ECOSYSTEM
PRODUCTIVITY

PRODUCTIVITY :

(i) **Primary productivity -**

- Primary production is defined as the amount of biomass or organic matter produced per unit area over a time period by plants during photosynthesis. It is expressed in term of weight (g^{-2}) or energy (Kcal m^{-2}). The rate of biomass production is called productivity. It is expressed in term of $g^{-2}yr^{-1}$ or (Kcal m^{-2}) yr^{-1} to compare the productivity of different ecosystem. It can be divided into **GPP** and **NPP**.

❖ **Productivity is of two types :**

(1) **Primary productivity :** Total energy accumulation in green plants in the form of biomass/organic matter in unit area over a period of time through photosynthesis is called primary productivity.

❖ **Primary productivity involves two types :**

(a) **Gross primary Productvity (GPP) :** Synthesis of organic matter in producers by photosynthesis in unit area in unit time is called GPP **(AIPMT-2015)**. It involves loss of energy through Respiration and other metabolic activities.

(b) **Net Primary Productivity (NPP) :** Amount of organic matter stored in producers by photosynthesis in unit area in unit time is called NPP.

NPP = GPP – R **R = Respiration.**

- **NPP -** It is available biomass for hosts (as herbivores or decomposers).

(2) **Secondary productivity :** It is resynthesis of organic matter in secondary consumers.

- **Loss of energy through rspiration is 20% in producers. 30% in Herbivores and 60% in carnivores.**

(3) **Net community productivity or Net productivity -** The rate of storage of organic matter not used by the heterotrophs.

NCP = N.P.P. – HR (HR = Energy used by Heterotrophs or consumers)

- Primary productivity depends on the plant species inhabiting a particular area. It also depends on a variety of environmental factors availability of nutrients and photosynthetic capacity of plants. Therefore it varies in different type of ecosystem. The annual net primary productivity of the whole biosphere is approximately 170 billion tons (dry weight) of the organic matter, productivity of the ocean are only 55 billion tons.
- In per unit area **maximum productivity** found in **tropical rain forest.**
- In water, **least productive ecosystem** is very **deep lakes** and **highly productive ecosystem** is **coral reef.**
- **Nitrogen** is the **limiting factor in ocean** and **phosphorus** is the **limiting factor in lake** productivity.
- In land - Highest productivity, **Tropical rain forest** i.e., 5 kg/msq/year.
- **Lowest productivity** is of **Deserts, tundra.**
- Most productive Agro-ecosystem is **Sugarcane** and **rice ecosystem** - 3-4 kg./msq/year.