

ASSESSMENT OF WATER QUALITY IN VAIGAI RIVER

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Abstract

The Surface water such as rivers, lakes, is connected to ground water and vice versa. This connection is usually through wetlands and springs. (A good way to think of this is the cold water that you may suddenly feel when you swim in a lake. That's ground water entering the lakes as a spring). Ground water and surface water are connected, so pollution can pass from one to the other very easily. The ground water is extracted from Vaigai River in Theni, Madurai, Dindigul and Sivagangai region to meet municipal, agriculture and other water requirements. This present study is mainly concerned about the quality of water Vaigai dam – outlet, Thenur pirivu – near Melakkal, Perani - S.Mettupatti, Dindigul, and Madurai region , Manaloor – Thirupuvanam, Sivagangai. Surface water samples are collecting in the above places, in stretch of origin of rivers and the samples are subjected to a comprehensive surface water analysis to study about the present status.

Keywords: water quality assessment- Physical – chemical parameter-vaigai river

Introduction

Assessment is the overall process of evaluation of the physical, chemical and biological nature of the environment in relation to natural quality, human impacts and intended uses – Includes the use of monitoring data (practical, desk-based or on-line data collection) – Includes interpretation of the data – Aims to define environmental conditions, detect trends, establish cause-effect relationships.

Hydrological Cycle; The water cycle, also known as the hydrological cycle or the hydrologic cycle, describes the continuous movement of water on, above and below the surface of the Earth. The mass of water on

Earth remains fairly constant over time but the partitioning of the water into the major reservoirs of ice, fresh water, saline water and atmospheric water is variable depending on a wide range of climatic variables. The water moves from one reservoir to another, such as from river to ocean, or from the ocean to the atmosphere, by the physical processes of evaporation, condensation, precipitation, infiltration, surface runoff, and subsurface flow.. Water evaporates as water vapor into the air. Ice and snow can sublimate directly vapour. Evapotranspiration is water transpired from plants and evaporated from the soil.

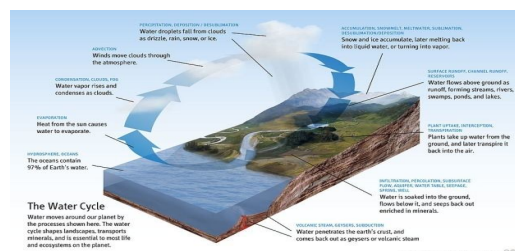


Fig.no.1.2.1 Hydrological cycle

Surface Water

Surface water is water on the surface of the planet such as in a river, lake, wetland, or ocean. It can be contrasted with groundwater and atmospheric water. Non-saline surface water is replenished by precipitation and by recruitment from ground-water.

Surface water supplies, primarily river runoff, are about 300 cubic miles. That means we have about 1/10,000th of 1% to use! Conservation is important!

Surface runoff plays an important role in the recycling process. Not only does it replenish lakes, streams and ground water, it also creates the landscape by eroding topography and transporting the material elsewhere.

Suspended sediment makes water look cloudy or opaque. The greater suspended load, the muddier the water. The distance the bed load travels depends on the velocity of the water.

Factor affecting surface runoff

Several factors can affect surface runoff. The extent of runoff is a function (f) of geology, slope, climate, precipitation, saturation, soil type, vegetation and time. Geology includes rock and soil types and characteristics, as well as degree of weathering. Porous material (sand, gravel, and soluble rock) absorbs water far more readily than does fine-grained, dense clay or unfractured rock. Well-drained material (porous) has a lower runoff potential therefore has a lower drainage density..

Drainage basins or watersheds have different shapes and sizes. Large drainage basins are usually divided into smaller ones. Size and shape have a direct effect on surface runoff, Refer to Module 3 to see information about drainage basins.

Drainage Basin's Effect on Surface Runoff

Long, narrow drainage basins generally display the more dramatic effect of surface runoff. They have straight stream channels and short tributaries. Storm waters reach the main channels far more rapidly in long narrow basins than in other types of basins. Flash floods are common in long, narrow drainage basins, resulting in greater erosion potential.

Climate is also important. Precipitation (type, duration and intensity) is the key climate factor. Infrequent torrential downpours easily erode sediment-laden topography, while soft drizzly rain infiltrates the soil. Vegetation aids in slope stability. Removal of vegetation by fire, clear-cutting (logging), or animal grazing often result in soil erosion. The eroded material is washed into streams, adding to the sediment load.

Runoff paths

There are three runoff paths that water follows to reach a stream channel-through flow, overland flow, and groundwater flow. Through flow is a shallow subsurface flow that occurs above the groundwater table. A major requirement for through flow is a good infiltration capacity. Through flow commonly occur in humid climates containing thick soil layers and good vegetation cover. In such locations, saturated soil conditions result in surface runoff (overland flow).

Overland flow occurs when precipitation exceeds infiltration rates. Overland flow is common in semi-arid regions, sparsely vegetated and/or disturbed areas, and locations containing dense, clay-rich layers.

Surface Water/Groundwater Interaction

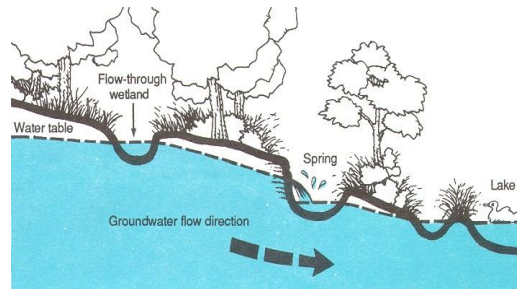
Surface streams have an effect on the groundwater table. Influent streams recharge groundwater supplies. Influent streams, located above the groundwater table, flow in direct response to precipitation. Water percolates down through the vadose zone to the water table, forming a recharge mound.

Effluent stream are discharge zones for groundwater. Effluent streams are generally perennial (flow year round). Groundwater seeps into streams channels, maintaining water flow during dry seasons.

Ground Water

Ground water is the water that fills cracks and other openings in beds of rocks and sand. Each drop of rain that soaks into the soils moves downwards to the water table, which is the water level in the underground reservoir. Ground water does not normally occur in underground streams, lakes or veins. Ground water is found in soils and sands able to retain the water – much like sponge holds water. Only small amount of the world's ground water flows in underground streams through caves. Most groundwater moves very slowly through tiny spaces between particles in rock and soil.

Groundwater is connected to rivers and lakes ad vice verse! This connection is usually through wetland sand springs. (A good way to thinks of this is the cold water that you may suddenly feel when you swim in a lake. That's groundwater entering the lakes as a spring). Ground water and surface water are connected, so pollution can pass from one to the other very easily.



Gaining stream

Groundwater found in the subsurface, inside pores within soil and rock. Groundwater is the largest source of freshwater o earth, and was little used until recently. With electricity and the modern pump, groundwater has become ivery important to agriculture, cities and industries. It is usually much cleaner than surface water.

A high nitrate (NO₂) concentration in ground water and surface water may cause environmental problems such as eutrophication and modify natural ecosystems and also related health problems. In human blood, NO₂ is reduced to nitrate (NO₂), which in turn converts blood hemoglobin to methemoglobin. This reduces the capacity of the blood to carry oxygen, in turn causing a blood disorder known as methemoglobinemia or blue baby syndrome. Nevertheless, nitrate NO₃ contamination of groundwater is a worldwide problem mainly due to the excessive use of fertilizer in intensive agriculture. Because nitrate is both soluble and mobile, it is prone to leaching through soil with infiltrating water and can persist in shallow groundwater for years.

Need for the Study

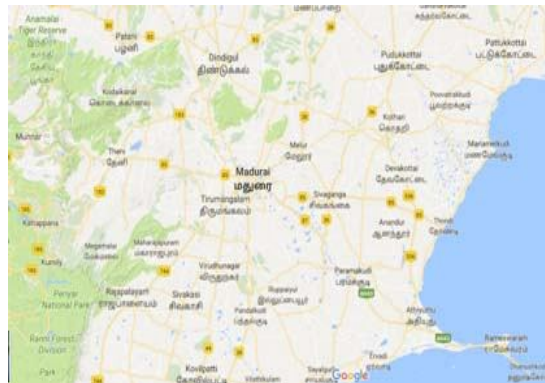
Theni, Madurai, Dindigul and sivagangai cities practice the water supply in the corporation area & agriculture purpose. Due to application of chemical in agriculture fields and wastewater discharge the pollution concentration in river water is high in that area.

Objective and Scope

1. To achieve by collection, testing and analyzing of river water samples and do water quality parameter and to assess the water quality.
2. To monitor the water quality periodically and analysis all the macro and micro nutrients in water
3. To identified surface water quality data compared with world health organization (WHO) and Bureau of Indian Standards (BIS).

Study Area

Theni, Madurai, Dindigul and sivagangai is situated in South India of Tamil Nadu State. The city has grown on both sides of Vaigai River. The city is situated on 9°48' N longitude and 78°06' E longitudes. The sampling sites are selecting on the basis of their distance such as, Vaigai Dam – Outlet, Mudhalam Patti, T.Vadipati, Viruvedu, Kannapatti, Perani, S.Mettupatti, Dindigul, Thenur Pirivu – Near Melakkal, Madurai, Kochadai – Madurai, Vandiyur – Madurai And Manaloor – Thirupuvanam, Sivagangai.



Show that study Area of Vaigai Dam Samples Sites.

Materials and Methods

Water samples are collecting from October 2017 to March 2018. Water samples were collected in sterilized clean high density polythene bottles. Acidifying the water samples after every collection and take to the samples at laboratory within a day. The samples were analyzed (Physical and chemical Parameters) by (BIS, 1983 and APHA, 1998) method. The following parameters were analyzed such as Turbidity, TDS, pH, nitrates, fluorides, sulphate, Total Alkalinity, Total Hardness, chlorides, sodium, potassium, DO, Temperature.

Sample collection area

Places	Samples no.
Vaigai dam – outlet	1
mudhalam patti,	2
T.vadipati	3
Viruvedu	4
Kannapatti	5
Perani- S.Mettupatti, Dindigul	6
Thenur pirivu – near Melakkal, Madurai	7
kochadai – Madurai	8
vandiyur – Madurai	9
Manaloor – Thirupuvanam, Sivagangai	10

Table; Number of samples

Vaigai River and its tributes, drain the part of the area, consisting a well developed, distinct drainage basin in the southern Tamilnadu. The river vaigai originates in the eastern slope of the western ghat mountains offshoot in the Varushanad area and flow north wards throughout Gandamanayakkanur. It is joined by several tributaries over a length of 43 km and reaches the plain area

Activities in Project Phase II

1. Collection, Testing And Analyzing Of surface Water Samples
2. Identification Of Polluted Surface (River) Water In Various Places
3. Compare The Results With Various Standard Water Quality Parameters
4. Result and discussion
5. Conclusion

Conclusion

1. They achieve by collection, testing and analyzing of river water samples and do water quality parameter and to assess the water quality.
2. To monitor the water quality periodically and analysis all the macro and micro nutrients in water
3. The water samples are identified surface water quality data compared with world health organization (WHO) and Bureau of Indian Standards (BIS).

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