## Glossary

**Anthropogenic**—involving the impact of humans on nature; induced or altered by the presence or activities of humans.

**Biofuel**—a nonfossil, natural, carbon-based fuel.

**Biological pump**—the export of newly produced organic carbon from the surface ocean (mostly via sinking) and regeneration of dissolved inorganic carbon at depth.

**Biosphere**—all areas on earth where living organisms are found; includes oceans, land, and lower atmosphere.

**Biota**—the animal and plant life of a region.

**Carbon cycle**—the complex array of chemical, physical, and biological processes by which carbon flows through the living and nonliving environment.

**CO₂ fertilization effect**—the enhancement of plant growth as a result of elevated atmospheric CO₂ levels.

**Decomposition**—the decay of dead organic material; decomposition is carried out by microorganisms and other decomposers that break down complex molecules and release nutrients.

**Dissolved inorganic carbon**—inorganic carbon molecules (chiefly carbonate and bicarbonate ions) that are in solution in water; accounts for 95% of ocean carbon.

**Dissolved organic carbon**—organic carbon compounds (e.g., from dead marine plants and animals) that have dissolved in water.

**El Niño–Southern Oscillation**—El Niño is an oceanic event that historically has occurred roughly every three to seven years, when warm surface seawater moves eastward along the equator from the western Pacific toward South America. The Southern Oscillation is a variation in air pressure over the South Pacific between Tahiti and Australia. The two phenomena are closely linked.

**Fallow**—left unseeded after being plowed; uncultivated.

**Feedback**—the return of a portion of the output from any process or system to the system’s input; the return may either add to the initial input (positive feedback) or subtract from it (negative feedback).

**Flow/flux**—the rate at which a variable enters or leaves a reservoir.

**Fluctuations/oscillations**—variations in the value of a variable, usually around the variable’s average value.

**Ice core**—a tube of ice taken from a glacier (e.g., in Greenland or Antarctica), used by scientists to study the properties of samples of trapped air for which the age can be determined.

**Ion**—an atom that carries a positive or negative charge as a result of having lost or gained an electron.

**Isotope**—one of two or more species of atoms of the same chemical element that have the same atomic number and nearly identical chemical behavior, but differ in mass.
Net primary production—the accumulation of organic matter in plants, calculated as the difference between photosynthesis and respiration.

Paleoecology—the branch of ecology concerned with identifying and interpreting the relationships of ancient plants and animals to their environment.

Paleorecord—record of fossil data, including trapped and preserved tree pollen (from animal nests, feces) and growth records (tree rings), air bubbles (ice cores), and marine plants and animals (sea sediments).

Peat—a substance consisting of partially carbonized vegetable material, chiefly mosses, usually found in bogs.

Photosynthesis—the process by which light, carbon dioxide, and water are used by plants to make carbohydrate products, essentially converting light to chemical energy.

Phytoplankton—tiny photosynthetic plants that live in oceans and lakes; phytoplankton form the base of the aquatic food chain.

Renewable resource—a resource that can be replaced as fast as it is exploited.

Respiration—an oxygen-consuming metabolic process used by plants and animals to break down organic substances, yielding energy and releasing carbon dioxide.

Sink—a reservoir that takes up excess of a variable from a system; e.g., the ocean is a sink for excess CO₂.

Source—a reservoir that supplies a variable to a system; e.g., fossil fuels are a source of CO₂ to the actively cycling carbon pool.

Species—a fundamental category in the classification of living organisms; organisms of the same species share common characteristics and appearance.

Subalpine—an ecosystem type usually characterized by spruce and fir trees, this area is immediately below timberline.

Temperate zone—the areas between the Tropic of Cancer and the Arctic Circle and between the Tropic of Capricorn and the Antarctic Circle.

Thermohaline circulation—a “conveyor belt” movement of water in the ocean thought to originate with the sinking of cold water in the North Atlantic and driven by temperature and salinity differences.

Tillage—the turning over of soil in agricultural fields.

Upwelling—the upward movement of water from depths of typically 50–150 m at speeds of approximately 1–3 m per day, resulting from the lateral movement of surface water.

Zooplankton—animal life, often microscopic, that drifts in oceans or lakes.