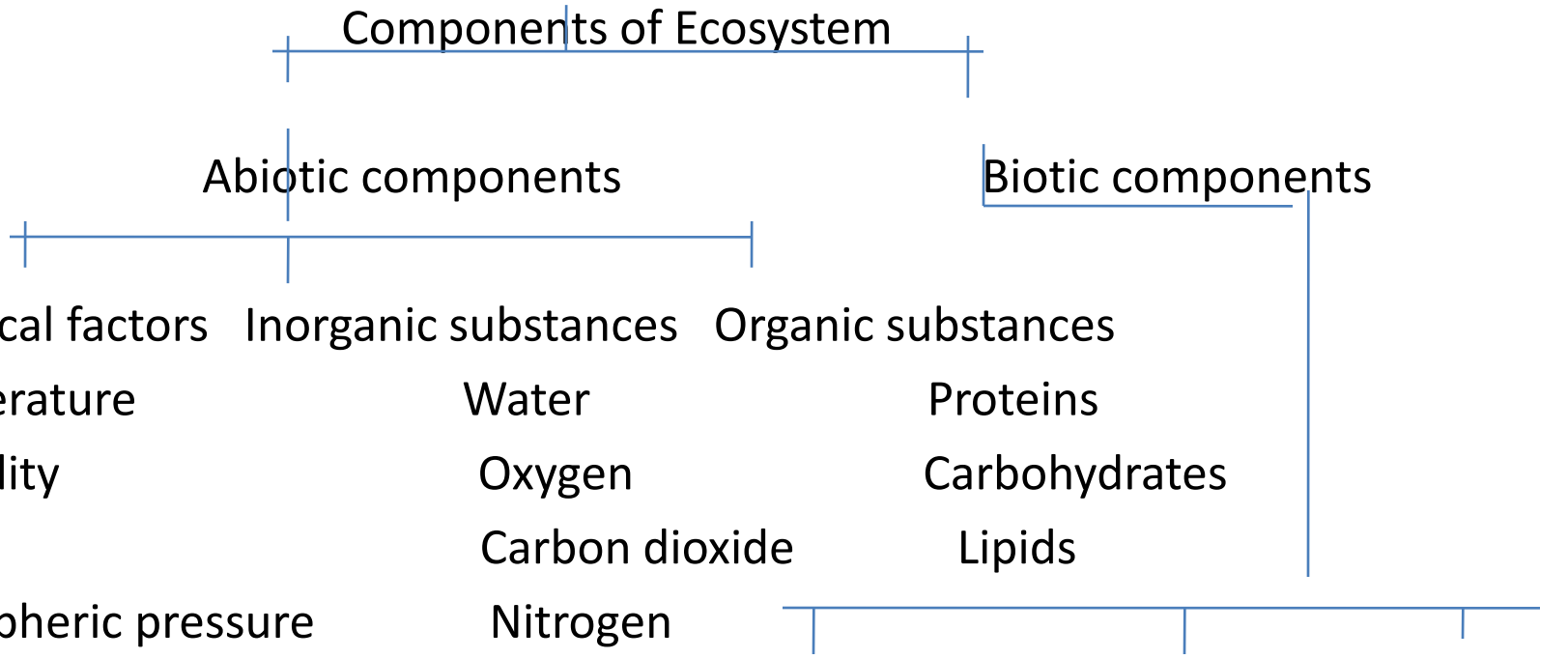
Forest ecosystems

- The term ‘ecosystem’ was coined by A.G. Tansley in 1935. An ecosystem is a functional unit of nature encompassing complex interaction between its biotic (living) and abiotic (non-living) components.
- Ecosystem varies greatly in size from a small pond to a large forest or a sea.
- it is convenient to divide it into two basic categories, namely the **terrestrial** and the **aquatic**. Forest, grassland and desert are some examples of terrestrial ecosystems; pond, lake, wetland, river and estuary are some examples of aquatic ecosystems. Crop fields and an aquarium may also be considered as **man-made ecosystems**

Components of an ecosystem

- Components of ecosystem: They are broadly grouped into:- (a) Abiotic and (b) Biotic components



- (a**) Abiotic components** (Nonliving): The abiotic component can be grouped into following three categories:- (i) **Physical factors**: Sun light, temperature, rainfall, humidity and pressure. They sustain and limit the growth of organisms in an ecosystem. (ii**) Inorganic substances**: Carbon dioxide, nitrogen, oxygen, phosphorus, sulphur, water, rock, soil and other minerals. (iii) **Organic compounds**: Carbohydrates, proteins, lipids and humic substances. They are the building blocks of living systems and therefore, make a link between the biotic and abiotic components.

- **Biotic components** (Living)
- **Producers**: The green plants manufacture food for the entire ecosystem through the process of photosynthesis. Green plants are called autotrophs, as they absorb water and nutrients from the soil, carbon dioxide from the air, and capture solar energy for this process.
- **Consumers**: They are called heterotrophs and they consume food synthesized by the autotrophs. Based on food preferences they can be grouped into three broad categories. Herbivores (e.g. cow, deer and rabbit etc.) feed directly on plants, carnivores are animals which eat other animals (eg. lion, cat, dog etc.) and omnivores organisms feeding upon both plants and animals e.g. human, pigs and sparrow.
- **Decomposers**: Also called saprotrophs. These are mostly bacteria and fungi that feed on dead decomposed and the dead organic matter of plants and animals by secreting enzymes outside their body on the decaying matter. They play a very important role in recycling of nutrients. They are also called detrivores or detritus feeders.

- Functions of ecosystem Ecosystems are complex dynamic system. They perform certain functions.
- These are:- (i) Energy flow through food chain (ii) Nutrient cycling (biogeochemical cycles) (iii) Ecological succession or ecosystem development
- (iv) Homeostasis (or cybernetic) or feedback control mechanisms

- Types of ecosystems Ecosystems are classified as follows:
- (i) **Natural ecosystems** (ii) **Man made ecosystems**
- (i) **Natural ecosystems**
- (a) Totally dependent on solar radiation e.g. forests, grasslands, oceans, lakes, rivers and deserts. They provide food, fuel, fodder and medicines.
- (b) Ecosystems dependent on solar radiation and energy subsidies (alternative sources) such as wind, rain and tides. e.g tropical rain forests, tidal estuaries and coral reefs.
- (ii) **Man made ecosystems**
- (a) Dependent on solar energy-e.g. Agricultural fields and aquaculture ponds.
- (b) Dependent on fossil fuel e.g. urban and industrial ecosystems.

Major forest ecosystems

A forest ecosystem is a community of organisms that lives within a forest. A forest is usually defined as a large group of trees . or

Forest ecosystem is

A distinct community of organisms, that…

- Lives in a forest, which can be defined as…
- A sizeable group of trees.
- In this ecosystem we will find:
- Plant life and fungi, and
- Many different animals, birds and insects.

Types of forest ecosystems

- Rainforest ecosystems
- **Rainforests**: Some of the most biodiverse ecosystems on the planet, with the Amazon being a prime example. The north-eastern part of India is particularly rich in rainforests. Further, the tropical rainforests in India are found in Assam, Andaman and Nicobar islands, and Western Ghats, etc.
- Rainforests tend to be humid inside, not just because they are often based around rivers. Water drips from the trees and humidity is contained within the forest environment thanks to thick canopies of leaves. Fantastically beautiful flowers and gorgeous birds and insects live here, as well as some rare mammals.

- 2. **Mangroves**: Mangroves are a unique mix of trees and tidal swamps. These fascinating forest ecosystems change greatly throughout the day. During part of the day they are dry and during much of the rest of the day they are waterlogged and home to crocodiles and other swamp creatures. These may be some of the most dynamic ecosystems in the world
- 3**. Inland forests**: Here, we will find plenty of mainland animals and birds (such as foxes and owls). Inland forests can be vast and ancient, or they can be smaller, like copses.
- 4. **The Taiga**: The taiga is the name for the sparse forest right towards the polar regions of the world, where conditions can be very cold and quite harsh. In fact, many of the forest ecosystems in the Taiga are arctic or polar ecosystems.

- 5. **Lakeside forests**: Waterbirds and other water wildlife can be found in these forest ecosystems. These types of forest ecosystems tend to be very humid and the types of organisms that live in them reflect this.
- 6. **Mountain forests**: The forests that grow on mountains (such as mountain pines) help to create unique ecosystems. For example, the Himalayan mountain forests in India. The peaks of mountains tend to be cold and rocky and the organisms that live in forest ecosystems at the top of mountains tend to be very well adapted for life in harsh conditions.

Characteristic features of forest ecosystems

. Forest ecosystems are so rich and diverse, and they have so many exciting and fascinating features. Below, you will find a discussion of some of the key features of these ecosystems.

- 1. **Seasonality**: In countries that have seasonal climates, forest ecosystems will change with the seasons.
- 2. **Deciduous or evergreen**: A forest may be deciduous (i.e. it sheds its leaves in winter) or evergreen (i.e. its leaves stay green and intact all the time), or it may be a mix of both deciduous and evergreen trees.
- 3. **Different levels**: Some forest ecosystems such as rain forests, feature several distinct levels – such as the forest floor, the lower canopy, the upper canopy and the tree tops.
- 4. **Attractive to birds**: Many bird species nest in tree tops and this makes forest ecosystems attractive to birds.
- 5. **Attractive to insects**: Many insects live in tree bark, leaf mulch or flowers and as such they find forest ecosystems very attractive places to make their homes.

Structure of Forest Ecosystems

- Different organisms exist within the forest layers. These organisms interact with each other and their surroundings. Each organism has a role or niche in sustaining the ecosystem.
- **Some provide food for other organisms; others provide shelter or control populations through predation:**
- **Producers:**
- All living organisms' intake energy in order to survive. In a forest ecosystem, trees and other plants get their energy from sunlight. Plants produce their own food, in the form of carbohydrates. Plants are, therefore, called the primary producers, since they produce the basic foodstuffs for other organisms within food chains and food webs. Photosynthesis is the chemical reaction that allows plants to produce their own food.

- **Consumers:**
- Animals cannot produce their own food. They must consume food sources for die energy they need to survive. All animals, including mammals, insects, and birds, are called consumers. Consumers rely on plants and other animals as a food source. Details of these animals in a forest ecosystem have been given earlier.
- Primary consumers only eat plants and are referred to as herbivores. Second-ary consumers are referred to as carnivores and feed on herbivores. Tertiary consumers are carnivores that feed on other carnivores. Omnivores eat both plant and animal matter.
- **Decomposers:**
- Leaves, needles, and old branches fall to the forest floor as trees grow. Eventu-ally all plants and animals die. So what happens to all of this plant and animal material? Does it sit on the forest floor forever? Thankfully no. These materials are decomposed by worms, microbes, fungi, ants, and other bugs.
- Decomposers break these items down into their smallest primary elements to be used again. Decomposers are important in that they sustain the nutrient cycle of ecosystems.

The importance of forest ecosystems

- Forest ecosystems are so important not just for the community close to the forest but for the whole world. Read on to find some reasons why.
- **The lungs of the world**: The Amazon rain forest is described as a biotic pump – like a giant green lung that releases oxygen into the atmosphere and locks away carbon.
- **Ancient**: Some of our forests are truly ancient, and much older than many human civilizations.
- **Biodiversity**: All of our forest ecosystems are so important for biodiversity. In fact, biologists very often claim that they are still discovering new species in the Amazon rain forest on a regular basis.
- **Homes for humans**: Forest ecosystems are not just habitats for animals. Many human communities, including indigenous communities, live in forests all over the world.
- **Protecting the earth**: Forests keep the earth rich in minerals, protect it from desertification by providing a shield against winds, and so on.