



Name: Engr. Asghar Badshah

Class ID: 14357

Paper: Water Demand Supply & Distribution (CE-562)

MS: CE & Manag.

Submitted To: Engr. Nadeem Ullah Sb

Dated: 19/04/20

**Q No. 1: What is “Hydrological cycle”? Now a days, there is general discussion that hydrological cycle has been disturb. Is this a myth or reality? Briefly explain.**

**Ans: Hydrological Cycle:**

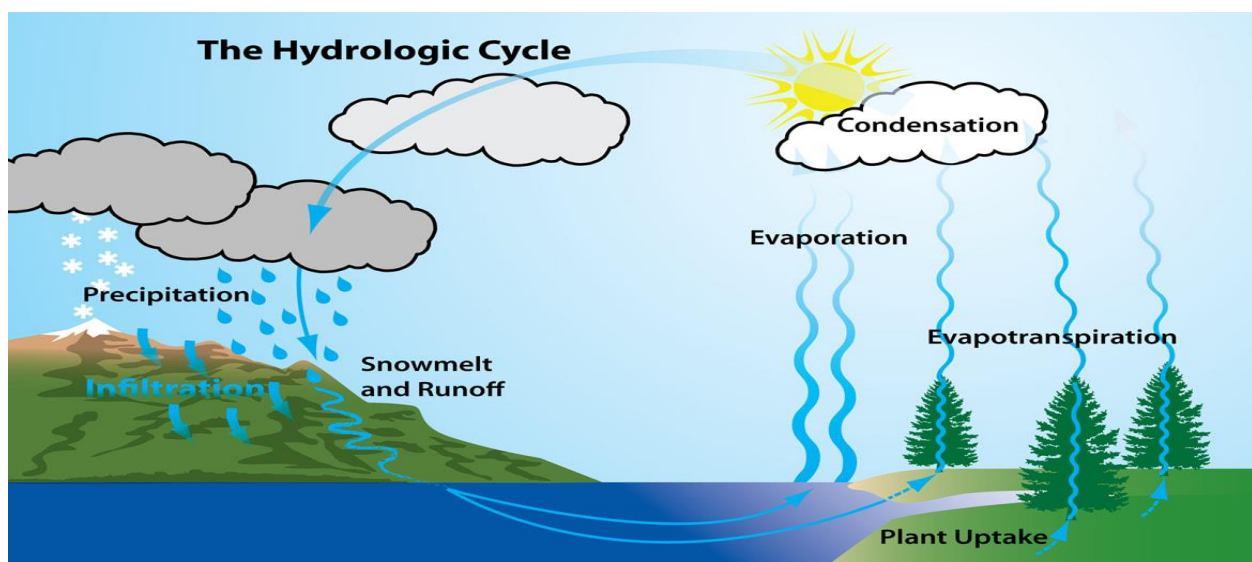
“ The sequence of conditions through which water passes from vapor in the atmosphere through precipitation upon land or water surfaces and ultimately back into the atmosphere as a result of evaporation and transpiration. — called also known as **hydrological cycle.**”

(Or)

**Hydrological cycle** is also known as **Water cycle**. In **Hydrological cycle**, containing various processes, water moves from the earth, plants and ocean surface to the atmosphere and back in the form of precipitation. Total quantity of water within the cycle remains essentially constant but still proportions of water in various forms like drinking waters, saline water etc. get changed due to changes in water cycle as the result of the various activities of the human in his daily life.”

**Hydrological Cycle Components, Process & General Discussion:**

Based on Hydrological Cycle it contain components briefly before going to General Discussions and it is explain as below:



(Source: Notesychs-Weebly, Hydrological Cycle)

**Process of Hydrological Cycle:** It includes the following:



1. **Evaporation:**

In this process the water moves from liquid state into the gaseous state as atmospheric water vapor.



(Evaporation)

2. **Condensation:**

In this process atmospheric water vapor changes into water due to cooling of air.



(Condensation)

3. **Precipitation:**

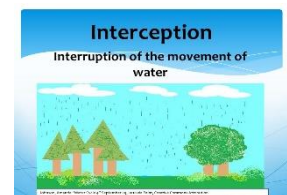
When water falls from atmosphere in the form of rain, snow, hail and sleet to the ground and water bodies.



(Precipitation)

4. **Interception:**

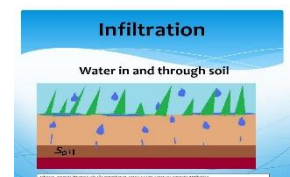
In this process some part of rain does not reach the streams but instead intercepted by the leaves, branches of plants, other greenery on the land etc.



(Interception)

5. **Infiltration:**

This process involves movement of water through the boundary area where atmosphere interfaces with the soil. Infiltrated water and water stored in the soil, can become subsurface runoff.



(Infiltration)

6. **Transpiration:**

In this process the leaves of plants lose water in the atmosphere.



(Transpiration)

7. **Runoff:**

It is a flow from a drainage basin/catchment area in surface streams, unaffected by artificial diversions or storages.



(Run Off)

8. **Storage:**

- a. It may be in atmosphere
- b. On earth surface
- c. In the ground







beneficial uses without causing unwanted environmental or socio economic consequences.’’

- Ground water is a valuable sustainable source of drinking water gifted by the nature to the humans.
- It should be used with maximum care so that the resource can sustain for appreciable amount of time.
- This is the water that seeps through the soil and gets accumulated above the non-porous rocks deep underground.
- The reserves of the ground water are called aquifers and may be used for various purposes like drinking, industrial use, irrigation purposes etc. Changes in ground water availability and quality badly affect human health, lively hoods, food security and economic development.
- . If humans fail to manage this precious asset it'll bring long lasting effects on the human life. Good management of ground water control is pumping to sustainable levels, control of unwanted discharge to ground water and in some areas the aquifers be recharged periodically.
- When large amounts of ground water are withdrawn from the aquifer local water table gets depressed, which in turn reduces the amount of ground water available to discharge to streams, wet lands and estuaries. If the withdrawal is continued beyond some level the ground in the area may also get subsided.

### **How Rain Harvesting be linked to Ground Water Sustainability:**

It can be linked by the following observation and research methodologies over the period which can be explained as below:



- Previously we came to know about the **Ground Water**, importance, **Sustainability**, and goals.
- There are different ways we can protect **Ground Water** from being used to save underground water for future generation.
- For this purpose we can use other sources of water beside the ground water.
- These sources may be **surface water** sources from lakes, streams, or from rain by mean of **Rain Water Harvesting Techniques**.



- **Rain Water Harvesting** conserve and augment the storage of ground water, reduces, water table depletion, improves the **Ground Water Quality** thus leading to **ground water sustainability**.



XX

**Q.3: What “Quality Parameters” should be considered in designing Water Supply System for a community?**

Ans: The Quality Parameters that Civil Engineer must consider consists of three primary factors:

1. Water Quantity
2. Water Reliability
3. Water Quality

**Water Quantity:**

- The sources of water should have enough quantity to serve all the needs of the community however the quality of water should be ensured at minimum cost.
- For this purpose various types of sources may be selected like ground water, surface water with appropriate disinfection wherever required.

**Water Reliability:**

- Such a source be selected which is more reliable.
- A reliable source is the one that will supply the required amount of water for as long as needed.
- For this purpose Hydrological and Geological data may be collected and properly analyzed before selection of the source.

**Water Quality:**

- While designing any scheme for future population this is the most important aspect which is to be discussed in detail.
- Water supply are generally exposed to some kind of population therefore before use it should be tested to determine the existence of any impurity that could cause a disease, Odor, taste, color etc.
- In water treatment the water is passed through various purposes like filtration, sedimentation, and disinfection.
- Developing a water source includes all work that increases the Quantity and Quality of water.



- For developing a source a Dam or Barrage may be constructed or even wells can be dug or surface water may be selected.
- The Quality of water we have to detect the presence of organisms, unwanted minerals and organic compounds in the water.

The Basic Requirements of to ensure the **Quality of Water** the following parameters are taken in account.

1. Physical
2. Chemical
3. Biological
4. Radiological

### **Physical Parameters:**

Characteristics of water that can be determined by the senses of touch, sight, smell, and taste are called physical parameters. Physical indicators are as follows:

- a) Water Temperature
- b) Total dissolved solids
- c) Total suspended solids
- d) Turbidity
- e) Electrical Conductance
- f) Odor

### **Chemical Parameters:**

The chemical parameters of water include:

- a) PH
- b) Biological Oxygen Demand (BOD)
- c) Dissolved Oxygen
- d) Total Hardness
- e) Heavy Metals
- f) Nitrates
- g) Ortho Phosphates
- h) Pesticides

### **Biological Parameters:**

Drinking water should not contain any microorganism known as pathogenic capable of causing disease or any bacteria indicative faecal pollution. The presence of living organisms in water are the basis of biological/bacteriological parameters which are as follows:



- a) Bacteria
- b) Algae
- c) Viruses
- d) Protozoa

**Guidelines Values for Bacteriological Quality:**

All Water intended for drinking	
E. Coli or thermotolerant coliform bacteria	Must not be detectable in any 100-ml Sample
Treated Water entering the distribution system	
E. Coli or thermotolerant coliform bacteria	Must not be detectable in any 100-ml Sample
Total coliform bacteria	Must not be detectable in any 100-ml Sample
Treated water in the distribution system	
E. Coli or thermotolerant coliform bacteria	Must not be detectable in any 100-ml Sample
Total coliform bacteria	In the case of large supplies, where sufficient samples are examined, must not be present in 95%of samples taken throughout any 12 month period

**Radiological Parameters:**

- Water from nuclear plants, industries, or medical research, using radioactive chemicals and mining of uranium ores or other radioactive materials or potential sources of water contamination.

**Conclusion for Design a Water Supply Scheme:**

Keeping in all above facts and information while designing a **Water Supply** Scheme for a community the following points and parameters should be kept in mind and strictly be adopted:

- The Water should be free from Pathogenic Organisms causing various diseases.
- Water should be fairly clear (Low Turbidity, Little Color)
- The water should contain no compound that cause a long term effect on human health.

