44.2D: Inorganic Nutrients and Other Factors

Soil structure, oxygen availability, wind, and fire are abiotic factors that have influences on species distribution and quantity.

Learning Objectives

- Identify further abiotic factors that affect species distribution and abundance

Key Points

- Soil structure, pH, and its nutrient content affect the distribution of plants, which in turn influences the distribution of the animals that feed on them.
- Oxygen availability is an important abiotic factor affecting species in both aquatic and terrestrial environments.
- Wind and fire impose physical disturbances that species must be adapted to in order to live in affected areas.

Key Terms

- inorganic: relating to a compound that does not contain carbon
- transpiration: the loss of water by evaporation in terrestrial plants, especially through the stomata; accompanied by a corresponding uptake from the roots
Other Important Abiotic Factors

Inorganic nutrients, soil structure, and aquatic oxygen availability are further abiotic factors that affect species distribution in an ecosystem. The same is true for terrestrial factors, such as wind and fire, which can impact the types of species that inhabit regions exposed to these types of disturbances.

Inorganic Nutrients and Soil

Inorganic nutrients, such as nitrogen and phosphorus, are important in the distribution and the abundance of living things. Plants obtain these inorganic nutrients from the soil when water moves into the plant through the roots. Therefore, soil structure (the particle size of soil components), soil pH, and soil nutrient content play an important role in the distribution of plants. Animals obtain inorganic nutrients from the food they consume. Therefore, animal distributions are related to the distribution of what they eat. In some cases, animals will follow their food resource as it moves through the environment.

Oxygen Availability

Figure 1: Jack pine cones: The mature cones of the jack pine (Pinus banksiana) open only when exposed to high temperatures, such as during a forest fire. A fire will probably kill most vegetation, so a seedling that germinates after a fire is more likely to receive ample sunlight than one that germinates under normal conditions.

Some abiotic factors, such as oxygen, are important in aquatic ecosystems as well as terrestrial environments. Terrestrial animals obtain oxygen from the air they breathe. Oxygen availability can be an issue for organisms living at very high elevations, where there are fewer molecules of oxygen in the air. In aquatic systems, the concentration of dissolved oxygen is related to water temperature and the speed at which the water moves. Cold water has more dissolved oxygen than warmer water. In addition, salinity, water current, and tide can be important abiotic factors in aquatic ecosystems.

Other Terrestrial Factors

Wind can be an important abiotic factor because it influences the rate of evaporation and transpiration. The physical


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The force of wind is also important because it can move soil, water, or other abiotic factors, as well as an ecosystem's organisms.

Fire is another terrestrial factor that can be an important agent of disturbance in terrestrial ecosystems. Some organisms are adapted to fire and, thus, require the high heat associated with fire to complete a part of their life cycle. For example, the jack pine, a coniferous tree, requires heat from fire for its seed cones to open. Through the burning of pine needles, fire adds nitrogen to the soil and limits competition by destroying undergrowth.