CHAPTER # 2

REVIEW OF LITERATURE
LITERATURE REVIEW

Adeyemo et al., (2008) carried a review of certain geographic parameters to determine the pollution levels of the rivers in Ibadan, in Nigeria. To achieve this, the process of sample collection was done at different points, throughout the length of the rivers, from its origin to its destination, in all the major regions of Ibadan. The period covered was from October 2003 to March 2004 and again from August 2004 to September 2004. The parameters that were assessed were D.O, BOD, pH, chlorides, nitrates and phosphates. Varying levels of pollution from unpolluted to exceptionally-polluted levels was observed during the different seasons, posing a threat to the fish health and biodiversity.

Aggarwal et al., (2012) carried out a study in the Kaushalya River in Parwanoo. The study includes an analysis of two types of parameters, viz. physicochemical and bacteriological. For this purpose, two sites were selected near the origin of the River and two sites were selected near the end point of the river. The process of sample collection was conducted in four specific months of 2011, namely, January, April, July and October. It was observed that except for some parameters, all others were within the permissible limits prescribed by various “Authorities”. However, it was concluded that water was unsafe for domestic use unless purified, since major physicochemical parameters like COD, alkalinity, hardness and major bacteriological parameters - total coliform and faecal coliform were in excess of the limits. The existence of a water treatment Plant at Kamli became necessary to purify the waters before consumption.

Alam et al., (2007) carried out a study to review the increasing levels of pollution in Surma River, Bangladesh. In order to assess the quality of Water, the process of sample collection was done in both rainy season and in summer. An aggregate of 167 samples were taken out. These samples were then tested for different types of parameters viz.–physical, physicochemical, and bacteriological. A fixed distance of 250 metres was kept for each of the sampling point. It was observed that the effluents of paper mills and cement factory have deteriorated the water quality which is shown by high value of BOD and Coliform count in dry season. The study concluded that for drinking purposes the water is not of an adequate quality in the absence of any purification; but for other recreational activities like swimming, industrial use etc. the ‘River Water’ was still of an adequate quality.
**Bhandari et al., (2007)** studied the physiochemical characteristics of Kosi River system, in North India. Samples were collected in all three seasons of the year during 2004-05. It was observed that, except in a few cases, the selected parameters were within the prescribed limits set by WHO. Only two parameters, BOD and Turbidity showed higher values compared to limits. Higher values of Mg and Ca may be attributed to the mining of Dolomite and soil erosion.

**Bilgrami et al., (1998)** conducted a research on the bacterial contamination of the water of the Ganga River. To evaluate the water quality, ‘Bacterial analysis’ of water was done. In order to collect samples, three points in ‘Bhagalpur’, were selected. The points were selected considering discharges of untreated domestic wastes as well as industrial effluents near these points. The observed data was compared with the limits prescribed by ISI and WHO. It was observed that Total Bacterial Density (TBD), Total Coliform (TC), Fecal Coliform (FC), Fecal Streptococci (FS), Escherichia Coli and Clostridium Perfringens were in excess of the limits. It was concluded that the river water was unsuitable for domestic purposes - drinking and other uses.

**Charkhabi et al., (2005)** reviewed the season wise variations in heavy metal concentration in Siahroud River, Iran. The study evaluated seven toxic heavy metals like Zn, Cu, Pb, Cd, Mn, Fe and Ni, which were analysed for five consecutive seasons. The results stated that four heavy metals (Lead, Iron, Cadmium and Manganese) the concentration levels were in excess of limits given by the USPH. It was found out that industrial land-use, use of fertilizers and pesticides for agricultural activities in the watershed area and other anthropogenic activities were the major causes for the high concentrations of the metals.

**Chetia et al., (2011)** carried out a study to review the pollution levels in Brahmaputra river system at Golaghat (Assam), India. The analysis of Arsenic (As) in the under ground water was carried out for this purpose. Samples were collected from different depths of the tube wells in the area. An aggregate of 22 samples were collected in this manner. Along with total Arsenic, an examination of concentration levels of Iron, Manganese, Calcium, Sodium, Potassium, and Magnesium was carried out. Physicochemical parameters like pH, total hardness, and DO were also studied out. Most of the samples were found to be
contaminated by As and Fe beyond permissible limits and the Gamariguri block was found to be affected the worst.

Chopra et al., (2012) studied the Limnochemical characteristics of the Yamuna River at upstream, downstream and at the point of influx of industrial effluent and domestic waste. Their research revealed that the intensity of pollution increased at the point of effluent/sewage disposal causing severe pollution. Thus, indicating the need to treat effluent/sewage before disposal into the river.

Gupta et al., (2011) carried out a physicochemical analysis pertaining to the Chambal River System in Kota city, Rajasthan. The period covered was summer seasons from 2007 to 2009. The pH values, total hardness, alkalinity, chlorides, sulphates and TDS levels were observed to be satisfactory, implying that the pollution was within limits. The presence of iron, ammonia and comparatively lower value of dissolved oxygen indicate the river is polluted to some extent. Overall the river was moderately polluted and only highly polluted at the points of influx of sewage and domestic wastes.

Hema et al., (2008) carried out a study in the River of ‘Tamiraparni River’ which flows throughout the year. The objective was to analyse the pollution levels. The study was with special reference to discharges of sewage water and the presence of Coliform Bacteria in the river water. There were many industrial units on both the banks of the river, which discharged industrial wastes, thereby affecting the quality of the river water. Examination of the samples collected, revealed that the existence of Coliform Bacteria in river water was maximum in December - post monsoon, while it was minimum in May –ie. Pre monsoon.

Hema et al., (2012) performed evaluation of surface water quality using multivariate statistical studies of the Cauvery River in Erode district, Tamil Nadu. The river carries the effluents of a large number of tanneries and textile industries established in this region. In order to draw samples for examination, 50 locations were selected along the course of the river. These samples were tested for thirteen parameters including trace elements like Cd, As, Cu, Cr, Zn and Pb. Multivariate statistical methods like FA, CA, PCA and data interpretation were used to identify low, moderate and high pollutant groups.
Jaji et al., (2007) carried out a review of pollution levels in Ogun River, South West Nigeria. In order to draw samples thirteen different locations were fixed. Over a period of one year, the selected samples were analysed against various types of parameters viz. Physicochemical & bacteriological. It was observed that in case of (i) physical characteristics such as turbidity and Oil & Grease, (ii) metals such as lead and iron, and (iii) Fecal Coliform bacteria, the acceptable limit set by the World Health Organization (WHO) for drinking water, had been exceeded at all the sites. The Mn and Cd concentrations from the study were above the WHO limit. It was reported that the river water is highly polluted and unfit for drinking or domestic use.

Jayalakshmi et al., (2011) assessed the physicochemical parameters of the Krishna River water around Vijayawada, Andhra Pradesh. The water samples were taken during January to December 2007 from seven different sites. Several physical parameters like pH, turbidity, temperature and chemical parameters like D.O, BOD, sulphates, chlorides etc. were determined and compared with standards given by the WHO. The sites around agricultural fields, factories, railway sewage entry and bus station drain water entry were found to be highly polluted.

Jeena et al., (2012) studied the impact of municipal sewage of the Cauvery River in Tiruchirapalli city, Tamil Nadu. Various parameters like pH, Electrical Conductivity, COD, BOD etc. were considered and it was observed that the Uyyakodan canal, which is a tributary of the Cauvery River, was more polluted than the river itself. The reason for this was stated as the dumping of domestic waste and municipal sewage into the canal as it passes through the city.

Jindal et al. (2011) performed a study of physicochemical parameters of Sutlej River around Ludhiana. For the purpose, water samples were taken from three locations along the course of the river. A period of 12 months from November 2006 was considered for this purpose. The concentration levels of some of the physicochemical parameters were assessed. In addition some heavy metal levels were also reviewed. The water was found to be unacceptable for drinking at two out of the three sites.
Joseph et al., (2010) performed an analysis of the physicochemical characteristic of Pennar River water in Kerela. The physical characteristics of water, such as, colour, odour, temperature ane EC were considered. Additionally, the purity of water was assessed by reviewing total suspended solids (TSS), total dissolved substances (TDS) and Total Solids (TS) in water samples taken. The physicochemical parameters, such as, turbidity, pH, alkalinity, hardness, dissolved oxygen, biochemical oxygen demand, chemical oxygen demand, chloride, salinity, fluoride, phosphate and nitrate were also studied. For the purpose of analysis, samples were extracted from 4 different locations in all seasons of the year, viz. rainy, winter and summer. The results indicated that the river is highly polluted and the water is unsuitable for drinking.

Kamal et al., (2007) carried out a study of Mouri River at Khulna, in Bangladesh. For the purposes of the study physicochemical properties of water were analysed. They collected water samples from six different sites regularly over the interval January-March 2002. A total of twenty two physicochemical parameters were studied some of which are Temperature, pH, BOD, COD, Sulphate, Phosphate, Nitrate, Sodium, Iron etc. are major indicators. It was observed that the river was not significantly polluted during the period of observation. A statistical analysis done on sample data revealed that temperature of the water had a positive co-relation with pH, Hardness, Total alkalinity, D.O, free CO$_2$, and sulphate. It was also observed that Biological Oxygen Demand and Chemical Oxygen demand had a strong inverse relationship with dissolved oxygen.

Karaer et al., (2006) carried out a study in the “Nilüfer stream, Turkey”. The objective was to study pollution caused by organic substances. The effects of such substances, as a result of both (i) discharges at specific locations in the river and (ii) its general effect as a result of accumulation through the surrounding environment were reviewed. It was observed that the quality of water was below standards of use. Various factors such as discharge of domestic wastes, sewage, industrial effluents, solid & liquid wastes, pesticides and fertilizers from nearby agricultural lands had contaminated the river. The observations suggest the need for a suitable legislation, installation – operation and maintenance of a waste water treatment plant and a programme for continuous monitoring of the pollution levels in the river.
Khan et al., (2012) studied the physiochemical properties of Jhelum River, Kashmir to find out the variation in properties due to the location of sites from where the water samples are drawn. Variation in the parameters with the change in geographical location of the sample site and season were observed. In some cases, some parameters have crossed the maximum permissible limits set by WHO. The author’s review indicated degradation in the quality of water and threat to all kinds of life.

Khare et al., (2011) conducted the physicochemical analysis of Ganga River water at Kanpur. The analysis involved the water samples taken from six different stations during pre-monsoon season (April-May) of 2010. It was observed that except for turbidity, all other parameters studied were within the most stringent limits set by WHO. The authors concluded by saying that the Ganga river water is most probably unfit for drinking and needs to be treated.

Kori et al., (2011) carried out a study on “Karanja River” at Bidar District, Karnataka. Various parameters affecting the pollution levels of the river water were studied. An aggregate of five locations along the course of the river were selected to collect samples. The period covered was December 2007 to November 2009 i.e. 2 years. A “Water Quality Index (WQI)” was computed by using weighted arithmetic average method on all the sample results. It was observed that the WQI varies from 66.16 to 81.88 in different seasons. Thus, the quality of water is poor and water quality management is essential to prevent further degradation.

Kotadiya et al., (2013) ascertained the “Water Quality Index” (WQI) of a Ghuma Lake, supplying fresh water in a rural area of Ghuma village in Ahmadabad district. The WQI was determined by studying 12 physicochemical characteristics like pH, electrical conductivity, hardness, D.O, BOD, TDS, alkalinity, Mg hardness, Ca hardness, Nitrate, Sulphate and Chloride. The water samples were collected every morning at an interval of 30 days. It was observed that the water from the lake is not suitable for drinking. As a result of saturation of water by evaporation, it was observed that the pollution levels were higher in summer than in the winter and rainy seasons.
Kristof. 1997 says that waters contaminated with waste and sewage, results in the outburst of epidemics in the form of diseases like cholera, diarrhoea, which are major water born diseases and a global health problem. Such health problems are mainly caused by faecal contamination of water. Several millions of people die, while around 2-3 billion people suffer from such diseases as a result of contaminated waters.

Kumar et al., (2006) assessed the quality of water of the Tunga River, Karnataka. They conducted hydro-chemical analysis to measure the seasonal variation in different variables of surface water of Tunga River by sampling at different stations during March to February 2005. A high level of saturation of D.O. was revealed. Additionally it was also observed that concentration levels of nitrate, phosphate, sodium and potassium in river waters were lower than such levels in sub terrain waters of the the region. In case of all parameters, the computed values were found to be within the range specified by Authorities such as WHO. Hence, the surface water of Tunga river water is fit for domestic use but a check needs to be maintained to prevent contamination in future.

Mahadev et al., (2010) assessed the environmental variables in Cauvery River and its tributaries in Mysore, Mandya and Chamaraja Nagar districts. To achieve this, both physicochemical and biological parameters were reviewed. For this purpose, four different locations were selected from where water samples were drawn and evaluated over a period of 1 year. Significant spatial variations were observed in water level, transparency, turbidity, colour, D.O, BOD, NO₃, NO₂ and total hardness among the physicochemical parameters at the study locations. The number of algal species were recorded at various sampling points ranged between 13 -20.

Malviya et al., (2010) performed a chemical assessment of Narmada River water at Hoshangabad city and Nemawar. The samples were collected for about a year at six different sampling sites, four sampling sites were selected in Hoshangabad, one sampling site in Handia village (Harda) and one sampling site in Nemawar village (Dewas). The parameters that were assessed are D.O, BOD, COD, turbidity and total hardness. Some of the sites were found to be highly polluted as compared to others.
Murugesan et al., (2007) carried out a study on Chittar River in the region of Courtallam, in the state of Tamil Nadu. To study the levels of pollution both physicochemical and biological properties of the water samples were studied. Courtallam Falls of the Chittar River is a place of tourist attraction during the southwest monsoon season. In this season high input of detergents and other anthropogenic activities is observed to contaminate the water. This study was performed during peak tourist season to assess physicochemical and biological properties of the river. All physicochemical parameters except sulphate were found within the permissible limits. However, the Total Coliform and Fecal Coliforms counts exceeded the permissible limits, indicating a poor quality of the river water.

Nash Linda. (1993) and Maywald. (1988) have concluded that high levels of nitrates in drinking water can cause health problems. These high levels of nitrates are usually due to leakage of fertiliser water runoff to well water, lakes and rivers which degrades drinking water. Diseases like, methaemoglobinemia (blue baby disease) by depriving the infants of oxygen occur due to high quantum of nitrates in drinking water. Presence of nitrates and phosphates in excessive quantities stimulate the growth of blue green algae. This leads to eutrophication.

Nhapi et al., (2004) carried out a study in the “Marimba River”, in Zimbabwe. The objective was to determine the relationship between sewage discharges and nutrient levels. The “Marimba River” ends in “Lake Chivero” and is one of its major sources. The “Lake Chivero” is the main source of water supply to “Harare City”. Fourteen locations along the course of “Miramba and Little Miramba River” were selected for this study. In order to determine the seasonal variations in water quality, samples were collected for 20 months starting with June 2000. A high level of pollution was observed. Such pollution level was observed to be quite high in nitrogen and phosphorus, which provide nutrients to micro-organisms. The of discharge of domestic wastes, sewage, industrial effluents and fertilizer and pesticides from agricultural use near the origin of the river contributed to the increase in levels of nutrients – like nitrogen and phosphorus. They exceeded the limits set by Authorities, such as, WHO. The adverse effects felt upstream were enhanced as the river flowed over to its destination.
Offiong et al., (1998) conducted a study on Cross River basin the region of Akpabuyo, in the Southern part of Eastern Nigeria. The objective was to study the pollution levels in the River. In order to achieve this, an aggregate of twenty one sampling points were selected. Each sample was reviewed for organoleptic, physicochemical and the biological parameters. It was observed that the river waters were soft, fresh, an acidic to an extent and were featured by a low ‘Sodium absorption rate’ (SAR). The levels of major cat ions and anions were observed to be within the limits prescribed by Authorities viz. the World Health Organisation. Since, all parameters except pH were within the limits prescribed by the relevant authorities, such as, WHO, the river water were considered to be of a quality adequate for drinking, recreational, household, agricultural and other allied purposes.

Olajire et al., (2001) carried out a study to review inorganic nutrients present in the Osun River water samples and the neighboring groundwater samples. They determined the concentrations of ions like Na$^+$, Ca$^{2+}$, NH$_4^+$, Cl$^-$, NO$_3^-$, CN$^-$ and PO$_4^{3-}$ and the values of parameters like pH, temperature, electrical conductivity, etc. In order to achieve this, 8 sampling locations were selected. The samples were drawn over a period of four months commencing May 1998. The authors observed that the values of certain parameters were higher than standard acceptable limits, indicating that the water was unfit for drinking and other uses.

Ombaka et al., (2012) conducted a study on the “Irigu” River in the Meru province of the Southern part of Kenya. In order assess the quality of the River “Irigu” both physicochemical and bacteriological parameters were evaluated. The sample collection and analysis was done both in the summer and rainy season. Certain parameters like pH, turbidity, NH$_3$ were high during the dry seasons due to anaerobic decomposition of organic matter. The phosphorous levels were beyond the limit which was likely to trigger periodic bloom and eutrophication. Metals like Fe, Mn, Pb and Al were beyond permissible limit. It was therefore concluded that the river waters could not be used for drinking and other allied domestic purposes.

Patel et al. (2003) carried out a study of the surface water in the Amirdad taluka in the Northern part of Gujarat. For this purpose the physicochemical properties of the water were studied. Various parameters, such as, pH, EC (electrical conductivity), TDS (total dissolved
solids), and TH (Total hardness) were analysed. Also the levels of chlorine and various metals were investigated. The study revealed that the values of certain parameters exceeded the permissible limits.

*Pathak et al., (2011)* studied the interdependency between the physicochemical water pollution indicators. The research was carried out in the summer, rainy and winter seasons. The samples were collected for a period of three years commencing 2008, from ten different sampling stations on the “Bebas River” in the Sagar region of Madhya Pradesh. The pollution levels in the sample waters were evaluated after investigating the samples for twenty one parameters. On the basis of the correlation observed in the sample data, statistical tools were used to estimate a variable when the other variable was known.

*Prabu et al., (2008)* carried out a study of the Huluka River of Ambo region, Ethiopia. The objective was to assess the purity levels of the river water as the river flowed towards its destination. In order to achieve this, five different sampling points were selected along the course of the river. The samples were collected over a period of six months commencing February 2007. Various parameters like pH, hardness, magnesium, chloride etc. were considered. The actual values of the different parameters were then compared with the standards set by “Canadian Council of Ministers for Environment”. It was found that most parameters exceed the limits and the water quality was found to deteriorate steadily, due to the direct discharge of domestic and municipal sewage. It was also found that the water quality worsens as one goes further downstream.

*Rahimibashar et al., (2012)* studied the effects of fish Culture pond on the water quality of the Shenrod River, Iran. They had six sampling sites before and after each fish ponds, which were sampled for water on a weekly basis, from April to September 2008. The results showed certain physicochemical parameters had crossed the permissible limit at study point after the fish ponds. The high values of NH$_3$, Nitrate, Sulphates and high value of hardness indicate that domestic and industrial waste has adverse effect on the river waters.

*Rai et al., (2010)* carried out a study on Ganga River at Varanasi. The objective was to investigate into the water quality. The study covered a period of 12 months commencing
March 2005. The process of sample collection was done at three points where STP (Sewage treatment Plants) of Bhagwanpur, Dinapur and DLW discharged the sewage into the river. This water was then used by nearby villages for irrigation. It was observed that at all the three sites the values of BOD, heavy metal concentrations (Cu, Zn, Pb, Cr, Cd) were above the standards set. The high count of E-Coli and Coliform bacteria indicated microbial and fecal pollution to a great extent.

Rai et al., (2011) carried out a study on the “Harmu” River at Ranchi. The objective was to assess the effect of discharge of sewage on the water quality of the river. Three different sampling points were selected for drawing samples. The samples drawn were then investigated for various physicochemical parameters, such as, pH, electrical conductivity, alkalinity, chloride etc. The results obtained were compared with permissible limits given by the WHO. The obtained values exceeded the standard limit making it unfit for drinking purposes.

Rai et al., (2012) carried out a review of the water of Ganga River at Patna, Bihar. The objective was to assess the levels of pollution of the river. For this purpose, two sampling points were selected. The study was carried in two seasons, viz. winter and summer. The actual values of the various parameters, obtained on the basis of analysis of sample data were then compared with the limits prescribed by WHO. It was observed that the standard limits prescribed by the relevant authorities such as WHO had been exceeded in a high number of cases. It was concluded that the water is unfit for drinking and it needs to be purified before it can be used for domestic consumption.

Rajamanickan R. et al., (2010), carried out a review of water of Amravati river basin, Karor. The objective was to determine how pollution levels were affected by effluents released by textile dyeing units on ground water quality of the river. It was observed that the pollution levels had enhanced as a result of increasing discharge of pollutants into the river. Comparison of the sample data with the standards prescribed by WHO, revealed that various physiochemical parameters, such as, TDS, TA, TH, Ca, Cl, SO₄ were in excess of the prescribed limits. It was concluded that a visible effect on the pollution levels of water had been caused due to the discharge of industrial wastes.
Samanta et al., (2005) carried out a review of water of rivers Hooghly and Haldi at Haldia. The objective was to determine the levels of toxic heavy metals and study the impact such enhanced levels (of toxic metals) have on fish life. The period covered by the study was spread over three years (June 99 to October 2002). Several sampling points were selected to draw samples (including Patikhali – where there was heavy industrial discharge). The existence of five (Cu, Cd, Mn, Pb & Zn) heavy metals in sample waters was quantified. It was observed that the concentration of the metals was least at the location which was before “the Haldia industrial area”. The value of various metals obtained from sample data was compared with “the Criterion Continuous Concentration (CCC)” of USA. The levels of Cd, Cu and Pb were observed to be quite high. This has an adverse effect on the various aquatic life forms present in the river or surrounding environment; it affects the functioning of the organs of the fishes.

Samuel A.et al., (2010) conducted a study on water quality of Noyall River, Tamilnadu. Several textile dye units discharged their effluents into the river. The study was carried out to find the correlation between the effluents discharged and the pollution levels in the river water. High levels of Total Dissolved Solids (TDS) and Cl were observed from data obtained from investigation of sample results. Heavy metals were also found in dam sediments.

Santhi D. et al., (2011), carried out a review of water quality in Kodumudiaru dam in Tirunelveli District. Various physiochemical parameters, such as, pH, Electrical conductivity, total hardness, total alkalinity and presence of metals, such as Ca, Mg etc. were analysed for the purpose of the study. Equipments like pH meter and Conductivity Bridge were used. The results revealed that the various parameters, referred to above, were within permissible limits and hence the dam water was safe for drinking, agriculture etc.

Saxena et al., (2008) carried out a study on Chambal River, in Madhya Pradesh. The objective was to study physicochemical parameters from the water samples drawn. The water shed area of the river, falls in the “National Chambal Sanctuary’ region. They studied, DO, Turbidity, pH, EC etc. Other parameters, like Total Hardness, Total Alkalinity, chloride, nitrates, sulphates, sulphides, BOD, COD, Na & K were also studied. The period of their study covered one year. It was observed that all the parameters
investigated were within the standards prescribed by relevant authorities viz. Indian Standard bureau. This indicates that water is free from pollution.

**Sharma et al., (2011)** carried out a study on “Narmada River” water at Hoshangabad, in Madhya Pradesh. The objective of the study was to review the physicochemical parameters from the sample water. The study showed that the values of the parameters at some of the sampling sites were in excess of the standards set by agencies such as Indian Standard Bureau, WHO. This was due to dumping of substantial wastes in the river waters. Thus, the potable nature of the water is lost.

**Sharma et al., (2012)** performed an evaluation of the physicochemical parameters of the Narmada River, Madhya Pradesh. The study covered a period of 12 months commencing August 2009. In order to draw water samples, three different sampling stations along the course of the River were selected. The various parameters considered were pH, temperature, transparency, D.O, BOD, chlorides, phosphates, nitrate, alkalinity, sulphates and total hardness. Phosphates, nitrate, alkalinity, sulphates were found to be high in September and October whereas pH, temperature, chlorides and total hardness were high in summer. The overall values of the parameters were within the WHO limits.

**Shinde et al., (2011)** studied the physicochemical parameters and the correlation coefficient of Harsool-Savangi Dam, Aurangabad. In order to draw water samples, 4 distinct locations were selected along the course of the river. The period covered was one year from January to December 2009. The values of the parameters indicated that the water was rich in nutrients and fit for irrigation and fish culture. Only in the monsoon, the total hardness increases making it unfit for drinking. The correlation coefficient indicated positive and negative significant correlation of physicochemical parameters with each other.

**Shiv Shankar et al., (2010)** carried out a study in Nagpur Municipality region. The main objectives of this work were to evaluate the quality of water in lakes, well, bore wells etc. The geochemical effect on the physiochemical properties of water was reviewed. Various factors such as the presence of fluorides, chlorides, the pH of water, EC, D.O were analysed. The analysis of different samples revealed that though the lake water was suitable
for drinking, the well/bore well water was not of an adequate quality for human consumption.

_Shrivastava et al., (2012)_ carried out a review on the sewage disposal into the Mancha River in Betul City, Madhya Pradesh. The water samples were collected from nine different sampling points, which had sewage inlets nearby. This exercise was conducted in early summer (in March 2009), in the rainy season (in July 2009) and after rainy season (in November 2009). They studied water quality for physicochemical parameters like D.O, COD, BOD, chlorides, nitrates etc. On comparing the data obtained with the amounts prescribed by the WHO, it was found that all the parameters exceeded the prescribed limits.

_Singh M. et al., (2010)_ carried out a review of physiochemical parameters of river, Gomati, at Karekat in UP. The study concentrated on parameters such as Calcium, Manganese, Iron and Chloride. It was concluded that the high concentration levels of Iron & Cl observed, were harmful to metallic pipes and structures as well as agriculture.

_Sowmyashree et al., (2013)_ have carried out a study near the origin of Tungabhadra River in the Western Ghats of India. The objective was to review the pollution levels with special reference to seasonal variations in the physiochemical properties of the river waters. The period covered was 12 months commencing from December 2009. Physiochemical parameters like temperature, conductivity, dissolved solids, pH, Hardness, D.O, total alkalinity, chlorides, Ca & Mn showed seasonal variations due to local climatic conditions. Analysis of the physiochemical parameters, for the area which was selected for the collection of sample, revealed low levels of concentration of the parameters analysed. These were within the permissible limits set by various agencies such as WHO and the water was ‘safe’ for drinking purposes.

_Sreeja et al., (2012)_ assessed the physicochemical parameters of the Kodayar River, Tamil Nadu at seven sampling stations from June 2010 to June 2011. Various parameters, both physical and physicochemical, such as, temperature, electrical conductivity (EC), total dissolved solids (TDS) were evaluated. The data obtained from the sample analysis was compared with the limits prescribed by various agencies, such as, WHO and ISI. It was found that water at most stations was not contaminated and was fit for domestic use. At
some stations where the contamination was higher, preventive measures need to be adopted to avoid further contamination.

_Thakare et al., (2012)_ performed a study of the metal pollutants of the water of Wardha and Dham Rivers at Wardha, Maharashtra. The water was collected from 10 different points on the Dham River and 9 different points on the Dham River. It was tested for seven metals – Cu, Mn, Fe, Zn, Ni, Na and K and 9 other physicochemical parameters. The results obtained showed that the values of all the parameters were within the safe standards laid down by Indian Standard Bureau. Hence the water of these rivers was completely harmless for human beings and fit for irrigation and domestic use.

_Ugwu et al., (2012)_ analysed the impact of growing population in the city of Abuja in Nigeria by studying the seasonal physiochemical characteristics of the Usma River. The study revealed that all parameters measured were within the permissible level except Total Suspended Solid, which exceeded for all seasons. The values for electrical conductivity and total dissolved solids showed that the discharges of domestic and industrial wastes in the river water as a result of human activities were responsible for the increased levels of pollution.

_Venkatesharaju et al., (2010)_ conducted a physicochemical and bacteriological investigation on Cauvery River, Karnataka. The study was conducted during a period of 3 years from 2006 to 2008. The objective of the study was to investigate into both – physicochemical and bacteriological parameters. Six sampling stations were selected along the Kollegal region of the river to draw appropriate samples. The samples were analysed for nineteen physicochemical and two bacteriological parameters. It was found based on the physicochemical parameters that the river is not polluted and all the parameters are within the permissible limits specified by the “Bureau of Indian Standards”. The high values bacteriological parameter however means that the water is not safe for drinking.

_Verma et al., (2010)_ carried out a study on the “Kalpi River” at Gwalior in Madhya Pradesh. The objective was to investigate into water quality of the river. They reported the values of various pollution parameters such as transparency, electrical conductivity, BOD, COD etc. at six different locations. It was concluded that to achieve a reduction in the level
of pollution, it was essential to have an organised approach to the problem of “Water Quality Management” – incorporating both aspects of quality and adequacy.

_Yadav et al., (2011)_ carried out a study on Kosi River in Rampur District, Uttar Pradesh, India. The objective of the study was to evaluate the quality of the river water. An aggregate of fifteen sampling stations were selected along the course of the Kosi River in order to draw sixty water samples for the study. Various physical characteristics and physicochemical parameters of water were examined. These included temperature, pH, transperancy, total hardness (TH), total alkalinity (TAK), Biological Oxygen Demand (BOD), Chemical Oxygen Demand (COD), chloride, nitrate and phosphate and fluorides. The results of the sample analysis were compared with the standards laid down by agencies such as “Indian Standards Bureau”. All sample observations were found to be beyond the permissible limits laid down. Therefore the river water was unfit for consumption, domestic and irrigation purposes.

_Yang et al., (2007)_ carried out a study on Huangpu River, China. The objective of the study was to evaluate the quality of the river water. The period covered by the study was the year 2004. The water samples were drawn on a bi-monthly basis. In order to collect samples five different locations along the river were identified. Various physicochemical parameters like pH, SS, D.O, BOD etc. along with the total bacteria and E. coli content were calculated. From the values and correlation parameters it was observed that the high nutrient content of the water had led to the growth of microorganisms, which in turn increased the BOD of the water. Due to the high demand for oxygen, there is a decrease in the nitration rate. This affects the quality of the river waters.