International Journal of Life Sciences
International Peer Reviewed Open Access Journal

Special Issue A 13, December 2019
ISSN:2320-7817(p) 2320-964X(0)

Original Article Open Access

Assessment of physical parameters of Amravati Dam, Malpur, Dist. Dhule, (M.S.), India.

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Manuscript details:

Available online on http://www.ijlsci.in

ISSN: 2320-964X (Online)
ISSN: 2320-7817 (Print)

Editor: Dr. Arvind Chavhan

Cite this article as:
Patil Jitendra C, Badgujar Sandip R, Jaiswal Deepchand P and Balde Govind H (2019) Assessment of physical parameters of Amravati Dam, Malpur, Dist. Dhule, (M.S.), India., *Int. J. of. Life Sciences*, Special Issue, A13: 71-77.

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ABSTRACT

Water is one of the most fundamental elements in the environment. It is considered as an essence of life. The use of water for various purposes including domestic, industrial and agricultural has no doubt increased in our life, which is vitally important abiotic component of the environment. Water exists in various forms in nature such as cloud, rain, snow, ice and fog. However; strictly speaking chemically pure water does not exist for any appreciable length of time in nature. By the time, it gets polluted severely and easily as it reaches us. It cannot escape pure while raining. It picks up small amount of gases, ions, dust and particular matter from the atmosphere. 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 physicochemical parameters. Water is an important constituent for all the living beings. The water quality guidelines provide a limit value for each parameter for drinking water. It is necessary that the quality of drinking water should be checked at regular time interval, because due to use of contaminated drinking water, human population suffers from varied of water borne diseases. The availability of good quality water is a necessary feature for preventing diseases and improving quality of life. Present communication deals with the investigation of physico-chemical parameters of Amravati Dam, Malpur, Dist. Dhule (M.S.) India.

Key words: Amravati Dam, Malpur, Physical parameters

INTRODUCTION

Environment consists of five elements, air, water, land, flora and fauna that inextricably inter-linked. These tend to interact with each other continuously. Change in one of them may affect other elements, and this disturbs the environmental balance. Water as extraordinary substance, exists in three states as solid, gases, liquid proved important for survivability of life (Simpi et al., 2011).

Out of total volume of water (approximately 1.4 billion km^3) more than 97% is ocean water unsuitable for human use, and only 3% of the earth's water is fresh. An estimated 77.2% of this is in frozen in the form of ice caps and glaciers.

Most of the remaining freshwater (22.4%) is ground water and soil moisture. Rest of the freshwater is a very small amount of surface water. Out of this 0.35% is present in lakes and swamps and less than 0.01% in rivers and streams. The amount of total water available for use in India is estimated to 1990 billion m^3 per year. About 86% of this comes from the surface runoff in river, streams, lakes and ponds, excluding ground water resources that still need to be tapped.

River also serves for domestic, industrial and agricultural disposal, transportation, getting food resources and for recreational activities (Dhote and Dixit, 2011). The good quality drinking water is often regarded as an important means of improve health according to World Health Organization (WHO, 2002) Aquatic organisms need a healthy environment. Maximum productivity depends on optimum level of Physico chemical parameters (Sadia et al., 2013). Limnology is the comprehensive study of fresh water bodies. Water has two dimensions that are closely linked-quantity and quality. The urban pond is influenced by several extrinsic factors which may alter the structural and functional components of such ecosystem (Goswami and Mankodi, 2012). Limnology is also described as “Hydrobiology or aquatic biology. According to Edgar do Baldi a prominent Italian ecologist; limnology is the science dealing with internal action of processes and methods whereby matter and energy are transformed within the lake or pond. Water is one of the most essential needs for the continued existence of all living organisms on earth.

Ever since the spread of environmental awareness all over world, monitoring of water resources through regular analysis has become crucially important feature. It is essential for exploration, exploitation and conservation of the potentials of the water bodies keeping this in view; we have made an attempt to evaluate the important physicochemical and biological parameter.

MATERIAL METHODS

The methods used for the analysis of various Physico-chemical parameters are used from *standard methods for the examination of water* (APHA 1985, Trivedy and Goel 1984).

pH

The pH of most of the natural waterfalls is within the range of 4 to 9. pH is the negative logarithm of hydrogen ion concentration, or more precisely hydrogen ion-activity. Portable digital pH meter was used for the measurement of pH values. Standard buffer solutions of pH 4.0 and 9.2 were used for calibration.

Transparency

Transparency is a water quality characteristic of lake and can be measured quickly and easily using Secchi disc. The Secchi disc was lowered down with the help of a graduated rope till it disappeared from the view and then lifted till it reappeared. The average reading of these two depths (in cm) was considered the limit of visibility and was taken as Secchi disc transparency.

$$\text{Transparency (cm)} = \frac{X+Y}{2}$$

Where,

X = Depth of disappearance (cm)

Y = Depth of reappearance (cm)

Turbidity

Turbidity arises because of wide variety of suspended colloidal materials, run off from barren areas during rain is the most natural contributor of turbidity, particularly silt and clay. Turbidity is interference to the passage of light by suspended particles in water. The scattering of the light is generally proportional to the turbidity.

Total Dissolved Solids (TDS)

The total dissolved solids were estimated by gravimetric method. (Trivedy and Goel 1984). The result was expressed in mg/l.

$$\text{TDS (mg/}l\text{)} = \frac{\text{A-B x 10,00,000}}{\text{V}}$$

Where,

A = Final weight of the dish in g

B = Initial weight of the dish in g

V = Volume of sample taken in ml.

Conductivity

Pure water is a poor conductor of electricity. Acids, bases and salts present in water make it relatively good conductor of electricity and such substances are called electrolytes.

The conductivity of water sample was measured with help of a conductivity meter. Electrical conductivity was calculated using observed conductance, cell constant and temperature factor at 25^0C (Trivedy and Goel 1984). The result was expressed as µmhos/cm.

RESULTS & DISCUSSION

pH

The pH of water ranged in 7. to 8.9. The pH of the reservoir Amravati Dam water was less alkaline throughout year. The pH of lake water exhibited positive correlation with TDS, Turbidity, Chloride and negative correlation with Transparency, Free CO_2, Total Alkalinity, Conductivity and Sulfate. pH also exhibited positive correlation with MPN, Rotifers, Cladoceran, Copepods, Total Zooplankton.

The pH was found to be minimum in winter and maximum in rainy season. Maximum pH was recorded in the month of August and September. The minimum pH was recorded in the month of December. It was observed that the pH values were almost within 7 to 8.9 throughout the one year.

Transparency

The transparency of water ranged between 30 cm to 100 cm in year 2018-2019. The minimum transparency of reservoir water was recorded in the month of June 30cm and maximum in December 100cm. Seasonal variations of transparency were also observed. In rainy season, transparency was less as compared to that in summer and winter season. Transparency of station B was comparatively lower than that of remaining stations. Transparence exhibited positive correlation with Sulfate and negative correlation with remaining parameters.

Table 1: Monthly variation in pH at four different stations of Amravati dam, Malpur during June 2018 – May 2019.

Months	Site A	Site B	Site C	Site D
June	8.7	8.6	8.6	8.6
July	8.4	8.6	8.6	8.5
August.	8.9	8.7	8.7	8.6
September.	8.5	8.5	8.8	8.8
October.	8.2	8.3	8.2	8.5
November.	7.6	7.8	7.7	7.5
December.	7.4	7.4	7.6	7.5
January	7.9	8.0	7.9	8.1
February.	8.0	8.0	7.9	8.1
March	8.4	8.5	8.2	8.3
April	8.5	8.4	8.5	8.4
May	8.2	8.4	8.4	8.5

Table No. 2 Monthly variation in Transparancy (cm) four different stations of Amravati dam, Malpur during June 2018 – May 2019.

Months	Site A	Site B	Site C	Site D
June	42	41	42	40
July	33	32	34	31
August.	33	32	34	35
September.	44	42	43	40
October.	61	63	65	64
November.	85	87	92	97
December.	90	80.5	83	85
January	94	85	86	94
February.	75	65	85	84
March	62	63	64	65
April	57	52	53	52
May	48	49	46	48

Table No. 3 Monthly variation in Turbidity (NTU) four different stations of Amravati dam, Malpur during June 2018 – May 2019.

Months	Site A	Site B	Site C	Site D
June	18	20	20	16
July	16	18	18	16
August.	16	14	16	14
September.	14	20	14	18
October.	18	14	18	18
November.	12	11	18	14
December.	12	20	11	12
January	14	12	11	18
February.	4	6	8	6
March	16	15	16	14
April	12	10	12	16
May	20	20	21	20

Table No. 4 Monthly variation in TDS (mg/l) four different stations of Amravati dam, Malpur during June 2018 – May 2019.

Months	Site A	Site B	Site C	Site D
June	280	283	284	270
July	274	282	281	276
August.	278	285	287	285
September.	276	269	275	265
October.	205	209	211	207
November.	184	165	207	203
December.	174	172	168	162
January	190	194	199	192
February.	208	200	204	208
March	204	203	200	198
April	206	208	200	220
May	215	208	211	199

Table No. 5 Monthly variation in Conductive (µmho/cm) four different stations of Amravati dam, Malpur during June 2018 – May 2019.

Months	Site A	Site B	Site C	Site D
June	308	255	258	294
July	271	269	257	254
August.	254	268	264	271
September.	263	267	292	301
October.	299	209	204	204
November.	260	241	360	299
December.	315	309	314	303
January	292	288	296	287
February.	222	231	216	230
March	318	294	303	300
April	264	258	259	273
May	324	448	400	412

Fig.1 Monthly variation in P^H at four different stations of Amravati dam, Malpur during June 2018 – May 2019.

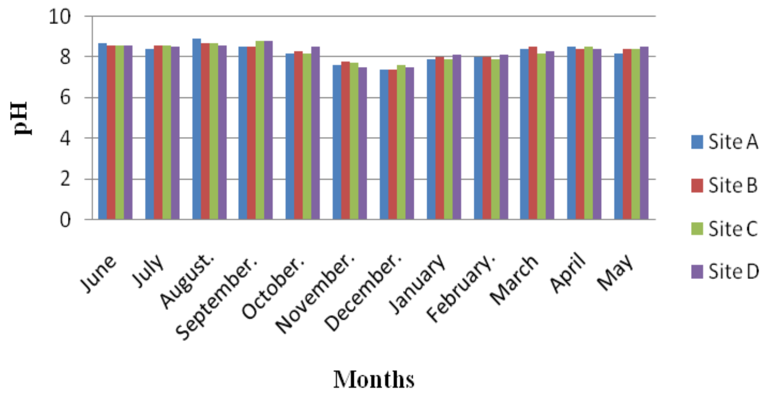


Fig.2 Monthly variation in Transparancy (cm) four different stations of Amravati dam, Malpur during June 2018 – May 2019.

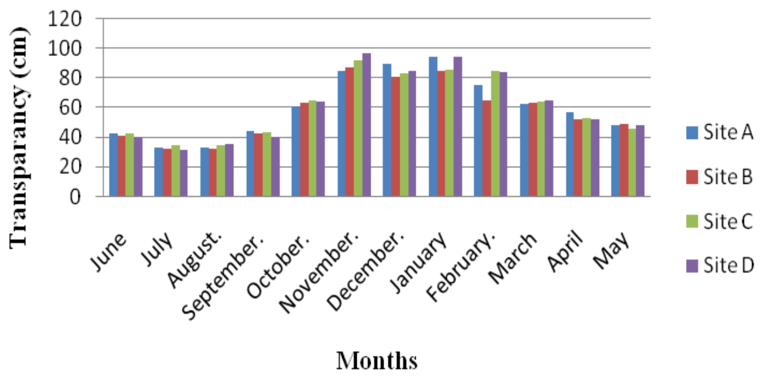


Fig.3 Monthly variation in Turbidity (NTU) four different stations of Amravati dam, Malpur during June 2018 – May 2019.

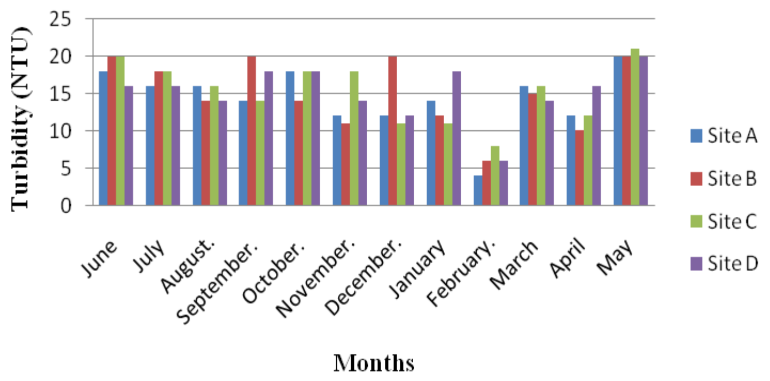


Fig.4 Monthly variation in TDS (mg/l) four different stations of Amravati dam, Malpur during June 2018 – May 2019.

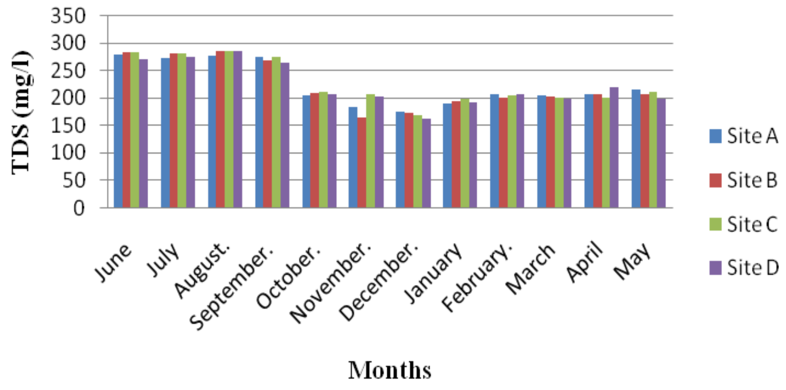
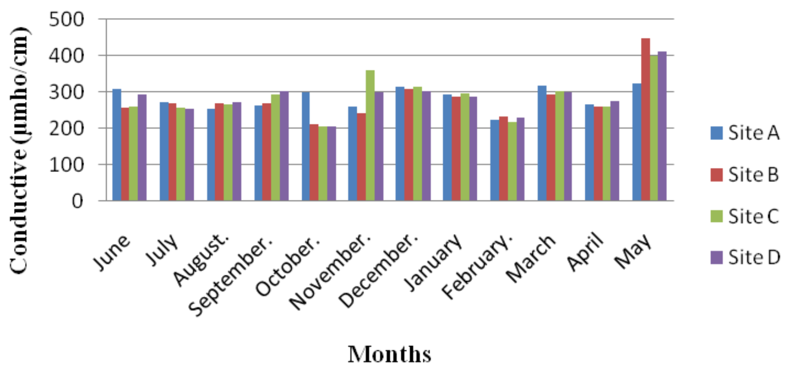


Fig.5 Monthly variation in Conductive (µmho/cm) four different stations of Amravati dam, Malpur during June 2018 – May 2019.



Turbidity

The Turbidity of water was ranged between 2 to 23 NTU in Year 2018-2019. The turbidity of reservoir water was minimum in summer and winter, while maximum in rainy season. The turbidity of reservoir water exhibited positive correlation with TDS, Conductivity, Free CO_2, Total Alkalinity, Chloride, MPN, TPC, Rotifers, Cladoceran, Total Zooplankton and Productivity.

Total Dissolved Solids (TDS)

Total Dissolved Solid fluctuated between 160 mg/*l* to 285 mg/*l* in year 2018-2019. The minimum TDS of reservoir water was recored in the month of December i.e 160 mg/*l,* while maximum in the month of June in year 2018. Seasonal variation of TDS was also observed. In winter season lower the value of TDS as compared to rainy and summer season in all four-study stations. TDS exhibited positive correlation DO, Chloride and negative correlation with Conductivity, Co_2 Total Alkalinity, Hardness Productivity and Sulphate.TDS also exhibited positive correlation with MPN, TPC, Rotifers, Cladoceran, and Total Zooplankton.

Conductivity

In present investigations Electric Conductivity ranging between 204µ mho/cm and 554 µmho/cm. It was found that the conductivity goes on increasing from June to November and then it declines gradually during December and further once again increases till the end of summer i.e. up to May. Conductivity exhibited positive correlation with Total Alkalinity and negative correlations with DO, Sulfate, MPN and TPC. Conductivity exhibited positive correlation with Rotifer, Cladoceran, Copepods, and Total Zooplankton.

CONCLUSION

Pure water does not actually exist in nature, as all water contains some naturally occurring chemicals that have leached from the surrounding environment. In most cases, the levels of naturally occurring chemicals are either beneficial, or minimal and of little consequence. There are many human made chemicals that can contaminate water and affect its usability. Sources of chemical contaminants can be naturally occurring chemicals, chemicals from agricultural activities, chemicals from human settlements, chemicals from industrial activities and chemicals from water treatment and distribution. The physical characteristics of water are usually one of those things that we can measure with our own senses such as: turbidity, colour, taste, odour and temperature. In general, drinking water to have good physical qualities if it is clear, tastes good, has no smell and is cool. Physical contaminants generally do have not direct health effects themselves; however, their presence may relate to a higher risk of microbiological and chemical contamination which may be harmful to human health (Vijay S. kale,2016)

Conflicts of interest: The authors stated that no conflicts of interest.

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