GRASSLAND ECOSYSTEMS

Grasslands are dominated by grass species but sometimes also allow the growth of a few trees and shrubs. Rainfall is average but erratic. Limited grazing helps to improve the net primary production of the grasslands but overgrazing leads to degradation of these grasslands resulting in desertification. Three types of grasslands are found to occur in different climatic regions:

(*a*) **Tropical grasslands:** They occur near the borders of tropical rain forests in regions of high average temperature and low to moderate rainfall. In Africa, these are typically known as **Savannas** which have tall grasses with scattered shrubs and stunted trees. The Savannas have a wide diversity of animals including zebras, giraffes, gazelle, antelopes etc. During dry season, fires are quite common. Termite mounds are very common here. The termites gather the detritus (dead organic matter) containing a lot of cellulose and build up a mound. On the top of the mound fungi are found to grow which feed upon this dead matter including cellulose and in turn release methane, a greenhouse gas.

Tropical savannas have a highly efficient system of photosynthesis. Most of the carbon assimilated by them in the form of carbohydrates is in the perennating bulbs, rhizomes, runners etc. which are present underground. Deliberate burning of these grasslands can relase huge quantities of carbon dioxide, another green house gas, responsible for global warming.

(*b*) **Temperate grasslands:** They are usually found on flat, gentle sloped hills, winters are very cold but summers are hot and dry. Intense grazing and summer fires do not allow shrubs or trees to grow.

In United States and Canada these grasslands are known as **prairies,** in South America as **Pampas**, in Africa as **Velds** and in central Europe and Asia they are known as **Steppes.**

Winds keep blowing and evaporation rate is very high. It also favours rapid fires in summer. The soils are quite fertile and therefore, very often these grasslands are cleared for agriculture.

(*c*) **Polar grasslands (Arctic Tundra):** They are found in arctic polar region where severe cold and strong, frigid winds along with ice and snow create too harsh a climate for trees to grow. In summers the sun-shines almost round the clock and hence several small annual plants grow in the summer. The animals include arctic wolf, weasel, arctic fox, reindeer etc. A thick layer of ice remains frozen under the soil surface throughout the year and is known as **permafrost**. In summer, the tundra shows the appearance of shallow lakes, bogs etc. where mosquitoes, different type of insects and migratory birds appear.

DESERT ECOSYSTEMS

These ecosystems occur in regions where evaporation exceeds precipitation (rainfall, snow etc.). The precipitation is less than 25 cm per year. About 1/3rd of our world's land area is covered by deserts. Deserts have little species diversity and consist of drought resistant or drought avoiding plants. The atmosphere is very dry and hence it is a poor insulator. That is why in deserts the soil gets cooled up quickly, making the nights cool. Deserts are of three major types, based on climatic conditions:

→(*a*) **Tropical deserts** like Sahara and Namib in Africa and Thar desert, Rajasthan, India are the driest of all with only a few species. Wind blown sand dunes are very common.

→(*b*) **Temperate deserts** like Mojave in Southern California where day time temperatures are very hot in summer but cool in winters.

→(*c*) **Cold deserts** like the Gobi desert in China has cold winters and warm summers.

Desert plants and animals are having most typical adaptations for conservation of water. Many desert plants are found to have reduced, scaly leaves so as to cut down loss of water due to transpiration or have succulent leaves to store water. Many a times their stems get flattened and develop chlorophyll so that they can take up the function of photosynthesis. Some plants show very deep roots to tap the groundwater. Many plants have a waxy, thick cuticle over the leaf to reduce loss of water through transpiration. Desert animals like insects and reptiles have thick outer coverings to minimize loss of water. They usually live inside burrows where humidity is better and heat is less. Desert soil is rich in nutrients but deficient in water.

Due to low species diversity, shortage of water and slow growth rate, the desert plant communities, if faced with a severe stress take a long time to recover.

AQUATIC ECOSYSTEMS

Aquatic ecosystems dealing with water bodies and the biotic communities present in them are either freshwater or marine. Freshwater ecosystems are further of standing type (**lentic**) like ponds and lakes or free-flowing type (**lotic**), like rivers. Let us consider some important aquatic ecosystems.

(*a*) **Pond ecosystem:** It is a small freshwater aquatic ecosystem where water is stagnant. Ponds may be seasonal in nature i.e. receiving

enough water during rainy season. Ponds are usually shallow water bodies which play a very important role in the villages where most of the activities center around ponds. They contain several types of algae, aquatic plants, insects, fishes and birds. The ponds are, however, very often exposed to tremendous anthropogenic (human-generated) pressures. They are used for washing clothes, bathing, swimming, cattle bathing and drinking etc. and therefore get polluted.

(*b*) **Lake ecosystems:** Lakes are usually big freshwater bodies with standing water. They have a shallow water zone called **Littoral zone,** an open-water zone where effective penetration of solar light takes place, called **Limnetic zone** and a deep bottom area where light penetration is negligible, known as **profundal zone** (Fig. 3.16).

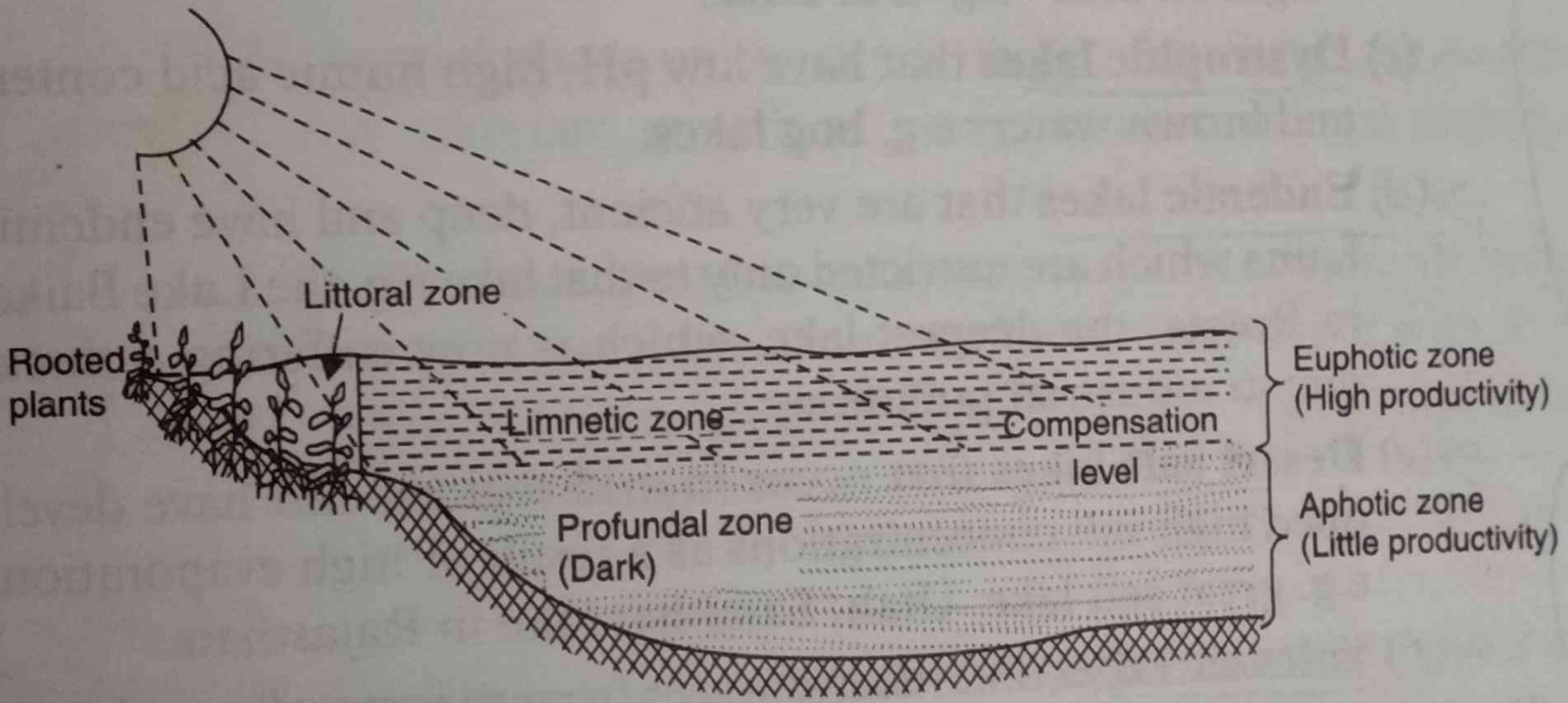

Fig. 3.16. Zonation in a lake ecosystem.