

## THE WATER CYCLE

Hydrology—distribution, origin, properties of water on the globe. The following 9 processes make up the key components of the water cycle. These different processes occur on both small- and global-scales. These processes also occur at vastly different rates, some occur very rapidly, some occur very slowly.

1. Evaporation—changing from liquid to gas. Evaporated moisture is lifted into atmosphere as water vapor. Takes heat.
2. Condensation—Water vapor changing to liquid. Vapor condenses onto small airborne particles (e.g., sea salts, sulfurous/nitrous acids). Releases heat.
3. Precipitation--water particles fall from atmosphere to the ground. Can be solid (e.g., snow) or liquid (e.g., rain).
4. Interception—interrupting the movement of water as it moves to a stream. Examples of interception include snow falling on tree leaves or depression storage in puddles.
5. Infiltration—Movement of water from atmosphere into soil. Depends on soil type.
6. Percolation—Movement of water through soil, driven mostly by gravity, but also by capillary forces. Flow of water through soil is also driven by geologic formations such as impermeable layers.
7. Transpiration—Water movement from inside plants to atmosphere in the form of water vapor. Plants lose most water during the day through stomata openings.
8. Runoff—Flow that appears in surface streams. This water could be from precipitation that directly falls on the stream, surface runoff that flowed over the land, or from subsurface sources. Runoff is what is left over (not used by people).
9. Storage—Water can be stored in 1. Atmosphere, 2. Surface of earth (e.g., lakes), 3. In ground.

## WATER IN THE BIOSPHERE

- There is very little accessible fresh water in the biosphere

|                     | Volume<br>(km <sup>3</sup> * 1000) | Percent of<br>Total | Percent of available<br>freshwater | Renewal time<br>(years) |
|---------------------|------------------------------------|---------------------|------------------------------------|-------------------------|
| Oceans              | 1,370,000                          | 97.61               | 0                                  | 3100                    |
| Polar ice, glaciers | 29,000                             | 2.08                | 0                                  | 16,000                  |
| Groundwater         | 4000                               | 0.29                | <b>95.4</b>                        | 300                     |
| Freshwater lakes    | 125                                | 0.009               | <b>3.0</b>                         | 1-100                   |
| Saline lakes        | 104                                | 0.008               | 0                                  | 10-1000                 |
| Soils               | 67                                 | 0.005               | <b>1.6</b>                         | 280 days                |
| Rivers              | 1.2                                | 0.00009             | <b>0.03</b>                        | 12-20 days              |
| Atmosphere          | 14                                 | 0.0009              | 0                                  | 9 days                  |

Table modified from Wetzel (2001)