REVIEW OF LITERATURE:

Investigations and Assessment of Selected Chemical and Microbial Parameters in Groundwater of Pulau Tiga, Sabah, Malaysia of Taksiran Parameter Kimia dam Mikrob Terpilih Bagi Air Bawah Tanah di Pulau Tiga, Sabah, Malaysia) by - Chin Yik Lin, and et.al (2010). In this work they collect Ambient groundwater samples from five wells in Pulau Tiga have been studied for selected physico-chemical and biological parameters to understand general water quality of the island. This study on groundwater of Pulau Tiga was undertaken to provide guidance and baseline data for future references. Two field works were undertaken in August and November 2007 to collect the groundwater samples. Groundwater samples were collected from five representative’s wells at the low lying area of Pulau Tiga in order to study the in-situ parameters such as DO, EC, TDS, pH, salinity and temperature. In general, groundwater in sites was moderate in conductivity (330 µS/cm – 1005 µS/cm), and serves as a vital freshwater source to both tourists and local inhabitants. However, bacteriological analysis showed that the groundwater quality was poor, with fecal coliform counts exceeding the WHO permissible limits for drinking water. Through this study, human factor was to be blame for the fecal contamination coliform where the polluted ground water might be originated from sanitation facilities located too close to the wells. The occurrence of total and fecal coliform bacteria in counts suggests poor sanitary handling and warns of the potential presence of disease-causing organisms.

The investigation on Physiochemical Analysis of Ground Water of Selected Area of Kaithal City (Haryana) India. D. P. Gupta, Sunita & Saharanb (2009). They have collected Ground water samples from different locations in the radius of 25 km. of Kaithal city, Haryana(India). These water samples from 20 sampling points of Kaithal were analyzed for their physicochemical characteristics. Laboratory tests were performed for the analysis of samples for pH, Colour, Odour, Hardness, Chloride, Alkalinity, TDS etc. On comparing the results against drinking water quality standards laid by Indian Council of Medical Research (ICMR) and World Health Organization (WHO), it is found that some of the water samples are non-potable for human being due to high concentration of one or the other parameter. The usefulness of these parameters in predicting ground water quality characteristics were discussed. Thus an attempt has been made to find the quality of ground water in and around Kaithal City town, suitable for drinking purposes or not.
The investigation on Physico-Chemical Parameters of river Bhavani in Three Stations, Tamilnadu, India by K. Varunprasath and Nicholas A. Daniel (2010) They studied on some physico-chemical characteristics of River Bhavani at its source and Mettupalayam and Sirumugai has been calculated for the period of one year (July 2007 to June 2008). The sampling points were selected on the basis of their importance. For surface water determination of water quality index becomes essential and pre-requisite. Analysis of some physico-chemical characteristics like water temperature, colour, electrical conductivity, transparency, total suspended solids, total dissolved solids, pH, dissolved oxygen, BOD, total alkalinity; total hardness has been done during the investigation period. Increase in temperature, turbidity, pH, electrical conductivity, total solids, suspended solids, dissolved solids, BOD values were higher in Sirumugai station, whereas the increase in total hardness, bicarbonate values were higher in Mettupalayam due to the intensity of expulsion of contamination. The dissolved oxygen values higher in Pillur dam station owing to unpolluted water. The Bhavani river has been facing severe anthropogenic activities, mostly due to municipal sewage and industrial waste and dense population.

Water Quality of Jalingachhara and Baluchuri; Streams of District Cachar, Assam, North East India studied by Hafsa Sultana Laskar and Susmita Gupta (2011). A study was conducted for assessing the status of water quality and plankton community of two streams Jalingachhara and Baluchuri of Cachar district, Assam. In both the streams analyses of physico-chemical parameters of water revealed low dissolved oxygen (DO), high biological oxygen demand (BOD), high turbidity, high ammonia and high phosphate in water. Water quality as reflected in Water quality index (WQI) was found to be fair (range: 26-50) in both the streams. In both the systems, phytoplankton community was represented by Chlorophyceae, Cyanophyceae, Bacillariophyceae and Euglenophyceae with Chlorophyceae as the most dominant group. Zooplankton community was represented by Cladocera, Rotifera, Copepoda, Brachiopoda, Rhizopoda, Ostracoda and Zoea larvae, dominated by Cladocera.

Investigation on Quality of ground water of Jaipur city Rajasthan, India and its suitability for domestic and irrigation purpose by R. K. Tatawati and C.P.Singh (2007). They have studied on the groundwater quality of Jaipur city experienced degradation due to rapid urbanization and industrialization. The hydro chemical investigation in the present study was restricted to the major ions concentrations, distributions, their relative abundance and the pattern of the
variability in groundwater chemistry. On the basis of the groundwater chemistry an evaluation of groundwater for domestic and irrigation uses is established. Eleven ground water samples were collected from Jaipur City, Rajasthan (India) from different hand pumps to study the chemical parameter, such as pH, EC, Total Hardness, Calcium, Magnesium, Sodium, Potassium, Carbonate, Bicarbonate, Sulphate, and Chloride, with the help of standard method of APHA during pre-monsoon (April 2006 to June 2006).

Analysis of physico-chemical parameters of water quality in and around Saltpans of Prakasam district A.P done by B. Lalitha kumari (2011). They studied on biggest problem for Human beings which Bore well and open well water were selected for analysis. In the present study located in and around salt pans of Oollapalam and Ooguru of Prakasam (Dt.)in A.P. The potability, salinity and Water Quality Index of available water sources in that area were estimated in the present study. The analysed Physico-chemical Parameters in collected water were, pH, conductivity(mmhos), turbidity, total solids, total dissolved and suspended solids, total hardness, Ca & Mg hardness, chlorides, alkalinity, nitrates, sulphates, phosphates, DO, BOD & COD, Bo, Na, K etc. All these were analysed in mg/l and at last Sodium Absorption Ratio (mmol/l) was also calculated. All these were calculated by below mentioned formulas. The findings clearly indicated that saline effluent has polluted water and the results obtained indicate us that the detrimental impact of saline effluent on water quality rendering it unsuitable for the propagation of life and is unfit for agricultural purposes.

The investigation on Physico-chemical Properties of Water Samples from Manipur River System, India by Singh M. R; and et.al. (2010). They done Assessment of physico-chemical parameters were carried out during April 2008 to March 2009 from four rivers namely the Imphal, Iril, Thoubal and Manipur located in Manipur, a north-eastern State of India bordering Myanmar. Sites I, IV, V and VI were subjected to various anthropogenic activities of man, passing through the urban residential areas while sites II and III from Manipur river were located in a forested watershed and free from human disturbances. Maxima of TDS 870 mg/l, conductivity 467µS/cm, NO3-N 0.550 mg/l, PO4-P 0.068 mg/l and K 9.00 mg/l were recorded during rainy season while maxima of free CO2 22.3 mg/l, total alkalinity 168.0 mg/l, Chloride 42.63 mg/l and total hardness 136.0 mg/l were observed during summer from the rivers indicating degradation of water quality during rainy season than summer. Values of DO was below the minimum permissible limit (4.43 mg/l) and free CO2 beyond the maximum limit
(22.30 mg/l) during summer season at site V. The values of the studied parameters were more during rainy season in Thoubal river followed by Imphal, Iril and Manipur rivers. The results indicated that most of the physico-chemical parameters from Manipur river system were within the WHO limits for drinking water and, therefore, may be suitable for domestic purposes. @ JASEM.

Assessment of drinking water of different localities in Brij region: A physico-chemical study by Shilpi Saxena and Saloni Gangal (2010) was done to establish quality criteria, measures of chemical, physical constituents must be specified, as well as standard methods for reporting and comparing results of water analysis. Keeping it in view the present study was taken up to analyze the drinking water sample of different localities. We calculate the water quality index with the help of fifteen physico-chemical parameters for drinking water of different localities. The estimated values show that some parameters are under the permissible limit and other shows variation from the prescribed WHO standard. The value of W.Q.I. also varies between the 80-200 so the water of these localities are unfit for drinking and human consumption without purification.

Investigation on Determination of Physico-Chemical Parameters of Deoli Bhorus Dam water A M. Kalwale, Padmakar A. Savale (2012). In their study, water samples were collected from two different locations of Deoli Bhorus Dam of Chalisgaon Tahsil Dist. Jalgaon in Maharashtra State, India for physico-chemical analysis. The laboratory test of the collected water samples were performed for analysis of various parameters such as pH, Temperature, Total Dissolved Solids (TDS), Dissolved Oxygen (DO), Alkalinity, Acidity, Total Hardness (TH), Chloride and Phosphorus. The methods employed for the analysis as per standard methods recommended by APHA, WHO, ICMR. The obtained values are compared with the standard limits. The results of this study reveal that the physico-chemical parameters are within the maximum permissible limit of WHO with some slight variations in some parameters. Hence, water is safe and suitable for domestic, irrigation and drinking purposes.

Assessment of Physico-Chemical quality of groundwater in rural area nearby Sagar city, was done by Hemant Pathak and S. N. Limaye (2012). In their study Ground water is one of the major resources of the drinking water in Sagar city (M.P.). In their study groundwater quality of the selected 02 Villages nearby Sagar city were taken for under investigations by forty groundwater samples collected from entire villages and assessed for their suitability for human
consumption. Physico-chemical parameters were carried out during different months of the pre monsoon, monsoon and post monsoon seasons in June 2007–July 2010. The statistical analysis of the collected samples yielded the range of the variation, mean, standard deviation and coefficient of variation. The multiple regression analysis and regression equation indicated that the degraded water quality of Gambhira and Baheria is caused by anthropogenic activities and inappropriate rural water management action plan.

Physico-chemical characteristics of ground water of Manachanallur Block Trichy, Tamilnadu, India has been assessed by M. Rameshaar (2012). Trichy has located in centre of Tamilnadu (India). Manachanallur is one of the main taulk which is called as “green valley of trichy”. It also has a historical importance and is blessed with fertile lands, having and various types of rice mills. It has an area of 36383.85 hectare of land in which 35236 hectare is under cultivation. Manachanallur taulk is located in northern part of the trichy district. Its border populated upto perambalur district. The people in the 40 villagers use kollidam river water and the ground water for drinking. Lot of work has been done and published already on the ground water quality of many village in other taulk of trichy district. But in the manachanallur taulk, there is a need to undertake the study to assess the drinking water quality. Hence water samples of ten villages were subjected to physico-chemical parameters such as pH, electrical conductivity (EC), total dissolved solids (TDS), total alkalinity (TA), total hardness (TH), Calcium (Ca2+), magnesium (Mg2+), Sodium (Na+), Potassium (K+), Chloride (Cl-), Nitrate (NO3-), Sulphate (SO42-) were analyzed (APHA, 1998) The results were compared with standards prescribed by ISI 10500-91/ICMR/WHO and suitable suggestion were made. The correlation coefficients were calculated for water quality assessment.

The investigation on Assessment of physicochemical quality of municipal water samples Makronia sub-urban area of Bundelkhand region Indiaby Hemant Pathak (2012). Municipal water is one of the major resources of the drinking water in Makronia sub-urban area. In the present study samples collected from different localities in and around Makronia sub-urban area were analyzed for their physico-chemical characteristics were carried out during different months of the pre monsoon, monsoon and post monsoon seasons in Sep. 2007 to Sep. 2011. Results show that all the samples are under Indian standard limit for drinking purpose. The statistical analysis of the collected samples yielded the range of the variation, mean, standard
deviation and co-efficient of variation. On the basis of analyses parameters, the results indicated the, satisfactory water quality of the water supplied by Municipal Corporation.

The investigation on Drinking water quality management through correlation studies among various physicochemical parameters: A case study by Navneet Kumar and D.K. Sinha (2010). Statistical regression analysis of twelve data points of underground drinking water of IM2 hand pumps at Moradabad, India was carried out to study the correlation between various physico chemical parameters. Twelve water quality parameters of water of all sites were estimated following standard methods and procedures of sampling and estimation. Comparison of estimated values with W.H.O. standards revealed that water of study area is polluted and water quality management is urgently needed. Regression analysis of these data points suggests that conductivity of drinking water is an important parameter and it is significantly correlated with ten parameters out of twelve water quality parameters studied. It may be suggested that drinking water quality can be checked effectively by controlling the conductivity of water. Present study may be treated as one step ahead towards the drinking water quality management.

Drinking water quality management through various physico-chemical parameters and health hazard problems with their remedial measures in Bhubaneswar city of Odisha, India by Lohani, and et.al(2011). They have studied the physico-chemical and bacteriological study and its adverse effect in Bhubaneswar the capital of Odisha well known as temple city of India are undertaken. Water samples from 39 different locations were collected in post monsoon period. Standard procedures were adopted to calculate their physical, chemical and biological parameters. Bhubaneswar has a typical interface of sedimentary terrain along with alluvium deposits, has got variability in its physical and chemical constituents. The variations are also remarkable on the basis of their lithological aspects. Different parameters of groundwater samples were examined using WHO and Indian Standards to find their suitability for drinking and domestic purposes. Systematic approach between various parameters is simultaneously carried out. Each element and its impact to health problem are discussed. The results are then interpreted to provide the details of the quality and quantity problem suggesting whether water of different locations are within the permissible limit for drinking and domestic purposes as far as different standards are concerned. A new approach has been developed that aims at identifying more important scenarios to evaluate the environmental and environment-induced human health effects. Water samples collected different locations from different sources according to the
availability are thoroughly studied and the results with their remedial measures are interpreted with retrospective suggestions.

The investigation on Analysis of water quality using physicochemical parameters Tamdalage tank in Kolhapur district Maharashtra, India by Manjare et.al. (2010). They studied Physico-chemical Parameters of Tamadalge Water Tank in Kolhapur District, Maharashtra. Monthly Changes In Physical and Chemical Parameters Such as Water Temperature, Transparency, Turbidity, Total Dissolved Solids, pH, Dissolved Oxygen, Free Carbon dioxide, and Total Hardness, Chlorides, Alkalinity, Phosphate and Nitrates. Were analyzed for a period of one year from 1st January 2009 to 31st December 2009. All Parameters were within the Permissible limits. The results indicate that the tank is Non-polluted and can be used for Domestic, Irrigation and Pisciculture.

The investigation on Assessment of Physicochemical Contaminants in Waters and Fishes from Selected Rivers in Nasarawa State, Niger by Aremu and et.al. (2011)They studied on levels of physicochemical parameters (pH, phosphate, chloride, nitrate, bicarbonate, turbidity, conductivity, alkalinity, total dissolved solids, chemical oxygen demand, biochemical oxygen demand, temperature, total hardness and total solid) and microbiological properties were determined in the water samples collected from Rivers Doma, Farinruwa and Mada in Nasarawa State, Nigeria using standard analytical techniques. Metals (Na, K, Ni, Cu, Mg, Fe, Ca, Zn, Pb, Cd, As, Se, Cr and Mn) were also determined from two different fish species (Tilapia zilli and Clarias lazera) caught from these three rivers using atomic absorption spectrophotometer (AAS). The results of physicochemical analyses showed that phosphate and nitrate ions were not present in the water samples during dry season but present in the wet season. Other physicochemical parameter values fall within WHO standard limits. Microbiological tests revealed that Rivers Doma and Mada were not safe for drinking. Magnesium had the highest concentrations in the bodies of two fish species irrespective of the season when the fish was caught followed by calcium while the least concentrated metal was arsenic. Lead and cadmium in the fish samples were not within the detectable range of AAS. Nickel level in the fish sample from Mada River during dry season exceeded the WHO maximum tolerable limit. Therefore, source protection is proposed for these bodies of water for the benefit of mankind because they were not safe for human consumption.
Investigation on Seasonal variation in physicochemical parameters of Khadakwasla reservoir by Kamble, and et.al (2008) The Khadakwasala reservoir is situated near Pune. The study of physicochemical parameters like temperature, pH, electric conductivity, sodium, potassium, calcium, magnesium, bicarbonate, chloride, Sulphate, dissolve oxygen, biochemical oxygen demand, chemical oxygen demand, nitrate, phosphate, silica and iron has been studied in the period of July 2005 to Jan 2006. The study shows that seasonal variation in the physico-chemical parameters.

Statistical analysis of physicochemical parameters of water of river Ganga in Haridwar district India has been done by Joshi, and et.al (2009) They studied on physico-chemical parameters of Ganga river water in Haridwar (Uttarakhand). Systematic calculation of correlation coefficient between water quality parameters has been done with the objective of minimizing the complexity and dimensionality of large set of data. The significant correlation has been further verified by using t-test. The water samples were collected and analyzed for two consecutive years 2007 and 2008 from five sampling stations during three seasons (winter, summer and rainy). In the present study, an appreciable significant positive correlation was found for Free CO2 with Cl- , TDSD, TSSD; turbidity with Cl- , Ec, TSSD; Cl- with Ec, Free CO2, TSSD; Ec with Cl- , TDSD, TSSD. A significant negative correlation was found for DO with Free CO2, COD, and turbidity. Cl- , Ec, TDSD and TSSD.

Investigation on A study of physicochemical parameters of Krishna river water particularly in western Maharashtra by N R Prasad and J.M. Patil (2008). The physico-chemical parameters of Krishna river water was studied in the month of May 2008. Nine samples were collected from different locations. The parameters like pH, EC, TDS, TS, BOD and DO etc. were determined in research lab of DKTE, Ichalkaranji. The results obtained were compared with standards of ICMR and WHO. From the results it was found that the most of the parameters of Krishna river water are within the permissible limit of ICMR and WHO.

The investigation on Biological, chemical and physical parameters of drinking water quality From shallow wells in Malawi a case study of Blantyre, Chiradzulu, and Mulanje districts by M. Pritchard and et.al. A study was conducted in Blantyre, Chiradzulu and Mulanje districts in Malawi to determine the biological, chemical and physical drinking water quality from shallow wells. An in-situ membrane filtration test kit (Paqualab 50) was used to determine the microbiological quality of water and a photometer was used for the chemical analyses.
samples were collected from twenty one covered/protected and five open/unprotected shallow wells at four different times in a year to determine the change in quality with different seasons. The results of microbiological analysis show that the drinking water quality is very poor, i.e. grossly polluted with faecal matter. Total coliform (TC) and faecal coliform (FC) values in the wet season (February and April) were much higher than those in the dry season (August and October). In terms of total coliform, the results show that approximately 80% of the shallow wells tested in the dry season and 100% of the wells in the wet season did not meet the drinking water temporary guidelines, set by the Ministry of Water Development (MoWD), of a maximum of 50 TC/100ml for untreated water. Approximately 50% of the wells failed to meet the faecal coliform drinking water guideline of 50 FC/100ml in the dry season while this figure had increased to 94% of the wells failing to meet the standard in the wet season. Covered wells were not as grossly contaminated as open wells but all of the wells tested failed the MoWD standards in at least one sample. Chemical analyses results were within the drinking water guideline and variations during seasons were insignificant. pH values were within the guidelines in the dry season except for Mulanje district where on average 45% of the wells had pH values below the lower limit of 6.0. In the wet season 50% of the samples had pH values below 6.0. Turbidity values were within the guideline for all covered wells in the dry season, while about 22% had turbidity values greater than the guideline of 25 NTU in the wet season. From these results it is very clear to see that the drinking water from the shallow wells tested, in southern districts of Malawi, is grossly contaminated microbiologically, with this contamination becoming worse in the wet season.

Assessment of Physico-Chemical Parameters of Water and Waste Waters in and Around Vijayawada by V. Jayalakshmi, N. Lakshmi and et.al (2007). The physico-chemical parameters of water and waste waters in and around Vijayawada were studied in the months of January-December 2007 for a period of one year from seven different sites. Selected sites are Krishna river water (site-I), exit canal near Vijayawada thermal power plant (site-II), canal near agricultural fields (site-III), water present in agricultural fields (site-IV), drain water near SIRIS company (site-V), drain water near railway station (site-VI) and drain water near bus stand (site VII). Water samples were analyzed for various physical parameters like pH, temperature, turbidity, conductivity and total dissolved solids and chemical parameters like DO, BOD, COD, phosphates, sulphates, chlorides, hardness, alkalinity and nitrates. The results obtained were
compared with standards of WHO. From the results it was found that the some of the water samples (sites I, II and III) are slightly polluted while waste waters of sites IV, V, VI and VII are highly polluted as a result of contamination with industrial, agricultural and domestic wastes. It is therefore recommended that more strict methods of waste effluent management should be adopted to reduce the inputs of pollutants into the river and surrounding waters.

Investigation on Sources and Quality of Drinking Water in the Lower Volta River Basin, Ghana by Amoah C1. and Koranteng S .S1 The sources and quality of drinking water in four Districts (Dangbe West, Dangbe East, North Tongu, South Tongu) within the Lower Volta Basin of Ghana have been investigated. The sources of drinking water in these areas are Volta river, boreholes, wells, streams, treated pipe borne water, dugouts and lakes. Observations indicate a steady rise of potable water supply from 6% to 28% from 1996 to 2006 respectively. This increase could be attributed to Donor and Government financial support as well as 5% contribution each from the Districts Assemblies and the communities. Majority of the inhabitants however, continue to depend on raw water from the Volta river and streams which have high total coliform (TC) counts of 6 – 840 MPN/100 ml; the faecal coliform (FC) (6-340MPN/100ml) exceeded the WHO limit of 0 FC per100 ml. The physico-chemical quality of parameters such as turbidity, iron and calcium of the river water were also high. Indigenous water treatment technology to improve water quality for household use and drinking has been suggested.