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SUBJECT: WATER DEMAND SUPPLY AND DISTRIBUTION

(Question 1)Answer:

Hydrological Cycle:

Water cycle, also called hydrologic cycle, cycle that involves the continuous circulation of water in the Earth-atmosphere system. Many processes involved in the water cycle, the most important are evaporation, transpiration, condensation, precipitation, and runoff.

The process of evaporation, condensation precipitation, interception, infiltration, percolation, transpiration and runoff and storage of water in which the water from ground and ocean evaporate and water from plant transpire in atmosphere, and then condense there and fall back to the ground in the form of precipitation.

The main factor affecting hydrological cycle are climate changes, surface changes, vegetation, rock type, bioturbation, deforestation, building, reservoirs, industrial activities, and urbanization. Science has shown that the climate change has occur in every part of the earth ecosystem because the processes involved are highly dependent on temperature. Global temperatures have steadily increased at their fastest rates in recent year which patterns, causing major extreme flooding in coastal communities around the world. Rocky or ice surfaces in arid and glacial regions impede infiltration; therefore, less water will be stored underground. Vegetation stores and impedes water from reaching the surface. This happens given that rainfall is less. Vegetation also affect the water cycle in a good manner it can absorb and store water which turn can be transpired contributing to condensation and therefore rain which is supplied to the basin again. Type of soil has also effect on water cycle because soils such as sand have large pore spaces and can store water compared to cohesive clays. Trees have positive and negative influences on the hydrological cycle because water readily reaches the surface and is not intercepted by any vegetation. However, deforestation has many drawbacks to the basin. Lack of trees implies that there is less transpiration and therefore less condensation and rainfall. Trees absorb water and infiltration and percolation to the groundwater become more and more. Buildings has also negative effect on hydrological cycle because it intercepts and stores considerable amounts of rain water and lessen water reaching the drainage basin. Dams provide more storage thus evaporation and hence condensation and rainfall occur. Urbanization also effect the hydrological cycle because more people mean more road and pavement construction; therefore, less infiltration and high runoff which reduces groundwater level.

The greenhouse effect or global warming scenario is a myth. Climatology has better thing to do rather than waste its time and resources and lose its credibility its priority should be minimize real weather risk now and not to gaze. The main factors affecting evaporation are temperature, humidity, wind speed, and solar radiation.

(Question 2)Answer:

Ground water Sustainability:

Groundwater sustainability may refer to the development and use of the resource in a manner that can be maintained for an infinite time without causing unacceptable environmental, economic, or social consequences.

Groundwater is the water present under the earth's surface in crack and space in soil beneath the earth surface and in the fractures of rock formations. It is stored and move according to geologic formations of soils, sand and rocks called aquifers. It is one of the nation's most important natural resources because it has a lot of advantages like no filtration is needed because Rocks act as a

natural filter, no loss of water through evaporation, no requirement for expensive and environmentally damaging dams, low pumping costs, free of pathogenic bacteria, can be instantly found. Ground water also contains mineral ions which slowly dissolve from soil particles, sediments, and rocks named as dissolved solids.

Ground water sustainability is actually the success and development and use of groundwater to meet both current and future beneficial purposes without causing bad consequences which include groundwater overdraft (reduced in supply of water by using water exceed), drying of wells, reduction of water in streams and lakes, declining of water quality, increased pumping costs and land subsidence

Continuous discharge of industrial effluents, domestic sewage use of fertilizers and pesticides, waste dump and over exploitation of the resource have badly impact on ground water sustainability. Though over utilization of ground water is the key factor for ground water depletion but there are other factors which have negative impact on ground water sustainability. The most important impact of groundwater depletion is loss of base flow; other impacts being severe crisis of safe drinking water and irrigated water.

A few step should be taken to preserve the ground water sustain abilities starting from plantation in your land scape. Proper disposal toxic waste into healthy manner like paint motor oil and other substances should be necessary. Proper disposal of chemical waste and usage should be practice. We should practice ourselves for not running the shower while brushing etc., and fix the leakage in toilet etc. we can wash only for 5 minutes to save the water and also wash our dishes on full capacity. We should Water the lawn on the coolest part of the day and only when they needed it. We should Use all natural household ingredient for cleaning of house like baking soda etc. We should educate yourself about water knowledge and other.

Rainwater Harvesting and ground water sustainability:

One technique that should be used to recharge ground water is Rain water harvesting. Rain water harvesting is a way of collection of rainwater and storing into natural reservoirs, tanks, or the infiltration into subsurface aquifers (ground water).it is a collection of water from surface or other impervious material in order to store it for later use.

There are different method for collection of rain water harvesting which include surface runoff harvesting and roof top water harvesting. The surface run off harvesting mainly used in urban areas for recharging aquifers while the roof top rain water harvesting is used on house roof for collecting of rain water and store it in a tank which can be used later for various purposes. Recharging aquifer can be done through various method like building check dams, recharging dry well, building gabion structure, lined underground reservoir, contour ridges, building permeable rock dams etc.

The main advantages of rain water harvesting is the used of collected water in our houses and other for farming (irrigation). We can used rain water for many purposes in house like hand watering of lawn and garden, connecting rainwater collection system to irrigation/sprinkler system, washing vehicles, washing pets, refilling fountains and fish ponds and swimming pool, replace the use of tap water with rainwater to wash driveways and sidewalks, toilets and clothes washer), and industrial processes instead of municipally treated water. By using the rain water harvesting technique we can minimize the use of ground water and saved it for future. Where groundwater sources contain high concentrations of toxic geogenic contaminants, the rainwater has been identified as a potential source of clean drinking water.

In those area where the ground water level is very below, the technique of rain water harvesting should be adopted not only for ground water recharge but also for commercial, domestic and industrial uses.

(Question 3)Answer:

In order to fulfil the water demand of the continuously growing population, it is essential to provide the sufficient and uniform quantity of water through the designed network of pipes. A typical water supply system consist of source, treatment, storage and distribution. Sources of water are ground water, hand pump, bore well and surface water.

Therefore a few quality parameter should be follow for safe water drinking system for community. In designing water supply three main parameter should be used i.e. physical, chemical and biological. Physical parameter are temperature, color, odor, turbidity and electric conductivity. Other parameter are alkalinity and salinity etc.

Water consumption in a community is characterized by several types of demand, including domestic, public, commercial, and industrial uses. Domestic demand includes water for drinking, cooking, washing, laundering, and other household functions. Public demand includes water for fire protection, street cleaning, and use in schools and other public buildings. Commercial and industrial demands include water for stores, offices, hotels, laundries, restaurants, and most manufacturing plants. There is usually a wide variation in total water demand among different communities. This variation depends on population, geographic location, climate, the extent of local commercial and industrial activity, and the cost of water.

Big problem in supply line is municipal line. Supply could be contaminated at source or through corroded pipelines. Mixing with sewage lines due to defective piping has been known to occur often. Complete tests should be carried out every half year, and the authorities should be informed when results indicate contamination

Commonly used basic water quality monitoring parameters are temperature, pH, conductivity, turbidity, and DO. Temperature impacts both the chemical and biological characteristics of water. It affects the dissolved oxygen level in the water, photosynthesis of aquatic plants, metabolic rates of aquatic organisms, and the sensitivity of these organisms to pollution, parasites and disease. Therefore it should be considered to complete in designing water supply system. The pH of the water affects the toxicity of water. As the pH falls (solution becomes more acidic) many insoluble substances become more soluble and thus available for absorption. The reason that the conductivity of water is important is because it can tell you how much dissolved substances, chemicals, and minerals are present in the water. Higher amounts of these impurities will lead to a higher conductivity. The other parameter that should be accounted is turbidity and it affects the growth rate of algae (micro-aquatic plants) and other aquatic plants in streams and lakes because increased turbidity causes a decrease in the amount of light for photosynthesis. Turbidity can also increase water temperature because suspended particles absorb more heat. DO is most important indicator of water quality. A high dissolved oxygen (DO) level in a community water supply is good because it makes drinking water taste better. The amount of dissolved oxygen in a water can tell us a lot about its water quality. Another parameter of water quality is hardness. This is a term used to describe the effect of dissolved minerals (mostly calcium and magnesium). Minerals cause deposits of scale in hot water pipes, and they also interfere with the lathering action of soap. Hard water does not harm human health, but the economic problems it causes make it objectionable to most people.

For quality water the further step for clarification should be adopted e.g. sedimentation, coagulation and flocculation, filtration, Disinfection, filtration, ultraviolet radiation, ozone, water softening, aeration, carbon absorption, fluorination, desalination, membrane process, cogeneration and hybrid process.