Literature Review

Much work is done on variations in water quality with reference to physicochemical & biological parameters in Cauvery River & Its Tributaries over a period of 1 year. Water temperature, water level turbidity & transparency were measured as per international standard method. Dissolved O₂ & biological O₂ demand were determined by the Winkler’s method. pH & Conductivity was measured by pH & Conductivity meter. Physicochemical & heavy metal analysis was carried out.¹

This Research work was related with water quality parameters such as pH, electrical conductivity, total hardness, Ca, Mg, total alkalinity, Cl⁻ salinity & Fluoride. Twenty samples of water from dam ponds were analyzed. pH was measured by pH Meter; EC was measured by Conductivity Bridge. Total hardness, Ca, Mg, total alkalinity, Cl⁻ salinity were determined by titration method. Researcher was not mentioned fluoride determination method. According to researcher Dam water was safe for drinking as well as for irrigation purpose.²

In a study of Geochemical effect on physicochemical properties different sources of water and its parameters in Nagpur Municipal area of Maharashtra such as ground water, lake water, well water, & Bore water were compared. Cl⁻ was determined by titration with AgNO₃ using K₂CrO₄, F⁻ was determined by ion selective electrode method, hardness by titration with EDTA & EBT indicator, pH using pH meter, EC using conductometer, DO by titrating with sodium thiosulphate using starch indicator. Researcher found that lake water was suitable for human being. Bore water & well water was not suitable for drinking.³

In another research work a study on Boron & other trace Elements in ground water of Narwar block (Shivpuri, M.P.) was carried out. Researcher studied 44 ground water samples. Samples were analyzed for boron, Mn, Fe, Cu by spectro photo metrically. In this research work researcher classified water samples on the basis of electrical conductivity in to 4 groups. In each class average, minimum, maximum concentrations of all elements were determined. EC values were measured using Systronics Ec meter. B varied from 0.0 mg/ml to 0.013 mg/ml, Fe varied from 0.0 mg/ml to 0.201 mg/ml, Mn varied from 0.0 mg/ml to 0.081 mg/ml, and Cu varied from 0.0 mg/ml to 0.069 mg/ml.⁴
A comprehensive environment study of metals on the soil-water-plant system at west chroompet area, Chennai, India, was carried out. This research work includes metal contamination of soil–water-plant where concentration of tanneries and industries were more. Soil, water, and edible parts of plant samples were analyzed for Cu, Ni, Mn, Co, Pb, Zn, Cr by AAS instrument. Researcher compared the values of their concentrations with WHO prescribed limit. Researcher found that the water and plant bodies were not much affected, although highly soil was highly polluted.

A study of ground water quality of Dabra Municipal area Gwalior M.P. was carried out. In this research work researcher studied 18 water sample collected from Dabra Municipal area in pre monsoon season and analyzed for PH, TA, TH, Mg$^{2+}$, Ca$^{2+}$, Na$^+$, K$^+$, Cl$^-$, SO$_4^{2-}$, NO$_3^-$, Ec and TDS. PH of water was measured using PH meter, Ec was measured by Ec meter, and TA was determined by titration with N/SO$_2$H$_2$ using phenolphthalein and methyl bromin as indicator. TH was determined by titration with EDTA using erichrome black. T as indicator, CT was determined by titration against AgNO$_3$ using K$_2$CrO$_4$ as indicator. Na, K, by flame photometer, NO$_3^-$, and SO$_4^{2-}$ using U.V. visible spectrophotometer. Researcher found that PH of water was alkaline.

In the study of the quality of drinking water in Dhakuakhana Sub division of Lakhimpur district, Assam, India researcher analyzed 30 water samples from study area for PH, total hardness, fluoride, nitrate, arsenic, Na, K and Fe using Std method such as APHA-AWWA-WPCF 1995. Researcher found that concentration of all parameters were within permissible limit expect Iron.

In another research study work A study of distribution pattern of some water quality parameters in Dhakuakhana Sub division of Lakhimpur district, Assam, India was carried out. In this research work researcher carried out comprehensive study with reference to water quality parameters such as PH, As, F, Fe, Cl, SO$_4^{2-}$, NO$_3^-$ in ground water of study area. All parameters were studied using Std methods. Sample data were subjected to statistical treatment. Statistical observations show that all parameters show non-uniform distribution. Thus the inherent quality of water is low due to unsymmetrical distribution of various parameter in the study area.
Research study work on Arsenic content in drinking water of Lakhimpur district, Assam and its impact on human health showed that in many locations in Assam Arsenic content was determined. Assam. But there was no reporting of arsenocosis from study area.

Chemical analysis of ground water at some selected sites in Jaipur (Rajasthan) was carried out with respect to PH, EC, Mg$^{+2}$, Ca$^{+2}$, Na$^+$, K$^+$, Cl$^-$, So$_4^{2-}$, No$_3^-$, HCo$_3^-$, F, SiO$_2^-$ and heavy metals such as Fe, Co, Cu, Pb, Ni, Zn, Mn, at 5 selected sites at Jaipur. Bicarbonate was determined by acid-base titration using bromo cresol green indicator. Cl$^-$ was determined by titration with AgNO$_3$ using K$_2$CrO$_4$ indicator. Ca$^{+2}$ and Mg$^{+2}$ were determined by EDTA, content of metal by AAS. Na$^+$ and K$^+$ were determined by flame photometer. So$_4^{2-}$ gravimetrically. No$_3^-$ by spectro photo metrically using brucin method. It was found that concentration of No$_3^-$ was high due to fertilizers, human sewage deposited in septic systems and domestic and municipal waste water.

Correlation analysis of ground water quality in and around shahzad nagar block of Rampur District, Uttar Pradesh. was carried out. Results were compared with WHO USPH, EUROPEAN & ICMR std. systematic correlation matrix study showed significant relation among different pairs of water quality parameters.

Correlation study on physicochemical parameters of ground water in and around costal area, Tirunelveli district also. Water samples were analyzed for PH, EC, TDS, TH, Mg$^{+2}$, Ca$^{+2}$, Na$^+$, K$^+$, Cl$^-$, So$_4^{2-}$, No$_3^-$, HCo$_3^-$, F, Fe, SO$_4^{2-}$, BOD, COD. It was found that most of the samples were polluted because of sea water intrusion near costal area. and pollution was less towards inner land. It was proved by significant +ve correlation of EC with ions.

Evaluation of water quality index for drinking purpose for ground water in and around Amalner town (Maharashtra) was carried out. In this research paper researcher discussed the suitability of ground water for human consumption based on computed water quality index values. Researcher classified WOI values into five types: good, poor, excellent, unsuitable and very poor. It was found that WOI values were high. Water samples from these sites were unfit for drinking.

In another research work Evaluation of surface water quality using multivariate statistical studies in a part of Cauvery River Tamilnadu.was carried out. In this research work researcher evaluated surface water chemistry and water pollution in a part of Cauvery River. Multivariable statistical
methods FA and CA and principle component analysis and interpretation of data, low high and moderate pollutant groups were identified.\textsuperscript{14}

In another research study work was done on Fluoride contents in ground water and fluorosis in human population in Haffaganj, Katihar block Katihar\textsuperscript{15}. In this research work researcher analyzed ground water samples for fluoride content. Concentration of fluoride was determined by ion selective electrode method. Analysis showed that fluoride ion level abnormal is between 0.7 to 0.10 mg / L.\textsuperscript{15}

Fluoride contamination in water of Koshi region (Bihar) was also carried out. Fluoride concentration values varied from 0.6 mg/l to 1.6mg/l. Due to this citizen were suffering from different types of fluorosis\textsuperscript{16}

Geochemical studies of fluoride and other water quality parameters of ground water of sikar district (Rajasthan) was also carried out. Water samples were alkaline in nature. Chloride content was found to be high. Fluoride concentration was found to be maximum. According to researcher dilution of fluoride rich water with fluoride free water should be encouraged.\textsuperscript{17} Ground water quality of coastal areas in Alappuzha district Kerala was carried out for analysis of bore and open well water of costal areas. Std methods were used for all the analysis. It was found that 9.4% open well water was hard and high alkalinity value. Fluoride concentration found to high in some region. Also Na and K concentration was found to be high.\textsuperscript{18}

A study of drinking water quality of desert affected area of Jhunjhunu district in Rajasthan. was carried out to find out water pollutants and to test the suitability of water for drinking and irrigation purpose in study area. pH, DO, TDS, TA were analyzed by using portable kit and rest of the parameter were determined by Std.APHA method. It was found that nitrate fluoride, Cl\textsuperscript{−} TDS, TH were higher. Water of study area was hard.\textsuperscript{19}

In the study of Ground water quality evaluation for drinking purpose in some areas of Biyad Sabarkatha district. Analysis was done using std. method. Results were analyzed graphically. Researcher was found that concentration of SO\textsubscript{4}\textsuperscript{2−} was high than WHO limits and concentration of F\textsuperscript{−} was high than WHO limit.\textsuperscript{20}
A study was done on Ground water quality assessment at Malegaon region of Nanded in Maharashtra and effect of seasonal variations. Researcher was found that seasonal changes in ground water ware temperature dependent as increase or decrease in temperature is related to atmospheric beat. Ground water samples show that there was high concentration of physicochemical parameter in monsoon and low in summer season.\textsuperscript{21}

Another study on Hydro geochemical studies of ground water in Salem district, Tamilnadu (India) was carried out where industrial, agricultural and mineral deposits. 66 Water samples were analyzed and results compared with IS1500-1991. Researcher was found that concentration of TDS, TH, Cl\textsuperscript{-} TA were high but water samples are suitable for irrigation and unsuitable for drinking purpose.\textsuperscript{22}

In Limnological studies to assess the water quality of “tali Pond” at Muttai dist. Betul (MP) researcher found that ponds were polluted by bathing washing, religious and recreational activity.\textsuperscript{23}

In the study of major ion chemistry of river Bhagirathi and river kosi the uttarakhand Himalaya researcher studied ionic distribution pattern of glacial origin and spring origin water quality of rivers. According to researcher rain precipitation, chemical weathering in drainage basin and anthropogenic in put were sources of major ions elements in river water. It was found that in Bhagirathi HCo\textsubscript{3}\textsuperscript{-}, SO\textsubscript{4}\textsuperscript{-}, and Cl\textsuperscript{-} anions and Ca\textsuperscript{++}, Na\textsuperscript{+}, Mg\textsuperscript{++} cat ions were present below permissible limit.\textsuperscript{24}

In the study of monitoring of toxic / trace metals in the surface water around Hyderabad lakes it was found that lakes are major sources of drinking water. These lakes are filled by rain only. Surface water samples were analyzed for Cr, Cu, Mg, Fe, Co, Ni, Cd, Pb, and Zn. It was found that metal concentration of some lake were below the maximum contamination level (MCL) where as some major water supplying lakes metal contamination was above MCL prescribed by BIS. Hence lake water is not suitable for drinking purpose.\textsuperscript{25}

In the study of Occurrence of fluoride in ground water and ground water quality in rural area of Tirunelveli dist.researcher reported that in Tirunelveli district dental mottling was found. Fluoride in drinking water caused dental fluorosis. It was found that concentration of fluoride in study area was in range 1.0 to 4.3 ppm & 44% of the people were affected with dental fluorosis
and traces of skeletal fluorosis. Level of F⁻ depends on OH⁻ & HCO₃⁻. Due to leaching of minerals F concentration increased. PH of water samples changes from 6.3 to 8.37.

In the study of Physico chemical characteristic of ground water in & around surat city water samples from 32 locations were collected and analyzed for physic chemical characteristics- PH, color, odour, hardness, Cl, Cod, TDS, SS, Fe, Cu, B. Cr. temperature and values of parameters were compared with the std. prescribed by WHO. and ICMR. It was found that water samples in Surat city possess concentration of TA, TH, CL, TDS & ground water requires treatment.

In another study of Physicochemical analysis of drinking water quality of sardines Panchayat, Bihar. It was found that concentration of Fe is more than 0.3 ppm. Beyond 0.3pp taste, colors were affected and it promotes iron bacteria, water sample contain 958 ppm. Excess Fe causes several complications. High values of alkalinity were observed. Hence such water is unfit for irrigation purpose.

In the study of Pollution status of Perennial river Tamiraparani with special reference to sewage mixing and coli form bacteria. It was found that Industrial units were situated on bank of this river. This river receives industrial effluents. Because of this water quality was altered due to entry of sewage and domestic from waste. Also coli form density in river was found to be high in December and minimum in May.

In the Physico chemical analysis of ground water samples of Jamkhandi town in Bagalkot dist. Karnataka ground water and municipal water samples from 5 locations in Jamkhand town were selected. In this work researcher assessed physical chemical properties ground waters samples and compared with municipal water using water quality index (WQI). It was found that water from municipal water samples were within prescribed limits suggested by WHO & ISI. Where other samples shows that all parameter values were lower than permissible limit.

In Physico chemical analysis of river Gomati at Kerakat, Jaunpur (UP) physic chemical parameters such as Ca⁺, Mg++,Fe⁺, Cl⁻ were determined. It was found that concentration of Fe and Cl was high. High concentration of Cl⁻ is harmful to metallic pipes and structures as well as agricultural crops.
In Physico chemical characteristics of Kollong river water, Assam. Researcher analyzed 30 water samples from 6 locations in different seasons for physic chemical parameters. Statistical analysis was carried out. Researcher found that eutrophic status of river. But all parameters were within manageable levels. 32

In quality assessment of ground water resources in Banahatti and Rabakavi areas of Bagalkot dist. Karnataka researcher carried out assessment of quality of drinking water in Rabakavi where industries were not present and Banahatti where industries were present. Water samples from Banahatti contain excess ion concentration due to dissolved salt and water quality in Rabakavi is superior than Banahatti. 33

In the Study on heavy metal contamination in ground water at outer skirts of kota city, Rajasthan India. Researcher analyzed 72 ground water samples for determination of contamination level of Fe, pb, Ca, Zn, Mn, Cr and data obtained was compared with ISI0500. It was found that Pb and Cr concentration were high. Health effect of Pb and Cr were given by researcher. 34

In the study of Spectro photometric and chemical analysis of ground water sample of Hand pump from Belaua Municipal area (Gwalior, MP) researcher carried out analysis of ground water for parameters PH, TA, TH, Mg$^{+2}$, Ca$^{+2}$, Na$^{+}$, K$^{+}$, Cl$^{-}$, So$_{4}$$^{-}$, No$_{3}$$^{-}$, Ec and TDS Concentration of No$_{3}$$^{-}$ and So$_{4}$$^{-}$ were established U.V.visible spectro photometer. Researcher did not compare values of different parameter with WHO or IS. 35

Study of Status of ground water quality in relation to some physicochemical parameter. in Shivamogga city, Karnataka includes assessment of quality of drinking water. Water parameter such as turbidity, PH,EC,DO, BOD,TH, TA,Cl, TDS, Ca. were studied. Observations compared with WHO & ISI ICMR Std. According researcher Cl increases degree of eutrophication. It was found to be high than WHO & ICMR range. This is due to increased sewage load in study area 36

In study of physico chemical parameters of irrigation water, prantij Gujarat (India) researcher assessed water quality for irrigation need. It was found that except few samples TDS, EC, SAR, (Sodium absorption ratio) were within safe limit. Ground water from study area was safe for irrigation. It contains desirable level f SAR and TDS. 37
In another research study work treatment on removal of turbidity & Fe rain water for drinking purpose in rural sector was studied. Researcher explained quality of rain water. Rain water consist of dissolved O$_2$, CO$_2$, and float in dust and when reaches to ground it absorb particles of mud and several salts get dissolved CO$_3$-, SO$_4$--, Cl, NO$_3$-, Ca, Mg, Na, K. This gives alkalinity to water. Turbidity can be removed by marine oleifera material which is coagulant. In this paper drinks water quality standards were given.\textsuperscript{38}

In study of Variation in calcium and Magnesium ratio with increasing electrical conductivity of ground water from shallow basaltic aquifers of Maharashtra. 523 ground water samples were analyzed for Ca & Mg ratio from Maharashtra. Other parameters were also determined. Samples were classified according electrical conductivity in 4 zones. It was fond that by increasing EC, Ca/Mg ratio decreases & by decreasing EC, Ca/Mg ratio increases. There was possibility of percolation of domestic sewage and waste from cattle farming as Cl and NO$_3$- concentration were more.\textsuperscript{39}

In the study of water pollution from heavy metals in special region of Chhindwara city, research work was carried out to determine concentration of heavy metals in water of study area. All types of water bodies were included in this work. Concentration of metals was determined by using AAS. Table showing concentration of heavy metals in different water samples was not given. Karanja River was carried out in this research work. In Bidar dist. Sugar factories, pulp, paper industries and distillery units are present. River receives effluents from these industries. A simple comprehensive weighted arithmetic method was used for analyzing season wise water quality index. Conclusion of this research work indicated poor water quality.\textsuperscript{41}

In the study of water resource development and management an experience in rural hilly area, researcher studies the prescribed area on different environmental condition and carried out water quality assessment of different sources of water. All physic chemical parameters were within limits. But bacteriological analysis showed that water samples from stream were bacteriological positive due to unsanitary and unhygienic condition. Water conservation programs in study area improve water availability.\textsuperscript{42}

Study of quality of effluent discharge by Tirupur textile dying units and its impact on river Noyyal, Tamilnadu includes impact of industrial effluent on quality of river water. This work
showed that TDS, Cl\textsuperscript{−} levels were high in river water. Heavy metals were found in Dam sediments.\textsuperscript{43}

In the study of impact of textile dyeing industries effluent on ground water quality in Karur, Amravati river. Due to continuous discharge of effluent water quality was deteriorated. Analysis of river water showed that physic chemical parameters TDS, TA, TH, Ca, Cl\textsuperscript{−}, So\textsubscript{4}− exceeded desirable limit. Study shows that these were severe impact on the ground water quality in downstream.\textsuperscript{44}

Study of Effect of red tide on physic chemical propertied of water and phytoplankton Assemblage in Sepangor Bay, Sahah Malaysia presents comparative study of physic chemical properties of water and phytoplankton during red tide & non red tide. During red tide temperature was high. DO level was low due to increase in temperature high salinity level, high PH permits algal bloom to develop.\textsuperscript{45}

Study of Water analysis: Emerging contaminants & current issues focus on present development in water analysis & new trends of emerging contaminants including DBPs (disinfectants byproducts), PFOA (Perfluoro non anonic acid) & other per fluorinated compounds. Pharmaceuticals, hormones, chiral contaminants, sunscreen UV filters, pesticides Degradation, arsenic, natural organic matter, nonmaterial used in cosmetic sunscreen, clothing, automobiles.\textsuperscript{46}

The literature survey reveals that no water quality assessment studies are made in prescribed study area so far. This study will be useful to assess and compare physical and chemical characteristic properties of selected water bodies in prescribed study area which will throw light on new emerging contaminants in water and possible problems with water in study area.