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HYDROBIOLOGY OF RIVER RAM GANGA

Meena Raghib[1], Asheesh Gaur[1], Shalini Gupta[2]

[1]Department of Zoology, IFTM University, Moradabad- 244001, UP, India; [2]Department of Zoology, Govt. Girls Degree College, Behat, Saharanpur, UP, India.

ABSTRACT

Fresh water is essential for healthy environment to support the life systems on this planet. In pre-monsoon period pH range increases which affects the other physico-chemical parameters like BOD, DO etc. and also the biomass. During monsoon, rain water again changes the water quality. In this review article the various physico-chemical parameters such as temperature, transparency, conductivity, TDS, pH, total alkalinity, calcium, nitrate, BOD, DO, turbidity etc. fluctuate on seasonal bases. The quality of river water is not good and it should not used for drinking purpose without treatment and at some places the quality of water is also not able to use for various domestic purposes without treatment.

Key Words: Biomass, BOD, DO, TDS, pH

INTRODUCTION

Environmental pollution is one of the most horrible crises that we are facing today. Due to the increased urbanization and industrialization surface water pollution has become an crucial problem. It is necessary to obtain precise and appropriate information to observe the quality of any water resources and the development of some useful tools to keep watch on the quality of such priceless water resources to retain their excellence for various beneficial uses (Alam and Pathak 2010). Water pollution is a major global problem which requires ongoing evaluation and revision of water resource policy at all levels (international down to individual aquifers and wells). It has been suggested that water pollution is the leading worldwide cause of deaths and diseases and that it accounts for the deaths of more than 14,000 people daily. An estimated 580 people in India die of water pollution related illness every day. About 90 percent of the water in the cities of China is polluted. As of 2007, half a billion Chinese had no access to safe drinking water. In addition to the acute problems of water pollution in developing countries, developed countries also continue to struggle with pollution problems. For example, in the most recent national report on water quality in the United States, 45 percent of assessed stream miles, 47% of assessed lake acres, and 32 percent of assessed bays and estuarine square miles were classified as polluted. The head of China's national development agency said in 2007 that one quarter the length of China's seven main rivers were so poisoned the water harmed the skin. Water is typically referred to as polluted when it is impaired by anthropogenic contaminants and either does not support a human use, such as drinking water, or undergoes a marked shift in its ability to support its constituent biotic communities, such as fish. Natural phenomena such as volcanoes, algae blooms, storms, and earthquakes also cause major changes in water quality and the ecological status of water.

Farmers put fertilizers and pesticides on their crops so that they grow better. But these fertilizers and pesticides can be washed through the soil by rain, to end up in rivers. If large amounts of fertilizers or farm waste drain into a river the concentration of nitrate and phosphate in the water increases considerably. Algae use these substances to grow and multiply rapidly turning the water green. This massive growth of algae, called eutrophication, leads to pollution. When the algae die they are broken down by the action of the bacteria which quickly multiply, using up all the oxygen in the water which leads to the death of many animals. Chemical waste products from industrial processes are sometimes accidentally discharged into rivers. Examples of such pollutants include cyanide, zinc, lead, copper, cadmium and mercury. These substances may enter the water in such high concentrations that fish and other animals are killed immediately. Sometimes the pollutants enter a food chain and accumulate until they reach toxic levels, eventually killing birds, fish and mammals. Factories use water from rivers to power machinery or to cool down machinery. Dirty water containing chemicals is put back in the river. Water used for cooling is

Corresponding Author:
Meena Raghib, Department of Zoology, IFTM University, Moradabad- 244001, UP, India
E-mail: meenaraghib1989@gmail.com

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warmer than the river itself. Raising the temperature of the water lowers the level of dissolved oxygen and upsets the balance of life in the water. People are sometimes careless and throw rubbish directly into rivers.

As per the latest estimate out of 23 thousand MId of wastewater generated, only six thousand Mid (i.e., about 26%) is treated before letting out, the rest is disposed off untreated. The level of treatment available in cities with existing treatment plant varies from 2.5% to 89% of the sewage generated. Treated or partly treated or untreated wastewater is disposed into natural drains joining rivers or lakes or used on land for irrigation/fodder cultivation or to the sea or a combination of them by the municipalities. Municipal water treatment facilities in India, at present, do not remove traces of heavy metals. Given the fact that heavily polluted rivers are the major sources of municipal water for most towns and cities along their courses it is believed that every consumer has been, over the years, exposed to unknown quantities of pollutants in water they have consumed. To add to this, Indian towns and cities have grown in an unplanned manner due to rapid population growth. Facilities for running water have been provided in many towns and even in some villages during the last couples of decades. This has resulted in the use of flush-latrines and much larger use of water in home for bathing, washing of clothes, utensils etc., generating large quantities of wastewater. Use of soaps and detergents and amounts of various food materials going to sink have also grown considerably with improved life standards. But sewerage has lagged far behind water supply. According to estimates made by the Central Pollution Control Board (CPCB), only 22% of the wastewater from class I cities and 14% from class II cities is being collected through sewerage. A large number of cities/towns either do not have any sewerage system or the sewerage system is overloaded or defunct. All this results in large quantity of wastewater uncollected.

Most Indian rivers and other sources of fresh water are polluted by industrial wastes or effluents. All these industrial wastes are toxic to life forms that consume this water. The total wastewater generated from all major industrial sources is 83,048 MId which includes 66,700 Mid of cooling water generated from thermal power plants. Out of remaining 16,348 mid of wastewater, thermal power plants generate another 7,275 Mid as boiler blow down water and overflow from ash ponds. Engineering industries comprise the second largest generator of wastewater in terms of volume. Under this category the major polluting industries are electroplating units. The other significant contributors of wastewater are paper mills, steel plants, textile and sugar industries. The major contributors of pollution in terms of organic load are distilleries followed by paper mills shows the volume of wastewater from different industries in India. Both large scale industries and small scale industries contribute their share of water pollution. While many large scale industries claim to have installed costly treatment and disposal equipments, these are often not in proper working order. Several examples can be cited, such as oil wastes present in the storm-water channel along Haldia Refinery and ammonia pollution in ground water around a urea factory of Kanpur and a natural spring close to Zuari Agro Urea plant in Goa. Small scale and cottage industries cause no less water pollution than the large scale industries. There are about 3 million small scale and cottage industrial units in India. These units neither have, nor can they afford appropriate sanitation and/or pollutant disposal systems, and yet have not hasistated in adopting highly polluting production technologies such as chrome, tanning of leather, use of azo-dyes in fabrics, use of cadmium in ornaments and silver-ware, electroplating with cyanide baths, production of dye-intermediates and other refractory and toxic chemicals, etc.

Traces of fertilizers and pesticides are wasted into the nearest water-bodies at the onset of the monsoons or whenever there are heavy showers. As the point of entry of such agricultural inputs is diffused throughout the river basin, they are termed as non-point sources of pollution. Although irrigation has increased considerably in the country, little precious has been done to tackle the problem of the high salinity return water. This is the situation in Punjab and Haryana. In Haryana, the 40 km long drain No. 8 pours 250,000 kg/day of chlorides into the Yamuna to raise the chloride concentration in the river from 32 mg per litre just upstream of the drain confluence to 150 mg per litre just downstream of it. And most of these chlorides are from agricultural return flows. According to the findings of the CPCB, some of the seepage into the drain contains over 15,000 mg per litre of chlorides. Intensive and ever increasing usage of chemical fertilizers, pesticides, weedicides and other chemicals is adding a new dimension to such pollution. According to A.K. Dikshit, senior scientist with the Indian Agricultural Research Institute (IARI), New Delhi, farmers often indulge in excess usage of fertilizers and pesticides. When these are used more than the recommended doses, they pollute water, land and air. Flood-plain cultivation is another significant contributor to water pollution. Fertilizers and pesticides used in these tracts of land are bound to be washed into rivers during the monsoons.

Indian rivers, particularly the Himalayan Rivers, have plenty of water in their upper course. They are, however, starved of water when they enter the plain area. Irrigation canals whisk away clean water soon after the rivers reach the plains, denying water to flow in the river downstream. What flows into the river is water trickling in from small insignificant streams and drains carrying untreated sewage and effluents. The river-turned drain flow downstream with little or no fresh water unless a large river augments the depleted flows. As the quantity of fresh water in the river is negligibly small, pollution either from urban and rural areas, industries or even natural forms of pollution cannot get diluted and its ill effects are not reduced. The Yamuna has almost no water at Tajewala in Haryana where the Eastern Yamuna Canal and the Western Yamuna Canal abstract all the water for irrigation. Similarly, the Upper Ganga canal and the Lower Ganga canal have left the Ganga downstream almost dry. When the Yamuna and the Ganga flow past Delhi and Kanpur respectively, they are turned into stinking sewers. Therefore, it is essential that a minimum level of flow of water must be maintained in the river. This is known as minimum flow of rivers. According to a report of the Ministry of Water Resources on the study of minimum flows in the Ganga**,** impact on river water quality resulting from discharges of treated or untreated wastewater into the river will depend on the dilution offered by the quantum of flows in the river. Minimum flows in the recipient river will be required to maintain the desired water quality. Further, the study has expressed the view that it is not possible to fix the minimum flow of water in the entire course of the river because it depends on the pollution discharged at different points on the river. For example the existing minimum flow in the Ganga at Kanpur in May is hardly 50 cumecs (cubic metres per second) whereas the required minimum in the same month is 350 cumecs. The study further says that since the water is scarce it is not possible to add further fresh water for dilution. The solution lies in less amounts of pollution entering the river. In view of the increased demand of water for irrigation, the minimum flow is likely to fall further in future. In the words of K. C. Sivaramakrishnan, former director of the Ganga Action Plan (GAP), "maintenance of minimum flows is an important point. In case of the Ganga between Bijnore and Kanpur, the river is just a small stream. In case of the Yamuna, from Delhi till the point where the Chambal joins, the river is just a trickle. The study further says that since the water is scarce it is not possible to add further fresh water for dilution. The solution lies in less amounts of pollution entering the river. In view of the increased demand of water for irrigation, the minimum flow is likely to fall further in future.

VARIOUS PHYSICO-CHEMICAL PARAMETERS

It is very important to test the water before it used for various purposes like drinking ,domestic, agricultural or industrial purpose. Water must be tested with different physico-chemical parameters. Selection of parameters for testing of water is solely depends upon for what purpose we going to use that water and what extent we need its quality and purity. Water does content different types of floating, dissolved, suspended and microbiological as well as bacteriological impurities. There are many methods for testing the water quality some physical test should be performed for testing of its physical appearance such as temperature, color, odour, pH, turbidity, TDS etc, while chemical tests should be perform for its BOD, COD, dissolved oxygen, alkalinity, hardness and other characters. For obtaining more and more quality and purity water, it should be tested for its trace metal, heavy metal contents and organic i.e. pesticide residue. It is obvious that drinking water should pass these entire tests and it should content required amount of mineral level. Only in the developed countries all these criteria's are strictly monitored. Following different physico-chemical parameters are tested regularly for monitoring quality of water.

Temperature

Temperature is an objective ,comparative measure of hot or cold. It is measured by a thermometer. Water temperature controls the rate of all chemical reactions, and affects fish growth, reproduction and immunity.

pH

The pH of a solution is a measure of the molar concentration of hydrogen ions in the solution and as such is a measure of the acidity or basicity of the solution. The letters pH stand for "power of hydrogen" and the numerical value is defined as the negative base 10 logarithm of the molar concentration of hydrogen ions.

EC (Electrical Conductivity)

Electrical conductivity is the measure of a material's ability to facilitate the transport of an electric charge is known as EC. Its SI derived unit is the siemens per metre. Conductivity shows significant correlation with ten parameters such as temperature , pH value , alkalinity , total hardness , calcium , total solids, total dissolved solids , chemical oxygen demand , chloride and iron concentration of water. It is measured with the help of a EC meter.

Alkalinity

Alkalinity is a measure of the buffering capacity of water or the capacity of bases to neutralize acids. The presence of buffering materials help neutralize acids as they are added to the water. These buffering materials are primarily the bases bicarbonate (HCO3-), and carbonate (CO32-) and occasionally hydroxide (OH-), borates, silicates, phosphates, ammonium, sulfides, and organic ligands. Alkalinity is measured by titration.

Turbidity

The cloudiness or haziness of a fluid caused by suspended solids that are usually invisible to the naked eye. The measurement of turbidity is an important test when trying to determine the quality of water. Organisms like phytoplanktons can contribute to turbidityin open water.The most common measurement for turbidity in the united states are the Nephlometric turbidity units (NTU).

Dissolved Oxygen (DO)

Dissolved oxygen analysis measures the amount of gaseous oxygen (O2) dissolved in an aqueous solution. Oxygen gets into water by diffusion from the surrounding air, by aeration (rapid movement), and as a waste product of photosynthesis. Its correlation with water body gives direct and indirect information e.g. bacterial activity, photosynthesis, availability of nutrients, stratification etc.

Biochemical Oxygen Demand (BOD)

Biochemical oxygen demand is a measure of the quantity of oxygen used by microorganisms (e.g., aerobic bacteria) in the oxidation of organic matter. Natural sources of organic matter include plant decay and leaf fall. BOD is conducted over a five day period .

Chemical Oxygen Demand (COD)

Chemical oxygen demand (COD) is a measure of the capacity of water to consume oxygen during the decomposition of organic matter and the oxidation of inorganic chemicals such as ammonia and nitrite. Both BOD and COD are key indicators of the environmental health of a surface water supply.

Total Solids (TS)

Total solids is a measure of total dissolved solids (TDS) and total suspended solids (TSS) in water. It is generally measured in mg/L. Total solids also affects water clarity. The total solids value is used to assess the reuse potential of wastewater and to determine the most suitable type of treatment process.

Total Dissolved Solids (TDS)

Total Dissolved Solids (TDS) are the total amount of mobile charged ions, including minerals, salts or metals dissolved in a given volume of water, expressed in units of mg per unit volume of water (mg/L), also referred to as parts per million (ppm).

Transparency

Transparency, transparence or transparent most often refer to Transparency and translucency, the physical property of allowing the transmission of light through a material. Transparency can be measure by secchi disk.

Calcium

It is measured by complex metric titration with standard solution of ETDA using Patton's and Reeder's indicator under the pH conditions of more than 12.0. These conditions are achieved by adding a fixed volume of 4N Sodium Hydroxide. The volume of titre (EDTA solution) against the known volume of sample gives the concentration of calcium in the sample.

Total Biomass

Total quantity or weight of an organism in a given area or volume. Organic matter used as a fuel, especially in a power station for the generation of electricity. Biomass can be measured by to methods direct and indirect method.

Study of some physico-chemical parameters of polluted water sample in India

Study of physico chemical parameter is very important. As its easily get an exact idea about the quality of water and we can also compare results of different physico chemical parameter values with standard values. Most of the physico-chemical parameters are determined by standard methods prescribed by APHA, WHO.

Sinha and Kumar (2006) evaluate an assessment on monitoring of trace metals in Gagan river water at Moradabad. according to this report, Gagan river water was found to be enriched with Zinc, Copper, Iron, Lead, micro-nutrients. These indicated a marked decrease in river water quality for trace metal studied. People exposed to river water might be suffering from the toxicity of trace metals.

Koliyar and Rokade (2008) carried out an assessment on water quality in Powai lake and observed different water parameters of lake. These lake water parameters increased during summer season but during rainy season these increased water parameters become diluted and this change affecting the aquatic environment. **Yogendra and Puttaiah (2008)** studied determination of water quality index and suitability of an urban water body in Shimoga town in Karnataka. They determined that environmental parameters influenced the water quality. **Prasad and Patil (2008)** carried out a study of physico-chemical parameters of Krishna river water in Western Maharashtra. After the study they found that most of the physico-chemical parameters of Krishna river water are within the permissible limit of ICMR and WHO so the water of Krishna river is suitable for drinking purposes and for aquatic animals in studied period.

Verma, S (2009) carried out and assessment of water quality in Betwa river at Bundelkhand region and observed that Betwa river water is polluting due to organic and inorganic pollutants of agricultural and household activities.

Chandra *et al.* (2010) has been work out on pollution status of river Ramganga: physico-chemical characterstics at Bareilly and his results showed that the temperature ranges from minimum of 17.2 to maximum of 25.3^{o}C, temp of water body is affected by sewage and industrial effluents . pH ranges from 7.59 to 8.36, total dissolved solids from 339.37 to 421.35 mg/l, total suspended solids from 95.93 to 127.66mg/l, dissolved oxygen from 3.07 to 3.89 mg/l, CO_2 from 26.18 to 26.69 mg/l. The results also showed that water of river Ramganga is highly polluted and having less amount of dissolved oxgen and high concentration of free CO_2 (Chandra et al 2010). **Sonawane, G.H. and Shrivastava, V.S (2010)** worked on ground water quality assessment nearer to the dye user industry they observed the drinking water of different sites is to be contaminated and not suitable for drinking purpose. **Parmar, K and Parmar, V (2010)** studied on evaluation of water quality index for drinking purpose of river Subernarekha in Singhbhum district. They observed that river water is excellent to average quality so that main cause of deterioration of river water is industrial effluents, untreated sewage and unprotected river sites.

Chandra *et al.* (2011) evaluate the physico-chemical studies on pollution potential of river Devaha at district Pilibhit (U.P). The electrical conductivity ranges from highest 1383.62µmho/cm to lowest 160.67µmho/cm, dissolved oxygen from 8.20 mg/l to 0.0 mg/l, biochemical oxygen demand from 36.10mg/l to 1.11mg/l, chemical oxygen demand from 172.11mg/l from 4.94mg/l, total hardness from 334.98mg/l to 66.12mg/l, chlorides from 162.10mg/l to 6.95mg/l, calcium from 90.21mg/l to 22.00mg/l, magnesium from 26.71mg/l to 2.72mg/l, sodium from 60.10mg/l to 4.23mg/l, potassium from 29.07mg/l to 1.23mg/l.

Manufacturing process of brass and steel based on coal furnaces generate a lot of dangerous waste material containing ash and metal like Cu, Ni, Zn,Cr and Fe which are generally be dumped in the river. (Agarwal et al 2011). **Yadav and Kumar (2011)** were monitored water quality of Kosi river in Rampur District, Uttar Pradesh, India. The temperature ranges between minimum of 17.8^{o}C to maximum of 21.7^{o}C, pH from 7.2-8.5, turbidity from 5.6 - 26.3 NTU, alkalinity from 154-516 ppm, total hardness from 181-296ppm, biochemical oxygen demand 12.7 - 53.6 ppm, chemical oxygen demand from 69-193 ppm, chlorides from 18-88 ppm, nitrate from 4.7 - 48ppm, phosphate from 3.3-6.7ppm, fluoride from 0.32-1.7ppm. **Chandra *et al.* (2011)** monitored result showed that the pH ranged from minimum of 7.28 to maximum of 8.6, dissolve oxygen from 3.8ppm to 5.4ppm, alkalinity from 79.3mg/l to107.8mg/l, total hardness 181.1mg/l to 203mg/l.

Gangwar *et al.* (2012) evaluate the assessment of physico-chemical properties of water: river Ramganga at Bareilly, U.P. The temperature ranged between 20.4^{o}C to 35.9^{o}C, pH from 8.1 to 8.8, total solids from 330mg/l to 396mg/l, turbidity from 22 to72 NTU, hardness from 192mg/l to 219mg/l, alkalinity from 96mg/l to 202mg/l, dissolved oxygen from 5.8mg/l to 6.3mg/l, bio-chemical oxygen demand from 5.0mg/l to 5.8mg/l, chemical oxygen demand from 33.5mg/l to 41mg/l. The above study concluded that water of Ramganga river at Bareilly revealed that the water quality is not good, the alkalinity of the water was high which was not good for agricultural purpose. The amoumt of chemical oxygen demand also noted higher than the amount of bio-chemical oxygen demand during the study period. The major reason of pollution in the river is due to industrial discharge. **Bahudula and joshi (2012)** studied the impact of sewer drains on the main canal of river Ganga, within haridwar city, Uttarakhand, India and his results indicated that the temp varies from minimum of 11.20 to maximum of 28.8, pH from 7.1 to 8.25,velocity from 0.50 to 2.75, turbidity from 3-10 , total solids from 160.0 to 2460, dissolved oxygen from 0.90 to 9.1mg/l, biochemical oxygen demand from 1.40 to 70.1mg/l, chloride from 8.62 to 77.2 mg/l.

Khan and Srivastava (2012) carried out an assessment on physico-chemical characteristics of ground water in and around Allahabad city and investigated that there is high concentration of salts in the ground water so it is not suitable for drinking and domestic purpose. It needs proper purification treatment before use. **Bajpai, R (2012)** did comparative study analysis of physico-chemical parameters of Hasdeo river barrage and Arpa river water samples of Bilaspur river and studied that Hasdeo river water is good and within the permissible limits but Arpa river water is polluted and not fit for domestic purpose.

Singh and Choudhary (2013) studied the physico-chemical characterstics of river water of Ganga in middle Ganga planes and the results showed that pH ranged from minimu of 6.2 to maximum of 7.9, dissolved oxygen found lower at all the site during summer and high during the winter. Dissolved oxygen ranged from 3.2-9.2ppm, Total hardness from 90-200ppm, phosphate-phosphorus (PO_4-P) ranged from 0.009-0.117 ppm, nitrate-nitrogen (NO_3-N) ranged from 0.016-0.116ppm**. Gangwar *et al.* (2013)** evaluate the assessment of water quality index of river Ramganga at Bareilly U.P India and the result showed exceed limit of all the physico-chemical parameters and concluded that the water of river Ramganga is unsafe for drinking purpose as it exceeds the limit of various agengies. **Jena *et al.* (2013)** was carried out investigation of water quality index of industrial area surface water samples and showed that parameters like chloride, sulphate, nitrate ,and pH were within the prescribed limit given by WHO, ICMR and BIS and alkalinity, hardness, electrical conductivity and total dissolved solids were found above from the permissible limit. **Shrivastava *et al.* (2013)** reported water quality deterioration of Machna river due to sewage disposal, Betul, Madhya Pradesh, India. The pH ranged from minimum of 7.4 to maximum of 10.0, chloride from 224 to 320 mg/l, nitrate from 23 to 65 mg/l, dissolved oxygen from 2.1 to 4.2 mg/l, bio-chemical oxygen demand from 123-166 mg/l, chemical oxygen demand from 321-420 mg/l, total dissolved solids from 145 to 220mg/l, total suspended solids from 105 to 145 mg/l.

Alam and Pathak (2013) studied the hydrochemical profile of wetland situated in Ram Ganga flood plains and the study revealed that the water quality is unsafe for drinking purpose but during winters it can use for bathing and washing. Domestic sewage consist of 99.9% water coming from washing, flushing, rinsing and other activities (Botkin and keller 1995). **Vishwakarma *et al.* (2013)** studied the assessment of water quality of Betwa river, Madhya Pradesh, India. The temp from 16 to 31°C, pH from 5 to 9.2,Hardness from 14.6 to 58.6 mg/l, dissolved oxygen from 2 to12.3 mg/l, biochemical oxygen demand from 2 to 15mg/l, chemical oxygen demand from 8 to 81.5 mg/l. The coefficient of correlation (r) among various physico-chemical parameters was also made. **Agarwal and Agarwal (2013)** studied on linear regression and correlation analysis of water quality parameters was carried out in river Kosi at District Rampur in India. They concluded that the validity of regression equation that can used to find the value of one parameter if the value of other is known in same water. **Kale, G.B (2013)** worked on zooplankton diversity of Danyanganga reservoir near Khamgaon, Maharashtra. He found that the number of fishes is reduced in the reservoir because of low nutrient level in the reservoir and variations in the pH of water. **Rai, B (2013)** carried out an project on pollution and conservation of Ganga river in modern India. According to this project report, The situation is much better for DO for which at only one site the bathing standard is not met. On the other hand in terms of total coliform count only at one place the bathing standard is met. The count exceeds by many times the bathing standard. **Eknath (2013)** worked on seasonal fluctuations of physicochemical parameters of river Mula Mutha at Pune and their impact on fish biodiversity. He concluded that Mula-Mutha river is highly polluted due to domestic and industrial effluents. Due to high pollution in river water some species are tolerant and during winter and summer the disappearance of fish fauna is also shown.

Bhawana Ayachit (2014) showed the impact of industrial effluents on water quality of Betwa, Mandedeep. The pH range from 5.4 to 6.8, temperature from 29.8 to 31.0, salinity from 18.7 to 20.8 mg/l, dissolved oxygen from 38.2 to 41.5 mg/l, bio-chemical oxygen demand from 38.0 to 59.0 mg/l, turbidity from 26.4 to 31.8,total suspended solids from 19.8 to24.9 mg/l, total dissolved solids from 196 to 231 mg/l, conductivity from 391 to 462, oil and grease 24.2 to 40.4 mg/l. **Ashfaq and Ahmad (2014)** studied the drinking water quality and the result of above study showed that most of the parameters were within the acceptable limits as prescribed by WHO and other agencies. The Ph value lie between 6.1- 8.5, total dissolved solids from 920-1970 mg/l, turbidity from 5-9 NTU, tatal alkalinity 295-640, total hardness 300-600 mg/l, chloride 280-950 mg/l.

Abir, S (2014) worked on seasonal variations in physicochemical characteristics of Rudrasagar wetland-A Ramsar site, Tripura and concluded that the water of Rudrasagar wetland has high concentration of TSS, TDS, nitrate, phosphate etc. This high concentration shows that Rudrasagar wetland is enriched in dissolved nutrients or eutrophicated. **Pandey and Augur (2014)** carried out an assessment on study of physico-chemical parameters of Ib river, Jashpur in chattishgarh. They observed good water quality of Ib river and river water is good for agricultural purpose. **Gaikwad and Kamble (2014)** carried out an assessment of the qualitative analysis of surface water of Panchganga river (MS). Different monitoring sites indicates the poor water quality of river Panchganga and confirmed need of necessary efforts to overcome the problem of pollution for maintenance of healthy aquatic ecosystem and its balance. **Kaur, and Verma (2014)** carried an assessment on physiochemical and microbiological study of river water of Ganga and Yamuna in Allahabad. They investigated the water of river Ganga, Yamuna and Sangam, found that water is to be above the permissible limits and various pathogenic microorganisms also isolated from these rivers water, so they concluded that the water of these rivers is not fit for human consumption without the treatment.

Gagan Matta (2014) studied the physico-chemical characterstics to assess the pollution status of river Ganga in Uttarakhand, the study was done to show the impact of pollution on Ganga. The study showed higher and lower ranges of different parameters. The temperature was foumd 8.14% higher, turbidity 29.39%, total solids 27.40 %, pH 1.40%, CO_2 11.76%, total hardness 18.83%, transparency found 13.93% lower, velocity 4.34%, dissolved oxygen 6.20%. The results clearly indicated that the water quality of river Ganga is not good not even satisfactory. Higher amount of turbidity can reduce the aesthetic quality of Ganga that may cause ecological changes. It can also show disastrous effect on fishes and other aquatic life.

Bhutiani *et al.* (2014) studied the assessment of Ganga river ecosystem at Haridwar, Uttarakhand, India with reference to water quality indices and the 11 year study revealed that water quality of river Ganga ranges from poor to good. The main source of pollution are sewage, solid and liquid contaminants or organic. The temp ranged from minimum of 14.4 to maximum of 16.90°C, conductivity from 175.00-210.00 , turbidity from 1.95-1.95 JTU, velocity 1.44-53.50 m/s, total solids from 112.00-60.60 mg/l, total dissolved solids from 112.50-495.20 mg/l, pH from 7.10-7.30, dissolved oxygen from 9.50-11.00 mg/l, bio-chemical oxygen demand 1.25-2.25 mg/l, chemical oxygen demand from 8.69-12.00 mg/l, CO_2 from 1.75-2.91 mg/l, alkalinity from 50.67-63.35 mg/l, hardness mg/l, nitrate from 0.02-0.07 mg/l, phosphate from 0.05-0.08 mg/l. **Kumar and Gupta (2015)** analysed the assessment of water quality of Ram ganga river in Moradabad District, Uttar Pradesh, india, and the results showed that pH ranged from minimum of 7.1 to maximum of 8.4, turbidity from 5.4 to 25.9 NTU, alkalinity from 152 to 515 ppm, hardness from 180 to 290 ppm, bio-chemical oxygen demand 12 to 50.6 ppm, chemical oxygen demand from 70 to 190 ppm.

Ahmad, A.B (2014) studied the evaluation of ground water quality index for drinking purpose from some villages around Darbandikhan in Iraq. He concluded that ground water is showing excellent quality of water and fit for drinking purpose without any treatment. **Singh, P (2014)** did study on seasonal variation in physico-chemical parameters of the river Gomti and investigated that river water is not good for domestic purpose. Many activities polluting the river water which deteriorating the water quality of aquatic life. **Ramesh, N and Krishnaiah, S (2014)** carried out an assessment on physic-chemical parameter of Bullandur lake and studied that almost water parameters within the permissible limits as per BIS except BOD (biochemical oxygen demand) and COD(chemical oxygen demand) which is found in higher amount. **Salla and Ghosh (2014)** carried out an assessment on of water quality parameters of lower lake in Bhopal. They concluded that the lake water is highly contaminated because it receives sewage and effluents of nearby area, so the water is unsuitable for drinking purpose and there is need for proper drainage facility to protect the water from deterioration.

Mishra and Nayak (2014) carried out an assessment on the study of water pollution in two major rivers in Odisha- Mahanadi and Brahmani, They analyzed the status of pollution of Mahanadi and Brahmani of Odisha and concluded that the sewerage system of nearby town is polluting the Mahanadi whereas Brahmani is polluted by the steel plants and chemical factory effluents. **Katakwar, M (2014)** studied the physico-chemical characteristics of Anjan river water in near Pipariya Madhya Pradesh. On the basis of various parameters studied, the water quality analysis indicates that the river water in the Pipariya area is polluted and can serve as a bad habitat for many aquatic animals including endangered species with Narmada River.

Ashok Kumar (2015) studied the monthly and seasonal variations in primary productivity of glacial fed mountainous Goriganga river in Kumaun Himalaya, Uttarakhand India and the result showed that the productivity of Goriganga river clearly revealed that the river is less productive and ologotrophic (nutrient poor and oxygen rich) in nature, as the photosynthetic rates always found below the oligotrophic range. The results also indicated that phytoplankton also confirmed the oligotrophic nature of Goriganga river. **Watkar, and Barbate, (2015)** worked on seasonal variations in physico-chemical properties of Chandrabhaga river in Dhapewada, district Kamleshwar Maharashtra. After study this is concluded that the water of river Chandrabhaga need proper and necessary treatment to avoid contamination of water for drinking purpose. At present the river water is suitable for irrigation and fishery purpose.

Selakoti and Rao (2015) studied on seasonal fluctuations in physico-chemical variables in spring fed Kosi river at Almora province from central Himalaya, India and the results evaluated that the water of study area is good and it can be used for drinking purpose and all the studied parameters were found in permissible limit as prescribed by safe water quality standards. The statistical correlations made between different hydrological parameters. Total dissolved solids is positively correlated with water temp and negatively correlated with transparency, alkalinity, dissolved oxygen and pH and equally correlated with conductivity. pH is positively correlated with dissolved oxygen and negatively correlated with chloride, conductivity and air temp . Dissolved oxygen and CO_2 are negatively correlated. **Shrivastava *et al.* (2015)** worked on water quality management plan for Patal Ganga river for drinking purpose and health safety. They concluded that river water is affected by industrial, domestic and public wastewater so the water of river can use only after proper treatment for drinking purpose.

Kushwaha and Agrahari (2015) studied the effect of domestic sewage on phytoplankton community in river Rapti at Gorakhpur and the results showed that parameters like CO_2, bicarbonate, alkalinity, nitrate, phosphate and bio-chemical oxygen demand were increased and parameters like pH, dissolved oxygen, carbonate and alkalinity were decreased it is also noted that these parameters were fluctuated at different stations, due to mixing of sewage phytoplankton populations was very low. **Shekhar and Shekhar (2015)** evaluate the water quality index of Hindon river of Western U.P, India and the study of Hindon river showed that during the study period all the sampling stations were highly polluted and it is due to untreated waste product digged into the river. The industrial effluents joins the river and destroy the water quality. The Hindon river water is also not fit for industrial purpose.

Priyanka Rajvanshi (2015) studied the seasonal studies of some physical parameters and heavy metals present in river Dhamola at Saharanpur District (U.P). The results showed that water temperature varied from 22.13 °C ±5.21 to 25.5°C ±4.13, turbidity varied between 381.33 JTU ± 62.14 to 1108.33 JTU± 233.57 total solids were found minimum of 948 mg/l ±240.13 to maximum of 2016.33 mg/l±744.56 total heavy metals range between14.89 mg/l ± 1.23 to 9.05 mg/l ± 0.95 total dissolved solids ranged between minimum of 323mg/l ± 34.15 to maximum of 1253mg/l ± 68.31 total suspended solids found between 408mg/l ± 50.15 to 1459mg/l ± 90.95.

Gagan Matta (2015) investigated the physico-chemical parameters of Ganga River water at Rishikesh (Uttarakhand) and indicates that most of the physico-chemical parameters from Gangetic River System comparison to ISI and WHO for drinking water, may be suitable for domestic purposes, but it require attention due to drastic changes in climate and increase in pollution in last decade.

RESULT AND DISCUSSION

From the above studies we have concluded that conductivity is highly significant with some parameters like pH, Calcium, TDS, TS if is higher amount of TDS present in water, it indicates the pollution (Navneet Kumar 2010). The hardness of water is due to the presence of Calcium. DO is also a very important parameter in the assessment of water quality . Due to the process of respiration of biota the oxygen amount generally reduced. 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 Ramganga, 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 (Jaspal Singh *et al*.).

CONCLUSION

From the above study we made a conclusion that the water quality of river Ramganga is not good at all. The various physico-chemical parameters are present in higher amount more than there permissible limit so it is necessary to check the water quality time to time.

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