

Transpiration

Transpiration is the process of water movement from the surface of plants to the atmosphere. Transpiration meaning can be easily understood as escaping water molecules from the surface or leaves of plants to the atmosphere due to a rise in the surrounding temperature. Questions like “Define transpiration” and “What is transpiration” can be easily answered by understanding transpiration's meaning.

In civil engineering, transpiration will be studied in hydrology in terms of different losses that occur due to [precipitation](#). Effective rainfall or runoff in a particular catchment basin is calculated by subtracting these losses from the total amount of precipitation that occurred in the catchment. So, an idea about the overall losses is necessary hence understanding the transpiration is essential for all these analyses.

Transpiration in Plants

As transpiration meaning says that, it is a type of water loss occurred on the surface or leaves of plants. So, by default, the phenomena of transpiration are related to the plants. It is the process of movement of water from the plants into the atmosphere. Due to the transpiration process, plants get cooled in the hot weather, and freshwater reaches the leaves through the stem from the roots of plants.

Transpiration loss through the plants occurs in any of the seasons, but it will be more in the rainy season because more water reaches the plant leaves, and as it gets the loss, freshwater reaches the leaves due to the presence of more water in the root zone depth. The transpiration in plants also will be more in a humid atmosphere or in a hot atmosphere; because in these atmospheres, more water gets evaporated(known as [evaporation](#)).

Purpose of Transpiration

As we know, transpiration is the movement of water molecules from plants into the atmosphere, and it is a natural phenomenon of plants that depends on many parameters, like surrounding temperature, humidity, etc. The purpose of transpiration can be understood in the following ways:

- With the help of the transpiration process, absorbed minerals by the roots are transferred to all parts of the plants.
- The water requirement for photosynthesis is provided due to the transpiration process.
- It will help cool the plants' internal structures when it is supposed to the heavy sunlight.
- With the help of this process, the turgidity of the plants can be maintained.

Factors Affecting Transpiration

We know that transpiration is escaping water molecules from the plant leaves to the atmosphere. And this phenomenon occurs naturally, but it depends on several factors. Changing the depending factors leads to a change in the rate of transpiration. These factors can be categorized into environmental factors, natural factors, etc. Here a few environmental factors on which the rate of transpiration depends are listed below:

- The humidity of the atmosphere
- The temperature of the surrounding atmosphere
- The pressure of the atmosphere
- Presence of sunlight
- The velocity of wind in the surrounding atmosphere

Measurement of Transpiration

In hydrology, estimating different losses that occurred due to the precipitation is very important to calculate the runoff in the catchment. Runoff is the quantity of water reaching a particular catchment's outlet. It depends on several factors, like, the infiltration index of the soil, rainfall intensity, duration of the rainfall, etc.

Transpiration is also one of the types of loss occurred due to precipitation, so estimating the quantity of transpiration is essential to calculate the runoff in the catchment. Transpiration is generally measured in terms of the rate of transpiration, which can be calculated by measuring the distance traveled by an air bubble in the capillary tube during a specific time interval. The faster movement of the water bubble indicates a higher rate of transpiration.

What is Evapotranspiration?

While transpiration occurs, the land in which plants stand also loses moisture through the evaporation of water from soil and water bodies. In hydrology and irrigation practice, it is found that evaporation and transpiration processes can be considered advantageously under one head as [evapotranspiration](#).

The real evapotranspiration occurring in a specific situation is called actual evapotranspiration (AET). Penman's equation is based on sound theoretical reasoning and is obtained by combining the energy balance and mass transfer approach.

$$PET = (AH_n + E_a\gamma)/(A + \gamma)$$

Types of Losses Due to Transpiration

Due to precipitation in a catchment, various losses occur depending on the catchment characteristics. These losses include infiltration loss, evaporation loss, transpiration loss, interception loss, etc. these losses occur in different forms, and the quantity of total

loss is subtracted from the rainfall amount to calculate the runoff in the catchment. These losses are explained below.

Interception loss occurs due to the loss of water stuck between the plant leaves, which will then evaporate. Infiltration loss is the percolation capacity of the ground soil; it is the loss of water that percolates through the soil and reaches the groundwater table. Evaporation is the loss of water from the water bodies. It occurs due to the vapourization of the water molecules from the surface of the water body due to a rise in the surrounding temperature.

