



e-ISSN: 2319-8753 | p-ISSN: 2347-6710

IJIRSET

International Journal of Innovative Research in
SCIENCE | ENGINEERING | TECHNOLOGY



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

Volume 10, Issue 9, September 2021

ISSN INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA

Impact Factor: 7.569



Comprehensive Analysis of pH & TDS Concentration Levels of Nira River Water for Sustainable Utilization

Dr. Potadar Vishnu¹, Jogdand Onkar K², Shinde Umakant³, Takwale Dattatray⁴

Assistant Professor, Department of Environmental Science, Deogiri College, Aurangabad, India¹

Assistant Professor, Department of Environmental Science, Deogiri College, Aurangabad, India²

Assistant Professor, Department of Biotechnology, Deogiri College, Aurangabad, India³

P.G. Student, Department of Environmental Science, Deogiri College, Aurangabad, India⁴

ABSTRACT: Water is one of the most significant and rich inorganic compound on the Earth planet. All the living creatures on earth planet required water for their survival and growth. The present work deals with pH & TDS Concentration of Nira River in the year of 2019-2020. Water pH & TDS of Nira river carried out at Sangavi village, the water quality of river water is very important because nearby villages and cities are using the river water for drinking, domestic and residential water supplies, agriculture (irrigation), transportation and infrastructure, tourism, recreation, and other human or economic purpose. The present paper is a based on pH& TDS concentration of water parameters. Minimum pH of the study area was 7.9 from the December and March. Maximum pH of the study area was 9.8 from the June. Minimum TDS of the study area was 549 from the September. Maximum TDS of the study area was 789 from the September. The pH required for drinking water is 6.5 to 8.5. TDS of water requirement is below 500 mg/lit as per IS 10500:2012. pH of NIRA River Water is found more than 9 and TDS more than 600 mg/lit. It is concluded that the water of Nira River is not good for health. Proper care and treatment is needed so as to use the water. Present research will be very helpful for upcoming researchers in the field of water analysis.

KEYWORDS: Nira River, pH, TDS, sewage etc.

I. INTRODUCTION

Water is necessary to every biotic components and is a one of the most important and abundant compounds in the world. Water is the lifeline of the biotic component. All living things on our planet need water for their survival and development. Water has ability to dissolve organic as well as inorganic compounds in it; hence water is called as universal solvent [1]. Hence, it is most essential thing to check the water at regular interval. Water is used for various purposes such as irrigation, transportation, washing, drinking, mass bathing and waste disposal for industries. Now a day due to increased population, rapid development, atmospheric activities, excessive use of fertilizers, agrochemicals in the field of agriculture to produce higher yields of crop, water is getting highly contaminated [2]. Hence, it is most needed to assess the water quality at regular interval. Due to use of this polluted water, human race may suffer from numerous water born as well as soil borne diseases. Due to use of this contaminated water, human population suffers from various waterborne diseases like diarrhea, cholera, typhoid and hepatitis etc. The activities like vehicle and cloth washing are common things in the rural areas as compared to urban area. Numbers of artificial activities have hazardous effects on the pH of nearby water sources [1]. Then SO₂ and nitrogen oxides are released, through industrial activities. Acid rain, Chemical pollution, from industrial operations, individuals and communities, may result a water body to become acidic. These chemicals may enter in the water through illegal discharges or after insufficient wastewater treatment. Even minor change in the pH of water may have a numerous negative consequences. The vehicle, cloth and animals washing are some of the common things in the rural zones as compared to cities. Such type of processes and associated effects are generally observed everywhere on almost all the river banks [3, 4]. These kinds of washings are the major causes of river water quality degradation [5]. At the time of vehicle washing, colour, oils, grease, iron particles and various harmful detergents are mixed in the river water specifically in the countries like India [6, 7]. Even the very thin layer of oil and grease is generally formed on the surface of various water bodies which creates a major issue at the time of purification of water on the river banks [8, 9]. For washing of cloths chemically prepared detergents are used [10]. The physical and chemical properties of such type of detergents get easily dissolved

in to river water [11]. This impact is observed many times specifically in dry season [1]. Flora and fauna are generally affected or even destroyed, as an outcome of acidification. Some cities like Aurangabad which is surrounded by the hills of Vindhya ranges and the Kham river passes through it and the same has great positive impact on ecological systems [12]. Many varieties of fish and aquatic organisms are very sensitive to alterations in water temperature and its composition. One of the major things may be observed, when the pH is approximately 6.0 to 7.0 which are considered as natural for many water bodies and it is favorable for the biodiversity conservation. There is an immediate effect of pH on water. As soon as pH decreases, the acidity increases where there are very less number of organisms may survive. Easily available water resources have already been widely exploited globally and the ecological pressures from development, population growth, and climate change put additional pressures [13]. In the last forty years, many countries around the world which have experienced economic development, improved welfare and poverty reduction at regional scale [14]. Water having the acidic nature is synergistic; it means that the proper mixing of water having low pH and an increased concentration of specific substances is detrimental [1]. For example, mercury, aluminum and lead are significantly toxic substances, but when the pH of the water source having lower concentration, these substances may have extremely havoc effects to the aquatic life.

II. RELATED WORK

In the context of sustainable water management, many hydrological studies have been published, which highlights the ecological role of water from the rivers. Moreover, there have been more researches based upon water quality evaluation. The initial water related issues at threshold limits developed by Falkenmark [15], was the basis on which the requirements for water consumption were restructured. By recognizing water needs among social sectors and economic sectors, Falkenmark [16] and Gleick [17], achieved to develop the water scarcity index by adopting specific water demands for basic human needs. Polluted water may be hazardous to aquatic life and human being. Acidic waters are also associated with the issues concerned with human utilization. While slightly acidic water is not so harmful, on its own, it may be quite dangerous when interacts with other compounds Integrated water utilisation have major impact on the economy and social components but it should be in an equitable way and without any compromise with the needs at various socioeconomic levels [18, 19, 20].

III. METHODOLOGY

Water has capacity to dissolve the organic and inorganic compounds. Therefore water is called as universal solvent. Some specific kind of pollutants in surface waters lethal to water bodies affecting the aquatic flora and fauna. Nira is a River flows through the state of Maharashtra, India. It is an important stream of the Bhima River and flows through Pune and Solapur districts of Maharashtra. River between Nira Narsingpur in Pune district and Malshiras taluka of Solapur district. The dams built on the Nira River are Devdhar dam and Veer dam in Satara and Pune District. The study was carried at Nira River water sample were collected from the Nira River in May 2020 and checked the pH and TDS at location by using digital pH & TDS Meter. Electrochemical method used for testing pH of water. TDS of water was checked by using HM Digital hand TDS meter. Measurement of TDS meter ranged in between of 0-9990 PPM. TDS is used to measure the electrical conductivity of water.

Study area showing the sampling spots

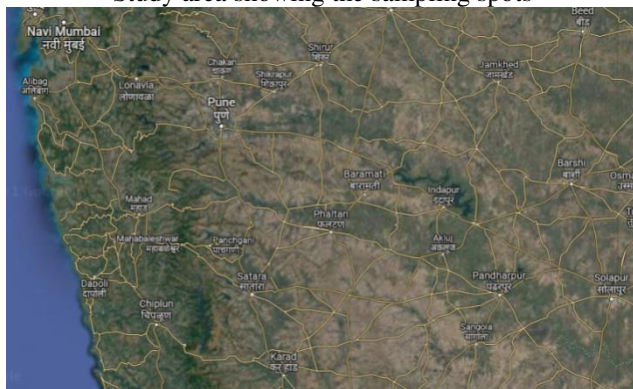


Fig.1a. Study area photo showing Nira River location in Maharashtra (India).

The electrical conductivity of water is directly associated to the concentration of dissolved ionized solids in the water. An ion from the total dissolved solids in water creates the ability for water to conduct an electric current, which is measured by using a conventional conductivity meter or TDS meter. When it correlates with the TDS measurements, conductivity provides an approximate value of the TDS concentration, usually within the ten-percent accuracy. Nira River is one of the tributary of Bhima River. The standard methods of APHA [21] were used for the analysis of water samples.



Fig. 1b. Study area photo showing Nira River discharge



Fig.1c. Study area photo showing Nira River discharge nearby Pool

IV. EXPERIMENTAL RESULTS

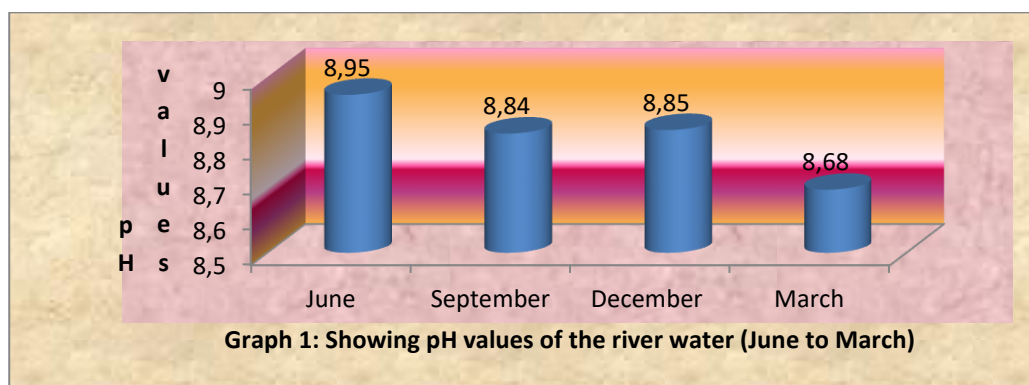
The present study was undertaken to analyze the pH and TDS concentration levels of the Nira River to know the sustainability of water. The obtained results have been tabulated in the result tables and graphically represented in the graphs no. 1 and 2. The requirement of pH as per IS 10500 in maximum 6.5 to 8.5 and requirement of pH as per WHO guidelines in maximum 6.2 to 8.5. The analyzed results of pH from study shows that, minimum pH of June month was 8.3 and maximum pH was 9.8. the average pH was 8.9. Minimum pH of September month was 8.2 and maximum pH was 9.5, the average pH was 8.84. Minimum pH of December month was 7.9 and maximum pH was 9.7. the average pH was 8.85. Minimum pH of March month was 7.9 and maximum pH was 9.4. the average pH was 8.68. Minimum pH of the study area was 7.9 from the December and March. Maximum pH of the study area was 9.8 from the June. The requirement of TDS as per IS 10500 in maximum 500 mg/liter and requirement of TDS as per WHO Guidelines in maximum 1000 mg/liter mg/lit. The analyzed results of TDS from study shows that, minimum TDS of June month was 628 and maximum TDS was 778. the average TDS was 679.9 Minimum TDS of September month was 549 and maximum TDS was 789, the average TDS is 658.3. Minimum TDS of December month was 577 and maximum TDS was 780. the average TDS was 672. Minimum TDS of March month was 558 and maximum TDS was 728. The average TDS was 661.1 Minimum TDS of the study area was 549 from the September. Maximum TDS of the study area was 789 from the September. Aquatic species like macro invertebrates, fish, and many species of amphibians are also being affected owing to higher levels of toxic pollutants and affect on growth, reproduction and mechanism of these species. There is not global agreement on the main reasons where there is a growing awareness that global climate change occur and many scientists believe that a major cause is the artificial emission of gases [14]. As per Indian standard IS

10500:2012 TDS required for drinking water is below 500 mg/lit. As per WHO guidelines TDS required for drinking water is below 1000 mg/lit. Increase in the toxic levels of some specific kind of pollutant concentrations in the India are thought to be greater owing to anthropogenic factors such as increase in salinity, sewage contamination, pollution and water softeners.

Table 1: pH values of the study area from June 2019 to March 2020

Sample No	June	September	December	March
1	9.1	8.9	7.9	8.6
2	8.6	8.2	8.8	9.4
3	9.1	8.8	8.6	8.7
4	8.3	9.5	8.9	8.6
5	9.3	9	9.2	8.4
6	9.8	8.3	8.7	7.9
7	9.1	8.7	8.8	8.4
8	8.7	9.3	9.5	8.6
9	8.9	8.6	9.7	8.9
10	8.6	9.1	8.4	9.3
Average	8.95	8.84	8.85	8.68
Max.	9.8	9.5	9.7	9.4
Min.	8.3	8.2	7.9	7.9

The pH concentration value of a water source is a basic measure of its acidity or alkalinity. The pH level is an indicator of the activity of the hydrogen ion, because the ionic activity is a very crucial representation of the acidity or alkalinity of any liquid. The pH scale, as ranges from zero to fourteen where exactly seven is being neutral. Water with a low pH is referred to be acidic and liquid with a high pH is basic, or alkaline i.e. more than seven. Pure water should have a pH in between 6.2 to 8.5 according to WHO and BIS standards, but water sources and rainfall tends to be slightly acidic may be due to the presence of contaminants in the water [1].



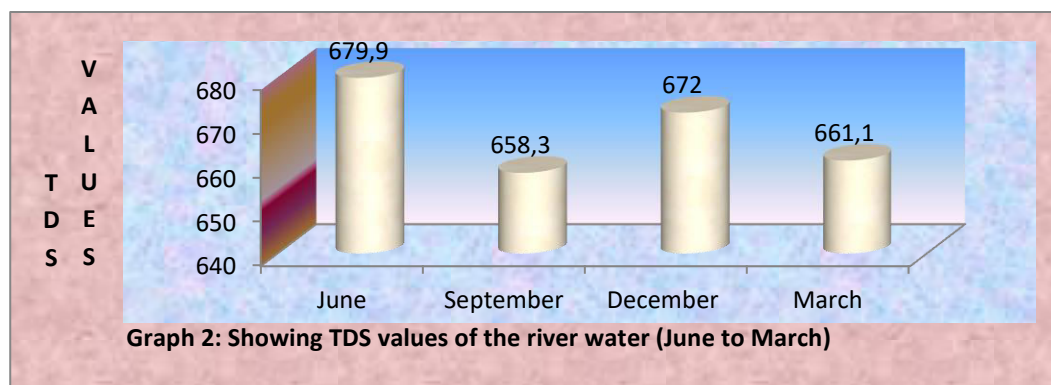
The pH scale is logarithmic concentration of hydrogen ion, it means that each step on the pH scale shows a ten-fold change in the acidity or alkalinity i.e. water body with a pH of 5.0 is ten times more acidic compared to the water with a pH of 6.0 and liquid with a pH of 4.0 is 100 times more acidic than liquid with a pH of 6.0. Surface water generally has a pH value in between 6.2 and 8.5 and water in the ground tends to have a pH in between 6.0 and 8.5. The pH of a water may vary naturally or sometimes due to the addition of contaminants. Some kinds of rock and specific soils, such as limestone, may neutralize acid more rapidly than other types of soil and rock, like granite. When there are a large number of floral species grow in river, it releases CO_2 when there is a death and decomposition. When the carbon dioxide gets mixed with the water, carbonic acid having the weaker bonds are formed; it may then cause decrease in the pH of the water body. Water with a pH that is less than 6.5 may have the ability to leach metal ions, like manganese, copper, iron, lead and zinc from various plumbing fixture units and also from pipes. It in turn, may be quite harmful. On the other hand, the pH scale, liquid that has a pH more than 8.0, can be very difficult to disinfect. The WHO

recommends that the pH of the water should be less than 8.5, because of basic water generally does not allow for effective use. Water availability has been critically identified as an environmental major limitation for the economic growth and the development [22]. Various conflicts in the planning and proper management of water resources may arise when people and organizations do not agree on the actual quantity and quality of water is needed or required at a specific location for precise purpose [23]. TDS refers to Total dissolved solids is made up of inorganic salts as well as a minute quantity of organic matter. Common inorganic salts found in water, like magnesium, potassium, calcium and sodium, all are nitrates, bicarbonates, chlorides and sulfates, cations and carbonates [1]. Cations are positively charged whereas anions are negatively charged ions. These minerals may originate from many sources, both natural and anthropogenic activities like domestic and industrial use of water.

Table 2: TDS values of the study area from June March 2020

Sample No.	June	September	December	March
1	640	589	577	705
2	680	658	658	698
3	655	647	630	658
4	703	789	649	728
5	708	758	780	659
6	658	637	756	558
7	691	549	777	643
8	658	637	581	658
9	778	608	654	602
10	628	711	658	702
Average	679.9	658.3	672	661.1
Max.	778	789	780	728
Min.	628	549	577	558

Mineral springs contain water with highest percentage of dissolved solids, because the water flows through a region where the rocks may have a high salt content. The river water contains high amounts of dissolved solids, due to presence of calcium and magnesium in the ground water. These minerals are also produced from manmade activities.



It is found that, the poor maintenance, frequent electricity break downs, improper design, lack of technical man power and the facilities constructed to treat wastewater does not function properly and remain closed at many times [24]. Agricultural activities and urban runoff may transport excess minerals into water bodies [25]. Water conservation

is the responsibility and duty of every citizen and It is the need of the time to protect and conserve each and every resource for the present and future generations [26].

V. CONCLUSION

Water is used for various purposes like drinking, irrigation, transportation, washing, bathing and for industrial activities. But now a days due to increased population, industrialization, rapid development, excessive use of fertilizers, agrochemicals in the agriculture to get more crop yield, water is being highly polluted it is found that average pH in the June month was 8.95, in the September 8.84, December 8.85 and in the month of March pH value was 8.68. The total dissolved solids in the month of June 679.9 mg/l, September 658, December 662 and in the month of March TDS was 661.1 mg /l. It is observed that the obtained values of pH and TDS exceed the limit given by BIS and WHO. On the basis of analyzed results it is recommended that the use of water of the Nira River should be strictly prohibited so as to protect human health and ecological system.

REFERENCES

- [1] Jadhav Shivaji and Jadhav Mrunalini (2017): Study of chloride concentration of Nira River, Pune, Maharashtra, India. International Journal of Chemical and Life Sciences 6. pp. 2025-2028
- [2] Jha A.N. and Verma P.K (2000): Physico-chemical properties of drinking water in town area of Godda district under Santal Pargana (Bihar), India, Poll. Res., Volume19 Issue (2), Pp 75–85
- [3] Patel Jinal Y and Minakshi V Vaghani (2015): Correlation Study for Assessment of Water Quality and Its Parameters of Par River Valsad, Gujraht, India. International Journal of Innovative and Emerging Research in Engineering, Volume 2, Issue2, pp 150-156.
- [4] Koul Nishtha, Lokhande R.S. and J.K (2012): Physico-chemical, Bacteriological, and Pesticide analysis of Tap water in Millenium City Gurgaon, Haryana, India, International Research Journal of Environment Sciences, Volume 1, Issue (2) pp1-7
- [5] Kadam M.S. Pampatwar D.V. and Mali R.P (2007): Seasonal variations in different physico-chemical characteristics in Masoli reservoir of Parbhani district, Maharashtra, J. Aqua. Biol. volume22, Issue (1), Pp 110 112
- [6] Venkatesharaju K, P Ravikumar; RK Somashekar; KL Prakash (2010): Journal of Science, Engineering and Technology, Volume 6, Issue (1), 2010, Pp 50-59
- [7] Kamble S.M. Kamble A.H. and Narke S.Y (2009): Study of physico-chemical parameters of Ruti dam, Tq. Ashti, dist. Beed, Maharashtra, J. Aqua. Biol., Volume24, Issue (2) pp86-89
- [8] Kodarkar M. S (1992): Methodology for water analysis, physico-chemical, Biological and Microbiological Indian Association of Aquatic Biologists Hyderabad; Pub., 2, 1992, Pp50
- [9] Solanki Manoj Kumar, Gupta O.P. and Shukdeo Prasad Ahirwar (2013): Study of Yearly Variation and Physico-Chemical study of River Water, Underground Water and Surface Water of Rewa City, MP, India, Int. Res. J. Environment Sci, Volume2, Issue (9), 2013 Pp 1-4
- [10] Abdullah M.S., A. Uzairu and O.J. Okunola (2009): International Journal of Environmental Research, Volume3 Issue (2), pp 271-274.
- [11] Koul Nishtha, R.S. Lokhande & J.K. Dhar (2012): Assessment of physico-chemical, microbiological and pesticide content in potable water in metropolitan city of Delhi, India Journal of Applicable Chemistry, Volume 1 Issue (4) Pp 512-518
- [12] Potadar Vishnu R, and Satish S Patil (2016): Carbon Sequestration Potential of Trees in And Around University Campus of Aurangabad City, Maharashtra, (India), IJSART - Volume 2 Issue 4, pp- 239-244.
- [13] Jackson, R.B.; Carpenter, S.R.; Dahm, C.N.; McKnight, D.M.; Naiman, R.J.; Postel, S.L.; Running, S.W(2001): Water in a changing world. Ecol. Appl., 11, 1027–1045.
- [14] Potadar Vishnu R, and Satish S Patil (2016): Carbon Storage and Sequestration by Trees in and Around University Campus of Aurangabad City, Maharashtra. International Journal of Innovative Research in Science Engineering and Technology Vol. 5, Issue 4, pp- 5459-5468.
- [15] Falkenmark, M. (1989): The massive water scarcity threatening Africa-Why isn't it being addressed. Ambio, 18, 112–118.
- [16] Falkenmark, M. Rapid Population Growth and Water Scarcity (1990): The Predicament of Tomorrow's Africa. Popul. Dev. Rev., 16, 81–94.
- [17] Gleick, P.H. (1996): Basic water requirements for human activities: Meeting basic needs. Water 21, 83–92.
- [18] Gain, A.K. Mondal, M.S. Rahman, R (2017): From flood control to water management: A journey of Bangladesh towards integrated water resources management. Water, 9, 55



- [19] Global Water Partnership (2017): Integrated Water Resources Management; TAC Background Paper N°. 4; Global Water Partnership (GWP): Stockholm, Sweden, 2000.
- [20] Grigg, N.S (2008): Integrated water resources management: Balancing views and improving practice Water Int., 33, 279–292.
- [21] APHA (1995): Standard method for the examination of water and waste water (14th Ed.) Washington D.C. Amer. Public Health Association, no.409A, pp.316-317.
- [22] World Bank. World Development Report (1992): Development and the Environment; Oxford University Press: Oxford, UK
- [23] Palmer, R.N. Werick, W.J. MacEwan, A. Woods, A.W. (1999): Modelling water resources opportunities, challenges and trade-offs: The use of shared vision modelling for negotiation and conflict resolution. In Proceedings of the 26th Annual Water Resources Planning and Management Conference ASCE (WRPMD'99), Tempe, AZ, USA, 6–9 June; pp.1–13.
- [24] Potadar Vishnu R, Jogdand Onkar K and Gawade Mahesh (2021): BOD Reduction of Industrial Wastewater at MIDC Waluj Area, Aurangabad, Maharashtra (India). International Journal of Innovative Research in Science, Engineering and Technology (IJIRSET). Volume 10, Issue 8, pp- 11417- 11422
- [25] WHO. Water Quality Monitoring (1996): A Practical Guide to the Design and Implementation of Freshwater Quality Studies and Monitoring Programmes; UNEP/WHO: Geneva, Switzerland.
- [26] Potadar Vishnu R, and Satish S Patil (2017): Ecological Footprint of People in and around Dr. B. A. M. University Campus of Aurangabad City, Maharashtra, India IJSRD - International Journal for Scientific Research & Development| Vol. 4, Issue 11 pp 281-284.



**Impact Factor:
7.569**



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

 **9940 572 462**  **6381 907 438**  **ijirset@gmail.com**



www.ijirset.com

Scan to save the contact details