

**REVIEW ON HYDROCHEMICAL ANALYSIS OF RIVERS****Rameshchandra Y Deshmukh<sup>1</sup>, Dr. Pushendra Sharma<sup>2</sup>, Dr. Prakash R. Dhote<sup>3</sup>**

<sup>1</sup>Research Scholar, Department of Chemistry, Sri Satya Sai University of Technology & Medical Sciences, Sehore , M.P.

<sup>2</sup>Research Guide, Department of Chemistry, Sri Satya Sai University of Technology & Medical Sciences, Sehore , M.P.

<sup>3</sup>Prof. & Head , Department of Chemistry, MIET , Gondia

**Abstract:**

The physical and chemical parameters exert their influence both, individually and collectively and their interaction creates a biotic environment, which ultimately conditions the origin, development and finally succession of the biotic communities. The potential cause of degradation of river water quality due to various point and nonpoint sources. Increasing problem of deterioration of river water quality, it is necessary to monitoring of water quality to evaluate the production capacity. Appreciable amount of work has been done concerning taxonomy, ecology, biodiversity, limnology, hydrochemistry and water quality index in foreign countries. In this article, review on hydro chemical analysis of rivers has been highlighted.

**Keywords:** Hydro chemical, Analysis, Rivers

**INTRODUCTION:**

Water also known as blue gold, one of the most precious natural resources is responsible for life on the Earth as, evolution of life and development of human civilization could not have been possible without water. All great civilizations of the world therefore evolved around rivers. Rapidly increasing population indiscriminate urbanization and unplanned industrialization along the rivers as well as in the catchment areas have put tremendous stress on water resources and their quality. Indiscriminate discharge of industrial effluent in rivers has been a common phenomenon leading to sever depletion of water quality and aquatic life. The examination of water quality is therefore necessary to assess its quality as well as to find out source of pollution , which ultimately helps in planning the water quality management such studies helps to find out whether water is suitable for drinking purpose, Primary assessment of water pollution level in the natural environment has therefore been of great

concern to the Scientists, Environmentalists and Engineers as it also help assessing adverse effects on human beings and environment (Tambekar et al.,2013).

**REVIEW OF LITERATURE:**

In India almost 70% of the water has become polluted due to the discharge of domestic sewage and industrial effluents into natural water source, such as rivers, streams as well as lakes. The improper management of water systems may cause serious problems in availability and quality of water. Since water quality and human health are closely related, water analysis before usage is of prime importance (Rajiv et al., 2012).

Taylor., (1949) worked on the examination of water and water supplies, London. Klein (1957) have worked on the aspects of River Pollution, London. Mercer (1967) emphasized the effects of abstraction and discharges on river water quality, London. Hynes (1970) worked on the ecology of running waters in England. Wong et al., (1979) examined the effects of nutrients on water quality of Shallow Rivers, Southern Ontario, Canada. Mutlak et al., (1980) worked on quality of Tigris river passing through Baghdad for irrigation, Baghdad, Iraq. Mitra, (1998) carried out work on spatial and temporal variation of ground water quality in Sand Dune area of Aomori Prefecture in Japan. Zanderbergen et al., (1998) studied on water quality of two small water shed in Greater Vancouver area BCWQI for water shed manager, Canada. Benzei et al., (1999) studied the physico –chemical characteristics of the rivers of North East Scotland. Bhatt et al.,(1999) studied the physico-chemical characteristics and phytoplankton of Taudha Lake Kathmandu. Peace and Wunderlin (2000) worked on water quality of the Suquia River (Argentina). Prowse et al., (2002) worked on the hydro ecological studies of northern Peace and Slave river basin at Canada. Tuzen et al., (2002) has investigated of some physical and chemical parameters in the river Yeshlirmak in Tokat region, Turkey.

Umeham and Elekwa., (2005) have studied the hydrobiological status of Ngwui, Ikwu and Eme streams in Umuahia North L.G.A., Abia State, Nigeria. Eletta O. and Adekola.,(2005) studied the physical and chemical properties of Asa River water, Kwara state, Nigeria. Charkhabi and Sakizadeh (2006) has assess the spatial variation of water quality parameters in most polluted branch of the Anzali Wetland, Northern Iran. Lumb et al.,(2006) worked on water quality of Mackenzie river basin, Canada.

Akubugwo et al., (2007) have done physico - chemical studies on Uburu Salt Lake Ebonyi State Nigeria. Abulude et al., (2007) have determine the physico - chemical parameter and trace metal contents of drinking water samples in Akure Nigeria. Adekunle et al., (2007) have assessed the groundwater quality in a typical rural settlement in Southwest Nigeria. Hutton et al., (2007) worked on the economic and health effects of increasing coverage of low cost household drinking water supply and sanitation interventions Geneva and New York. Kamal et al., (2007) carried out the study on the physico-chemical properties of water of Mouri River, Khulna, Bangladesh. Kannel et al.,(2007) studied the spatial and temporal changes of the water quality in the Bagmati river basin ,Nepal. Osibanjo and Adie (2007) examined the impact of effluent from Bodija Abattoir on the physic-chemical parameters of Oshunkaya stream in Ibadan city, Nigeria. Sanchez et al.,(2007) studied the DO deficit was used as the environmental indicator to assess the WQI in the watersheds of Las Rozas, Madrid ,Spain. Joarder et al., (2008) have done the regression analysis of ground water quality of Sunamganj District, Bangladesh. Oruonye and Medjor, (2009) have studied the physico-chemical analysis of borehole water in the three resettlement areas (Ali Sheriffiti, Sagir and Dambore) in the Lake Chad Region of Nigeria.

Adefemi and Awokunmi, (2010) have done the determination of physicochemical parameters and heavy metals in water samples from Itaogbolu area of Ondo-State, Nigeria. Eletta et al., (2010) have studied on physico-chemical characterisation of some ground water supply in a school environment in Ilorin, Nigeria. Iskandar, (2010) has worked on the effectiveness of biofilter as a treatment for domestic wastewater, Malaysia. Maitera et al., (2010) has worked on the assessment of the organic pollution indicator levels of river Benue in Adamawa State, Nigeria. Singkran, et al., (2010) have worked on determining water conditions in the northeastern rivers of Thailand using time series and water quality index models. Daraigan et al., (2011) worked in the direction of linear correlation analysis study of drinking water quality data for AL- Mukalla city, Hadhramout, Yemen. Khwakaram et al.,(2012) worked on the determination of water quality index (WQI) for Qalyasan stream in Sulaimani city of Kurdistan region , Iraq. Dike et al., (2013) illustrated the pollution studies of river Jakara in Kano Nigeria, using selected physico-chemical parameters. Fataei et al.,(2013) worked on water quality assessment in Balikhlou river, Iran. Hossain et al., (2013) studied surface water Pollution in Eastern Part of Peninsular Malaysia.

Majority of rivers of India have extensively been studied by many researchers for various aspects of quality of water. Ray and David, (1966) studied on the effect of industrial wastes and sewage upon the chemical and biological composition and fisheries of the river Ganga at Kanpur. Dakshini and Soni, (1979) studied the water quality of sewage drains entering Yamuna in Delhi. Bodola and Singh, (1981) illustrated the hydrobiology of the river Alaknanda of Garhwal Himalaya, India.

Agrawal and Srivastava,(1984) done the pollution survey of major drains discharge into river Ganga and Yamuna at Allahabad. Quadri and Shah, (1984) studied the hydrobiological features of Hoassar. A typical wetland of Kashmir-I. Badge and Verma, (1985) has done the limnological studies of J.N.U. lake., New Delhi. Tiwari and Mishra (1985) worked on the preliminary assignment of water quality index of major Indian rivers. Sinha,(1986) emphasized the effects of Ganga pollution on health, New Delhi. Bansal, (1989) worked on the physico-chemical studies of the water of river Betwa in M.P. Sinha et al., (1989) worked on the physico - chemical studies of river Ganga water at Kalakankar (Pratagarh), India.

Malviya et al., (1990) studied on aspects of water pollution in river Narmada at Hoshangabad M.P. Singh and Singh, (1990) worked on the pollution studies on river Subarnarekha around industrial belt of Ranchi (Bihar). Trivedy et al., (1990) worked on river pollution in India. Dahiya and Kaur,(1991) examined the physicochemical characteristics of underground water in rural areas of Tosham subdivisions, Bhiwani district, Haryana. Singh et al.,(1991) carried out the study on the BOD contamination in Kali river at Sadhu Ashram in Aligarh. India. Kulshrestha et al.,(1992) illustrated the seasonal variation in the limnological characteristics of Manasarovar reservoir of Bhopal. Chopra et al., (1993) examined the relationship between abiotic variables and benthic fauna of river Yamuna in Garhwal, Himalaya. Khanna , (1993) worked on the ecology and pollution of Ganga river. Saxena and Chauhan, (1993) studied on the physico-chemical aspects of pollution in river Yamuna at Agra. Subba Rao (1997) worked on water quality index in hard rock terrain of Guntur district, Andhra Pradesh, India. Sharma and Pande , (1998) worked on the pollution studies on Ramganga river at Moradabad. Koshy and Nayar , (1999) examined the water quality aspects of river Pamba. Shivanikar et al., (1999) determined the relationship between environmental temperature fluctuation and dissolved oxygen level in Godavari river water.

Chugh, (2000) illustrated the seasonal variation in the microbial ecology of the river Ganga at Haridwar. Kumar, (2000) has done the quantitative study of the pollution and physico-chemical conditions of the river Mayurakshi in Santhal Paragana (Jharkhand state). Mathew and Nayar, (2000) studied the water quality aspects of river Pamba at Kozenchery, India. Mohanta and Patra, (2000) studied on the water quality index of river Sanamachhakandana at Keonjhar Garh. Orissa, India. Mishra and Tripathi (2001) examined the impacts of city sewage discharge on physico-chemical characteristics of Ganga river. Rafeeq and Khan, (2002) examined the impact of suger mill effluents on the water quality of the river Godavari near Kandakurthi village, Nizamabad District, Andhra Pradesh. Kumar and Singh, (2002) illustrated the relationship between the ecology, conservation and management of the river Mayurakshi in Santhal Pargana (Jharkhand State) with special reference to effect of sewage pollution on abiotic and biotic potentials. Sargaonkar and Deshpande, (2003) has worked on the development of an overall index of pollution for surface water based on a general classification scheme in indian context, environmental monitoring and assessment. Goldar and Banerjee, (2004) examined the impact of informal regulation of pollution on water quality in rivers in India. Kesharwani et al., (2004) worked on the determination of water quality index (WQI) of Amkhera pond of Jabalpur city (M.P.). Kulshrestha and Sharma, (2006) examined the impact of mass bathing during Ardhkumbh on water quality status of river Ganga. Radha Krishnan et al.,(2007) has done the comparative study on the physico - chemical and bacterial analysis of drinking, borewell and sewage water in the three different places of Sivakasi. Srinivasrao et al., (2007) observed the variation in dissolved oxygen , biochemical oxygen demand and chemical oxygen demand in certain polluted sites of Godavari river at Rajahmundry, Andhra Pradesh, India.

Abida and Harikrishna, (2008) studied on the quality of water in some streams of Cauvery river. Avvannavar and Shrihari, (2008) worked on water quality index for drinking purposes for river Netravathi, Mangalore, South India. Mishra et al., (2008) studied the water quality index and suitability of water of Kohargaddi dam at Balrampur district of India. Singh et al., (2008) illustrated the seasonal variations in different physico - chemical characteristics of Yamuna river water quality in proposed Lakhwar hydropower project influenced area. Yogendra and Puttaiah,(2008) determined the water quality index and suitability of an Urban waterbody Karnataka.

Gupta et al., (2009) worked on the physico-chemical analysis of ground water of selected area of Kaithal city (Haryana) India. Janardhana et al., (2009) examined the fluoride contamination in groundwaters of Sonbhadra district, Uttar Pradesh, India. Joshi et al., (2009) studied on physico - chemical parameters to assess the water quality of river Ganga for drinking purpose in Haridwar. Kumar and Dua (2009) worked on the water quality index for assessment of water quality of river Ravi at Madhopur. Ramakrishniah et al., (2009) has done the assessment of water quality index for the groundwater in Tumkur. Sharma and Kansal, (2009) worked on the water quality analysis of river Yamuna using water quality index in the national capital territory, India

Ashok et al.,(2010) has done the physico-chemical and microbiological study of Tehri dam reservoir, Garhwal Himalaya, India. Jain et al., (2010) worked on the assessment of ground water quality for drinking purpose, District Nainital, Uttarakhand, India. Jothivenkatachalam et al., (2010) has done the correlation analysis of drinking water quality in and around Perur block of Coimbatore district, Tamil Nadu, India. Mahananda et al., (2010) studied the physico-chemical analysis of surface water and ground water of Bargarh district, Orissa, India. Reiza and Singh (2010) made an attempt to understand the groundwater quality by using Water Quality Index (WQI) in Angul-Talcher region of Orissa. Agarwal et al., (2011) has done a case study of assessment of pollution by physico-chemical water parameters using regression analysis of Gagan river at Moradabad- India. Jayalakshmi et al., (2011) has assessed the physico-chemical parameters of water and waste water in and around Vijayawada. Kumar et al., (2011) worked on the assessment of seasonal variation and water quality index of Sabarmati river and Kharicut canal at Ahemadabad, Gujarat. Simpi et al.,(2011) has analysed of water quality using physico-chemical parameters Hosahalli tank in Shimoga district, Karnataka, India. Thomas et al., (2011) studied on the physico- chemical analysis of well water at Eloor industrial area.

Basavaraddi et al., (2012) made a study on seasonal variation of groundwater quality and its suitability for drinking in and around Tiptur town, Tumkur district of Karnataka, India. Bhattacharya et al., (2012) studied on groundwater quality of Anand district, Gujarat, India. Kalra et al., (2012) worked on the seasonal variation of some physico-chemical analysis of water in Ara block of Bhojpur district, Bihar. Kalra et al., (2012) studied on physico-chemical analysis of ground water taken from five blocks (Udwantnagar, Tarari, Charpokhar, Piro, Sahar) of southern Bhojpur (Bihar) Khan and Kumar, (2012) has done the

interpretation of groundwater quality using correlation and linear regression analysis from Tiruchengode taluka, Namakkal district, Tamilnadu, India. Kumar and Chopra (2012) has monitored the physicochemical and microbial characteristics of municipal wastewater at treatment plant, Haridwar city (Uttarakhand) India. Kushwah et al., (2012) carried out an experimental work on water quality of raw sewage and final treated water to waste water treatment plant Bhopal. Mandal et al., (2012) has studied on some physico-chemical water quality parameters of Karola river, West Bengal. Naik et al., (2012) has studied the physico-chemical characteristics of Kunigal lake in Tumkur district, Karnataka, India. Panwar and Srivastava (2012) assessed the groundwater quality in contiguous of integrated industrial estate at Pantnagar of Uttarkhand. Pathak et al., (2012) studied on the physico-chemical status of two water bodies at Sagar city under anthropogenic influences. Rajiv et al., (2012) carried out their work on physico-chemical and microbial analysis of water of different river in Western Tamil Nadu, India. Srinivas et al., (2012) carried out studies on chemistry and Water Quality Index of groundwater in Chincholi Taluka, Gulbarga district, Karnataka state of India.

Agarwal and Agarwal , (2013) worked on the linear regression and correlation analysis of water quality parameters of river Kosi at district Rampur, India. Jalal and Kumar, (2013) worked on the water quality assessment of Pamba river of Kerala, India in relation to pilgrimage season. Ramesh and Seetha, (2013) worked on the hydrochemical analysis of surface water and groundwater in tannery belt in and around Ranipet, Vellore district, Tamil Nadu, India. Singh et al., (2013) worked on physico-chemical analysis of Yamuna river water. Sirajudeen et al., (2013) determined the water quality index of ground water around Ampikapuram area near Uyyakondan channel Tiruchirappalli District, Tamil Nadu, India. Srivastava and Kumar, (2013) has calculated the water quality index with missing parameters . Tank and Chippa, (2013) carried out their work on the analysis of water quality of Halena block in Bharatpur area. Tirkey et al.,(2013) illustrated the water quality indices-important tools for water quality assessment. Yadao et al.,(2013) worked on the analysis of water quality using physico-chemical parameters, Satak Reservoir in Khargone district, Madhya Pradesh,India.

Abhineet and Dohare, (2014) studied on the physico-chemical parameters for testing of present water quality of Khan river at Indore. Choudhary et al., (2014) studied on the physico-chemical parameters of Bilawali Tank, Indore (M.P.) India, Lodh et al., (2014) has

done the studies of water quality with special reference to ancient lakes of Udaipur City India. Pandey et al., (2014) has assessed the physicochemical parameters of river Ganga at Allahabad with respect to WQI.

Paul et al., (2014) has done the assessment of ground water quality in Nellikuzhy panchayat of Kerala state, India. Singh and Singh, (2014) has done the comparative study of water quality index of Mansi Ganga, Radha and Shyam, Kunds of Govardhan at Mathura. Solanki et al., (2014) has done comparative study of physico-chemical analysis of river water and underground water in winter season of Rewa city, MP, India. Barde et al., (2015) has done the comparative study of physico-chemical analysis of Narmada river water at Barwani and Khalghat, MP, India. Iena and Maneemegalai, (2015) has determined the water pollution status of Varahanadhi river water by physico-chemical analysis at Tamilnadu, India. Shrivastava et al., (2015) has done the water quality management plan for Patalganga river for drinking purpose and human health safety. Saxena, (2015) studied on the water quality parameters and development of nano-composites for water treatment at Bassi area in Jaipur, Rajasthan.

Bobdey, (2002) worked on the impact of human activities and domestic wastes, appraisal of potable water quality of river Wainganga, Dist. Bhandara. Sawane et al., (2007) illustrated the seasonal distribution of trace elements in water of Irai river, Dist. Chandrapur. Dahegaonkar, (2008) studied on water quality and biodiversity of loticecosystems near Chandrapur. Prasad and Patil, (2008) has worked on the study of physico - chemical parameters of Krishna river water particularly in Western Maharashtra. Chavan et al., (2009) have studied the seasonal variation in the physico - chemical parameters of river Wainganga near Bramhapuri, Dist Chandrapur. . Sonawane et al.,(2009) has worked on hydrobiological studies on two freshwater reservoirs from Satara district. Murhekar, (2011) has determined the physico-chemical parameters of surface water samples in and around Akot city. Patil and Patil ,(2011) has done the comparative study of groundwater quality of open wells and tube wells around Amalner town of Jalgaon, district. Raut et al., (2011) examined the seasonal variations in physico-chemical characteristics of Peth Lake at Ambajogai district, Beed Marathwada Region, Akkaraboyina and Raju,(2012) has done a comparative study of water quality indices of river Godavari . Asati, (2012) has worked on the water quality analysis of source Wainganga river for Tirora town near Bhandara . Khan et al., (2012) worked on the physico-chemical analysis of Triveni lake water of Amravati district . Loni and Raut, (2012)

have studied on the groundwater quality from six villages of Hatkanangale taluka, Kolhapur district. Mahakalkar and Gupta, (2012) has done the comparative assessment of water quality of wells and borewells of Lonkhairi village, Nagpur. Murhekar (2012) studied the trace metals contamination of water samples from various samples surface water in and around Akot city. Nagarnaik and Patil, (2012) has analysed the ground water of rural area of Wardha city using physicochemical and biological parameters. Nazneen Sadat, (2012) studied the fluoride concentration in the river Godavari and ground water of Nanded city.

Ansari and Hemke (2013) has determined the water quality index for assessment of water samples of different zones in Chandrapur city. Bahekar and There, (2013) illustrated the seasonal variation in physico-chemical characteristics of Koradi Lake, district Nagpur. Bhandarkar and Bhandarkar (2013) has done a comparative study on seasonal variation of physico-chemical properties in some freshwater lotic ecosystems in Gadchiroli. Bhor et al., (2013) has done the water quality assessment of the river Godavari, at Ramkund, Nashik. Mahajan and Tank, (2013) studied on the physicochemical parameters of water body in Dara Dam, Maharashtra. Mane et al., (2013) studied on the water quality and sediment analysis at selected locations of Pavana river of Pune district. Pandey, (2013) has made a case study of surface water quality with painstaking human impacts on the Wainganga river, Bhandara. Pandey et al., (2013) examined the water quality index of the Wainganga river, Bhandara. Patil and Ghorade, (2013) has done the assessment of physico-chemical characteristics of Godavari river water at Trimbakeshwar and Kopargaon. Tambekar et al., (2013) has done the evaluation of physico-chemical parameter of water quality around Chandrapur District. Jain and Shriwastava, (2014) has done comparative review of physico-chemical assessment of Katraj lake, Pune. Kolhe and Shinde, (2014) studied some physico-chemical parameters of Godavari river water at Ramkund, Nashik with reference to correlation study. Kulkarni and Sangpal, (2014) have assessed the surface water quality index of Ujjani reservoir, Solapur District. Gedekar ,(2015) have studied on ecological study of river Wainganga near the region of Ancient Markandadeo temple, district Gadchiroli, Maharashtra.

Heavy metal cadmium pollution in water is a serious environmental pollution, its pollution degree depends on the content and chemical form of cadmium, and is affected by the original water chemical form. The water chemical ions of rivers have certain depletion effects on water pollutants. Based on this, by taking the Longjiang River in Guangxi as the research object, this paper analyses its water chemical characteristics and ion sources. This shall

provide theoretical basis for the later management of Longjiang River. The results show that the water body of Longjiang River mainly includes  $\text{Ca}^{2+}$  and  $\text{HCO}_3^-$ , account for 65%-89% and 65%- 98% of the total cations and anions, respectively. The river is weakly alkaline, the ions of the water are mainly derived from the dissolution of carbonate in the drainage basin, and are mainly affected by natural chemistry. (Yongxiang Zhang, 2018).

The chemical composition of river water collected from the main stream of the Naqu and its tributaries was analyzed to reveal its hydrochemical characteristics and to evaluate the water quality for irrigation purposes. Based on 39 samples, the results revealed mildly alkaline pH values and total dissolved solids (TDS) values ranging from 115 to 676 mg/L, averaging 271 mg/L. Major ion concentrations based on mean values (mg/L) were in the order of  $\text{Ca}^{2+} > \text{Na}^+ > \text{Mg}^{2+} > \text{K}^+$  for cations and  $\text{HCO}_3^- > \text{SO}_4^{2-} > \text{Cl}^- > \text{CO}_3^{2-}$  for anions. Most hydrochemical types were of the  $\text{Ca-HCO}_3$  (~74.36%) type. Cluster analysis (CA) suggested that the hydrochemical characteristics upstream of the main stream of the Naqu were obviously different from those from the middle and downstream of the main stream and its tributaries. The analysis shows that the Sangqu, Basuoqu, Mumuqu, Zongqingqu, Mugequ basin tributary, and the Gongqu basin tributary were mainly affected by carbonate weathering. Carbonate and silicate weathering commonly controlled the hydrochemistry upstream and downstream of the main Naqu, Chengqu, and Mugequ streams. The middle of the main stream of the Naqu was mainly affected by silicate weathering, and anhydrite/gypsum dissolution mainly affected the hydrochemistry of the main Gongqu stream. The quality of water samples was suitable for irrigation purposes, except for one sample from the main stream of the Mugequ. (Fuqiang Wang, Yang Zhao, Xi Chen, Heng Zhao, 2019).

### **CONCLUSION:**

A survey of literature in Maharashtra state context reveals that various workers have carried out extensive work and studies in their particular area. Trivedy and Goel,(1986) has studied the chemical and biological method for water pollution studies, Karad. Ahmed and Krishnamurthy, (1990) has done the hydrobiological studies of Wohar reservoir Aurangabad. Zafar Javeed, (1991) has done the comparative study of ecological pollution of reservoirs and lakes in the vicinity of Aurangabad and Godavari river at Paithan. Salaskar and Yeragi , (1997) studied on water quality characteristics of Shenala lake Kalyan. Patil et al., (2001)

studied on the physico –chemical characteristics of ground water of Armori town of Gadchiroli district, Maharashtra.

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