The hydrological cycle

The hydrological cycle of the earth is the sum total of all processes in which water moves from the land and ocean surface to the atmosphere and back in form of precipitation. The hydrological cycle is dependent on various factors and is equally affected by oceans and land surfaces. In the case of the land surface, vegetation plays a vital role in the maintenance of the hydrologic budget (Pielke and Niyogi, 2009). The presence of vegetation increases the capacity of the land surface to retain moisture. Precipitation is then intercepted by plants and directly evaporated when captured by the canopy. The plants themselves transpire and aid in the creation of a major amount of water vapor through evapotranspiration processes. The surface runoff, in the case of bare ground, is much greater than in vegetated lands. As plants dominate the processes of energy, water vapor, and carbon exchange, their presence is critical to the functioning of the hydrological cycle.

The hydrologic cycle begins with the evaporation of water from the surface of the ocean. As moist air is lifted, it cools and water vapor condenses to form clouds. Moisture is transported around the globe until it returns to the surface as precipitation. Once the water reaches the ground, one of two processes may occur; 1) some of the water may evaporate back into the atmosphere or 2) the water may penetrate the surface and become groundwater. Groundwater either seeps its way to into the oceans, rivers, and streams, or is released back into the atmosphere through transpiration. The balance of water that remains on the earth's surface is runoff, which empties into lakes, rivers and streams and is carried back to the oceans, where the cycle begins again.

The hydrological cycle describes the movement of water within a ecosystem, for example a watershed. As this movement refers to the circulation of water between the individual reservoirs of the watershed it is termed local water cycle. If the global hydrological system is viewed it is termed global water cycle. During the circulation water changes its aggregate state.

The cycle starts when water falls as precipitation (rain, snow, etc.); to some extent it is intercepted by the vegetation; precipitation which reaches the land surface evaporates partially; together with the amount of water which is transpired by the plants, part of the fallen precipitation returns to the atmosphere (this process is termed evapotranspiration); the other part of the precipitation may partially infiltrate into the soil (subsurface water); if the subsoil layer is saturated by water or if pipes exists, the infiltrated water runs as interflow downward inside the soil;

some amount of water percolates deeper into the bedrock and enters the groundwater reservoir. The top of this zone is termed the water table. Water which is stored as groundwater in pores and fissures runs with long delay as base flow to the receiving water;

the precipitation that reaches the soil surface and was not absorbed by the soil may be stored temporary in puddles on the surface if the upper soil is impermeable or saturated with water. It becomes unchannelled overland flow which runs directly from the slope to the Gina river (receiving water body) if rainfall continues

Why is the hydrologic cycle important

The hydrologic cycle is important because it is how water reaches plants, animals and us! Besides providing people, animals and plants with water, it also moves things like nutrients, pathogens and sediment in and out of aquatic ecosystems.

It plays an overarching role in the cycling of solar energy, sediments, and chemical elements vital for the sustenance of life. Although it is clear that contemporary ecosystems reflect an evolutionary adaptation to the delicate linkages that exist among the various components of the hydrological cycle, it is also apparent that evolving life must have influenced the evolution of the hydrological cycle over geological time. Life, it appears, is simultaneously a product of the hydrological cycle and its cause.

Ways in which the hydrologic cycle is affected

One of the ways that water moves through the cycle is through its ability to permeate, or soak, into the soil. There are four key areas that impact that part of the cycle:

1.changes in the ability of soil to soak up water through increases of impervious surfaces, like roads and buildings, and removal of forest cover;

2. water withdrawals or impoundments (such as through wells or dams)

3. filling depressional wetlands;

4. altering stream flows and beds.

 