

Background reading excerpt from *Science for All Americans*

The earth has a variety of climatic patterns, which consist of different conditions of temperature, precipitation, humidity, wind, air pressure, and other atmospheric phenomena. These patterns result from an interplay of many factors. The basic energy source is the heating of land, ocean, and air by solar radiation. Transfer of heat energy at the interfaces of the atmosphere with the land and oceans produces layers at different temperatures in both the air and the oceans. These layers rise or sink or mix, giving rise to winds and ocean currents that carry heat energy between warm and cool regions. The earth's rotation curves the flow of winds and ocean currents, which are further deflected by the shape of the land.

The cycling of water in and out of the atmosphere plays an important part in determining climatic patterns—evaporating from the surface, rising and cooling, condensing into clouds and then into snow or rain, and falling again to the surface, where it collects in rivers, lakes, and porous layers of rock. There are also large areas on the earth's surface covered by thick ice (such as Antarctica), which interacts with the atmosphere and oceans in affecting worldwide variations in climate.

Fresh water is an essential resource for daily life and industrial processes. We obtain our water from rivers and lakes and from water that moves below the earth's surface. This groundwater, which is a major source for many people, takes a long time to accumulate in the quantities now being used. In some places, it is being depleted at a very rapid rate. Moreover, many sources of fresh water cannot be used because they have been polluted. (*Science for All Americans*, pp. 43–44.)