Unit Assessment Statements

Biomes and Ecological Succession

• Biomes are collections of ecosystems sharing similar climatic conditions that can be grouped into five major classes: aquatic, forest, grassland, desert and tundra. Each of these classes has characteristic limiting factors, productivity and biodiversity.

• Insolation, precipitation and temperature are the main factors governing the distribution of biomes.

• The tricellular model of atmospheric circulation explains the distribution of precipitation and temperature and how they influence structure and relative productivity of different terrestrial biomes.

• Climate change is altering the distribution of biomes and causing biome shifts.

• Zonation refers to changes in community along an environmental gradient due to factors such as changes in altitude, latitude, tidal level or distance from shore (coverage by water).

• Succession is the process of change over time in an ecosystem involving pioneer, intermediate and climax communities.

• During succession, the patterns of energy flow, gross and net productivity, diversity, and mineral cycling change over time.

• Greater habitat diversity leads to greater species and genetic diversity.

• *r-* and *K*-strategist species have reproductive strategies that are better adapted to pioneer and climax communities, respectively.

• In early stages of succession, gross productivity is low due to the unfavourable initial conditions and low density of producers. The proportion of energy lost through community respiration is relatively low too, so net productivity is high—that is, the system is growing and biomass is accumulating.

• In later stages of succession, with an increased consumer community, gross productivity may be high in a climax community. However, this is balanced by respiration, so net productivity approaches 0 and the productivity–respiration (P:R) ratio approaches 1.

• In a complex ecosystem, the variety of nutrient and energy pathways contributes to its stability.

• There is no one climax community, but rather a set of alternative stable states for a given ecosystem. These depend on the climatic factors, the properties of the local soil and a range of random events that can occur over time.

• Human activity is one factor that can divert the progression of succession to an alternative stable state by modifying the ecosystem; for example, the use of fire in an ecosystem, the use of agriculture, grazing pressure, or resource use (such as deforestation). This diversion may be more or less permanent depending upon the resilience of the ecosystem.

• An ecosystem’s capacity to survive change may depend on its diversity and resilience.