

SUBJECT: WATER DEMOND SUPPLY AND DISTRIBUTION

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DEPT = MS WATER RESOURCES ENJJ

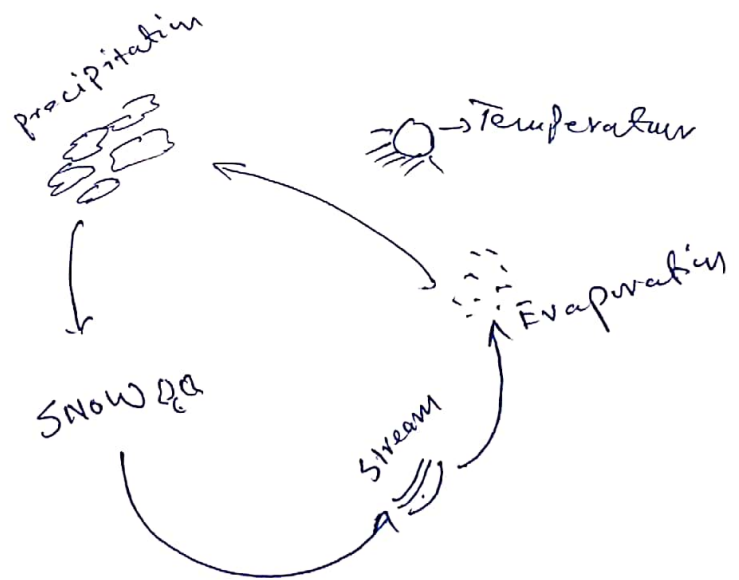
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## Hydrologic cycles

It is a sum of all process in which water evaporate/move from land and ocean surface to the atmosphere and back in the form of precipitation. Basically water cycle deals with the origin and distribution of water on globe.

Hydrological cycle includes the following process.

- (1) Evaporation
- (2) Condensation
- (3) precipitation
- (4) Interception
- (5) Infiltration
- (6) Transpiration
- (7) Runoff
- (8) storage



Now-a-days there is a great discussion that hydrological cycle has been disturbed is this a myth

⇒ Now-a-days ~~there is general~~ Hydrological cycle has been disturbed by population growth, industrialization, urbanization, land use changes and improved standards of living. In many countries resources are already fully committed and water will become a scarce commodity, all these above items disturb Hydrological cycle

(1) Population Growth

due to population growth portable water withdrawal from well drinking and other usage and for industries usage which effect Hydrological cycle  
Because of population growth more water use as compare to water penetration into ground and other sources

(2) Industries

Industries produce  $CO_2$  which go into Air and warm Atmosphere more rapidly, where in hydrological cycle warm Air come from ocean

to land side and after rising it cool and vapour convert to Rain or snow and then come to land or sea surface but due to  $\text{CO}_2$  Atmosphere warm and whole process Disturb. According to environmental scientist, due to lock down all industries are closed and environment change.

### ③) Agriculture

Most part of the water used for Agriculture usage therefore it is more vulnerable to water shortage because higher priority given to portable water.

### ④) Land-use-change

Due to population growth land use for Houses, Industries, Roads, markets, stores etc. Where water don't able to penetrate in soil because of Baehmann or Concrete pavements Concrete sheet (Building floors and roofs) on ground which is used for above structure and Hydrological cycle Disturb



(5) Improved standards of living

Due to improved standards of living every new day people change vehicles, clothes, shoes and other life related items all these things related to industries which are directly related to hydrological cycle.

Summary

From the above discussion we conclude that main responsible for hydrological cycle is human now-a-days as all industries closed the ratio  $CO_2$  decrease and atmosphere come down and due to this change hydrological cycle again start to come to normal but due to population growth and concrete sheet it is impossible to recover into normal state.

## GROUND WATER SUSTAINABILITY ==

Ground water sustainability is the Development and use of ground water Resources To meet current and future Beneficial uses without Causing Unacceptable Environmental or socioeconomic consequences.

Ground water is the primary source of fresh water in streams, lakes and wet lands and maintains the pickled Balance of Inlets. When large amount of ground water are withdrawn from the aquifer system the water table is locally depressed, which inturn Reduces the amount of ground water available to discharge to streams, wetlands and estuaries. large scales sewerage particales have also Reduced ground water levels and discharge To surface Receiving water.

Factors affecting groundwater supplies and use  
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→ Methods that promote the wise use of groundwater supplies

→ Need to determine strategies that promote groundwater sustainability.

→ Need for cooperative efforts to fill data gaps and underpinnings Research.

→ Need for increased collaborative educational efforts.

It is important that we understand the factors that contribute to local regional and state wide groundwater shortages the strategies that can be implemented to promote a sustainable groundwater supply and what resources or tools are needed to implement these strategies successfully. In many parts of the country, surface water supply

are inadequate or unavailable and groundwater is the only practical source of water supply. Groundwater feeds streams and Rivers, especially during period of drought or low flow. Approximately 40% of Agricultural irrigation water is groundwater. But the water shortages of recent drought years coupled with the increasing cases of surface and groundwater contamination warn us that we stand at a critical juncture regarding the availability of adequate water supplies. No state met its groundwater data collection.

Manmade Activities play a key Role for Depletion of natural composition of ground water through the disposal or dissemination of toxic chemicals and microbial matter at the land surface and into soils or through waste water. In Pakistan most of the population is dependent on groundwater as the only source of much clean drinking water supply than



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The flow of Rainwater from Roof gutters to a Rainwater storage tank. By doing this water can be collected and use for various uses. In this way these store water use instead water drain out from well. When there is too much Rain we can collect all the water at Roof via piping system It can be transferred to underground water after filtering so that it can be Reused for house hold purpose.

Also we can send the rainwater flowing on the streets to underground water after proper filter system. so that it could be used in dry season. In few places the underground water level goes down so much, extent that wells, tubewells are dry in these places. Due to water withdrawal from well in this way Rain water that loose can be use very properly and water which produce flood and drain after flooding these water drop into River and

River drop into sea which lose in this above  
Technique Underground water Remain safe and  
Its level Remain stable for long time.

There should be a provision of sending  
Rain to go Underground to increase Under  
ground water level so that It brings water  
levels of wells and tubewells back to normal.  
There are many ways to send Rainwater  
to Underground to increase the Underground  
water level.

Most simple way is to dig a pit in  
the ground and make a filtering system  
so that clean Rain water can Reach Underground  
and can be Reused.

## Rain water Harvesting

Water is our most precious natural Resource and something that most of us take for granted. We are now increasingly becoming aware of the importance of water to our survival and its limited supply. The Harvesting of Rain water simply involves the collection of water from surfaces on which Rain falls and subsequently storing this water for later use. It is two Types:

- (1) Roof top Rain water Harvesting
- (2) Surface runoff Rain water.

Ⓐ How can Rain water Harvesting be linked to ground water sustainability.

The collection of Rainwater from the Roofs of Buildings can ~~take~~<sup>place</sup> easily take place within our cities and towns. All these is necessary to capture this water is to direct



Surface water. Continuous discharge of industrial effluents, domestic sewage use of fertilizer and pesticides, waste dump and over exploitation of the Resource have badly impact on ground water sustainability. So sustainable ground water management is a burning challenge for the 21st Century because it ensured livelihood security across the world.

### Impact of Ground Water Depletion

The most important impact of ground water depletion is loss of Base flow. If the base flow is reduced then there are different critical additional impacts take place. These are,

- increased magnitude and frequency of flood.
- Loss of wetland and riparian vegetation.
- changes in channel morphology,
- Accelerate erosion.
- increase frequency drought.
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Q: NO: 3 what "Quality parameters" should be considered in designing water supply system for a Community.

Brief Explanation:

Public, in general judges the quality of water supplied based on its appearance, taste and odour at the point of its use. Although appearance, taste odour etc are useful indicators of quality of drinking water. Their presence may not necessarily make water unsafe to drink. In the same way the absence of any unpleasant qualities does not guarantee water to be safe for consumption. True that drinking water should be esthetically pleasing, ideally looking clear, colorless and well aerated with no unpleasant taste and odour.

However suitability <sup>②</sup> in terms of public health is determined by microbiological, physical, chemical and Radiological characteristics. Of these the most important is Microbiological quality. The drinking water thus should be,

- Free from Pathogenic organisms
- Clear (with low Turbidity and little color)
- Not saline (salty in taste)
- Free from offensive Taste or smell)
- Free from compounds that may have adverse effect on health or harmful in long terms.
- Free from chemicals that may cause corrosion of water supply system or stain clothes washed using it.

The water quality problems are mainly due to Bacteriological contamination, a significant

(3)

The quality parameters that engineer must be considered in Designing water supply system for Community:

selection criteria of water sources!

While selecting a water source for development, the engineer must consider three primary

Factors:

(1) Water Quantity

(2) Water Reliability

(3) Water Quality.

Brief explanation of each one is given

Below:

(1) Water Quantity:

The source must be capable of supplying enough water for the Rural Community. If not another Resource or

Perhaps several sources will be required.

Water source selection. The process of choosing the most suitable source of water for development into a public water supply largely depends on the local conditions.

## (2) Water Reliability

The Reliability of a water supply is one of the most important factors that the engineer considers when selecting a water source.

A Reliable water source is one that will supply the required amount of water for as long as needed. To determine the Reliability of the water source the engineer studied data such as hydrological data To determine the variations that may be expected at the water source.



### (3) Water Quality ⑤

The third primary factor the engineer must consider when selecting a water source is the quality of water. Water supplies are generally exposed to pollution of some kind. Therefore to ensure that water is potable, it must be tested to determine the existence of any impurities that could cause disease, odor, foul taste or bad color.

The basic requirements for drinking water are that it should be.

- (a) Free from disease
- (b) Fairly clear
- (c) Containing no compounds that cause an offensive taste or smell.
- (d) Containing no compounds that have an adverse effect acute or in long term on human health

⑧

Not of causing corrosion or encrustation of the water supply system, nor straining clothes others washed in it the Result of studies and Research on drinking water quality are laid down in practical guidelines which usually take the form of a table giving number of selected water quality parameters. The most important parameter of drinking water quality is the Bacteriological quality i.e. the content of Bacteria and viruses.