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A REVIEW OF LITERATURE ON PHYSICO-CHEMICAL ANALYSIS ON NUNDKOL LAKE WATER GANDERBAL JAMMU AND KASHMIR (INDIA)

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ABSTRACT: Water is a natural resource that is required for the survival of all living things and metabolic processes on the planet. Lakes, being precious natural resources, have always been of tremendous value to humans. They have always been a source of water for domestic, industrial, and irrigation reasons since ancient times. Nundkol Lake is an oligotrophic alpine lake in Jammu and Kashmir's Kashmir Valley, in the Ganderbal district. This lake is located at the base of Mount Haramukh (5,142 metres). Gangbal Lake, which is larger and higher in height, is 1.5 kilometres to the north of the lake. During the summer, the shores of Nundkol Lake, surrounded by lush green meadows, serve as a camping location. Naranag is the closest settlement and serves as the starting point for the trip to the lake.

The capacity and quality of lake water are deteriorating as a result of expanding urbanisation, industrialisation, and other development activities. As a result, the current study has been done to analyse the quality of lake water and to investigate its potential environmental implications. Taking these aspects and the need into account, this paper conducted a review of the existing literature.

KEYWORDS: *Coefficient of Variation, Correlation Matrix, F-value, Mathematical modeling, Physico-chemical characteristics, P-value, Regression equation, Statistical approach, Water Quality Index.*

INTRODUCTION: Lakes are inland depressions composed of standing limited bodies of water that are significantly influenced by the local climate. Lakes, being valuable natural resources, have always been extremely valuable to humanity. Lakes are used commercially for a variety of purposes, including fishing, transportation, irrigation, industrial water supply, and receiving waters for waste water effluents. In addition to their relevance for human usage, lakes contain intrinsic biological and environmental values. By decreasing temperatures and affecting the climate of the surrounding region, they help to regulate stream flow, recharge ground water aquifers, and reduce droughts. They provide habitat for aquatic and semi-aquatic animals and plants, which in turn provide food for many terrestrial organisms, and they help to diversify the environment.

Nundkol Lake is formed by glacial runoff. Nundkol Lake is fed by Gangabal Lake and Mount Haramukh's melting glaciers. It is the source of the Wangath Nallah, a major right tributary of the Sindh River.

Nundkol Lake freezes and is covered in snow during the winter. During the summer, the lake's basin is encircled by a carpet of alpine flowers. Geum, blue poppy, potentilla, and gentian are all fairly common. In late spring, Hedysarum flowers can be spotted all around the lake. Nundkol Lake is stocked with trout, including brown trout. Fishing is only authorised for licenced anglers.

Tourists are drawn to the alpine meadows of Trunakhul and Badpathri in Nundkol Lake. It is located at the halfway point of the two-day journey to the lake. An alternative hike begins in Chattergul village, 10 kilometres west of Naranag, and leads through the Mahlish meadows. The lake can also be reached via Bandipora, and the five-day walk begins at Arin. Tourists prefer Naranag walk and return through Gadsar Lake, Vishansar Lake, and the Sonamarg region of Jammu and Kashmir to cover the most of the area's alpine lakes.

Nundkol Lake is only accessible during the summer; the hikes in Nundkol Lake are closed during the winter due to excessive snowfall. Nundkol Lake is accessible from Srinagar via a 65-kilometer motorable route that passes through Ganderbal District and Wayil on its way to the Naranag trekking camp.

Water becomes contaminated when insoluble solid crystals, soluble salts, sewage waste, low level poisonous compounds, industrial can betes, algae, microorganisms, and other substances enter it (APHA, 1992).. Healthy water is defined as water that is not designed for human consumption yet is not harmful to people when used for food preparation (BIS, 1993). Nitrate is one of the most frequent groundwater contaminants in rural areas. It is regulated in drinking water because high amounts can lead to methemoglobinemia, popularly known as "blue baby syndrome" (Mccasland, et al.,1985 and USEPA, 2004).

In recent years, it can be deduced that the drinking water quality in four-fifths of the district has met the maximum allowable levels established by BIS for Nitrate. However, some of the values identified outliers in this research were substantially higher than the BIS's maximum permitted limits. Such values could be attributed to increased usage of nitrogenous fertilisers in the area, or to home wastes that may have polluted groundwater.

Purified mineral water in PPE bottles purchased from a store will inevitably absorb some carbon dioxide (CO2) from the environment, generating mild acid (carbonic acid) and possibly some dissolved plastic molecules (Ananthanarayan and Paniker, 1990).

Lakes in Kashmir

1. **Dal Lake:** The Dal Lake, one of Kashmir's most famous lakes, is really made up of three lakes and does not resemble a typical lake at all. This is owing to its maze-like waterways, channels, houseboats, and floating islands, which all contribute to the appearance of a group of islands in a body of water. This is one of the most well-known sights in Srinagar, and staying in a houseboat here is an unforgettable experience.
2. **Nagin Lake:** Nagin Water, an offshoot of Dal Lake, provides a calm and realistic experience of Kashmir's "lake life." Surrounded by hills and vegetation, visitors can stay on a houseboat for several days, take a shikara ride, explore floating markets, or simply relax. A real romantic Kashmiri experience awaits you at one of the valley's most stunning lakes.
3. **Wular Lake:** Wular Lake, one of Asia's largest freshwater lakes, is a popular tourist site near Srinagar that you should not miss if you visit Kashmir. This lake, which covers an area of more than 130 square kilometres, maintains a diverse bio variety and is vital to many people who rely on it for fish and aquatic plants. Furthermore, this lovely lake protects the entire Kashmir Valley from flooding. Tourists can also get a bird's-eye view of the lake from the top of a garden on a hill near the lake. This is one of the most beautiful lakes in Kashmir and is a must-see for everyone.
4. **Surinsar and Mansar Lakes:** Surinsar and Mansar Lakes in Kashmir are ideal for nature lovers. Visitors can best appreciate its tranquillity, tranquilly, and serenity during the summer, when it is brimming with lotus blossoms. Accommodation options are accessible near the lake, making it one of the best options for individuals who crave nature.
5. **Gadsar Lake:** The Gadsar Lake, one of Kashmir's highest lakes, is a hidden gem that can only be reached via an alpine trek. The Gadsar Lake, located in what is known as the "Valley of Flowers," is 28 kilometres from Sonamarg and has an exceptionally stunning backdrop. It is well-known as a trekking base and is surrounded by alpine flowers, making it a treat for nature enthusiasts.

6. **Manasbal Lake:** Manasbal Lake, one of the nicest lakes in Kashmir, is a beautiful option for those who enjoy the unusual. It is a birdwatcher's heaven, as it is home to a variety of water birds. Aside from it, there is a Mughal Garden created by Nur Jahan alongside the lake. Overall, this is a must-see lake in Kashmir for all nature and history enthusiasts.
7. **Gangabal Lake:** The Gangabal Lake, also known as Haramukh Ganga, is located on the foothills of Haramukh Mountain at a height of 3570 metres. It is home to a variety of species, including brown trout and rainbow trout, and allows tourists to enjoy a great fishing trip (permit needed). It may not be one of the most well-known lakes in Kashmir, but this eccentric and gorgeous jewel offers nature lovers and adventure seekers an unforgettable experience in terms of activities and vistas.
8. **Tso Moriri:** Tso Moriri, one of the world's tallest lakes, is located 137 kilometres from Leh and is a sight to behold. One may spend the night camping next to it and take in the breathtaking scenery of the Rupso Valley. A diversity of aquatic species may be found in the lake, which is 40 metres deep at its deepest point. For those seeking tranquilly and religion, there is also a monastery nearby.
9. **Tsokar Lake:** Tsokar Lake, a natural wonder in Kashmir, is located near Rupso in Leh and is surrounded by hot water springs. At 5000 metres in elevation, this is a true natural wonder that you do not want to miss. The lake is heavily salted, giving it a white gloss and a truly attractive ambiance.
10. **Nundkol Lake:** A stunning crystal clear alpine lake at the foothills of Harmukh mountain. The lake is slightly over a kilometre away from the well-known Gangabal lake. The walk to the lakes begins in the tourist destination Naranag in Ganderbal. Both lakes are part of the well-known "Great Lakes Trek" that connects Naranag and Sonmarg.

LITERATURE REVIEW:

C. Barghigiani; et al.; (2001) has published the findings of a six-river monitoring programme (Serchio, Cecina, Cascina, Era, Elsa, and Pavone) that drain north-west Tuscany (Italy). Agricultural, industrial, and urbanisation pressures all have an impact on water quality, including its suitability for aquatic organism survival. Several physicochemical parameters (temperature, DO, TSS, total ammonia and nitrites, Cu, Cd, Cr, Ni, and Pb) were measured in the river waters to analyse the anthropogenic impact on the environmental conditions of these watercourses and their appropriateness for fish life.

S. K. Deshmukh; (2001) A study to examine the environmental facts of the present waste water treatment facilities in Kolhapur and Ichalkaranji cities was reported. For the collection of primary data, the survey approach was used. The stratified random sampling approach was utilised to perform the sample surveys in Kolhapur (E ward), villages downstream, and the city of Ichalkaranji. It was discovered that the current sewage treatment plant had a negative impact on the water quality standards of the Panchaganga River downstream, resulting in river pollution and inadequate water supply to downstream communities and villages, particularly Ichalkaranji. During the river Panchaganga monitoring, the B.O.D. levels were found to be higher at Shirol and Ichalkaranji. It was caused by the mixing of untreated and partially treated residential sewage into the river from the cities of Kolhapur and Ichalkaranji. The water quality was excellent.

A. B. Banakar, B. R. Kiran, E. T. Puttaiah;et.al.; (2005) carried out research on the hydrochemical parameters of water samples from Chandravalli pond in Chitradurga, Karnataka The water samples were tested for criteria such as pH, water temperature, electrical conductivity, turbidity, and so on, and the findings were collated month by month. Except for phosphates, nitrates, and chlorides, the results showed that the water had a moderate amount of all parameters. As a result, this pond has been proven to be safe for human consumption, as it falls within the allowable drinking water levels set by ISI regulations.

N. Ramamurthy, J. Subhashini and S. Raju; (2005) A study of the Vaniyambadi area, which includes many tannery factories along the banks of the Palar River and is a major source of environmental contamination, was presented. The pH, Conductivity, carbonate, bicarbonate, chlorides, fluorides, calcium, magnesium, sodium, potassium, Sulphate, phenol, BOD, and COD levels in the Palar River, Vaniyambadi area are calculated, and the intensity of pollution is assessed.

P. B. Lokhande, A. D. Gawas and H. A. Mujawar; (2005) presented a study that focused on the determination of physicochemical parameters such as temperature, pH, turbidity, EC, hardness, chlorides, alkalinity, DO, BOD, COD, Sulphate, and phosphate in water samples from various sampling points. In this experiment, samples were taken from the Savitri River near Mahad in the Konkan region. It was discovered that the water in all of these locations was unfit for drinking; nonetheless, it could be utilised for domestic purposes.

R. K. Tiwary and Abhishek; (2005) conducted a study to determine the effect of coal washeries in contaminating the Damodar River People living in the basin are gradually getting poisoned since contaminated and its tributaries are utilised for drinking and other domestic purposes by the area's large population. According to the study, coal fines in the form of suspended solids are the principal pollutants, and efficient management and disposal of coal fines should be given high priority in order to lower the amount of pollution in the river.

Prakash Chandra Mishra;(2005) carried undertook a study to analyse the water quality in the Rourkela region of Orissa state; Rourkela is the most major industrial centre in the mineral-rich state of Orissa in eastern India. Every day, various harmful gases, particulate particles, and liquid effluents enter the biosphere. As a result, it is critical to evaluate the extent to which the water used by residents of Rourkela city and the surrounding areas has been poisoned. Water analysis and assessment about the appropriateness of water for human consumption and other household applications necessitate sophisticated sampling and sample handling processes. Temperature, pH, Turbidity, Total Dissolved Solids (TDS), Total Suspended Solids (TSS), Hardness, Biochemical Oxygen Demand (BOD), Dissolved Oxygen (DO), Electrical Conductivity (EC), Residual Chlorine, Chloride, Sulphate, Total Alkalinity, Chemical Oxygen Demand (COD), Fluoride, Iron, and other parameters were measured in the samples. The results show that the water in the study area contains more than 200 chemical constituents. As a result, the surface water in this area will be treated.

S.V. Mahajan, Savita Khare, V. S. Shrinivasa (2005) A study was carried out to analyse the hydrochemical features of groundwater samples obtained from bore wells in various places around G.I.D.C.Vapi (Gujarat) before and after rainy seasons. A total of 19 criteria are within the allowable ranges of drinking water standards, with some exceeding them. The coefficients for water quality were determined using correlation and regression. The findings of this study reveal that all of the characteristics are, to varying degrees, connected with one another. Thus, the linear correlation is highly useful for obtaining a pretty accurate understanding of the quality of ground water through experimentation.

Ammar. Tairi , Abderrahamne Boudoukha (2007) With the use of principal component analysis, a study was conducted on the assessment of water quality at the KoudiatMedouar dam in Algeria. The water was tested to determine whether it was safe to drink. Water samples were tested for factors such as pH, TDS, EC, and so on. Water needs are increasing day by day as a result of the massive increase in population and

industry. The geology has a strong influence on the water bodies in this area. As a result, the primary goal of the study was to analyse the quality of water in this location.

M. M. Khan, M. Admassu and H. R. Sharma; (2009) provided a research of the water quality of the river Shinta in the Azuzu district of Ethiopia in order to determine the effects of urban activity, human habitation, and industrial effluent discharge on its water quality. Some water quality parameters showed significant variation. According to the survey results, around 25% of the respondent's children have health concerns, and approximately 18.75 percent of the respondent's complaints about irritation after taking a bath in river water. About 25% of respondents reported disease in their domestic animals, believing it was caused by use of dirty river water, whereas 59 percent who use river water for irrigation reported wilting of seasonal crops and a decline in crop yields.

S. Harinath; (2009) presented a study aimed at assessing the water quality of Bommanahalli Lake Data for four sample points were gathered in order to analyse the quality of lake water for human consumption and irrigation. The physicochemical parameters of experimental water samples were collected and evaluated using conventional methods; the resultant results were also compared to standard values specified by the Bureau of Indian Standards (BIS). According to the findings of this investigation, the water is dangerous for human consumption.

Akshay R. Thorvat, N. P. Sonaje & M. M. Mujumdar; (2011) presented the study in which river water samples were collected from four different stations of the Panchaganga river in Kolhapur city and water quality assessment was carried out on a weekly basis from October 2009 to March 2010. The correlation-regression analysis was then performed, and correlation coefficients (R) were calculated using a correlation matrix to find the highly connected and interrelated water quality measures. The associations between water quality metrics were determined for each station. Pairs of parameters with significant R were chosen, and regression models were created for the four separate stations. To test the significance of the pair of parameters, a P-value test was performed, as well as to test the joint effects of several independent variables without necessarily taking the separate effects of each variable into account.

P. Satheeshkumar et al (2011) Different multivariate statistical analyses, such as cluster analysis, principal component analysis, and multidimensional scale plot, were used in their study to evaluate the tropic state of water quality for four monitoring sites. During September 2008–December 2010, they conducted research to assess the physicochemical parameters of water and sediment features of Pondicherry mangroves on India's southeast coast. Salinity (10.26–35.20 psu), dissolved oxygen (3.71–5.33 mg/L), pH (7.05–8.36), electrical conductivity (26.41–41.33 ms1), sulphide (1.98–40.43 mg/L), sediment texture sand (39.54–87.31 percent), silt (9.89–32.97 percent), clay (3.06–31.20 percent), and organic matter (0.94– A correlation of P0.01 was found between pH, temperature, salinity, sand, silt, clay, and organic matter. CA classified the four seasons into four groups (pre-monsoon, monsoon, post-monsoon, and summer) and the sampling sites in to three groups. PCA identified the spatial and temporal characteristics of tropic stations and showed that the water quality was worse in stations 3 and 4 in the Pondicherry mangroves.

J. Sirajudeen et al (2013) in their paper Statistical approach and assessment of the physicochemical state of ground water near the South Bank Canal, Tamil Nadu, India The physicochemical state of water samples from five important localities in Karur and Tiruchirappalli, Tamil Nadu, was examined. The sampling points were chosen based on their significance. Temperature, pH, electrical conductivity (EC), total dissolved solids (TDS), dissolved oxygen (DO), total hardness (TH), calcium (Ca), magnesium (Mg), sodium (Na), potassium (K), nitrate (NO3), sulphate (SO4), and phosphate (PO4) of ground water were all determined. The ground water was found to be contaminated at a few sample sites, including Mayanur, Lalapet, and Petavaithalai. While the physicochemical metrics at the sampling sites exceeded the water quality criteria, and the quality of water is bad and it is not fit for drinking purpose. For the statistical analysis, correlation co-efficient (r) were also calculated for

S. Venkatramanan et al (2013) in their investigation A multivariate statistical technique was used to collect data on the physicochemical parameters of ground water in and around the Nagapattinam area. Ground water samples were collected from several areas in and around the Nagapattinam district and evaluated for their physicochemical properties. During the monsoon and summer seasons in June and December of 2011, ground water samples were obtained from 52 excavated and deep wells. They looked into the determination of physicochemical parameters like pH, EC, TDS, Ca, Mg, Na, K, HCO3, SO4, and Cl. According to factor analysis, seawater intrusion and agricultural runoff are the primary factors regulating

the hydrogeochemistry of ground water in the study area. This work also demonstrates how multivariate statistical analysis may be utilised to better knowledge and assessment of ground water status.

Salim Aijaz Bhat et al (2014) Statistical Assessment of Water Quality Parameters for Pollution Source Identification in Sukhnag Stream: An Inflow Stream of Lake Wular (Ramsar Site), Kashmir Himalaya The declining water quality of the Sukhnag stream, one of Lake Wular's primary inflow streams, was statistically examined. To 26 water quality measures, statistical approaches such as principal component analysis (PCA), regression analysis, and cluster analysis were used. PCA identified a reduced number of mean 2 variables, showing that 96% of temporal and spatial variations affect the water quality in this stream. The first factor from factor analysis explained 66% of the total variance in velocity, total-P, NO3–N, Ca2+, Na+, TS, TSS, and TDS. Bray-Curtis cluster analysis revealed a 96% similarity between sites IV and V and a 94% similarity between sites III and IV. The seasonal similarity dendrogram revealed a maximum similarity of 97 percent between spring and autumn clusters and 82 percent between winter and summer clusters. The accumulation factor (AF) trend for nitrate, nitrite, and chloride showed that downstream values were roughly 2.0, 2.0, and 2.9 times greater than upstream concentrations, respectively.

Hussien M EL- Shafei (2014) in his paper Assessment of various water quality variables as guidelines for pond fish culture management in Lake Manzala, Egypt Hussien M EL- Shafei demonstrated the utility of multivariate statistical techniques for water quality data analysis and interpretation, identifying pollution sources, and analysing temporal variations in water quality for effective lake water quality management.

Kumar Manoj et al (2014) in their investigation Water quality assessment using multivariate statistical techniques: The discussion and review of some analytical models covered the fundamentals of the five multivariate data mining approaches, namely cluster analysis, principal component analysis, factor analysis, multiple linear regression analysis, and discriminant analysis, as well as their applications in the characterization and classification of surface water quality. The study also covers some of the fundamental ideas of the newly utilised source apportionment receptor modelling technique, which employs multiple linear regression (MLR) and absolute principal component scores (APCS-MLR model) for comprehensive water quality assessment.

Deepa P et al (2016) Seasonal fluctuations of physicochemical characteristics of Korattur lake, Chennai, Tamil Nadu, India conducted a study to evaluate the physicochemical parameters of Korattur lake. Using standard protocols, the samples were tested for a variety of physicochemical parameters such as colour, odour, temperature, turbidity, Electrical conductivity (EC), pH, alkalinity, Total dissolved solids (TDS), Total hardness (TH), Dissolved oxygen (DO), chloride, fluoride, calcium, magnesium, ammoniacal nitrogen, nitrate, nitrite, sulphate, and phosphate.

Heavy metal contamination studies

Eko and Ibok (1998) reported seasonal fluctuation and partitioning of trace metals (Fe, Cu, Mn, Cd, Cr, and Pb) in surface sediments of the Calabar River in southern Nigeria They discovered that chemical partitioning of metals in sediments indicates that the non-detrital (acid soluble) fraction contributes 30% of the total metal load, whereas fine-grained host minerals/compounds are the principal carriers of the detrital (acid-insoluble) portion.

Yilmaz et. al (2003) carried out work on heavy metal concentrations in surface soil of Izmit Gulf region, Turkey. Cadmium, Cobalt, Chromium, Copper, Iron, Manganese, Nickel, Lead, and Zinc total metal concentrations were investigated in the trials. According to the findings of the research and comparisons of soil types, urban and industrial soils were much more polluted than rural soils. Cd was not found in any of the soil samples tested. Pb enrichment in urban and industrial soils might be caused by gasoline combustion. Co, Cu, Mn, Pb, and Zn mean values were determined to be 22, 33, 842, 37, and 72 mg kg-1, respectively.

Heavy metal contamination studies

Tandi et. al (2004) studied environmental and potential health effects of growing leafy vegetables on soil irrigated using sewage sludge and effluent. The influence of long-term (> 30 years) application of sewage sludge and effluent on Zn and Cu buildup in top soil, absorption of these metals by lettuce (Lactuca sativa L.) and mustard rape (Brassica juncea L.), and dry matter production was studied in 2001 at Pension farm (near Harare). As sewage sludge/effluent was applied, it significantly (p 0.001) increased total Zn (1563.9 mg/kg) and Cu (133.3 mg/kg) in the top soil (20 cm depth) when compared to the control.

Chen et. al (2005) assessed heavy metal pollution in surface soils of urban parks in Beijing, China . The study was conducted to examine the concentration of potentially dangerous heavy metals in urban park soil

in order to determine the possible dangers to inhabitants and tourists. The data given here demonstrate that the park's location and age are crucial variables in influencing the level of heavy metal contamination, notably Cu and Pb. Furthermore, Zn buildup did not appear to approach pollution levels, and no visible Ni pollution was discovered in the soils of Beijing's parks.

Demirezen and Aksoy (2006) studied heavy metal levels in vegetables in Turkey are within safe limits for Cu, Zn, Ni, and exceeded for Cd and Pb. They discovered that pollution levels in cities were greater than in rural areas. Cu (22.19–76.5), Cd (0.24–0.97), Ni (0.44–13.45), Pb (3–10.7), and Zn (3.56–259.2) were the elements in the order and concentration ranges in g/g of various plants. Cu, Zn, and Ni amounts in vegetables analysed are within suggested international norms. The results also reveal that onion (0.97 g/g) and peppermint (76.5 g/g) can collect more Cd and Cu than the other vegetables investigated.

Onder et. al (2007) studied the Determination of Heavy Metal Pollution in Grass and Soil of City Centre Green Areas (Konya, Turkey) This study was carried out to assess the levels of heavy metal contamination in 2003-04. The study's findings revealed that heavy metal levels in soil and grass samples were greater in 2004 than in 2003. In this investigation, certain heavy metal concentrations in samples collected in high-traffic areas and factory gardens above the regulatory values (5.67 ppm for Pb in soil and 10.69, 27.51, and 0.19 ppm for Cu, Cr, and Cd in grass, respectively), posing a risk to people.

Maleki and Zarasvasand (2008) conducted a study to determine the levels of four different heavy metals [Cadmium (Cd), Lead (Pb), Chromium (Cr), and Copper (Cu)] in various vegetables cultivated around Sanandaj City, including leeks (Allium ampeloprasum), sweet basil (Ocimum basilicum), parsley (Petroselinum crispum), garden cress (Lepidium sativum), and tarragon (Artemisia d It has been determined that the veggies cultivated in this location pose a health risk to humans.

Sadia Bibi et. al (2008) carried out pollen analysis and heavy metals detection in Honey samples from seven selected countries. This study provides a simpler approach for estimating the total number of pollen grains in honey as well as the relative frequencies of pollen from diverse plant sources. In addition to pollen identification, heavy metal contamination and concentration in honey samples were analysed, and the results are described.

Abdulmojeed et. al (2011) The quantities of Cr, Co, Cu, Ni, Pb, and Zn in four different vegetables, including spinach, okra, onions, and tomatoes, were determined in effluent irrigated fields in Sharada, Kwakwachi, and Jakara in Kano, Nigeria. When the findings were compared to the control, all of the metals evaluated in the vegetable samples taken from the effluent watered gardens were shown to be at significant levels (p0.05). However, the amounts of metals in fresh vegetables were within the National Agency for Food and Drug Administration and Control (NAFDAC) permissible limits.

He Bin et.al (2013) discussed Research progress of heavy metal pollution in China their Sources, analytical methods, status, and toxicity. Heavy metal pollution is one of China's most critical environmental challenges, threatening a vast number of people. This research examined heavy metal pollution in China, concentrating on four aspects: the current state of heavy metal pollution in China, heavy metal sources in China, toxicity and potential danger, and feasible reduction techniques.

Tobias et.al (2013) discussed environmental metals pollutants load of a densely populated and heavily industrialized commercial city of Aba, Nigeria. According to the findings, the mean concentrations of the majority of the metals were over the Nigerian Federal Environmental Protection Agency (FEPA) and World Health Organization (WHO) guidelines. The study's findings have major consequences for public health.

Islamet. al (2013) studied heavy metals in water, sediment and some fishes of karnofuly river, Bangladesh. The tests were conducted to determine the chemical and biological quality of water, sediment, and fish in several stations along the Karnofuly River in Bangladesh. The findings also offered data to help comprehend and quantify the hazard of climate change on the ecosystem in this region. This study will send a strong message to government bodies and policymakers to adopt laws and regulations in order to safeguard our environment, as well as raise public awareness. To preserve the river from future contamination, the responsible authorities must respond immediately.

Chibuike et.al (2014) reviewed article on Heavy Metal Polluted Soils: Effect on Plants and Bioremediation Methods. Heavy metal-polluted soils have grown more widespread across the world as geologic and human activity have increased. Combining microorganisms and plants in bioremediation provides more effective cleaning of heavy metal damaged soils. The effectiveness of this strategy, however, is heavily dependent on the kind of organisms engaged in the process.

Bagul et. al (2015) gave new perspective on heavy metal pollution of water. The river water has become poisoned as a result of human and industrial activity. This is a significant issue these days. The study highlighted the influence of numerous human activities on water quality and suggested a tendency to do more research on the effects of contaminated river water on aquatic and human life. The current study covers the causes, effects, and preventative actions taken to learn about the effects of heavy metals on humans, the environment, aquatic life, plants, and ecosystems.

Chanchal Vermaet al (2016) did study on Heavy metal contamination of groundwater due to fly ash disposal of coal-fired thermal power plant, Parichha, Jhansi, India. The study focuses on groundwater pollution caused by coal-fired thermal power station fly ash dumping into a non-liner ash pond. In coal, fly ash, and groundwater samples, five heavy metals (Pb, Ni, Cr, Mn, and Fe) were found. Energy Dispersive X-ray Fluorescence was used to analyse heavy metal concentrations in coal and fly ash, whereas AAS was utilised to test groundwater. Pb (0.170–0.581 ppm), Ni (0.024–0.087 ppm), Fe (0.186–11.98 ppm), Cr (0.036–0.061 ppm), and Mn (0.013–0.178 ppm) were the heavy metal concentrations in groundwater. The observed results demonstrated that the heavy metal concentrations in groundwater exceeded the WHO limit.

Mohammad Ali (2016) studied preliminary assessment of heavy metals in water and sediment of Karnaphuli River, Bangladesh, Heavy metal contamination in sediment is viewed as a worldwide concern, with poor nations such as Bangladesh bearing a disproportionate burden. This study suggested that constant monitoring of As, Cd, and Pb in water, sediment, and other aquatic biota of the Karnaphuli River be directed to assess the danger of these critical metals in order to protect the ecology in the river's vicinity.

Hezbullah. M et al (2016) discussed Heavy metal contamination of food in a developing country like Bangladesh: An emerging threat to food safety. Their research study highlighted potential sources of heavy metal contamination in the food chain in developing countries such as Bangladesh, where it is regarded as a growing danger to food safety. It was discovered that arsenic, cadmium, chromium, and lead are the four biggest hazards to heavy metal pollution in Bangladesh's food chain. Heavy metal pollution is mostly caused by improper industrial effluent disposal and the use of chemical fertilisers and pesticides to surface water and agricultural land. Consumption of these heavy metals in food at levels beyond the acceptable limit causes organ malfunction, including cancer.

SUMMARY OF LITERATURE: Following a thorough review of the relevant literature, it is clear that the physicochemical features of lake or river water have been dramatically impacted by human activities as well as natural dynamics, affecting water quality and quantity, biodiversity, and ecological imbalance. The various water quality variables are computed using Regression Equations and compared to the observed values. The correlation analysis on water parameters found that all metrics were more or less co-related. Regular monitoring and complete evaluation of water quality and associated processes necessitate advanced analytical models that identify hidden instruments affecting their attributes. This data is critical for developing monitoring frameworks and ensuring the long-term management of water resources. Intelligent data analysis tools, such as multivariate statistical models, can be extremely beneficial in water quality control initiatives. Also, agricultural and domestic sewage drained into surface water from urban and rural regions has a negative impact on the water quality features of a lake or river.

CONCLUSION: Lakes and their environs are delicate ecosystems that confront rising challenges from water abstraction, rapidly growing townships, and human population. Unchecked lake damage has been halted thanks to the intervention of the local authorities and the tireless efforts of Non-Governmental Organizations. However, regular monitoring of water quality and greater conservation efforts are required to protect these beautiful natural flora and wildlife reservoirs. The correlation regression research allows for easier and faster monitoring of water quality at the site, as well as prediction of various water quality indices. The research also aids in the selection of treatment strategies to reduce toxins in lake or river water. The water quality index (WQI) study aims to evaluate the environmental impacts on lake or river water quality.

REFERENCES

1. B. Banakar, B. R. Kiran, E.T. Puttaiah, R.Purushotham& S. Manjappa (2005), "Hydrochemical Characteristics Of Surface Water In Chandravalli Pond, Near Chitradurga".
2. Akshay R. Thorvat, N P Sonaje, M M Mujumdar "Development of regression model for the Panchaganga River water quality in Kolhapur city" Engineering Research and Applications, 1(4), 2011, pp1723-1730.
3. Barghigiani, T. Ristori, R. Scerbo, C. Cini, R. Nottoli, L. Moschini and V. Giaconi; (2009), "Assessment of water Pollution and Suitability to Fish Life in Six Italian Rivers", Environmental Monitoring and Assessment, 66: 187–205, Kluwer Academic Publishers.
4. Deepa P, Raveen R, Venkatesan P, Arivoli S and Samuel T Seasonal variations of physicochemical parameters of Korattur lake, Chennai, Tamil Nadu, India International Journal of Chemical Studies 2016; 4(3): 116-123 P-ISSN2349–8528 E-ISSN 2321–4902 IJCS 2016; 4(3): 116-123
5. Hussien M EL- Shafei Assessment of some water quality characteristics as guide lines for the management of pond fish culture in Lake Manzala, Egypt International Journal of Fisheries and Aquatic Studies 2016; 4(2): 416-420 ISSN: 2347-5129 IJFAS 2016; 4(2): 416-420
6. Kumar Manoj, Pratap Kumar Padhy Multivariate statistical techniques and water quality assessment: Discourse and review on some analytical models INTERNATIONAL JOURNAL OF ENVIRONMENTAL SCIENCES Volume 5, No 3, 2014 Research article ISSN 0976 – 4402 doi: 10.6088/ijes.2014050100053
7. M. M. Khan, M. Admassu and H. R. Sharma; (2009), "Suitability Assessment of Water Quality of River Shinta and its Impacts on the Users: A Case Study from Gondar Town of Ethiopia", Indian Journal of Environmental Protection: Vol. 29, No. 2: IJEP 29 (2): 137-144.
8. N. Ramamurthy, J. Subhashini and S. Raju; (2005), "Physico-Chemical Properties of Palar River in Tamilnadu", Indian Journal of Environmental Protection: Vol. 25, No. 10: IJEP 25 (10): 925-928.
9. P. B. Lokhande, A. D. Gawas and H. A. Mujawar; (2005), "Study of Water Quality Parameters of River Water in Konkan Region", Indian Journal of Environmental Protection: Vol. 25, No. 3: IJEP 25 (3): 212-217.

10. P. Satheeshkumar & Anisa B. Khan Identification of mangrove water quality by multivariate statistical analysis methods in Pondicherry coast, India Received: 15 November 2010 / Accepted: 30 June 2011# Springer Science+Business Media B.V. 2011
11. R. K. Tiwary and Abhishek; (2005), "Impact of Coal Washeries on Water Quality of Damodar River in Jharia Coalfield", Indian Journal of Environmental Protection Vol. 25, No. 6: IJEP 25 (6): 518-522.
12. S. Harinath; "Water Quality Studies on Bommanahalli Lake", Journal of Industrial Pollution Control 25 (1) (2009) PP 33-36.
13. S. K. Deshmukh (2001), Theme paper on "Strategy for Techno-Economic Feasible Treatment".
14. S. Venkatramanan1, 2, S. Y. Chung1*, T. Ramkumar2, G. Gnanachandrasamy2, S. Vasudevan2 A multivariate statistical approaches on physicochemical characteristics of ground water in and around Nagapattinam district, Cauvery deltaic region of Tamil Nadu, India Earth sci. res. j., Volume 17, Issue 2, 2013. eISSN 2339-3459. Print ISSN 1794-6190.
15. SalimAijaz Bhat,1 Gowhar Meraj,2 Sayar Yaseen,1 and Ashok K. Pandit1 Statistical Assessment of Water Quality Parameters for Pollution Source Identification in Sukhnag Stream: An Inflow Stream of Lake Wular (Ramsar Site), Kashmir Himalaya
16. Thorvat A. R., Sonaje, N. P., and Mujumdar, M. M. Regression Modeling and Impact Assessment of Panchaganga River Water Quality in Kolhapur City. International Journal of Advance Foundation And Research In Science and Engineering (IJAFRSE), TACE 2015. Impact Factor: 1.036, Science Central Value: 26.54, Vol. 2, 456-464.
17. Thorvat A.R., Mujumdar M.M. and Narvekar S.P. (2014), "Development of Regression Model for Physico-Chemical Characteristics of Water Quality of Rajaram Lake in Kolhapur City, M.S., INDIA", International Journal of Global Technology Initiatives (IJGTI), Volume 3, Issue 1, A96-A102.
18. Thorvat A.R., Sonaje N.P. and Mujumdar M.M. (2013), "Statistical Approach towards PhysicoChemical Characteristics of the Panchaganga River Water Quality in Kolhapur City, M.S." Special Issue on, "Hydrology and Water Resources Engineering", International Journal of Earth Sciences and Engineering (IJEE), Vol. 06 No. 05 (01), 1266-1272.
19. Thorvat, A. R., N. P. Sonaje, M. M. Mujumdar, and V. A. Swami. "A study on the Physico– chemical characteristics of Panchaganga River in Kolhapur city, MS, India." Research journal of chemical sciences, ISSN (2012): 76-79.

20. Thorvat, A. R., Swami, V. A., Mujumdar, M. M. Evaluation of Physico-Chemical Characteristics of Water Quality of Rajaram Lake in Kolhapur. International Journal of Engineering Research and Technology, Vol. 10, No. 01, 358-362.
21. Yilmaz F., Yilmaz Y. Z., Ergin M., ErkoA. Y. E., Muftuoglu A. E. and Karakelle B. (2003) Heavy metal concentrations in surface soils of Izmit Gulf region, Turkey. Journal of Trace and Microprobe Techniques, 21: 523-531.
22. Ekpo B.O. and Ibok U.J. (1998). Seasonal variation and partition of trace metals (Fe, Zn, Cu, Mn, Cr, Cd, and Pb) in surface sediments of Calabar River, south eastern Nigeria. Environmental Geochemistry and Health, 20 (3): 131-121.
23. Aldrich MV, Ellzey JT, Peralta-Videa JR, Gonzalez JH, Gardea-Torresdey JL. Lead uptake and effects of EDTA on lead-tissue concentrations in the desert species mesquite (Prosopis spp.). Int. J. Phytorem. 2004; 6:195–207.
24. Chen, H. and T.J. Cutright. 2002. The interactive effects of chelator, fertilizer, and rhizobacteria for enhancing phytoremediation of heavy metal contaminated soil. J. Soils Sedi. 2 : 203-210.
25. Demirezen D. and Aksoy A. (2006). Heavy metal levels in vegetables in turkey are within safe limits for Cu,Zn and exceeded for Cd and Pb. Journal of Food Quality,29 (3): 252.
26. Huang B., Yanfeng Z., Xuezheng S., Dongsheng Y., Yongcun Z., Weixia S., Hongjie W. and onder A. (2007) Source identification and spatial variability of nitrogen, phosphorus, and selected heavy metals in surface water and sediment in the riverine systems of a peri-urban interface. Journal of Environmental Science and Health, 42:371-380.
27. Wahla, I.H. and Kirkham, M.B. 2008. Heavy metal displacement in salt-waterirrigated soil during phytoremediation. Environ. Poll. 155 : 271-283.
28. Bibi Sadia, Husain Syed Zahoor and Malik Riffat Naseem (2008.) pollen analysis and heavy metals detection in honey samples from seven selected countries. Pakistan Journal of Botany, 40(2): 507-516.
29. Abdulmojeed O. Lawal and Abdulrahman A. Audu(2011) Analysis of heavy metals found in vegetables from some cultivated irrigated gardens in the Kano metropolis, Nigeria, Journal of Environmental Chemistry and Ecotoxicology,3(6):142-148.

30. He Bin., Yun ZhaoJun., Shi JianBo and Jiang GuiBin (2015) Research progress of heavy metal pollution in China: Sources, analytical methods, status, and toxicity, Chinese science bulletin, Vol.58 (2) : 134-140.

31. . F. islam ., M. rahman ., S.S.A. khan ., B. ahmed ., A.bakar and M. halder (2013) .Heavy metals in water, sediment and some fishes of karnofuly river, bangladesh, pollution research paper, 32(4):723-726.

32. G. U. Chibuike and S. C. Obiora (2014) Heavy Metal Polluted Soils: Effect on Plants and Bioremediation Methods, Applied and Environmental Soil Science , 1- 12.

33. Bagul V. R., Shinde D. N., Chavan R. P., Patil C. L. and Pawar R. K. (2015) New perspective on heavy metal pollution of water. Journal of Chemical and Pharmaceutical Research, 7(12):700-705.

34. Mir Mohammad Ali., Mohammad Lokman Ali. Md. Saiful Islam and Md. Zillur Rahman (2016) Preliminary assessment of heavy metals in water and sediment of Karnaphuli River, Bangladesh, Environmental Nanotechnology, Monitoring & Management 5:27–35.