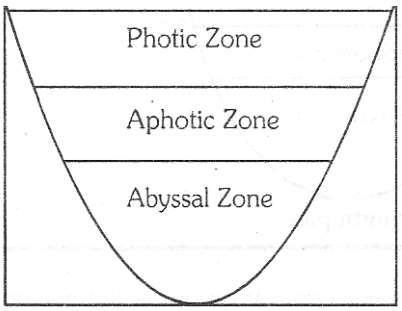
STUDY OF OCEAN ENVIRONMENT

All the ocean basins are roughly of the shape of a wash basin or an inverted hat.

Type I - On the basis of structure :
For the coast line a gradually slopping region extends for about **160 km** into the sea. This zone is called **continental shelf** and has a depth of **8-200 meters.** The angle of the slopes then abruptly steepness to form the **continental slope.** The continental slope levels off into a more or less horizontal **ocean floor.** The depth of the ocean floor is in the range of several thousand meters.

Type II - On the basis of availability of light :
The vertically zones of the ocean are determined by the availability of light or penetration of light for photosynthesis that is

- **Photic or Euphotic zone -** It is upper lighted zone up to a depth of about 200 meters.
- **Aphotic zone -** Middle region where diffused light penetrate which is insufficient for photosynthesis , it extends up to the depth of 200-2000 meters.
- **Abyssal zone -** It is deeper part where light do not reach below 2000 meter, is the area of perpetual darkness.



Type III - On the basis of environment :

Three major environment may be recognized in the **ocean basin.**

- **The Littoral zone -** Comprising the sea floor from the shore to the edge of the continental shelf.
- **The benthonic zone -** Formed of sea floor along with the continental slope and the aphotic and abyssal zone.
- **The pelagic zone -** Constituting the water of the ocean basin.

ALTITUDE AND LATITUDE

Altitude

↓

Height above the sea surface place fromOf any place.

Latitude

↓

The distance of any the equator

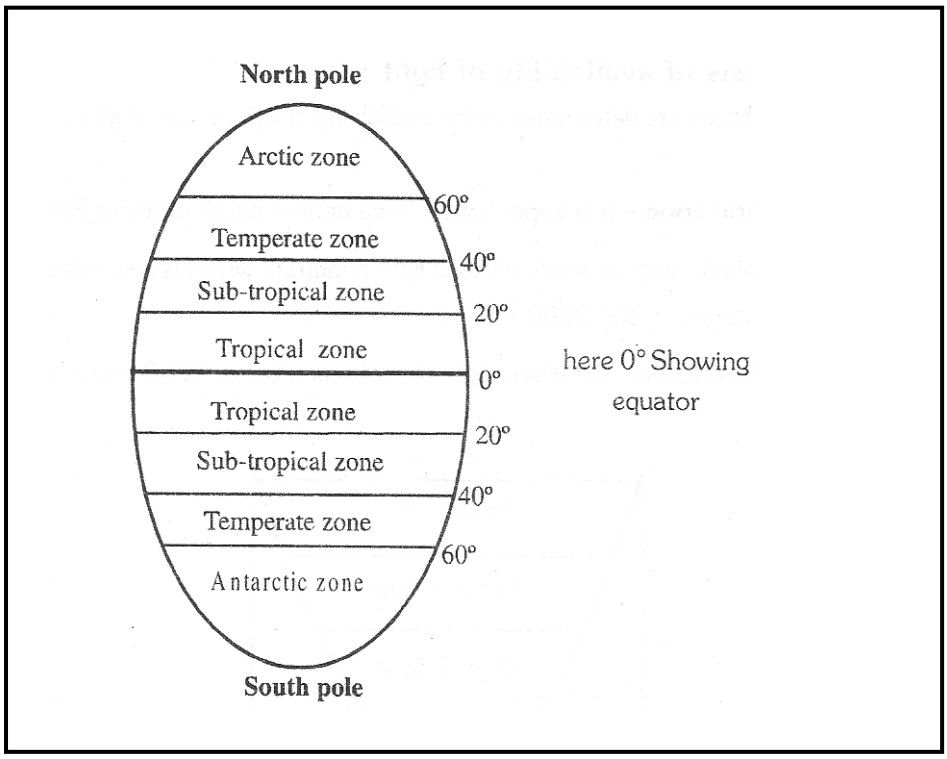
On the basis of variation in mean temperature along latitude the main climatic regions are

(1) **Tropical =** 0^0 - 20^0 latitude

(2) **Subropical** = 20^0 - 40^0 latitude

(3) **Temperate =** 40^0 - 60^0 latitude

(4) **Arctic and Antarctic =** 60^0 - 80^0 latitude



Note :

- The temperature an light values are maximum at the equator, decreases gradually towards the pole Effect of altitude and latitude are almost same on temperature.
- The type of vegetation from sea level to measuring altitudes are similar to increasing latitude (distance from equator)

SOIL OR EDPHIC FACTOR

Soil - Soil is the uppermost layer of earths crust formed by weathering of rocks. It is the mixture of living or non living materials.

Minerals 45% + Water 25% + Air 25% + Organic matter (living + non living) **5%**



Soil mineral matter –

As a result of weathering the mineral particles of different size are formed. The soil is divided into five types on the basis of **size of soil particles.**



Note : Loam Soil is the **best soil** for growing of crops, it has high water holding capacity, high aeration and high root penetration.

SOIL ORGANIC MATTER

The dead organic matter present in soil is called humus, which is formed by decomposition of plant and animal remains. Freshly fallen plant and animal material called detritus or **litter,** partially decompose litter is called **duff.** Fully decomposed litter is called **humus.**

Litter → Duff → Humus

Decomposition (Formation of Humas) :

Decomposers break down complex organic matter into inorganic substances like carbon dioxide, water and nutrients and the process is called decomposition. Dead plant remains such as leaves, bark, flowers and dead remains of animals, including fecal matter, constitute detritus, which is the raw material for decomposition. The important steps in eh process of decomposition are **fragmentation, leaching, catabolism humification and mineralisation.**

Detritivores (e.g. earthworm) break down detritus into smaller particles. This process is called fragmentation. By the process of leaching, water soluble inorganic nutrients go down into the soil horizon and get precipitated ad unavailable slats. Bacterial and jungal enzymes degrade delritus into semplir inorganic substances. This process is called as **catabolism.**

It is important to note that all the above steps in decomposition operate simultaneously on the detritus.

Humification and mineralisation occur during decomposition in the soil. Humification leads to accumulation of a dark coloured amorphous substance called humus that is highly resistant to microbial action and undergoes decomposition at a extremely sow rate. Being colloidal in nature it severs as a reservoir of nutrients. The humus is further degrades by some microbes and release of inorganic nutrients occur by the process known a **mineralisation.**

Decomposition is largely an oxygen-requiring process. The rate of decomposition is controlled by chemical composition of detritus and climate factors. In a particular climate condition, decomposition rate in slower if detritus is rich in lining and chitin, and quicker, if detritus is rich in nitrogen and water-soluble substance like sugars. Temperature and soil moisture are the most important climatic factors that regulate decomposition though their effects on the activities of soil microbes. Warm and moist environment favour decomposition where low temperature and an anaerobiosis inhibit decomposition resulting in build up of organic materials.

Two types of Humus –

(i) Mor (Coarse terxtured humus) - It is raw humus and is formed in acidic soil (**PH - 3.8 - 4.0**) in

which decomposition of litter is slow because it has less number of decomposer organism.

(ii) Mull - This is completely decomposed litter i.e. human because rate of decomposition is fast due to high PH of soil. (**Best PH of the soil 5.5 to 6.5**)

SOIL WATER

It is of three types

Holard - The total amount of water present in the soil is called holard.

- **Hygroscopic water -** A thin layer of water attached tightly to soil particles due to forces of cohesion or adhesion. This is non available to plant.
- **Gravitational water -** The water moves downwards due to gravity, it is non available to plant.
- **Capillary water -** Inter particle spaces or porous spaces act as minute capillaries and some amount of water is present in these capillaries due to surface tension. This is capillary water. It is the only form of soil water which is available to plant.
- **Combined water-** The water which is present as hydroxides of iron, aluminum silicon, etc. is called combined water.

Some Terminology :

1. **Field capacity -** When soil holds all the water except gravitational water, it is known as field capacity. It is upper limit of water availability.

   Field capacity = Holard - Gravitational water,

   or

   Field capacity = Capillary water + Hygroscopic water + Combine water

2. **Water holding capacity (Storage capacity) -**

   W.H.C. = Holard - (Hygroscopic water + Combined water + Gravitational water)

3. **Wilting point :** The lower limit of water availability of a soil is called wilting point.

Note :

1. The water potential of soil at field capacity is **(-0.01 Mpa) [Mpa = Mega Pascal]**
2. The water potential of soil at wilting point is **(-1.5 Mpa)**
3. Amount of water in soil measured by **tensiometer.**

SOIL PROFILE

1. **O - layer -** This is made up of **litter.**
2. **A - layer -** This layer consists of mainly humus. Minerals are also found here. Most of microfauna and micro flora are present in this layer of soil. Four feet thick top soil is essential for growth of plant. The destruction of this layer is called soil erosion.

A layer is divided in two parts - A_1, A_2

- **A_1 -** The upper part of A layer (**A_1**) is also called humic or melanized zone because dark black humus is present.
- **A_2** - The lower part of A layer (**A_2**) is known, as podosolic or eluvial zone or zone of leaching. It is light coloured region because of little amount of organic matter.

3. **B - layer or subsoil -** This layer is made up of **big soil particles or minerals.** This layer has less amount of humus, it contains compounds of iron, aluminum and manganese in higher amount, it is also known illuvial zone.

4. **C - layer -** This layer is composed by **incompletely weathered rock** materials.
5. **R - layer -** This layer is present in unweathered parental rocks.

A Horizon + B Horizon = Solun

SOME TERMINOLOGY RELATED TO SOIL

LATERIZATION :

In the **tropical area** due to high temperature, high rainfall, litter is decomposed very rapidly in A layer. Due to mineralization of litter **Al** and Fe are liberated in the upper layer of soil, colour of this soil becomes **redish-brown**, this process is known as laterization.

PODSOLIZATION :

In **temperate** are temperature is low and high humidity occurs. Humus and minerals contents dissolves and percolate with water and are leached from A layer to B layer. Due to loss of chemicals the colour of soil of A layer (horizon) turns to **light ash** colour. This process is known as podsolization and soil is known as podosols.

GLEIZATIOIN :

In **tundra** region due to low temperature humid condition humus is formed is less quantity and moves slowly in B layer. So colour of B layer becomes **blue - grey** due to deposition of **Fe** salt. This process is known as gleization and soil is known as gleys.

- ♦
- ♦
- ♦
- ♦
- ♦
- ♦

Note

- **Black cotton** - Soil of Maharashtra are commonly known as regur soil
- **Sierozen** - Light coloured soil of arid region
- **Bog soil** - Soil of marshes and swamps
- **Solnetz / Solansltz** - Black alkaline soil
- **Peat soil** - In which 90% humus in present.
- **Solonchak** - Which alkaline & Saline soil

OTHER ABIOTIC COMPONENT

1. **Precipitation -** It is a source of soil water. The hydrological cycle is the movement of water between earth, air and atmosphere.

   Forms of precipitation -

   (i) Drizzle - Minute drops of water floating in air
   (ii) Rain - Large drops of water
   (iii) Snow - Water in solid form
   (iv) Sleet - Ice in minute granular from
   (v) Hails - Large balls of ice

2. **Humidity -**

   Atmospheric moisture in the form of invisible vapour is known as humidity. it is expressed in terms of relative humidity.

   Relative humidity -

   The amount of moisture in air as percentage of the amount which the air can hold at saturation at the existing temperature.

If temperature ↑ RH ↓

Note :

- R.H. is measured by **Psychrometer**
- Wind speed is measured with the help of **anemometer.**

3. **Topography -**

   It included the physical features of the earth like altitude, slope, exposure, mountain chains valleys plant. It affects distribution of organism by influencing the climate factor like light, wind, rainfall etc.