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The environmental factors which influence the life and development of plants and organisms are grouped into four main classes which are as follows-

1. **Climatic factors** (related to aerial environment),
2. **Edaphic factors**( related to soil conditions),
3. **Physiographic ( topographic factors)**, and
4. **Biotic factors**( influence of living organisms).

# CLIMATIC FACTORS

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- Climate is one of the important natural factors controlling the plant life. Its study is called climatology. The climate includes the following factors-
- A) Light
- B) Temperature
- C) Precipitation and atmospheric humidity ( water)
- D) Air and atmosphere.

# CLIMATIC FACTORS – (A) Light 3

- Light is the most essential abiotic factors without which no life can exist. The chief natural source of light are sunlight, moon light, star light and light producing or luminescent organisms. Of these sunlight has the greatest ecological significance.
- The radiant energy coming from the sun in the form of visible spectrum is called light energy.
- The solar radiations which penetrate earth's atmosphere consists of a band of visible light and a small proportion of ultraviolet and infrared radiations.
- Earth is a very small object in the solar system and it receives only 1- 50 millionth of the total solar radiation reaching the universe. The journey of solar energy from sun to earth surface is very much moderated while it passes through stratosphere and the atmospheric envelope surrounding the earth.
- In the stratosphere lies the ozone region which absorbs the harmful solar radiations of short wavelengths.

# Climatic factors - (A) Light 4

- Light affects the following aspects of plant life-
- 1. Photosynthesis- Out of the total energy reaching the earth, only about 2% is used in photosynthesis and about 10% is used in other physiological activities. The green plants **synthesize their food(carbohydrate)** from water and CO<sub>2</sub> in **presence of sun light**. The solar radiations provide energy for this process. Here radiant energy of sun available to the plant is converted into chemical energy by chlorophylls.
- 2. Respiration- There is **no direct effect** of light on the respiratory activities of plants. Indirectly respiratory substances are synthesized in the presence of light.
- 3. Transpiration- Mostly the stomata remain opened in the light and closed in the dark. Light brings about phosphorylation and conversion of starch into soluble sugars in the guard cells and thereby increases their osmotic pressure which, in turn, causes inflow of water in the guard cells.

# Climatic factors - (A) Light

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- 4. Growth and flowering of plants- Growth of plants depends especially on the intensity, quality, duration and direction of light. The plant growth is slow in the light of high intensity (inhibits the production of auxins or growth hormone).

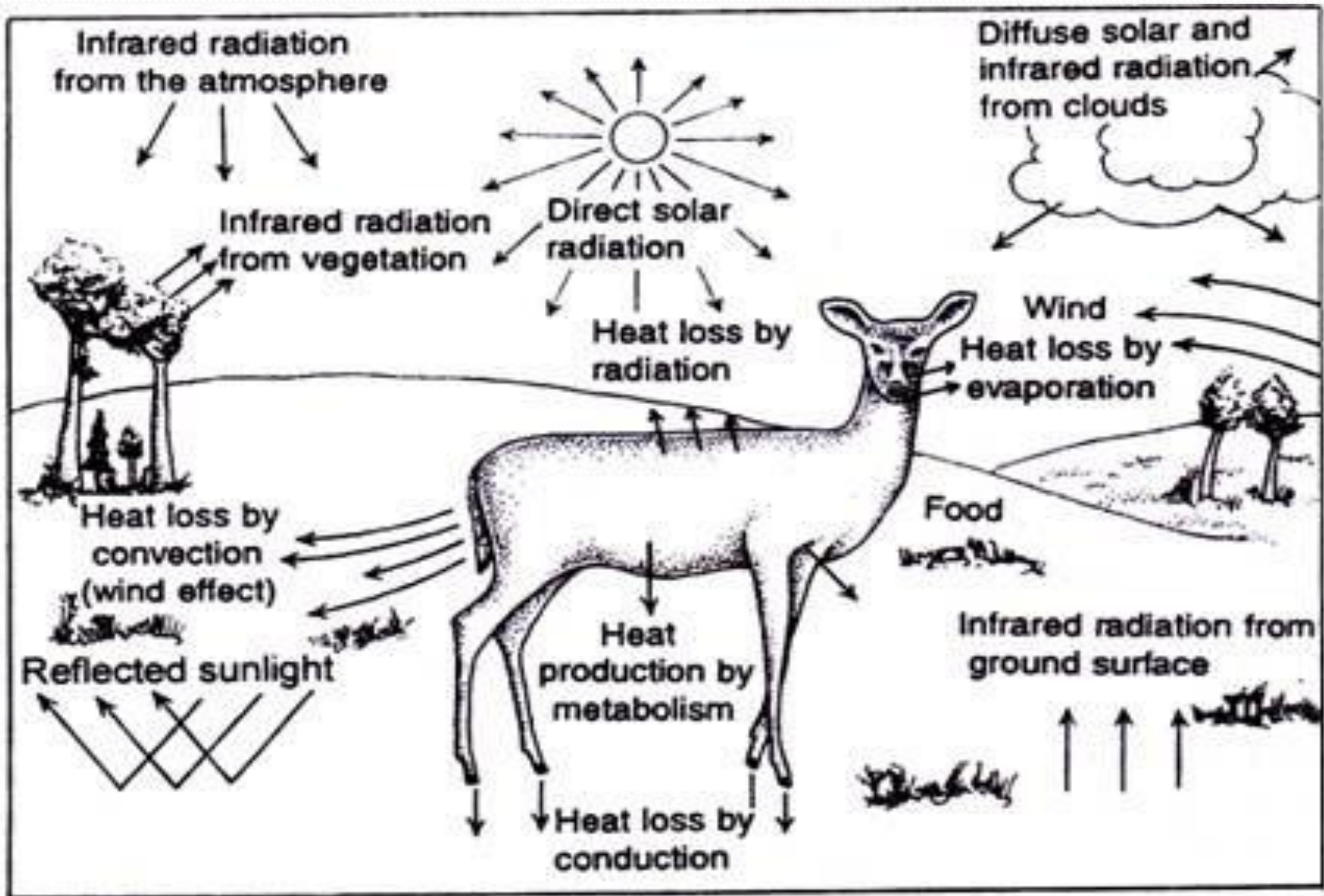
According to the response to duration of light (photoperiod), plants have been classified into three groups-

- i) Long day plants- Plants which bloom when the light duration is more than 12 hours. Ex- radish, potato, spinach etc.
  - ii) Short day plants- Plants which bloom when the light duration is less than 12 hours. Ex- cereals, tobacco, dahlia, cosmos etc.
  - iii) Day neutral plants- Plants which show little response to length of day light. Ex- cotton, tomato, balsam etc.
- 5. Movements- Light affects the movement in some plants. The stems elongate towards the source of light (positively phototropic) and the roots are negatively phototropic. The leaves grow transversally to the path of light.
  - 6. Germination of seeds- Moist seeds are very sensitive to light for its germination. In some seeds light promotes germination while in some it inhibits.



# Climatic factors - (B) Temperature

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# Climatic factors - (B) Temperature

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- Temperature is a variable factor which is influenced by time, season, latitude, altitude, slope, direction, soil texture, plant cover, human activities like urbanisation and industrialization. Temperature is a measure of intensity of heat. Heat is a form of energy called thermal energy. The total amount of heat entering the biosphere from the sun is balanced by the amount lost per unit time.
- Every plant has a specific range of temperature requirement. Existence of vegetation has been recorded between 0 to 66 degree centigrade.
- The sudden fall in temperature is injurious because plant tissue are badly affected by it.
- The temperature affects vegetation either directly or indirectly . Directly in two ways-
  - i) It affects the physiological processes of plants and consequently their growth and size, and
  - ii) It determines which species can survive in a particular region.

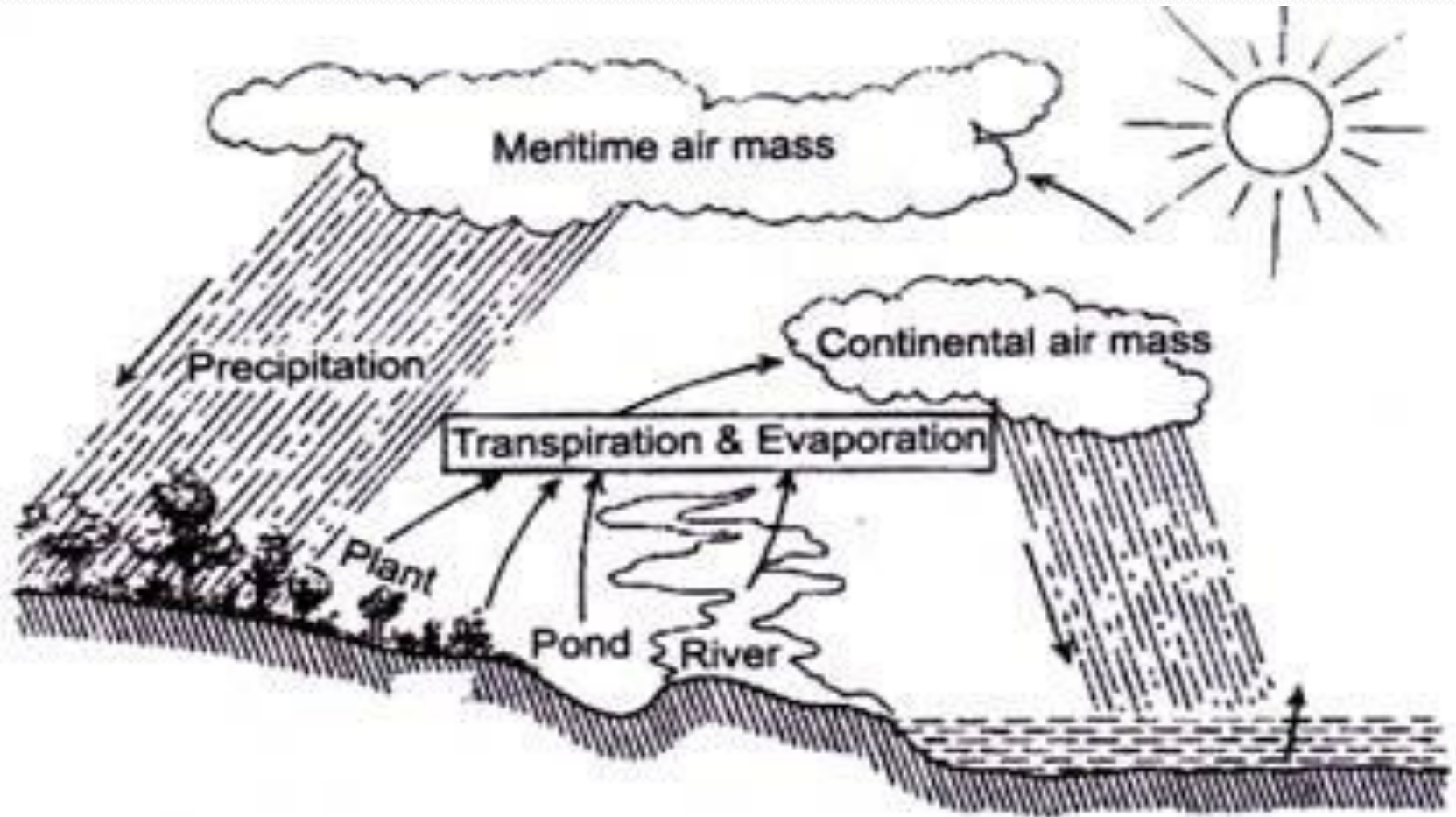


# Climatic factors - (B) Temperature 8

- According to heat requirements, vegetation can be divided in following 4 types-
    - a) Megatherms- These are the plants of warm habitat which require high degree of heat throughout the year, found in tropical climates( deserts).
    - b) Mesotherms- These are the plants of habitat which is neither very hot nor very cold, cannot stand extremely high or low temperatures. Found in tropical and subtropical habitats.
    - c) Microtherms- These are the plants of cold habitat which require low temperature for their growth, cannot tolerate high temperature. Found in tropical and subtropical areas at high elevation.
    - d) Hekistotherms- These are the plants of cold and alpine regions. They withstand long and very severe winter.
- Temperature in combination with moisture determines the general distribution of vegetation.

# Climatic factors - (C) Water

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**Fig. 2.5.** Hydrologic cycle in nature

# Climatic factors - (C) Water 10

- Water is one of the most important climatic factors. It affects the vital processes of all living beings. It affects the morphology and physiology of plants.
- Water of atmosphere reaches to the earth's surface through precipitation and from earth's surface it reaches to the atmosphere through evaporation and transpiration( water or hydrologic cycle).
- The amount of rainfall in different localities largely determines the nature of vegetation therein.

- **Annual rainfall**

- 1) 0 to 13.24 cm
- 2) 13.25 to 35.1 cm
- 3) 35.2 to 63.5 cm
- 4) 63.6 to 114.3 cm
- 5) 114.4 to 203.2 cm

## **Vegetation**

- Desert
- Semi- arid grassland
- Dry subtropical grassland
- Savana and open woodland
- Humid subtropical forest
- Tropical rain forest.

# Climatic factors - (C) Water 11

- The atmospheric humidity influences directly the form and structure of the plants. It directly affects the transpiration. In dry atmosphere transpiration rate increases.
- On the basis of water requirements, the plants are grouped into 3 ecological groups-
  - i) Hydrophytes- Plant adapted to aquatic environment.
  - ii) Xerophytes- Plants adapted to grow in dry lands where water content is low.
  - iii) Mesophytes- Plants living in the habitat that usually shows neither an excess nor a deficiency of water.

## Climatic factors - (D)Air and atmosphere 12

- The earth is enveloped by a gaseous layer called atmosphere. Gaseous mantle forming atmosphere extends into outer space some 1000 km or so above the earth surface.
- The lowest layer of atmosphere in which man and other living organisms live is called troposphere. It is about 20 km above earth surface.
- The gaseous mixture present in the troposphere is called air. Air moving from high pressure to low atmospheric pressure is called wind. It is an important ecological factor of the environment and it affects plant life and vegetation as follows-
  - i) Wind increases water loss. It decreases the growth of plant.
  - ii) Mechanically wind causes erosion of soil and abrasion of vegetation through removal of particles .
  - iii) In strong dry and hot winds , young parts of plants may become shriveled and killed in a few hours .



## Climatic factors - (D)Air and atmosphere 13

- iv) In strong winds, big trees are uprooted and small plants and grasses are affected very little. Weak plants like wheat, maize, sugarcane, jwar, etc are bent against the ground, may again become partially erect.
- v) Wind is an important agent for the **dispersal** of pollen grains, fruits, seeds and spores of the plants. Thus it also plays important role in **local distribution** of plant species.
- vi) In India and many other countries of the world, unchecked winds have caused total disappearance of vegetation at certain places and rendered big areas deserted. Rajsthan desert in India is spreading eastward due to unchecked wind erosion.

# Trees uprooted due to strong wind

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# Banana trees need support

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Cereal crop, bending over the stems near ground level  
due to strong wind

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# THANKS