

SEGMENT FOUR LECTURE EIGHT: DISTURBANCE, SUCCESSION AND BIOGEOGRAPHY

Stability is the tendency of a community to reach and maintain an equilibrium composition of species in spite of disturbance. Periodic disturbance is a natural component of ecosystems (storms, droughts, fires, floods) or caused by human activities (clearing for farming, urban development, and mining). Moderate disturbances initially divide communities into patches; Recovery from moderate disturbance can create conditions that increase species diversity.

Post-Disturbance Succession

Ecological succession refers to transitions in community composition over time and may be:

- Primary—in a relatively lifeless area without soil (after glacial retreat (Fig. 54.22) or the formation of a volcanic island);
- Secondary—in a recently disturbed area with intact soil (Fig. 54.21).

Succession occurs because of:

- inhibition due to interspecific competition and
- facilitation, in which earlier communities alter environmental conditions so that they become favorable for other immigrant species.

Human Activities Cause Ecosystem Disturbance

1. Acid Precipitation occurs when emissions of sulfur and nitrogen from fuel combustion combine with water so that precipitation contains sulfuric and nitric acids—(Fig.);
2. Biological magnification of toxins with increasing trophic level (Fig. 55.20)
3. Global warming is occurring because of “carbonization” of the atmosphere. Measurements of both CO₂ and temperature over 40 years show a general trend of increase (Fig. 55.21) and correlates with measurements from ice core and tree ring data.
4. Ozone depletion (Figs. 55.24-25) has occurred because of the use of chlorinated fluorocarbons (CFCs), which rise to the lower stratosphere and convert ozone (O₃) to molecular oxygen (O₂). The U.S. and 179 other countries signed the Montreal Protocol to eliminate the use of CFCs, and there are indications that ozone depletion is slowing.
5. Human-induced eutrophication is called Cultural eutrophication. Sewage and agricultural runoff redistributes nutrients, especially nitrates and phosphates. In freshwater ecosystems, these nutrients cause algal blooms and accelerate the natural process of eutrophication.
6. Disruption of nutrient cycling due to fertilizer runoff (see Fig. 55.18).

Fig. 55-23

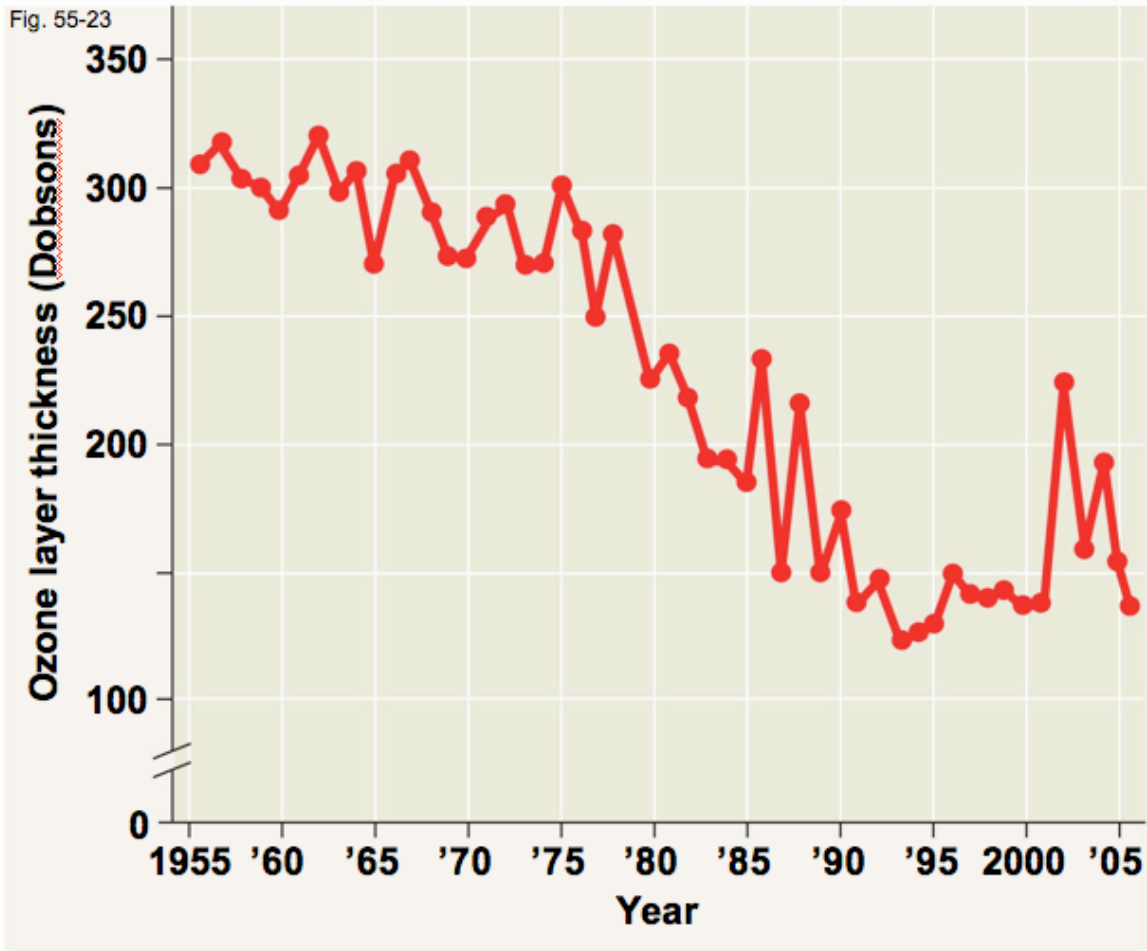


Fig. 55-24

Chlorine atom

