1. THE WATER CYCLE

All water on Earth participates in the water or hydrologic cycle.

In the Tucson area, most precipitation falls in the mountains as rain and snow, about 1000 mm (40 inches)/year on Mt. Lemmon versus 300 mm (12 inches)/year in downtown Tucson. Most of this water either evaporates immediately or runs off on the surface into rivers or lakes. Water enters the ground (infiltrates) mostly through fractures in the mountains and through coarse sediments underneath the stream beds. Ground water, like surface water, flows basically from high to low elevation. However, because ground water flows a lot slower than surface water, ground water in the Tucson Basin can be up to several thousand years old, and may have formed under different climate conditions.

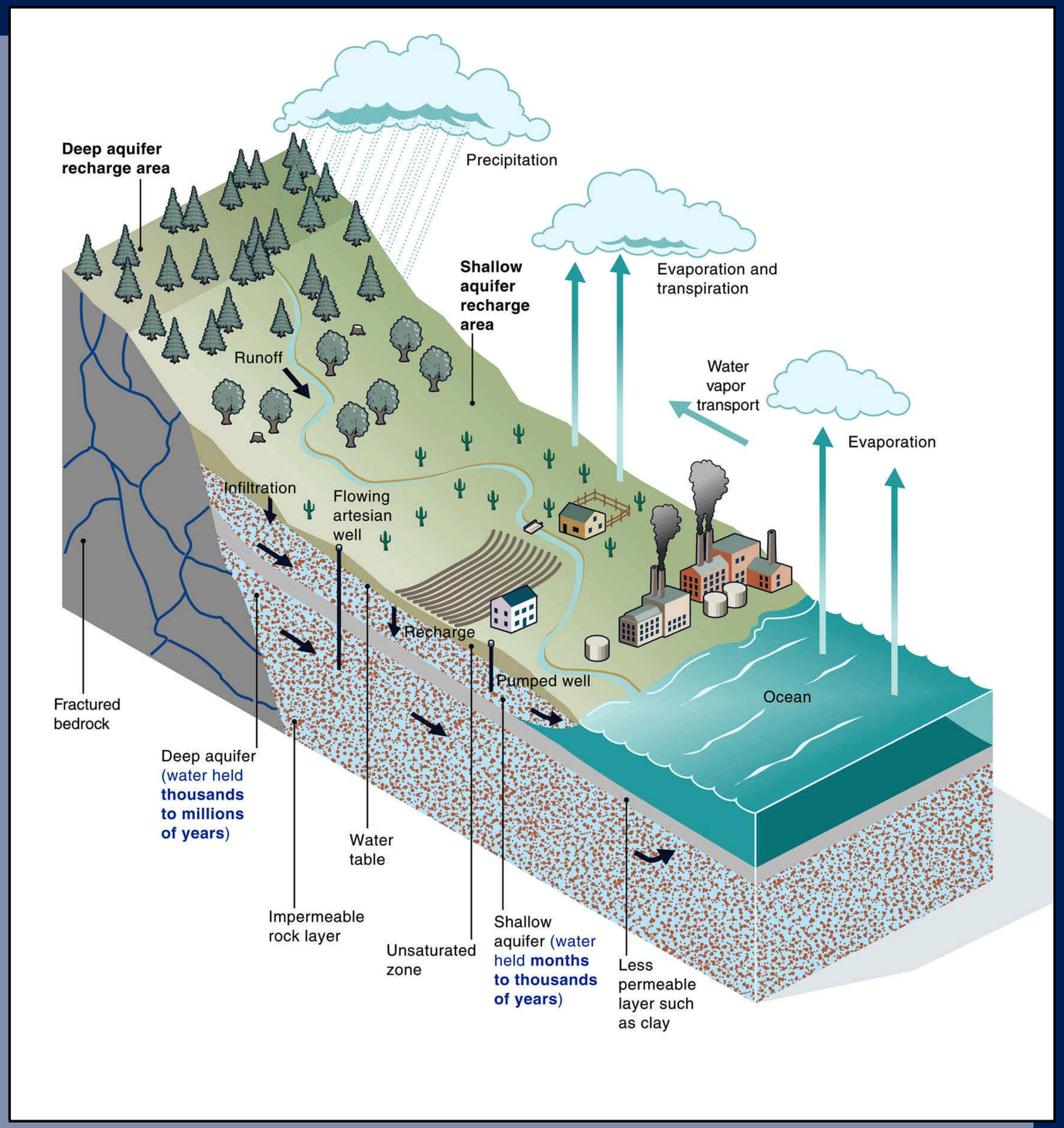

Figure 1. Global Water Cycle. *Water evaporating over the oceans is transported by wind, condenses to form clouds, and falls to Earth as rain or snow. Most of it immediately returns to the atmosphere by evaporation or transpiration (loss of water from plants). Part of it runs off on the surface and forms lakes and rivers. The remainder soaks into the ground, some of which recharges aquifers (permeable geological formations that produce water) and becomes ground water. Surface water and ground water eventually flow into the ocean or evaporate/transpire back into the atmosphere to complete the water cycle.*

Source: M. Stute, Lamont-Doherty Earth Observatory, 2002

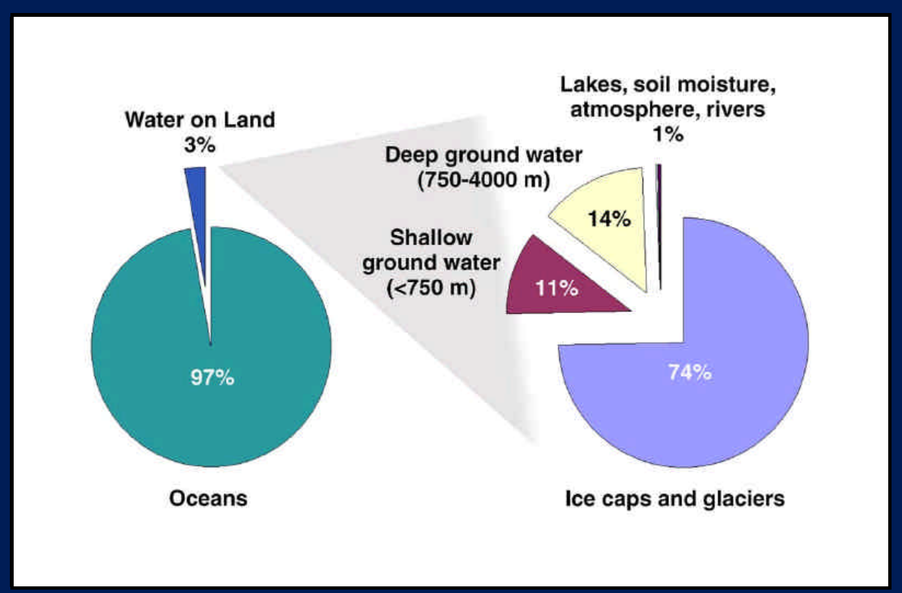

Figure 2. Global Water Budget. *Only very little of the Earth's water is available for our use. More than 97% of the water on our planet is in the oceans and too salty for consumption. Less than 1% of all water on Earth is available to support life on land.*

Source: after Berner and Berner, 1987

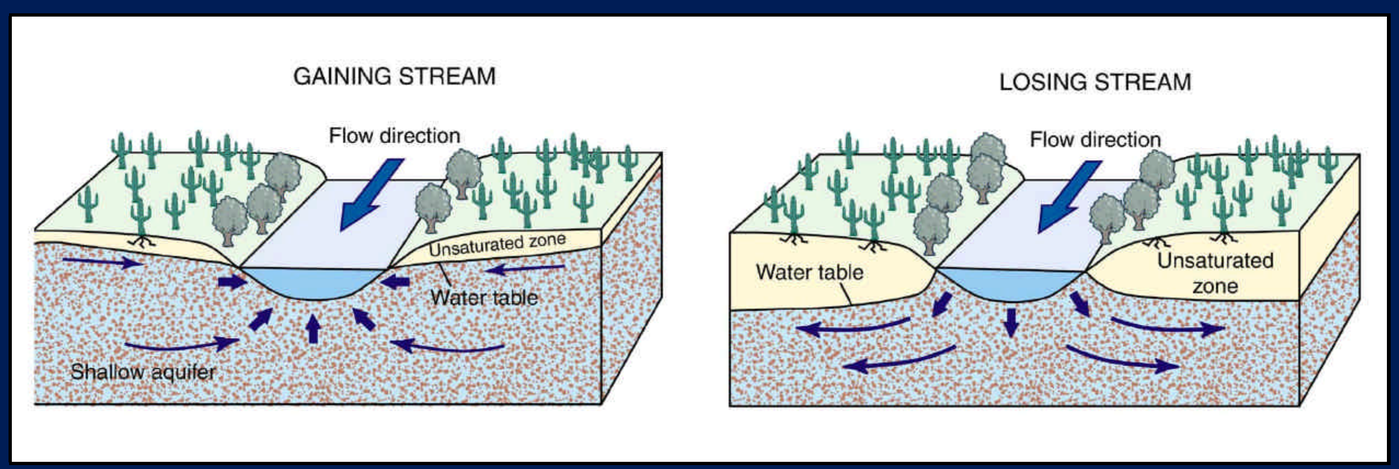

Figure 3. Gaining and Losing Streams. *Surface and ground water are often connected, and water can flow in either direction depending on the elevation of the stream or lake relative to the water table in the aquifer. Lowering of the water table by over-pumping or drought may result in stream beds drying up, causing the subsequent death of vegetation and animals. Artificial recharge through stream channels can raise ground water levels. The water table is the level to which water rises in a shallow well in the uppermost aquifer.*

Source: after Winter et al., USGS Circular 1139, 1998