

Water is the essential element for life which is a natural resource available in plenty and made available to human needs at various degrees of quality to meet public requirement for which the water taken from the resource needs different levels of treatment. This gives rise to several different concepts in treatment which on its evolution at many different levels has many complexities which need to be relearned from the core to give away the redundant and make the water available anywhere, any time to meet the total requirements.

The water available on the earth is more than sufficient to meet all the requirements and the scarcity is due to the water supply scheme not specific to a particular region. Water is available everywhere, but the source is different for different region as to how the water cycle takes its form in the particular region with the atmospheric conditions, geological formation and anthropogenic activities. Water cycle is the connectivity of different components of the earth as the same forms the basic element of life for the existent of every ecosystem including desert. The non availability of water is felt there because the pattern of weather is not understood and it is common even in olden days to find the rose garden there which shows anything is possible if efforts are taken to find the hidden resources specific to the region. Nature is unbiased and it makes everything available at everyplace and the complexity is due to the way that we don't see what we are searching for, as the same is imagined with our preparation, professionalism and core competency where the same is seen with simplicity and open mind, no matter what the expertise we possess.

The water with the elemental components, hydrogen and oxygen is influenced by the atmospheric temperature and the will not always seventy percent water and thirty percent land mass, it takes continuous transformation and hence the proportion of land to water bodies is ever evolving. Water cycle is water from the water bodies that gets evaporated with the sun's heat and rises up as water vapors which gets condensed as water droplets and when the same appears as down pour, as rain which appears as storm water, runs over the



surface as surface run off, takes many routes with the topography and finally reaches the ocean. The water that stagnates in depressions remain as ponds, and lakes and from all these surface water the water again gets evaporated and reaches the atmospheres, taken by plants for their growth in transpiration and percolates through the soil and reaches the ground water table depending on the hard stratum of less porosity that is available beneath the ground to hold this water, which is available as underground Water. If there are deep fissures and cracks that could carry these water much deeper, then the proportion of land mass to water mass will change. There appears a new land and with the accumulation of water from melting glaciers and coastal wave fronts, there could be submergence of land mass too.

The water is thus a media to carry on life of all components in ecosystem and evolves in cycle in such a way that the flux rate varies with time and the form in which the same appears as the major source, varies with time and space. At one point, the same is surface water which by evolution and more consumption shift to the other form and the three major forms being surface water, underground water and ocean water. The ocean water is saline and denser that the evaporation rate is slow and the same remains in huge quantities and is more persistent. Yet it finds its way underground but makes the ground water too salty. The ground water had been depleted much for its use being the major source to meet the individual needs. Most of the same being taken through open wells which got drained quickly, for the slow replenishment of the same. This being the reason in the beginning of the common water supply scheme, always the surface water from rivers and lakes had been used as a major source from where the water is tapped, treated and supplied through conduits to majors areas of need.

This proved to be the major investment from government side and this involved a lot of man power and labour force to make it available for use, to have the same in reserves both at distribution and at the source for future use and to meet the emergency needs. The need for purity of water from the source resulted in the water treatment plants where there are several unit processes and operations and make it fit to be used as per the quality standards specified by the organizations for different purposes. In spite of all these, the same is not



completely efficient with quality due to the cracks and bursts in the distribution lines and quantity of water does not meet the requirements of public completely in the practical situations leading to additional purifiers at home. With the insufficient quantity to meet the purpose, almost all the industries moved to have their own water supply from ground water sources.

Thus among the water sources as surface, ground water and ocean water , surface water is depleting for the land mass being converted to living areas that the canals leading to lakes and rivers are less. The stagnation on the surface causes the ground water table to rise near the surface and the same adds to infiltration water. The ocean water always prove to be expensive in treatment to meet the quality standards and hence cannot be a viable source except that the natural evaporation will make it useful to appear as rain water and the dilution of the ocean water with more of surface runoff will also help for the same. The source available for domestic and industrial purposes together are the ground water now and are available now in plenty in the top aquifers than in the deep stratum for the surface water not streamed to perennial rivers.

The ground water source can be used to meet the domestic and industrial needs and add to economy as the same is filtered through the water bearing stratum and has more of minerals with it. The hardness due to salinity will be a problem only when the water is taken from the deep regions as water on its travel downwards, have taken most of the salts causing hardness which will not be there if the infiltrated water in the top aquifers are taken. When this source will takes its maximum usage, it could be suggested for the industries to go for the deep stratum and the domestic to go for the infiltration water in the top stratum to maintain balance for a long time, but the cycle gets a repetition and the surface water and gets replenished with waste water sent back to soil from the septic tanks and the surface run off by rain water harvesting. There is no further scope for surface waters to meet the increasing demands which will happen only when the ice bergs melt and find their way to surface waters.

To this the global warming certainly helps, the problem remains in the excess heat in the zone of generation which has to descend to higher attitude for



which there must always be temperature gradient all through for a long attitude, and for which burning municipal solid wastes and releasing the exhaust smoke at high attitude helps a lot. With these approaches we can reach a balance progressively to meet the increasing demands in future too, much economically. The multipurpose reservoirs could be used to the maximum for power generation which will help meeting the power needs. The global warming at ground level can also be tapped for charging the battery that supplies energy. All these help maintaining a balanced ecosystem holistically.

The global warming is actually the media to move up the natural cycles and is not to be viewed as a threat. The heat on the earth's surface makes the air heated up and that moves to sea causing warm air front which will be evaporating the water at a higher rate that we get cold breeze towards the land mass thus the sea water finds a way to get back to the water cycle at a higher rate to balance the water needs. This is the reason for dense down pour at a shorter time which will not add to storm runoff but as capillary water and to add to the ground water.

As energy, the resources can neither be created nor destroyed, the issue lies in not finding the form in which it is available to meet the immediate need that may not be the same always but shift towards the next level which makes the evolution and every creation dynamic.

Threads

1. What are the various purposes for which water is used? Discuss their quality standards.
2. What are the sources of water? Which is your option to meet your own needs? Discuss the reasons for your choice?
3. Quantify your daily water requirement? Extend the same to the level of a city.
4. How do you estimate the population? Discuss the various population forecasting methods. Discuss the advantages and disadvantages. Which method do you find the most accurate?



4. Do you feel the population forecasting and survey are needed for the effective governance?
5. What do you mean by design period? How do you find the same is adopted practically with the water supply schemes?
6. Study a typical water supply scheme and narrate your own exposure on the components.
7. Discuss the principle of screens?
8. Discuss on sedimentation process?
9. Explain the process of filtration.
- 10, what are the different methods of chlorination.
11. Discuss on the water quality parameters and suggest a water supply system for domestic need of a family.
12. The common water supply scheme is not efficient practically. Discuss on the practical issues you will be facing with water needs daily?
13. The connectivity an individual has with the governance is not adding value to him but restricts him with more of rules and norms to avail the best as individual, rather making him to avail the better by being one among the masses. Elaborate on this with your own views.
14. The democratic governance can be achieved by connecting individual with the governance directly without any representatives. Comment on this.
15. Discuss on the impurities that can be removed by activated carbon.
16. After having conceived the principles of a normal water treatment train, suggest a water supply scheme for one of your choice among a domestic unit, colony, hospital, commercial complex, and hotel and justify the efficacy of the scheme.



True democracy lies in meeting the individual needs.

Planning for the masses always prove futile as the same do not have inclusion.

Planning for the individual is simple and includes him which is progressive certainly.

