

## **Assignment # 01**

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**Question # 1.**

What is “Hydrological Cycle”? Now-a-days there is general discussion that Hydrological Cycle has been disturbed. Is this a myth or reality? Briefly explain.

**Answer # 1**

The earth water circulatory system is known as Hydrologic Cycle. Total water supply of earth is in constant circulation from earth to atmosphere, and back to earth.

Water cycle or hydrological cycle of the earth is the sum of all processes in which water moves from the land and ocean surface to the atmosphere and back in the form of precipitation.

**Hydrological cycle includes the following processes:**

- Evaporation
- Condensation
- Precipitation
- Interception
- Infiltration
- Percolation
- Transpiration
- Runoff and storage

It is true that hydrological cycle of the world has been disturbed .it is mainly due to human activities . The followings are the reasons of disturbance of hydrological cycle.

**Paved surfaces:**

It is also became a huge factors now adays that mostly the surfaces of earth is getting paved by concrete or asphalt. Due to this the overflow through surface increased and less absorption inside the earth surface which cause the high flow of rivers lakes etc.

**Geology:**

Due to the rapid increase of urbanization the cities are being expanded to hilly areas. For this purpose the hilly areas are being excavated which makes surfaces of rock exposed .Permeable rocks allow for groundwater storage, percolation, base flow, through flow and infiltration

**Global warming:**

It is now a days the most crucial issue of the world because it is almost effecting every department of human life. But most the effect of this is on hydrological cycle. Due to the global warming the evaporation of water from surface of the earth has been increased which cause heavy precipitation.

**Vegetation**

Dense foliage increases interception to the precipitation to get into the soil surface which makes the hydrological cycle unbalanced. Roots suck up water which hardly reaches to the soil surface Reduce of overland flow causes fall in the flow in nearby streams .

**Irrigation:**

Modern ways of irrigation are also causing disturbance oh hydrological cycle.

**Dam building:**

Increases water storage and reduces river levels  
Increases evaporation which may affect local rainfall patterns

**Deforestation**

Can lead to extreme river flows due to increase in overland flow and a lack of interception.

**Question # 2.**

Briefly describe “Ground water Sustainability”? How can “Rainwater Harvesting” be linked to ground water sustainability?

**Answer:**

Groundwater sustainability is the development and use of groundwater resources to meet current and future beneficial uses without causing unacceptable environmental or socioeconomic consequences.

Ground water is hidden, the resource is often forgotten or misunderstood. Groundwater is, in fact, vital to public health, the environment, and the economy. Groundwater supply sustainable yield can be defined as how much water can be withdrawn from an aquifer system, where and for how long, with acceptable physical, economical, environmental, social, cultural, institutional, and legal consequence. A sustainable supply of clean drinking water is crucial for worlds future. Studies were initiated to begin to answer the question of acceptable physical (hydraulic) and environmental limits to sustainability. While much has been accomplished, additional research needs to be conducted to protect this vital resource for future generations.

**Linking of rain water harvesting to ground water sustainability:**

Demand on water resources is increasing day-by-day due to the population growth and expansion in urbanization, industrialization and irrigated agriculture. Adopting the concept of sustainability and conservation of ground water resources can help to cope up with the global water shortage. Rainwater harvesting system is one of the concepts that can be implemented to meet the water shortage problem.

Rainwater quality always exceeds the surface water and comparable to groundwater. Successful implementation of rainwater harvesting system is a great contribution for future rainwater harvesting development and living quality. In developed countries the governments are building civil structure to harvest the rainwater for their domestic needs for agriculture .industrial etc. But in countries under financial crisis can't afford this much expenses so they use their groundwater for this purpose. Because of this the ground water table is declining because of imbalance of supply and demand. The ground water sustainability depends only on rainwater harvesting. In a country like Pakistan a lot of water is wasted due to poor management . Country is largely depends upon the ground water to meet its agricultural needs which causes shortage of ground water and fall of GWT.

**Question # 3.**

What “Quality Parameters” should be considered in designing water supply system for a community?

**Answer:**

A wide range of water quality parameters are considered while designing water supply system for a community are given below.

- PH
- Alkalinity
- Salinity
- Turbidity
- Nutrients (total nitrogen and total phosphorus)
- Chlorophyll
- Metals (aluminum and iron).