

14.2. PRODUCTIVITY

A constant input of solar energy is the basic requirement for any ecosystem to function and sustain. **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 terms of weight (g m^{-2}) or energy (kcal m^{-2}). The rate of biomass production is called **productivity**. It is expressed in terms of $\text{gm}^{-2} \text{yr}^{-1}$ or $(\text{kcal m}^{-2}) \text{yr}^{-1}$ to compare the productivity of different ecosystems. It can be divided into gross primary productivity (GPP) and net primary productivity (NPP). **Gross primary productivity** of an ecosystem is the rate of production of organic matter during photosynthesis. A considerable amount of GPP is utilised by plants in respiration. Gross primary productivity minus respiration losses (R), is the **net primary productivity** (NPP).

$$\text{GPP} - \text{R} = \text{NPP}$$

Net primary productivity is the available biomass for the consumption to heterotrophs (herbivores and decomposers). **Secondary productivity** is defined as the rate of formation of new organic matter by 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 types of ecosystems. The annual net primary productivity of the whole biosphere is approximately 170 billion tons (dry weight) of organic matter. Of this, despite occupying about 70 per cent of the surface, the productivity of the oceans are only 55 billion tons. Rest of course, is on land. *Discuss the main reason for the low productivity of ocean with your teacher.*