

# The physico chemical and microbiological environmental sciences essay



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A lot of analytical work has been carried out on natural water bodies, both fresh water and waste water, throughout the globe and as such a voluminous literature is available on the subject. In view of the objective of the present research, a critical survey of literature was carried out to gather information on various relevant aspect such as physicochemical features, heavy metals concentrations. A lot of work & research has been done on the physico chemical parameter of the river Ganga. A series of papers reporting the results of studies carried out on river Ganga at Kanpur Chakraborty et. al. (1965) from Kanpur studied the water quality of Ganga at J. K. Rayon's water intake point and at Golaghat and Bhairoghat pumping stations situated at the upstream of the Ganga river. It was concluded that the water quality gradually deteriorated as it passes from Bhairoghat pumping station to the J. K. Rayon water intake point in summers because in this stretch the river received waste waters from number of sewage drains. Saxena et. al. (1966) made a systematic survey of the chemical quantity of Ganga at Kanpur. According to the study, the biological oxygen demand, is minimum in winter and maximum in summer. The chloride ranged beyond the limit and the river was found to be alkaline in nature except in rainy season. He concluded that the tanneries significantly increased the pollution load of river as they discharge huge amounts of effluents containing organic wastes and heavy metals. It was further reported that tanneries, textile mills and several other industrial units discharged million gallon per day of waste water generating BOD load of approximately six thousand Kg day. Hydro biological features of the river Ganga was studied by Pahwa and Mehrotra (1966). The authors studied a stretch of 1090 kms. of river Ganga extending from Kanpur in west to Rajmahal, in Jharkhand state, in the east. They reported that the turbidity

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was maximum in monsoon and minimum during January to June. The pH of the river water ranged between 7.45 minimum during June to August and 8.30 maximum during January to May. The dissolved oxygen, i. e. D. O. count ranged from 5.0 to 10.5 ppm with maximum values during January and February. While the minimum values were recorded in monsoon. Pehwa & Mehrotra et. al. (1966) studied the Hydro biological features of the river Ganga. A stretch of 1090 kms. of river Ganga extending from Kanpur in west to Rajmahal in Jharkhand state in the east was studied by these authors. They reported that the turbidity was maximum in monsoon and minimum during January to June. The pH of the river water was minimum during June to August and maximum during January to May. The dissolved oxygen, i. e. D. O. count was having maximum values during January and February & minimum values in monsoon. Bhargava et. al. (1982) in a survey of total length of the river Ganga found that quality index was far above the prescribed limit at Kanpur. He further found that the Ganga water was having unusually fast regenerating capacity by bringing down B. O. D. owing to the presence of large amount of well adapted micro-organisms. According to the research Ganga is rich in polymers excreted by various species of bacteria. These polymers being excellent coagulants remove turbidity by coagulation, setting the suspended particles at the sewage discharge point. Study carried out in 1986-87 on physico-chemical properties of river Ganga water at Buxar (Unnao) clearly revealed that extent of pollution varied in different seasons. Usually all the 23 parameters studied showed high values in summer and lower during monsoons except turbidity which was high in rainy season. Values of BOD, COD, DO and H<sub>2</sub>S were recorded high than the tolerance limit. Kashiprasad et. al. [1977] reported some

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improvement in water quality parameters such as BOD, DO, total phosphate and nitrate as compared to the previous study by Saxena et al. Bhargava et. al. [1977] made the observation that despite high organic pollution load in river Ganga, the dissolved oxygen levels in the river are high and background BOD levels in the river are low. To partially explain this curious phenomenon, he invoked the bio-flocculation mechanism proposed by the Pavoni et al. [1972], which may result in flocculation and settlement of particulate BOD to river bottom. Pandey, PK | Pandey, GN et. al. 1980 Physico-chemical monitoring of River Ganga at Kanpur was carried out at intervals of one month for the year 1977. Nine sampling stations were selected on the basis of their importance. The analysis was carried out for the parameters BOD, COD, DO, temperature, ammoniacal and albuminoid nitrogen, sulfide, chromium, pH, sulfite, sulfate, chloride, hardness, electrical conditions, and total solids. The total effluents flowing into the River Ganga while passing through Kanpur are well above the assimilation capacity of the river during summer and winter months. Thus the vital values associated with the stream have almost been nullified Priyanka Trivedi et. al. 2010 In the present work various physico chemical parameters i. e. Turbidity, temperature, pH, total hardness, Iron, Chlorides, Dissolved Solids, Calcium, Sulphate, Nitrate, Fluoride, Chromium, total alkalinity are analyzed for various seasons; Summer, Monsoon, Autumn, Winter, Spring for the period (April-December-2008 and (January- March-2009) in the surface water, ground water and filtration plant treated water of Kanpur city. Significant variation of physico - chemical parameters of surface water were observed; various physico-chemical parameters for the water samples were within highest desirable limit (HDL) prescribed by WHO for drinking purposes for all

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seasons except for pH in summer, Total alkalinity and Fe contents in spring, autumn and winter; Total dissolved solids in winter, Turbidity in all seasons. The observations imply that Ganga water in monsoon is better than winter seasons, where as the ground water was found better in winter compared to that of summer season. The results suggest that the quality of surface water improved after treatment in filtration plant as compared to ground water.

Agarwal Animesh et. al. 2011 A study carried out in river Gagan (India) to assess the extent of pollution by different industrial and domestic activities. Water samples collected from river Gagan at two sites and analyzed for alkalinity, biological oxygen demand (BOD) and chemical oxygen demand (COD) during summer, winter & rainy season. The collected data subjected to statistical analysis and good correlation between alkalinity & BOD and alkalinity & COD is established. Regression equations also established between above parameters to predict the level of pollution of river Gagan. In the present study regression, equation established between two parameters, which can used to predict the value of one parameter if value of other is known. The above study gives us a tool to find the value of physicochemical parameters and extent of pollution theoretically, which is not only time saving but also cost effective.

Richa Khare et. al. 2011 present an extensive investigation of physico-chemical parameters of water samples of Ganga river at Kanpur. Water samples under investigations were collected from the different sites of Kanpur and its adjoining areas during Pre monsoon(April-May) year2010. Correlation coefficients were calculated between different parameters to identify the highly correlated and interrelated water quality parameters and t-test was applied for checking significance. The observed values of different physico-chemical parameters like pH, temperature,

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turbidity , total hardness (TH) , Iron , total alkalinity (TA) , Oxygen consumption (OC), Suspended solids (SS) of samples were compared with standard values recommended by world health organization (WHO).. All the physico - chemical parameters for pre monsoon, monsoon and post monsoon seasons are within the highest desirable or maximum permissible limit set by WHO except turbidity which was high while  $\text{NO}_3^-$  , Cl-1 and F- are less than the values prescribed by WHO. Reeta Johri et. al. 2011- In Kanpur, river Ganga takes entry at Bithoor and passing along several ghats and lakes it exist at Jajmau covering a distance about 22 Km. The fish fauna in different region of river Ganga at Kanpur is of different categories according to a degree of pollution at various ghats. Therefore, for a study purpose a stretch of about 24 Km. of river Ganga is selected for the upper stream near Bithoor, middle stream to the Permat region and to the downstream at Kanpur near Jajmau up to new Jajmau bridge. The physico-chemical analysis of the water samples collected from upper, middle, and down streams of river Ganga from tannery area to Jajmau automobile transport bridge revealed that almost all the major characteristics were little beyond permissible limits. The water as such could not be used both for drinking and bathing purposes. It could only be used for irrigation in fields but after treatment. The low values of dissolved oxygen affected potability of water and caused mortality of fish and other aquatic animals in Bithoor, Permat and Jajmau, respectively. The magnesium toxicity caused nausea, muscular weakness or even paralysis to the villagers, residing near by areas. The high percentage of cadmium caused vomiting, diarrhea, abdominal pain, giddiness, bone deformation, hypertension, choking, coughing and bronchitis to resident of the people residing in that areas particularly in Jajmau. The high percentage of

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chromium also caused mortality and low longevity of the aquatic organisms particularly fishes. The high MPN values and BOD values also indicated the organic pollution in the Bithoor, Permat and Jajmau region. The result of turbidity showed that water was very dirty near Jajmau region because it is the entry point of the tannery effluents discharged in the river Ganga while the water of Permat and Bithoor zone is not so dirty because it is diluting during the course of its movement, but it could not be recommended for animals and human beings before treatment. The water in the Bithoor region could be used for bathing and agriculture as such but could also be used for drinking purpose after treatment. Shashwat Katiyar et. al. 2011 An investigation has been made to ascertain the effect of tannery effluent associated with seasonal variation on river water samples collected from confluence point, upstream and downstream located near Jajmau area at Kanpur. All the samples analyzed for physico-chemical parameters including estimation of chromium. The pH at confluence point (Q) was significant alkaline during summer as compared to upstream point P3 due to dumping of untreated tanneries effluent, which suggested that utilization of salts for leather tanning process. Study shows that a significant decrease in DO values at summer, although the higher level of DO during monsoon season might be attributed to the dilution of the effluent by rain water. The level of BOD shows a significant increase at confluence point during as compared to upstream point (P3) during summer. Although the level of COD at different sampling points affected with seasonal variation but it was not significant. However this study also revealed a significant negative correlation showing that as BOD and COD increases in values DO decreases with correlation of (for BOD) and for COD). These correlation between BOD, COD and DO suggest <https://assignbuster.com/the-physico-chemical-and-microbiological-environmental-sciences-essay/>

a similar cause. The correlation analysis of TDS versus BOD and COD gives a positive correlation showing that as TDS increase BOD and COD also increases. These correlation analysis shows that levels of TDS, BOD and COD are highly correlated with each other in sampling area during different seasonal variation. Chromium levels were high in almost all sampling points with seasonal variation, thus tanneries effluent with seasonal variation showed highly adverse effect on river Ganga. Priyanka Trivedi et. al. 2010 We present an extensive investigation of physico-chemical parameters of water samples of Ganga river at Kanpur. Water samples under investigations were collected from Jalsanstan Benajhwar Kanpur sampling station during pre monsoon (April - May), monsoon (July - August) and post monsoon (October - November) seasons in the year 2008. Correlation coefficients were calculated between different pairs of parameters to identify the highly correlated and interrelated water quality parameters and t-test was applied for checking significance. The observed values of different physico-chemical parameters like pH, temperature, turbidity, total hardness (TH), Iron, Chloride, total dissolved solids (TDS),  $\text{Ca}^{2+}$ ,  $\text{Mg}^{2+}$ ,  $\text{SO}_4^{2-}$ ,  $\text{NO}_3^-$ , F-1, total alkalinity (TA), Oxygen consumption (OC), Suspended solids (SS) of samples were compared with standard values recommended by world health organization (WHO). It is found that significant positive correlation holds for TA with  $\text{Cl}^-$ ,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ , TH, TDS, fluoride and OC. A significant negative correlation was found between SS with chloride,  $\text{Mg}^{2+}$ , TDS, fluoride and OC. All the physico-chemical parameters for pre monsoon, monsoon and post monsoon seasons are within the highest desirable or maximum permissible limit set by WHO except turbidity which was high while  $\text{NO}_3^-$ ,  $\text{Cl}^-$  and F- are less than the values prescribed by WHO.

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RAI et al The study was carried out for a period of only two seasons (Pre monsoon and Post-monsoon) in a year. The physico chemical parameters such as pH, Electrical conductivity (EC), Alkalinity, Total Solids (TS), Hardness, Chloride, Dissolved Oxygen (DO), Biological Oxygen Demand (BOD) & Most Probable Number (MPN) were evaluated at selected sites of River Ganga. The river is subjected to severe domestic and sewage pollution at two selected sites of Patna. At sampling site I and II physicochemical parameters were not found to be within the safe limits of drinking water as World Health Organization W. H. O (1984). But at sampling site II chloride were found within the safe limits. At sites I & II water sample was not found good quality showing that the River Ganga has moderately polluted. The present studies indicate that increase water pollution levels in the River Ganga present near urban environment due to discharge of various types of waste water/ sewage/effluent K. R. Beg and S. Ali 2008 The objective of this study was the sediment quality assessment of Ganga River at Kanpur city where effluents from tannery industries are discharged. Sediment samples from upstream and downstream area were collected and analyzed for trace metals and toxicity bioassay. Among various trace metals examined Cr in downstream sediment was 30-fold higher than in upstream sediment and its concentration was above the probable effect level. In general trace metals in the downstream sediment were found higher compared to reported earlier.

A. R. Khwaja et. al. 2001 The leather industry, besides being a major contributor to the Indian national economy, is unfortunately also one of the major polluters. The present article discusses the influence of the wastes on the physicochemical characteristics of the Ganga water and sediments. Two <https://assignbuster.com/the-physico-chemical-and-microbiological-environmental-sciences-essay/>

sampling sites have been chosen at Kanpur, the first before and the second after the point where tanneries are located. The same physicochemical parameters which have been determined in the wastes have been monitored at these two sites for two seasons. The results reveal that most parameters increase as the river traverses between these two points. The increase in values of parameters such as BOD, COD, Cl<sup>-</sup>, and total solids could be due to the domestic wastes just as much as to the tannery wastes. However, chromium is one parameter which can primarily be identified to originate from the tanneries. The speciation of the sediments for chromium reveals that the leakage of chromium into the Ganga is taking place at the second site. There is almost a ten fold increase in chromium at the second site as compared to the first. At the first site the surface chromium is primarily in the residual fraction while at the second site it is in the Fe-Mn oxide fractions. 0103-088. Khwaja AR, Singh Rashmi, Tandon SN et. al. (Dept Chem, Univ Roorkee, Roorkee 247667). Monitoring of Ganga water and sediments vis-à-vis tannery pollution at Kanpur (India): a case study. Environ Monit Assess, 68(1) (2001), 19-35 [17 Ref]. Article discusses the influence of the wastes on the physicochemical characteristics of the Ganga water and sediments. Two sampling sites have been chosen at Kanpur, one before and the other after the point where tanneries are located. The results reveal that most parameters increase as the river traverses between these two points. The increase in values of parameters could be due to the domestic wastes just as much as to the tannery wastes. The speciation of the sediments form chromium reveals that the leakage of chromium into the Ganga is taking place at the second site. Analysis of upstream and downstream water and sediment revealed a 10-fold increase in chromium level in the sediment at <https://assignbuster.com/the-physico-chemical-and-microbiological-environmental-sciences-essay/>

downstream Jajmau area of Kanpur showing unchecked release of untreated tannery effluent[1]. Armienta et al. 2001; Cooman et al. 2003

Waste generated from tanning generally contains much higher concentration of total dissolved solids (TDS), suspended solids, phenols, chromium, chlorides, ammonia, heavy metals, etc. (Armienta et al. 2001; Cooman et al. 2003).

Ajmal et al. 1987 The concentrations of cadmium, cobalt, chromium, copper, iron, manganese, nickel, lead and zinc in the water and sediments of the Ganges river were determined by Atomic Absorption Spectrophotometry in the year 1981. The respective ranges of concentrations of cadmium, cobalt, chromium, copper, iron, manganese, nickel, lead and zinc found in the water

were ND-0.53, ND-4.89, 3.20-56.6, ND-27.57, 22.0-133.8, 35.0-93.0, ND-2.22, 2.0-5.6 and 7.37-67.36  $\mu\text{g l}^{-1}$  and in the sediments were ND-3.48, 2.35-14.4, 9.0-83.16, 11.27-95.0, 2168.0-11624.8, 110.5-470.0, 3.45-28.80, 0.55-21.8 and 72.0-418.6  $\mu\text{g g}^{-1}$ . The data showed that there was considerable variation in the elements from one sampling station to the other. The sediments collected from different sampling stations were also analysed for pH, calcium carbonate, organic matter, potassium and phosphorus.

B. D. Tripathi et al. (1991) analyzed the physico-chemical characterization of city sewage discharged into River Ganga at six sites Assi ghat, Shiwala Ghat, Harishchandra Ghat, Chauki Ghat, Rajendra Prasad Ghat and Raj Ghat, Varanasi. At Raj Ghat sewage was the most concentrated with the highest pollution load. Tiwari, et al. 2004 studied the pollution potential of river Pandu contaminated heavily by the discharge of various industries.

Untreated sewage discharge not only damage for aquatic life but also hazardous to human health used for drinking purpose in the downstream

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areas of the river. Most of the cities and towns have developed along the banks of rivers because of the multipurpose-use of river water. But unfortunately some rivers are being polluted by indiscriminate disposal of sewage and industrial wastes ( Trivedy, 1990). P. K. Rai et. al., The work presented here analyzed water samples from three sewage treatment plants which regularly discharge into the River Ganga. Biological oxygen demand and dissolved oxygen values were well above the permissible limit at all sites, and were recorded as being at maximum at Dinapur sewage treatment plant. Heavy metals (Zn, Cu, Cd, Pb, Cr) in disposed effluents were above permissible limits at all three sites. Likewise, the most probable number index of E. coli in water samples and coli form counts were recorded as being higher in irrigated water samples and vegetables, indicating a serious health hazard posed by intense microbial and faecal pollution. 1Mohammad Muqtada Ali Khan The present study was undertaken to analyzed chemical parameters of groundwater samples were collected from representative sampling stations established over entire study area in post monsoon 2005, and pre monsoon2006 periods from 37 locations in parts of the Central Ganga Plain. Eight parameters such as, TDS, HCO<sub>3</sub>, Cl, SO<sub>4</sub>, Na, K, Ca, and Mg were selected as the groundwater quality variables in this study. Total dissolved solids were calculated by summing up the concentrations of all the major cations and anions. The concentrations of Ca<sup>++</sup>, Mg<sup>++</sup>, Cl<sup>-</sup>, HCO<sub>3</sub><sup>-</sup> and total hardness were determined by volumetric method. Ca<sup>++</sup> and Mg<sup>+</sup> were determined by EDTA titration. For HCO<sub>3</sub><sup>-</sup>, HCl titration to a methyl orange point was used. Chloride was determined by titration with AgNO<sub>3</sub> solution. Flame emission photometry was used for the determination of Na<sup>+</sup> and K<sup>+</sup>. Sulphate was determined by gravimetric method. The higher values

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of TDS, Na, K, and Cl were recorded in pre monsoon 2006 compared to post monsoon 2005. On the other hand the higher values of Ca, Mg, HCO<sub>3</sub>, and SO<sub>4</sub> were observed in post monsoon 2005 than pre monsoon 2006. This showed clear impact of land use on groundwater. The regression analysis between TDS-Na; TDS-K; TDS -HCO<sub>3</sub>; showed strong positive relationship. and moderate positive correlation with Cl ions and very low positive correlation with Ca, Mg, and SO<sub>4</sub>. All the estimated chemical parameter values were found to be statistically significant in both pre and post monsoon years. Mohammad Moniruzzaman et. al. Now a days, Buri ganga is one of the most polluted rivers in Bangladesh. Most of the industries and factories of Dhaka are situated on the banks of the Buri ganga or very close to the river system. Substantial part of urban sewage of the Dhaka city is also thrown in the Buri ganga river. A study was conducted to determine the pollution level of water of Buriganga river. Field investigation was started from June 2004 and Sample collection was conducted six times at an interval of two months up to April, 2005. Different water quality parameters such as pH, EC, TDS, DO, Cations (Na<sup>+</sup>, K<sup>+</sup>, Ca<sup>2+</sup>, Mg<sup>2+</sup>, NH<sub>4</sub><sup>+</sup>) and anions (HCO<sub>3</sub><sup>-</sup>, Cl<sup>-</sup>, SO<sub>4</sub><sup>2-</sup>, PO<sub>4</sub><sup>3-</sup>, NO<sub>3</sub><sup>-</sup>) were examined for water of each sampling points to monitor the level of these parameters where it exceed or within the permissible limit. Present investigation suggested that, Dissolved Oxygen (DO) concentration of water of Buriganga river was very low particularly in dry season (2-3 mg/l). Ammonium(NH<sub>4</sub><sup>+</sup>) and Nitrate (NO<sub>3</sub><sup>-</sup>) concentration near Hazaribagh, Sadarghat, Zinzira, Lalbagh, Kotouali and Shutrapur area were very high, which crossed the maximum permissible limit. In dry season the level of pollution was much high than in wet season. That indicates the water of Buriganga was not safe for drinking purposes, irrigation, fisheries, <https://assignbuster.com/the-physico-chemical-and-microbiological-environmental-sciences-essay/>

recreational activities and various industrial uses for most of the times of year (Mtiyaj et. al. 2012). The river Narmada is the third holy and fifth largest west flowing river of India and biggest west flowing river of the state. The river takes its origin from Maikal hillocks from eastern highlands of Vidhyas ranges near Amarkantak and finally falls in Arabian Sea. Limnological study was carried out for the period one year from August 2010 to July 2012 to enumerate the various physico-chemical parameters of Narmada river. Water samples were collected from sampling stations every month and were analysed as per standard methods. Minimum value of Total solids, BOD and Chloride were recorded in January month and maximum value in June-July months. The results of present study indicate that physico-chemical parameters of Narmada river are within WHO limits. Mehrotra et. al. (1990) According to the research done by Mehrotra (1990), the various sources responsible for pollution of the river in Varanasi city are domestic sewage effluents of mercury (65 to 520ppb), Lead (less than 10 to 800 ppm), chromium (less than 10 to 200 ppm) and nickel (less than 10 to 130 ppm) in the sediments of Ganga river at Varanasi. The industries, burning of dead bodies at the ghats, use of detergents, insecticides and pesticides used in agriculture. Study revealed the presence of toxic metals like city.

Dhiredrna Mohan Joshi<sup>1</sup> et. al. This paper is an attempt to analyze the water quality of river Ganga in Haridwar district for irrigation purpose. Water samples were collected from 5 sampling stations. The study area has been divided into three seasons: Winter (November-February), summer (March to June) and rainy (July to October). Water quality variables were measured in the river over a period of two years (Nov. 2006 to Oct. 2008). The samples were analyzed for electrical conductivity (Ec), total dissolved salts (TDS),

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magnesium content (MC), sodium percent (SP), sodium adsorption ratio (SAR), residual sodium carbonate (RSC) and permeability index (PI). Study of all these characteristics indicates that river water in rainy season is not suitable for irrigation purpose because of high values of total dissolved salts, Ec and SP

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The study area selected was ground water of Bhopal " The City of Lakes", Madhya Pradesh, India. In the present study an attempt has been made to identify the ground water quality of the city in Pre monsoon and Post monsoon phase in year 2007. The physico-chemical parameters like pH, Electrical conductivity, Total hardness, Total alkalinity, Chloride, Sulphate, Sodium, Potassium, Mg and Nitrate were studied to analyze the potable ground water quality of the city. Better water quality was found in Post-monsoon season than Pre-monsoon season. Extent of pollution occurred due to over exploitation of ground water, urbanization and anthropogenic activities. Shraddha Sharma et. al. Narmada is considered to be the lifeline of the state of Madhya Pradesh in Central India. The Narmada water is used for bathing, drinking, irrigation and industrial purposes. The city sewage and industrial effluent from Security paper mill at Hoshangabad drains in the Narmada River and pollutes the water quality. Urban sewage enters into Narmada through main nallas. River water quality at Hoshangabad has become a matter of concern due to continuous changing environment and increasing social and industrial activity that influence the water quality directly or indirectly. The present investigation is undertaken to study the effect of domestic sewage and effluent from Security paper Mill on the water

quality and ecology of river Narmada at Hoshangabad. The study is carried on at four sites along with the bank of river Narmada. Water samples from four stations were collected, out of which three main sewage mixing points of the city and one fresh water site are taken into account. The samples collected were analyzed, as per standard methods parameters such as Temperature, pH, were measured in-situ. The statistical evaluations were also made. The result showed increase in BOD, Nitrates, Phosphates and Total Coliforms, No. of phytoplanktons. The results revealed that most of the water samples were below or out of limited; according to the WHO, BIS standard Maheshwari et al. 2011

The aim of this study is to assess the quality of surface water of Yamuna River. Water samples were collected from Yamuna River along different points and analyzed for various physicochemical parameters during winter and summer seasons. Effects of industrial wastes, municipality sewage and agricultural runoff on the river water were investigated. The study was conducted between the Kailash Mandir and Taj Mahal area. This area is most polluted due to the presence of many chemical fertilizers, iron, leather and other industries. All these industries discharge their untreated toxic waste water directly into the river Yamuna. Various physical and chemical parameters like DO, BOD, COD, pH, total suspended solid, total dissolved solids, Alkalinity, Turbidity, Hardness, Chloride contents, sodium, calcium, Electric Conductivity are determined for different samples and compared with the standard limits recommended by WHO. The analytical results showed that during winter season, the quality of water is more suitable for domestic purpose.

R. K Tiwary et. al. A study was carried out on Ganga river in Bihar region in and around Patna to assess the impact of sewage pollution on the water quality of the river. The drain water

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samples from the confluence point of outfall drains to the river were collected and studied for key parameters. Parameters such as BOD, COD, TDS, TSS, total and faecal coli form (MPN) were observed high in drain water. The physicochemical analysis of Ganga river shows that the water has high TDS, TSS, BOD, and COD. The coli form bacteria were found to be alarmingly high in the river. Most of the parameters analyzed were found high near the bank in comparison to the water in the middle stream of that station. The XRF analysis of sediments of the Ganga river showed that Si, Fe, Ca, Al and K are the major elements of the Ganga sediment. The study revealed that due to discharge of untreated sewage into the Ganga, the water quality of Ganga has been severely deteriorated and the potable nature of water is being lost.

Sujeet Kumar et. al. 2012 A study was made to determine the surface water quality status of river Varuna in Varanasi City. Water quality assessment of river Varuna is done on the basis of 15 parameters at 32 different sampling sites between Kotwa (upstream of Varanasi City) and Aadikeshav Ghat (Ganga- Varuna Sangam). Appreciable deterioration in water quality of the river can be observed from upstream of Varanasi City to Ganga Varuna Sangam. Alarming depletion of dissolved oxygen level in river water is an indication of disposal of untreated sewage and industrial effluent. To assess the quality of water of river Varuna , each parameter was compared with the standard desirable limit of that parameters in surface water as prescribed by Vinit Kumar 2011

River Yamuna, the largest tributary of River Ganga has been one of the most prominent and important rivers of India. Unfortunately, certain stretches of River Yamuna are very polluted. Various urban centers are located on the banks of Yamuna River, draw fresh river water for various activities. In almost the entire wastewater generated by

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these centers is disposed off into the river. The objective of the monitoring studies undertaken for water body is to assess variation in water quality with time. Ten sampling stations were selected along the river for sampling purpose from January to June, 2010. Water samples were analyzed in terms of physico-chemical water quality parameters. Range of values were found as temperature (14°C-28°C), pH (6.43-9.13), conductivity (340.00 µmhos - 734.00 µmhos), DO (4.90 mg/l-8.50 mg/l), BOD (3 mg/l-8 mg/l), COD (11mg/l-24 mg/l), alkalinity (123.00 mg/l- 240.00 mg/l), total hardness (230.00 mg/l- 475.00 mg/l), chloride (18 mg/l-32 mg/l) and fluoride (0.40 mg/l-1.20mg/l). The values of these parameters indicate that Yamuna River is moderately polluted under the study area.

Physico-Chemical and Microbiological Study of Tehri Dam Reservoir, Garhwal Himalaya, India

Ashok K. Agarwal et. al. in the present study physico-chemical and microbiological characteristics of the water of Tehri dam reservoir in the Garhwal Himalaya of India were determined during June 2003 through May 2005 when the reservoir was under construction, and was 5 km long and 40 m deep having an area of 2.2 sq km, and is located at 30°23' N latitude, 78° 29'E longitude and 635 m altitude at monthly intervals during June 2003 through May 2005 with an objective to estimate the impact of the reservoir on various physico-chemical and microbiological parameters of the water. Total solids, total suspended solids, total solids, turbidity and sulphate values were maximum on all the sites in rainy months, which may be due to the gradual disturbances in sedimentation of solids as well as dust particles deposited along with runoff rainwater. The alkalinity varied during different months. The values of pH, conductivity, hardness, calcium, dissolved oxygen and biological oxygen demand were higher during summer months. The chloride

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concentration was highest in the month of January and the nitrate increased in the summer months and early monsoon due to the higher phyto planktonic production. The maximum number of total coliform, faecal coliform and total plate count was observed during summer and rainy seasons and minimum during winter. Singh et al 2012 The Pollution of aquatic ecosystem by heavy metals has assumed serious proportions due to their toxicity and accumulative behavior. This paper deals with the measurement of five heavy metals i. e. Cu, Cr, Zn, Ni, and Cd. Grab samples of water and sediments for a period of two year (January 2007 -December 2008) were collected from 3 different sites following the Standard Methods. Water and sediment samples of the river were processed and analyzed for heavy metals using AAS. The heavy metals found in the river water were in the range of: Cu (ND to 0. 12 mg/l); Cr (BDL to 1. 09 mg/l); Ni (BDL to 0. 12 mg/l) and Zn (BDL to 0. 87 mg/l), and in the sediments in the range of: Cu (BDL to 0. 09 mg/g); Cr (BDL to 0. 14 mg/g); Ni (BDL to 0. 09mg/g) and Zn (BDL to 0. 87 mg/g). Cd was found absent both in river water and sediment samples. Some physico-chemical parameters viz, pH, dissolved oxygen, total hardness, phosphate-phosphorous and nitrate-nitrogen were also estimated as they have direct or indirect influence on incidence, transport and speciation of the heavy metals. Based on the findings, the Ganga river sediments from Champanala to Barari can be considered as unpolluted with respect to Cd, Cu, and Ni, whereas concentration of Cr and Zn show their pollutional status which may be detrimental to the rich biodiversity of the river segment. Imran Mithani et. al. 2012The total environment is a complex entity of which water is the essential component for survival of all the living beings. Life in aquatic environment is largely governed by physico-chemical

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characteristics and their stability in ecosystem. The precipitation which is the main source of water gets contaminated as soon as it reaches on the earth's surface and during its flow anthropogenic activities in surrounding area further add impurities in it. The water samples were collected monthly for a period of one year from different sampling stations along the stretch of river. During study period, river maintained well alkaline nature of water in study area. Parameters like dissolved oxygen, conductivity, total hardness, total alkalinity and pH showed variation from upstream to downstream. Dissolved oxygen was found to be maximum during winter may be due to low temperature. However, conductivity, total hardness and total alkalinity were found to be maximum during the summer season.

N. R. Prasad et. al. and J. M. Patil et. al. 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.

Sujata Sen et. al. Surface water samples were taken and collected from pond and river samples in and around of Lumding Town of Assam and analysed for temperature, pH, conductance, TS, TDS, TSS, turbidity, hardness, total alkalinity, D. O., C. O. D., F<sup>-</sup>, NO<sub>3</sub><sup>-</sup>, HCO<sub>3</sub><sup>-</sup>, Cl<sup>-</sup>, SO<sub>4</sub><sup>-2</sup>, Na<sup>+</sup>, K<sup>+</sup>, Ca<sup>+2</sup>, Mg<sup>+2</sup>, Fe. The results were considered for correlation analysis and it was observed that many of the parameters bear a good positive correlation and some bears a negative correlation.

D. Kar et. al. A total of 96 surface water samples collected from river Ganga in West Bengal during 2004-05 was analyzed for pH, EC, Fe, Mn,

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Zn, Cu, Cd, Cr, Pb and Ni. The pH was found in the alkaline range (7.21-8.32), while conductance was obtained in the range of 0.225-0.615 mmhos/cm. Fe, Mn, Zn, Ni, Cr and Pb were detected in more than 92% of the samples in the range of 0.025-5.49, 0.025-2.72, 0.012-0.370, 0.012-0.375, 0.001-0.044 and 0.001-0.250 mg/L, respectively, whereas Cd and Cu were detected only in 20 and 36 samples (0.001-0.003 and 0.003-0.032 mg/L). Overall seasonal variation was significant for Fe, Mn, Cd and Cr. The maximum mean concentration of Fe (1.520 mg/L) was observed in summer, Mn (0.423 mg/L) in monsoon but Cd (0.003 mg/L) and Cr (0.020 mg/L) exhibited their maximum during the winter season. Fe, Mn and Cd concentration also varied with the change of sampling locations. The highest mean concentrations (mg/L) of Fe (1.485), Zn (0.085) and Cu (0.006) were observed at Palta, those for Mn (0.420) and Ni (0.054) at Berhampore, whereas the maximum of Pb (0.024 mg/L) and Cr (0.018 mg/L) was obtained at the downstream station, Uluberia. All in all, the dominance of various heavy metals in the surface water of the river Ganga followed the sequence: Fe > Mn > Ni > Cr > Pb > Zn > Cu > Cd. A significant positive correlation was exhibited for conductivity with Cd and Cr of water but Mn exhibited a negative correlation with conductivity. Vinit Kumar et. al. River Yamuna, the largest tributary of River Ganga has been one of the most prominent and important rivers of India. Unfortunately, certain stretches of River Yamuna are very polluted. Various urban centers are located on the banks of Yamuna River, draw fresh river water for various activities. In almost the entire wastewater generated by these centers is disposed off into the river. The objective of the monitoring studies undertaken for water body is to assess variation in water quality with time. Ten sampling stations were

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selected along the river for sampling purpose from January to June, 2010. Water samples were analyzed in terms of physico-chemical water quality parameters. Range of values were found as temperature (14°C-28°C), pH (6.43-9.13), conductivity (340.00  $\mu$ mhos -734.00  $\mu$ mhos), DO (4.90 mg/l-8.50 mg/l), BOD (3 mg/l-8 mg/l), COD (11mg/l-24 mg/l), alkalinity (123.00 mg/l- 240.00 mg/l), total hardness (230.00 mg/l- 475.00 mg/l), chloride (18mg/l-32 mg/l) and fluoride (0.40 mg/l-1.20mg/l). The values of these parameters indicate that Yamuna River is moderately polluted under the study area. NARENDRA SINGH BHANDAR et. al. 2005 Present work deals with the assessment of physico-chemical parameters of water samples of Kosi river at Kosi sampling station during 2004 and 2005 in pre monsoon, monsoon and post monsoon seasons. Statistical studies have been carried out by calculating correlation coefficients between different pairs of parameters and t- test applied for checking significance. The observed values of various physico-chemical parameters of water samples were compared with standard values recommended by WHO. It is found that an appreciable significant positive correlation holds for chloride with pH, Mg, Na, hardness and total suspended solid; and sodium with hardness, EC and sulphate. A significant negative correlation was found between potassium with turbidity, Cl-, EC and hardness. All the physicochemical parameters of Kosi water are within the highest desirable limit or maximum permissible limit set by WHO except turbidity and BOD which recorded a high value. Jaspal Singh et al On the basis of various parameters studied it was concluded that the water quality of River Ramganga is not good. Due to high alkalinity the river water was not suitable for agricultural purposes. COD is much higher than BOD, it indicates that most of the pollution in Ram ganga, <https://assignbuster.com/the-physico-chemical-and-microbiological-environmental-sciences-essay/>

in the study zone, is caused by industrial discharge. The main sources of organic pollution are non-point sources like agricultural run-off, cattle-dropping etc.