



Impact Factor - 6.261

ISSN - 2348-7143

INTERNATIONAL RESEARCH FELLOWS ASSOCIATION'S

# RESEARCH JOURNEY

Multidisciplinary International E-research Journal

PEER REFREED &amp; INDEXED JOURNAL

December-2018 Special Issue - LXXVIII

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SWATIDHAN PUBLICATIONS





55	Casting of vote – Duty of every voter	Abhinandan Boragave	324
56	Study of Anxiety Level Between Team Games and Individual Game Players of Belapur	Sanjay Nawale	327
57	Physical Literacy: A Theoretical Concept	Elroy Pinto	330
58	Yoga and Stress	Dr. B. W. Mane	338
59	Approach of Parents towards Female Participation in sports	Shrinivas Patil	342
60	Arvind Adiga's the White Tiger is Study of Social Issues	Prof. Santosh Akhade	346
61	A Study of Postmodern Cyberpunk Science Fiction in Gibson's Neuromancer	Ramadas Banasode	349
62	Librarian's Role in Managing the open Data	Mrs. Bhakti Gole	353
63	M Commerce: The Users Perspective	Vaibhav Bhalerao	359
64	Changing Buying Behavior of Indian Consumers	Dr. Vishwas Chavan	369
65	Growth of E-Commerce in India	Prof. N.B. Kale & Prof. B.K. Nagare	374
66	Effectiveness of Co-Operative Strategies in Mathematics Learning	Dr. Bharati Khasnis	379
67	Challenges in Using Mobile Banking Services	Dr. Babasaheb Mali	382
68	Role of Lead Bank in Financing the Small-Scale Industry in Sindhudurg District	Mr. Prakash Masurkar	386
69	Problems & Remedies of Rural Entrepreneurship in Konkan	Prof. Santosh Mengal	394
70	Biodiversity and Environmental Balance	Prof. Anand Bandekar	398
71	Effect of Sports Participation by The Parent on Physical Fitness of Their Child	Mr. Jayashing Naik	402
72	Expected Benefits of the Risk Management to Improve the Performance	Rameshwar Swami	406
73	Physicochemical Analysis of Pond Water of Ranmasle Village, in Solapur District, Maharashtra, India	Ashok Kadam, Rajesh Bopalkar, Sameer B. Patil	410
74	Role of Innovation in women Entrepreneurship and Empowerment: an Empirical Research	Pushpalata Patil & Deepali Patil	414
75	An Analytical Study of Electronic Payment Systems in India	Mr. Somnath Patharkar	422
76	A Paradigm Shifting of Indian Traditional Economy Market to Emerging Economy Market	Mudiraj Narendra Balbhim	425
<b>हिंदी विभाग</b>			
77	वर्तमान समाज में बढ़ते अपराध- एक अध्ययन	डॉ. राखी धिंग्रा	430
78	चंद्रसेन विराट की गज़लों में सामाजिक चेतना	श्री. भिकाजी कांबळे, डॉ. सुनील बनसोडे	435
79	ओमप्रकाश वाल्मीकि के काव्य में दलित विमर्श	डॉ. देवीदास बोर्डे	441
<b>उर्दू विभाग</b>			
80	ناول "ضدی" ایک تجزیاتی مطالعہ	ڈاکٹر سیمانابید	443
<b>मराठी विभाग</b>			
81	व्यवहाराची भाषा व वाङ्मयाची भाषा याचे तौलनिक अध्ययन	डॉ. बळवंत दाभाडे	446
82	मुलाखत तंत्र आणि मंत्र	डॉ. एस. एस. भैरगुडे	450





## Physicochemical Analysis of Pond Water of Ranmasle Village, in Solapur District, Maharashtra, India

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### Abstract :

*Quality of water is an important criterion for evaluating the suitability of water for irrigation and drinking. This paper deals with the study of physico-chemical parameters of pond water of Ranmasle village and was carried out by collecting sample in July 2018. The results were compared with standards prescribed by WHO and ISI 10500-91. Total 17 parameters were analysed. It was found that the pond water was contaminated and unfit for drinking purpose.*

**Keywords :** Pond Water, physicochemical parameters, WHO, ISI 10500-91.

### Introduction :

Ponds are the small aquatic ecosystems and are generally located near human civilization. Due to this reason these ponds are mostly influenced by the human activities which in turn pollute them. Water is universal solvent dissolving a number of substances that it comes in contact with. However water for human consumption and other domestic purposes should be free from disease causing organisms, poisonous substances, excessive amount of minerals and organic matter. The determinant of good growth in water body includes dissolved oxygen, hardness, turbidity, alkalinity, nutrients, temperature, etc. Conversely, other parameters like biological oxygen demand, and chemical oxygen demand indicate pollution level of a given water body. In most water bodies, various chemical parameters occur in low concentrations [1]. Fresh water is essential for agriculture, industry and human existence. Rapid growth of urban areas directly or indirectly affected existence of the pond such as over exploitation of resources and improper waste disposal practice [2].

It is very essential and important to test the water before it is used for drinking, domestic, agricultural or industrial purpose. Water must be tested with different physico-chemical parameters. Selection of parameters for testing of water is solely depends upon for what purpose we going to use that water and what extent we need its quality and purity. Water does content different types of floating, dissolved, suspended and microbiological as well as bacteriological impurities [3]. Some physical test should be performed for testing of its physical appearance such as temperature, color, odour, pH, turbidity, TDS etc, while chemical tests should be perform for its BOD, COD, dissolved oxygen, alkalinity, hardness and other characters. For obtaining more and more quality and purity water, it should be tested for its trace metal, heavy metal contents and organic i.e. pesticide residue. It is obvious that drinking water should pass these entire tests and it should content required amount of mineral level. Only in the developed countries all these criteria's are strictly monitored. Due to very low concentration of heavy metal



and organic pesticide impurities present in water it need highly sophisticated analytical instruments and well trained manpower.

The present study involves the analysis of water quality in terms of physico-chemical parameters of pond water of Ranmasle village in North Solapur Taluka, District Solapur of West Maharashtra region in Maharashtra State. The purpose of this present investigation was to determine the values of the major physiochemical parameters of pond water of Ranmasle village and it's environ. Furthermore, to determine if there is any build up of toxic substances which could lead to bio-accumulation and magnification leading to health implications.

### Material And Methods :

#### Study area:

Ranmasle is a Village in Solapur North Taluka in Solapur District of Maharashtra State, India. The latitude 17.66577 and longitude 75.9157875 are the geo coordinate of the Ranmasale. Ranmasale belongs to West Maharashtra region. It is located 28 Km towards North from District head quarter Solapur. The people are using open well water, tube well water as well as pond water for their daily need. The literature survey reveals that no water quality management studies are made in this region so far. Hence the present study was planned and undertaken.

#### Preparation of water samples :

Water samples for the estimation of physicochemical parameters were collected in rainy season mainly in July 2018. One liter acid leached polythene bottle were used for water sampling. Sample collection was done during morning hours between 7.00 am to 10.00 am and brought to laboratory for further analysis. The sample was kept in refrigerator maintained at 4°C.

#### Physicochemical analysis :

Parameters like colour, temperature, light penetration, pH, were estimated on the spot while samples for dissolved oxygen. DO was fixed on spot and other parameters were analyzed in the laboratory as per standard methods prescribed by Trivedy and Goel (1986), APHA (1992), Kodarkar *et al* (1998). The results of this study are presented in Table 1.

### Results And Discussion :

The average results of the physicochemical parameters for pond water sample are presented in Table 1.

**Table 1:** Physicochemical Characteristics of Pond Water of Ranmasle Village

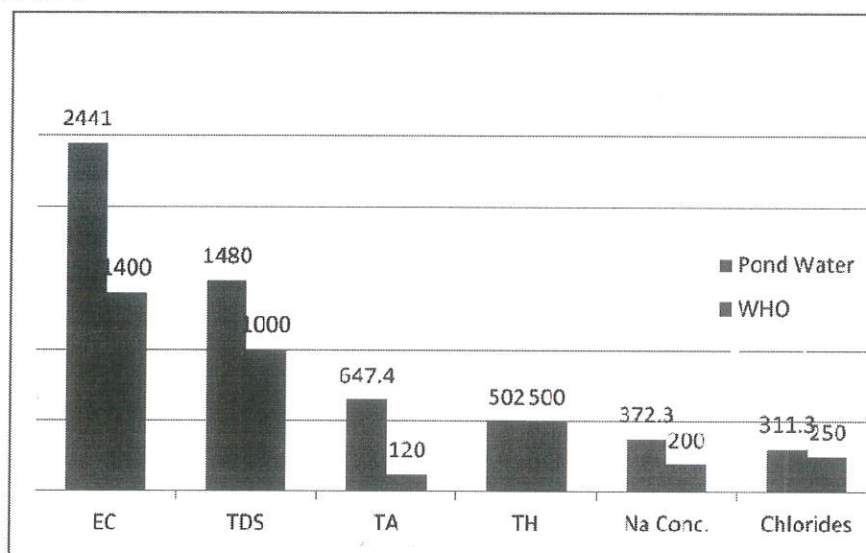
Sr. No.	Parameter	Reading	WHO (1973)	ISI 10500-91
1	Colour	Light Green	-	-
2	Light Penetration (cm)	233.22	-	-
3	pH	7.4	7-8.5	6.5-8.5
4	EC	2441	1400	-
5	TDS	1480	1000	500
6	Turbidity	0.4	5.0	10
7	DO	2.6	-	5.0
8	TA	647.4	120	200
9	TH	502	500	300
10	Ca <sup>2+</sup>	27.25	100	75
11	Mg <sup>2+</sup>	108.7	150	30





12	Na <sup>+</sup>	372.3	200	200
13	K <sup>+</sup>	2.011	-	-
14	Cl <sup>-</sup>	311.3	250	250
15	NO <sup>3-</sup>	1.271	5	45
16	SO <sub>4</sub> <sup>2-</sup>	89.89	250	200
17	PO <sub>4</sub> <sup>3-</sup>	0.233	-	-

All parameters are in mg/L except pH, EC and Turbidity. EC in micromho /cm, Turbidity in NTU



Graphical Comparison of Physicochemical parameters of Pond water and Standards of WHO

Electrical conductivity is a measure of water capacity to convey electric current. It signifies the amount of total dissolved salts [6]. EC values was 2441 micromhos/cm. High EC values was observed indicating the presence of high amount of dissolved inorganic substances in ionized form. Total dissolved solids indicate the salinity behavior of pond water. Water containing more than 500 mg/L of TDS is not considered desirable for drinking water supplies, but in unavoidable cases 1500 mg/L is also allowed [7]. TDS values was 1480 mg/L showed higher TDS values than the prescribed limit given by ISI 10500-91. In most waters, turbidity is due to colloidal and extremely fine dispersions. The turbidity values was 0.4 NTU and found within the limits prescribed by ISI 10500-91.

Dissolved oxygen is important parameter in water quality assessment and reflects the physical and biological processes prevailing in the water. The DO values indicate the degree of pollution in water bodies. DO value was 2.6 indicating contamination by organic matter. Alkalinity of water is its capacity to neutralize a strong acid and it is normally due to the presence of bicarbonate, carbonate and hydroxide compound of calcium, sodium and potassium. Total alkalinity value for sample was found to be greater than the value prescribed by WHO.

Hardness is the property of water that prevents the lather formation with soap and increases the boiling points of water [6]. Hardness of water mainly depends upon the amount of calcium or magnesium salts or both. The hardness value indicated it is within the limits prescribed by WHO. Calcium and Magnesium are directly related to hardness. Calcium concentration was 27.25 mg/L and found below permissible limit. Magnesium content in the investigated water sample was 108.7 mg/L which were found within WHO limit.



Sodium concentrations was 372.3 mg/L and showed higher than the prescribed limit. The major source of potassium in natural fresh water is weathering of rocks but the quantities increase in the polluted water due to disposal of waste water [4]. Potassium content in the water sample was 2.011 mg/L. The chloride concentration serves as an indicator of pollution by sewage. People accustomed to higher chloride in water are subjected to laxative effects[6] In the present analysis, chloride concentration was found 311.3 mg/L.

Pond water contains nitrate due to leaching of nitrate with the percolating water. Groundwater can also be contaminated by sewage and other wastes rich in nitrates. The nitrate content in the study area 1.271 mg/L and found within the prescribed limit. Sulphate occurs naturally in water as a result of leaching from gypsum and other common minerals [5]. Discharge of industrial wastes and domestic sewage tends to increase its concentration. The sulphate concentration varied was 89.89 mg/L and found within the prescribed limit. Phosphate may occur in pond water as a result of domestic sewage, detergents, agricultural effluents with fertilizers and industrial waste water [8]. The phosphate content in the study area was found 0.233 mg/L.

#### Conclusion :

High EC and TDS values were observed indicating the presence of high amount of dissolved inorganic substances in ionized form. Electrical conductivity(EC), Total dissolved solids (TDS) and Alkalinity values were found to be greater than the value prescribed by WHO. The results indicate that water of Ranmasle pond is polluted and is not suitable for drinking purposes.

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