

The Process of the Water Cycle Research Paper

Introduction

Nature comprises many processes that recycle various elements to avoid human wastage. Nature does not waste any of its elements and recycles them all including water, air and organic fertility. Recycling of natural elements occurs in order to maintain ecological balance for survival of all living species.

However, human beings have meddled with nature so much that problems such as depletion of ozone layer and global warming are inflicting the human race adversely (Kalman and Sjonger 11). An example of a process in which nature recycles one of its constituent elements is the water cycle. By definition, the water cycle is a continuous movement of water between the earth surface and the atmosphere (Kalman and Sjonger 11).

The water moves from water bodies such as oceans and rivers into the atmosphere and vice versa. It involves several states of matter including solid, gas and liquid in which water changes its form in an unending cycle of precipitation (Kalman and Sjonger 2). The cycle involves several steps that include evaporation, precipitation, run-off and percolation. Each of these steps plays a role in continuing the water cycle.

Water cycle process

The water cycle is important in maintaining the right amount of water in nature. In addition, it facilitates the storage of underground water that is used when there is no precipitation (Olien 8). There are several steps involved in the water cycle.

They include evaporation, condensation, precipitation, infiltration, sub-surface flow and run-off (Olien 8). In all these steps, water is converted into different states of matter including liquid, gas and solid. Heat exchange is one of the

processes that are involved in all the steps. In each of these steps, heat is either lost or gained.

Evaporation

This is the process by which water changes from liquid form to gaseous form (Olien 9). It is the primary process that drives the movement of water from water bodies into the atmosphere in form of water vapor. The main water bodies include oceans, sea, lakes, rivers, dams, streams and ponds.

They provide approximately 90% of the vapor in the atmosphere. The other 10% comes from plants through the process of transpiration (Olien 9). Evaporation takes place when heat from solar energy heats up water in water bodies and causes it to change from liquid to gas. On the other hand, evapotranspiration is the process of water release from the surface of plants and soil due to evaporation (Olien 10).

Transpiration contributes a very low percentage of water vapor in the water cycle. Evaporation is the main process that drives the water cycle. Afterwards, the water vapor rises to the atmosphere and the next step of condensation begins. Research has established that after water molecules rise into the atmosphere, they spend approximately 10 days before being released as precipitation.

Condensation

This is the process by which water vapor changes from vapor into liquid, and is the reverse process of evaporation (Olien 11). Condensation plays a significant part in the water cycle because it results in the formation of clouds. After clouds are formed, they possess the ability to produce precipitation.

Precipitation is the main route through which water returns to the earth surface after the process of evaporation (Olien 11). In times when clouds are not visible, water is still present but in the form of vapor and small water droplets.

Clouds are formed from the combination of these water droplets with atmospheric elements such as dust, smoke and salt. They form tiny cloud droplets that enlarge into clouds as more droplets combine with atmospheric elements. Cloud droplets have different sizes that range from 10 microns to 5 millimeter (Olien 12).

This process takes place in the higher parts of the atmosphere because the weather conditions found there encourage condensation. This is because temperatures are cooler than the lower parts of the atmosphere. As water droplets coalesce, clouds and precipitation may form at the same time. Precipitation refers to clouds in either liquid or solid form falling to the surface of the earth from the clouds (Olien 13).

Precipitation

Precipitation refers to the process by which water is discharged from the atmosphere in a liquid or solid form into the surface of the earth, be it land or water surface (Kalman and Sjonger 16). Precipitation is released from the atmosphere in many forms that include snow, hail, freezing rain, sleet or rain.

It is the main channel that returns water into the surface of the earth. In most cases, precipitation is released as rain. Some precipitation is released from the atmosphere in form of snow, which accumulates in certain places on the ground to form glaciers and icecaps. When temperatures rise during spring, they melt and the water flows back into water bodies.

These structures store water for long periods. Clouds comprise water vapor, which accumulates over a long period to form precipitation (Kalman and Sjonger 16). Precipitation happens when these droplets gain a fall velocity that is greater than the cloud updraft speed. This takes a long time because a single raindrop is made by a combination of millions of tiny cloud droplets.

Surface run-off

This is the runoff of precipitation on the surface of the earth (Kalman and Sjonger 18). When rain hits an impervious surface on the ground, it flows over the surface. This water then flows back into water bodies and evaporates to continue the cycle. It flows into lakes, rivers and streams, from which it flows into the oceans.

Approximately, a complete water cycle takes 9 days. During runoff, water may infiltrate the ground, evaporate or flow back into water bodies. Only about 30% of precipitation that falls from the atmosphere flows back into the oceans. The other 70% evaporates, infiltrates the ground or is transpired (Olien 20). Human beings can also divert surface runoff to desired places for use in agriculture.

Infiltration

This refers to the process of water movement from the earth surface into the ground. A small portion of infiltrated water is held by the shallow soil layer from which it flows horizontally and vertically through the soil layer into the atmosphere (Olien 21). Some water seeps through the ground surface and flows into streams while the rest infiltrates further into the ground and replenishes the ground-water aquifers.

If these aquifers are porous, then people can drill water holes into the aquifers to draw water for domestic and agricultural uses (Kalman and Sjonger 23). Water that infiltrates into the ground stays there for some time before seeping into streams or moving vertically to the surface from where it evaporates.

Ground water storage and discharge

Some water infiltrates into the deep regions of the earth surface and is stored there for long periods. Despite being trapped in the depths of the earth, the water moves slowly since it is part of the water cycle. Ground water is stored in structures known as aquifers. To participate effectively in the water cycle, ground water seeps through the ground and enters the main water bodies by horizontal movement.

The structure of aquifers and confining soil and rock layers are the main factors that determine the speed of groundwater movement. In addition, the movement of the water depends on the permeability and porosity of the soil constituents that hold the water. Because of gravity, groundwater moves further downwards into the ground surface and may never move back to the water cycle. It remains trapped in the ground for thousands of years.