In this lecture, I am going to discuss the role of watersheds, surface and ground water, and the impact of flooding on the water cycle.

Everyone lives in a watershed, though few are aware of the fact. In simple topographic terms, a watershed is an expanse of land area that drains into a particular lake, river, or ocean. A more elaborate definition is offered by 19th century U.S. geographer John Wesley Powell, who described a watershed as "a bounded hydrologic system, within which all living things are inextricably linked by their common water course and where, as humans settled, simple logic demanded that they become part of a community." Watersheds are defined physically by the flow of water on the ground surface, but the function of a watershed is affected not only by the action of water on the surface but also by the absorption of water into the ground, where it is stored for significant periods of time. The presence of this form of water, referred to as "ground water," is the reason why wells can be dug and water retrieved in locations where there is very little water on or near the ground surface.

Surface water is readily recognized, in streams, rivers, and lakes, which are products of water collecting on land surfaces in stable bodies, such as lakes, or flow long distances in stable bodies that we know as rivers. Ground water, which is out of sight, is less often thought about, but is best known for its practical role in concentrating water underground so that it can be tapped by use of wells. Its lesser known but perhaps more important function is to recharge streams and rivers during dry seasons. This is accomplished as water absorbed into the ground during precipitation is gathered and moved slowly underground until it eventually reaches and enters streams, even in dry months. It is the ability of water to pass through the soil, also known as its relative permeability or impermeability, which governs how much of the precipitation that reaches the ground is ultimately absorbed into the soil.

In regions characterized by substantial rainfall, flooding is a natural temporary phenomenon of the land accommodating periods of high precipitation. Floodplains—large expanses of flat land adjoining streams and rivers, are nature's means of spreading the volume and reducing the velocity of stormwater to allow it to be absorbed into the ground over a wide area rather than rushing off to erode soils and stream banks and depositing sediment in stream beds. Reduced permeability resulting from increased paving of land can increase both the frequency and intensity of flooding. In such cases, water that would have otherwise been absorbed into the ground instead accumulates in volume and rushes to low-lying areas to flood them. At the same time, this stormwater is prevented from serving in its capacity of recharging or refilling ground water. This situation creates problems that we shall address in later units.