CHAPTER - II
LITERATURE SURVEY/REVIEW
REVIEW OF LITERATURE

Twenty-first centuries have plagued the humanity with new problems due to industrialization and at the same time population explosion. Pollution has come to the forefront and has become a major threat to the very existence of mankind. The cry of pollution is heard from all corners of the world and it is the major challenge of our times (Sharma, 2004). Various workers in our country have carried out extensive studies on Water Quality.

Lamikanra, 1999, reports municipal water production and distribution is safe and fit for human consumption. A good knowledge of the chemical qualities of raw water is necessary so as to guide its suitability for use. Thus, regular physico-chemical analysis of water at source be carried out be to determine or check the effectiveness of treatment process.

According to World health Organization (WHO, 2013), the physical parameters that are likely to give rise to complaints from consumers are color, taste, odour, and turbidity while low pH causes corrosion and high pH results in taste complaints.

A large number of studies every year are done on the quality of water. Garg et al. (1990) studied the various water quality parameters of ground water of Roorkee city. A systematic calculation of correction coefficient ‘r’ for eight water quality parameters of 72 samples collected from 6 different places of water supply sources (Tube Well) for 12 months and the result show that, large positive correlation between BOD and Permanent Hardness (r = 0.991) and for BOD and Total Hardness is r = 0.989.

Abdul Jameel (2002) studied drinking water quality in and around Tiruchirapalli city and found that water contained high level of inorganic salts and total hardness with high electrical conductance.
Studies done on river Pani, and Mishra (2000) showed that the main pollution in the river is the dispersal of sewage water from the surrounding area which made water unsuitable for drinking and irrigation purposes.

Similarly, Dudey et al. (1999) A survey was conducted in the villages adjoining newly developing Malanpur Industrial Complex so as to ascertain the current status of groundwater quality in the region. The study reveals that the values for secondary drinking water standards were satisfactory except some parameters which have little health significance. Since, the study reports on groundwater quality in villages adjoining an industrial area, this baseline date on the groundwater quality will help in assessing the impact of industrialization on the environment through regular monitoring in future.

Mishra et al. (2008) studied water quality of Anand district, Gujrat, which provides information needed for ground water management in region. Jinwal and Savita Dixit (2008) to the study area selected was total urban area of “The City of Lakes” Bhopal, M.P. Water samples were drawn from bore-well and hand pumps during Pre and Post monsoon period of the year 2007. Better water quality was found in Post-monsoon season than Pre-monsoon. Extent of pollution occurred due to over exploitation of ground water, urbanization and anthropogenic activies.

Shivasharanappa et al., (2012) the study area Bidar City. The city including its industrial area is divided into 35 wards. In this study for the purpose of revealing the water quality of 35 bore wells of 35 wards covering the study area have been established by determining the physical and chemical characteristics as per standard methods. The water from all the wards after the analysis revealed that there is less pollution, except the iron parameter, which is little higher at few places. This might be due to the laterite soil prevailing in the region.

Khangembam and Gupta (2008) regarded Nambul River as one of the most polluted rivers of Manipur which receives a heavy flux of sewage,
domestic and agricultural wastes and other effluent which may vary from simple nutrients to toxic and hazardous substances.

Aggarwal TR et al. (2000) to study the impact of sewage on the chemistry of Varuna river water, four study sites were selected along the Varuna river corridor to evaluate the impact of sewage on the chemistry of Varuna river water. Results indicate that the sewage discharged into the river increases the temperature, pH, alkalinity, BOD, COD, chlorides, nitrates, phosphate, potassium, calcium and heavy metals contents. The dissolved oxygen and transparency decrease due to the mixing of sewage into the river water.


Limnological studies on the water bodies in and around Gwalior-Chambal region have also attracted the attention of various workers. Verma (1969) Studied hydro- biological features in relation to carp breeding in Takenpur tank Gwalior. The physico-chemical characteristics of Harsi reservoir (Kushwah, 1988), Tighra reservoir (Dixit 1989), Motijheel (Kaushik and Saxena 1992), Shivpuri (Mishra et al., 2010) A Limnological study was carried out on Sakhya Sagar Lake Shivpuri (India) and physico-chemical characteristics of Sakhya Sagar Lake were studied for a period of twelve months from one year (2007). Again Tighra reservoir (Mohor, 2011), Datia City (Singh, 2012) Gwalior City (Saxena, 2014) have been studied.
In Madhya Pradesh several water bodies were considered for limnological studies. Verma (1964) probably, made the beginning of Limnological work and reported diurnal variations of physico-chemical characteristics of Dal Sager Tank and, in seoni. Sakhyasagar lake (Bajpai et al., 1993) Limnological Studies to Assess Water Quality of lower and Upper Lake, Bhopal. Khare, P., (1998). Limnological studies of Jagat Sagar Pond Rewa (M.P.). Thakre (2010) Limnological Studies to Assess the Water Quality of “Tapti Pond” At Multai District, Betul (M.P.). Water quality of Ramghat dam, Mirzapur dam and pashpatinathpood in Mandsour district, Madhya Pradesh have been investigated by Deepali et al., (2011) and concluded that the Pashpatinath pood showed higher concentration of nitrate, phosphate due to many domestic activities as compare to other site. Dubey (2012) Limnological Studies on Khop Niwari Tank with Special Reference to Phytoplanktons, The present work is pertaining to study the permanent standing water body in village district Chhatarpur, Madhya Pradesh state, the period of study extended over a period of six months from 2011. Verma (2013) Studies on the Limnology of Future Anthropogenic Pond of Damoh District (M.P.)

Aher HR et al. (2000) Present investigation aims to assess the status of ground water quality of Pravara area in Maharashtra where molasses were given continuously as a fertilizer. The pollution may slowly occur with time due to percolation. The various physico-chemical parameters are listed.

Choudri B.S. et al. (2001) Sediments have been collected from Rayapur and Sattur ponds around Lakamanahalli industrial area and analysed for trace elements content. Sediments showed 2 fold increased level of studied elements concentration in comparison with relatively non polluted values. Further, the results of correlation coefficient and t-test values indicate positive correlation in deposition and significant at 5% level of confidence. The higher content of these trace elements in the sediments is attributed to surrounding industrial activity.
Dahiya Sudhir et al. (2000), A study on fluoride levels in underground water of seven villages of Tosham sub division, district Bhiwani (Haryana) was undertaken. Fluoride content in 56% samples was found to be more than the WHO permissible levels. Fluoride concentration in the studied samples ranged from 0.18 to 9.0 ppm with an average of 2.92 ppm. A negative correlation of fluoride with pH and positive with EC and total availability with a low level of significance has been observed.

Kumar et al. (2006) has studied seasonal variation in physico-chemical characteristics of Ranjit Sagar Reservoir (Jammu & Kashmir) and found out that most of the water quality parameter indicated better water in the reservoir. Nitrates and phosphates were higher during monsoon and post-monsoon period in a perennial water body at Kolhapur (Hujare, 2008). Similarly, Jain Renu (2008) has studied the physico-chemical seasonal analysis of singwasa reservoir, MP India. Silicate, calcium, Potassium, Magnesium, Concentartion in Suraj Kund was quite similar to that observed by Kaushik and D.N. Saxena (1991) in their study., Grag et al. (2010) have shows that the Seasonal variations in water quality and major threats to Ramsagar reservoir, India and this is a small inland reservoir located in Datia district, Madhya Pradesh is constructed over Nichroli nallah, in the basin of Sindh River. The physico-chemical characteristics, trophic status and pollution studies of Ramsagar reservoir have been studied from April, 2003 to March, 2005.

Jach CK et al. (2000), a hydrochemical study of the ground water of district Sagar has been carried out to examine the suitability of water for drinking and irrigation purposes. The results of the study provide information needed for ground water quality management in the region. The values of sodium adsorption ratio indicate that ground water of the area falls under the category of low sodium hazards. The ground water of the region has also been classified and characterized on the basis of hydrochemical facies and their quality for agricultural use.
Jain CK, Sharma MK (2000), Ground water samples from different villages of Sagar district in Madhya Pradesh have been analysed for various water quality constituents during pre-monsoon and post-monsoon seasons and correlation coefficients among different parameters were determined. An attempt has been made to develop regression equations to predict the concentration of water quality constituents having significant correlation coefficients with electrical conductivity. The usefulness of these equations in predicting the ground water quality is discussed.

Jain CK, Sharma MK, Bhatia KKS, Seth SM (2000), Paper discusses the significance and general description of the problems of fluorosis to create public awareness among the people of the country and appraise them with various treatment methods to combat with the problem of fluorosis. Techniques for defluoridation are based on precipitation, adsorption, ion exchange, reverse osmosis, electro-chemical deposition etc. Nalgonda technique which involves the addition of lime and alum for defluoridation is extensively used in India.

Srivastava S.K., et al (2000), the occurrence of fluoride, more than the permissible limit has been observed in the shallow aquifers of Puri district. Few high fluoride levels have also been found in deep tube wells. Granite gneisses in the Northern part of the district may be the source of high fluoride in deeper aquifer. Alluvium containing mica, in the remaining areas, appears to be the main contributor of fluoride to shallow aquifers. Use of phosphatic fertilizers may also be one of the reasons of high fluoride in shallow aquifers.

Similarly, Umarani, P., A. Ramu, (2014), the study is to investigate the fluoride pollution of groundwater in the South east coastal regions of Tamil Nadu, India. Totally 36 ground water samples have been collected from open dug well, hand pump and bore wells in the east coastal region from Rameshwaram to Thiruvanmiyur during the year 2011. Samples were analysed to find out the fluoride ion along with physical and Chemical Parameters. The
fluoride content of ground water ranges from 0.02 to 1.54ppm suggests domestically not suitable.

Jha AN, Verma PK (2000), Paper reports analysis of physico - chemical factors of drinking water of a small Godda, Bihar. Most of the physico-chemical parameters were within the limit of drinking water standards. Zn, Ni, Fe, Pb, Cu, Mn and Co exhibited lower concentration and stand far below the standards laid down for water quality. Well water was characterized by a very high concentration of chloride, chromium and selenium, quite above the standards limit. The well water appears to be of poor quality and not suitable for drinking purpose.

Ramesh HS, et al. (2000), a study on subsurface water quality in Kalayarkoil Panchayat Union of Sivagangai District in Tamil Nadu has been carried out. Analysis of trend and spatial distribution of various chemical parameters predominantly affecting the subsurface water quality of study area in premonsoon and postmonsoon seasons has been made. The study reveals that the concentration of parameters analysed shows increasing trend in both season and its is more in postmonsoon season, indicating increasing rate of leachate into subsurface water during monsoon period., In the same way, Saravanakumar, (2008), Seasonal variation in physicochemical characteristics of water, sediment and soil texture in arid zone mangroves of Kachchh-Gujarat.

Shib Abir, (2014), the study of water quality of Rudrasagar Wetland, Tripura with regards to various physico chemical parameters is found to be highly fluctuated with seasonal variations. High value of DO obtained during winter months and shows inverse relation with water temperature, EC, TDS, Chloride, COD have had maximum concentrations in summer. The correlation coefficient showed positive and negative relationships among the parameters. The study revealed that the water quality is rich in TDS, Phosphate and Nitrate content which indicates that of Rudrasagar wetland is moderately eutrophicated.
Sharma Dushyant, Jain Ram (2000), Gopalpura tank, one of the artificial water bodies of Guna (M.P.), is used for irrigation as well as for pisciculture by the villagers. Various physico-chemical factors were found to be interrelated. Study of various physico-chemical factors also indicated that the tank is quite suitable for pisciculture and proper awareness of its culture in scientific way should be taught to the villagers for its proper utilisation and exploitation.

Parihar et al., (2012). In the present study, physico-chemical and microbiological characteristics of the drinking water, were determined in July 2009 from different location in Gwalior region, M.P., India. Total 16 water samples were collected from different locations in and around Gwalior city. The observation of study strongly suggest that water of Gwalior region is of very high TDS and needs to be lowered down within prescribed limits before using it for drinking purposes. Also, the water samples were showing microbial content beyond the portability range, which needs to be disinfected before consumption to avoid water-borne diseases.

Kulkarni and Shrivastava, (2000). The industrial effluent samples have been collected from both the industrial areas of Pandesars and Sachin GIDC areas of Surat city. Some nearby soil and ground water samples were also collected for correlation and comparison. Statistics of all the parameters have been evaluated. These efforts are important for the assessment of ground water pollution in and around the selected area.

Singh, et al. (2001). Fiftyeight irrigation water samples were collected from 58 villages of Chirawa Block, Jhunjhunu district. EC of irrigation water has significant positive correlation with EC of soil and weak positive correlation with pH of soil. Significant positive correlation was found in SAR (0.53) and RSC (0.47) of irrigation water with pH of soil.

Soil is the basis of the life in the universe, directly or indirectly. Tyagi Poonam et al (2000), a review of available work on physico-chemical quality of ground water in industrial areas of zinc smelter plants, ore-mining industries,
steel plants, thermal power plants, tanneries, distilleries and heterogeneous group of industries in India has been undertaken.

Singh KK et al (2001), Fifty-eight irrigation water samples were collected from 58 villages of Chirawa Block, Jhunjhunu district. EC of irrigation water has significant positive correlation with EC of soil and weak positive correlation with pH of soil. Significant positive correlation was found in SAR (0.53) and RSC (0.47) of irrigation water with pH of soil.

Bahuguna, et al., (2011). The present study encompasses the evaluation of the physicochemical parameters and bacterial load of seven different automobile contaminated soil samples collected from different locations of Uttarakhand, India. The soil temperature ranged from 38 o C to 43 o C, pH 6.80 to 8.10, and moisture contents 0.4721.864 mg/g of soil. The inorganic phosphates, nitrates and total organic contents ranged 0.0300.499 mg/g, 0.2217.112 μg/g, and 75.25270.3 mg/g of soil respectively. In this study, it was concluded that the soil samples obtained from motor vehicle repair stations near to market and industrial area were found to be highly contaminated with PAHs. These sites showed high temperature, low moisture contents and low bacterial count in the soil.

Lokeshwari et al., (2006) identified that the sewage water irrigation to be important source of heavy metal contamination of agricultural soil and reported the contamination of vegetation due to irrigation of plough fields soil with water from Bellandur lake Bangalore which received the sewage of city containing heavy metal trace in water. Comparing the result of heavy metals in water, soil and vegetation samples especially rice and vegetable with their respective natural levels.

Studies on quantitative soil contamination due to heavy metals were carried out in Katedan Industrial Development Area (KIDA), south of Hyderabad, Andhra Pradesh, India under the Indo-Norwegian Institutional Cooperation Programme. There are about 300 industries dealing with dyeing,
edible oil production, battery manufacturing, metal plating, chemicals, etc. Soil samples were collected throughout the industrial area and from downstream residential areas and were analytical by X-ray Fluorescence Spectrometer for fourteen trance metals and ten major oxides. The analytical data shows very high concentrations of lead, chromium, nickel, zinc, arsenic and cadmium throughout the industrial area. The study not only aims at determining the natural background levels of trace elements as a guide for future pollution monitoring but also for future pollution monitoring but also focuses on the pollution vulnerability of the watershed (Govil et al., 2007). A field study was conducted at three major sites that were irrigated by either treated or irrigation water, soil and the edible portion of the palak (Beta vulgaris L. var all green H) were collected monthly during the summer and winter seasons and were analyzed for Cd, Cu, Zn, Pb, Cr, Mn and Ni. Heavy metal in irrigation water were below the the internationally recommended (WHO) maximum permissible limits set for agricultural use for all heavy metals except Cd at all the sites. Similarly the mean heavy metal concentrations in soil were below the Indian standards (IS) for all heavy metals, but the maximum value of Cd recorded during January was higher than the standard. However, in the edible portion of B. vulgaris, the Cd concentration was higher than the permissible limits of the Indian standard during summer, whereas Pb and Ni concentrations were higher in both summer and winter seasons. Results of linear regression analysis computed to assess the relationship between individual heavy metal concentration in the vegetable samples and in soil showed that Zn in soil had a positive significant relationship with vegetable contamination during winter. Concentration Cd, Cu and Mn in soil and plant showed significant positive relationship only during summer. The study concludes that the use of treated and untreated wastewater for irrigation has increased the contamination of Cd, Pb and Ni in edible portion of vegetable causing potential health risk in the long term from this practice. The study also points to the fact that adherence to standards for heavy metal contamination of soil and irrigation water does not ensure safe food (Sharma et al., 2007).
Abad et al., (2014), Land use changes from natural ecosystems into managed ecosystems resulted in negative effects on soil structure and quality. This study was to determine the effects of different land-use types on physicochemical properties of soils in Jafarabad region, Northern Iran. Twenty seven of soil samples were collected from the 0-30 cm depth of three different adjacent land uses. Land use changes from forest to agriculture resulted in significant decreases in silt contents, aggregate stability, N, P, K and organic matter and with this change, bulk density, sand content and pH was increased significantly. The results of study showed that forest clearing and subsequently cultivation and tillage practices resulted in the decline of the soil quality and these changes affects on soil sensitivity to degradation and erosion. Based on the results, soil nutrient in the natural forest and agriculture lands are highest and lowest respectively.

Krishna et al., (2007) did the study on soil contamination on Surat, Gujrat (India). The aims of the study work to determine extent and distribution of heavy metal (Ba, Cu, Cr, Co, Ni, Sr, V and Zn) to find out the large scale variability and to delineate the source as geogenic or anthropogenic based on the distribution maps and correlation of metals in soils. Soil samples were collected from the industrial area of Surat from top 10 cm layer of soil. These samples were analyzed for heavy metals by using Philips PW 2440 X-ray fluorescence spectrometer. The data reveal that soils in the area are significantly contaminated, showing higher leaves of toxic elements than normal distribution. The higher concentrations of these toxic metals in soils to be monitored regularly for heavy metal enrichment.

Rajbala and Bhaskar, (2012). This article presents an overview of impact of steel industry on soil nutrient quality. 20 Samples were collected from different places of Jindal Strips Ltd. steel plant of Hisar district (Haryana). The quality analysis has been made through physical parameter (WHC, Bulk density, Colour, pH) and chemical parameter (Sulphates, Phosphate, Na+, K+, Org.C, Chloride ion ,Ca$^{+2}$, Mg$^{+2}$). A systematic
calculation of the correlation coefficient has also been carried out between different analyzed parameters. Comparative studies of samples were conducted and it was found that soil is not acidic in nature; it is alkaline soil which has pH in range of 8.1 to 11.6. Value of calcium and magnesium is very high of some and these are the major nutrient for plant growth.

Singh, et al., (2015), the study of soil for parameters of pH value, Electrical conductivity, Organic carbon phosphorus, Potassium Cation exchange capacity, Calcium, Magnesium in a year of 2013-14 of JP cement industrial area in Rewa city (M.P.). Ten Soil sample are collected from different located area inside JP industrial area of pre-monsoon. The present study clearly indicates that industrial soil around Jaypee nagar industrial area contaminants in pre-monsoon season, the pollution load was high in some of the sample which may be due to the disposal of effluents from surrounding industries and runoff from the agricultural field. Pollution loads are increased due to industrialization. However, proper remediation measures need to be taken for sustainability.

Yadav (2008) find out that the available Fe, Mn, Cu and Zn showed positive and significant correlation with organic carbon and also found negatively and significantly correlated with pH and calcium carbonate content of soils. Sidhu and Sharma (2010) also reported that the available micronutrients (Zn, Cu, Mn and Fe) increased with increase in organic carbon and decreased with increase in sand content, pH, and calcium carbonate.