

## INVESTIGATION OF PHYSICO-CHEMICAL PARAMETERS OF NATHSAGAR DAM, AT PAITHAN, DISTRICT- AURANGABAD, (M.S.), INDIA

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### ABSTRACT

An attempt was carried out to study Physico-chemical investigation of Nathsagar Dam, Paithan, Dist- Aurangabad. The study was carried out during the year 2016-2017. During the study period Hydro biological parameters such as temperature, pH, Alkalinity, DO, Free CO<sub>2</sub>, TDS, Hardness, as well as Chloride of water was studied.

**KEY WORDS:** Fish culture, Physico-chemical Parameters, Nathsagar Dam Paithan.

### INTRODUCTION

Nathsagar is largest man-made earthen dam spreaded over 6272 ha. area. It is constructed on the river Godavari, located at Paithan in Marathwada region of Maharashtra state, India. Nathsagar is the largest man-made dam in Asia. Its height was approximately 41.30m and length 9.998m. The total storage capacity 2,909 MCM. and effective life storage capacity is 2,171 MCM. (million cubic meters). The total catchment area of dam is 21,750 km<sup>2</sup>, there are a total 27 water gates for the dam. Jayakwadi project is one of the largest irrigation projects in Maharashtra, Jayakwadi dam irrigates cultivable area of 237,452 hectares in the district of Aurangabad, Beed, Ahmednagar and Parbhani through its left and right canals.

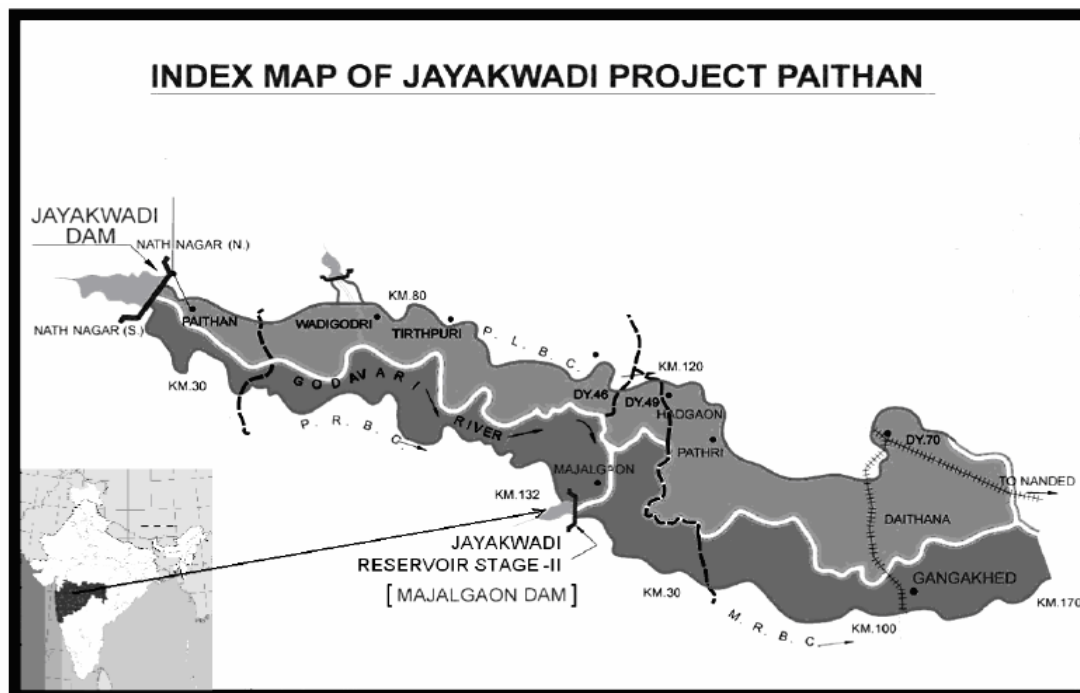
The water of Nathsagar reservoirs was used for many purposes such as domestic, industrial, and Agricultural. The main purposes of dam water are providing main water resources for Agricultural purposes a. It also provides water for drinking purpose to nearby city and villages and municipalities, industries, fish culture farms etc. of Aurangabad and Jalna, Maharashtra State, India. The foundation of the dam was laid by the then Prime minister of India Lal Bahadur Shastri on 18 October 1965. The dam was inaugurated on 24 February 1976 by the then Prime Minister Indira Gandhi. The study was carried out during the year of 2016-2017.

The water samples were collected from 2 different sites such as North and South side of Nathsagar dam. Many research worked on these study such as Mishra and Lingaraj (2015), have studied physic-chemical properties of Chilka lagoon, Dalal et al (2013) studied physico-chemical assessment of water quality of Dham river. Deshmukh and Sonawane (2008); Deshmukh (2016), Studied seasonal variation in abiotic factors of Godavari river at Paithan

### MATERIALS AND METHODS

The study was carried out to observed water quality of Nathsagar. The study was carried out during the year of 2016-2017 by collecting water samples from 2 different sites at the Nathsagar dam in the morning time 8 to 10 am. During the month of March to February. The parameters were studied by standard method (APHA 2005). Water sample were immediately brought in the laboratory by using plastic bottle.

The water temperature was recorded at the site by using thermometer. The pH was determined by using pocket digital pH meter. DO was determined By Winkler's method. Free CO<sub>2</sub> was determined by titration method following Trivedy et al (1987). Hardness of water was estimated by EDTA method. Alkalinity estimated by titration method as suggested by APHA (2005). Chloride by trimetric method. and TDS by calculated by APHA (2005).



### RESULTS AND DISCUSSION

The results are shown in Table 1, 2 and Graph 1 and 2.

#### Temperature

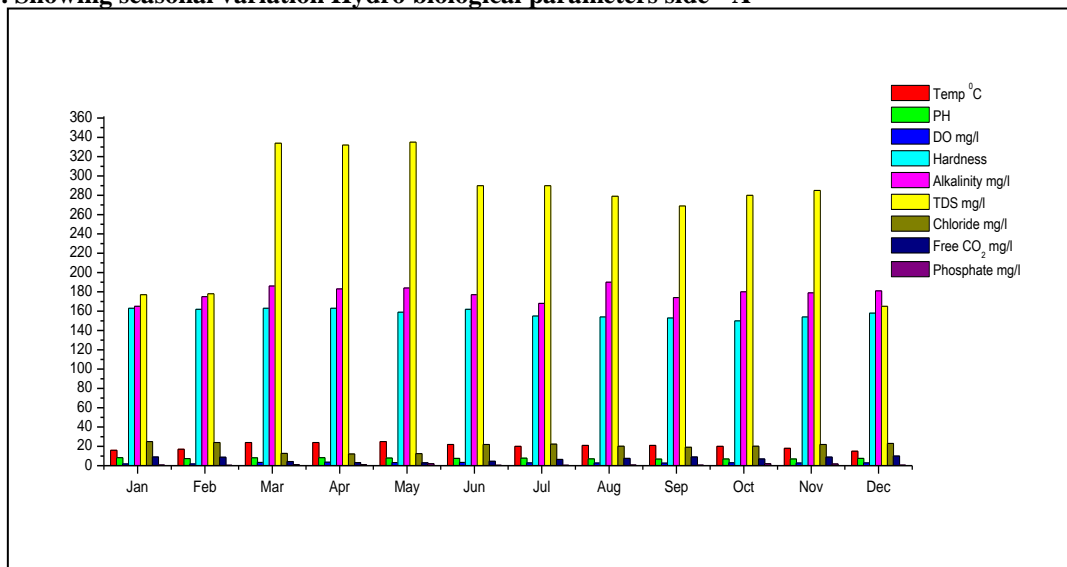
Temperature is one of the important parameter of water. temperature ranges between 15°C to 24°C site A and temperature ranges between 16°C to 24°C of site B .

**Table 1 . Site “A” Seasonal Variation in Hydro biological parameters of Nathsagar , Dam Paithan.**

Sr. No.	Month	Temp 0°C	PH	Do mg/L	Hardness	Alkalinity mg/L.	TDS mg/L	Chloride mg/l	Free CO2 mg/L	Phosphate mg/L
1	March	24°	8.2	3.3	163	186	334	12.7	4.30	1.06
2	April	24°	8.3	3.6	163	183	332	12.1	3.20	1.05
3	May	25°	7.9	3.2	159	184	335	12.5	3.0	2.0
4	Jun	22°	7.5	3.3	162	177	290	22.0	4.55	0.52
5	July	20°	7.8	2.9	155	168	290	22.3	6.5	0.43
6	August	21°	7.1	2.7	154	190	279	20.1	7.60	0.65
7	Sept.	21°	7.2	2.6	153	174	269	19.1	8.93	0.58
8	Oct.	20°	7.3	3.0	150	180	280	20.1	7.0	2.0
9	Nov.	18°	7.0	2.8	154	179	285	22.0	8.90	1.8
10	Dec	15°	7.5	2.9	158	181	165	23.0	9.98	0.55
11	Jan.	16°	8.3	1.8	163	165	177	25.0	8.95	0.65
12	Feb.	17°	7.3	1.8	162	175	178	24.0	8.80	0.48

The minimum temperature were recorded in the month December (winter). And maximum temperature recorded in the month of April (summer). of both site on dam. Temperature affect many chemical and biological parameters Gupta (2004).As the temperature increases molecular motion of water increases, sand increase due to evaporation solubility of gases reduced are studied by Gupta (2004). Muley and Patil (2006) recorded that maximum temperature was recorded during pre- monsoon and lowest during winter.

**Graph 1. Showing seasonal variation Hydro biological parameters side - A**



### PH

The PH is important parameter to know acidic and basic nature of water. pH ranging from 7.0 to 8.3 at site A while the pH range 7.1 to 8.2 of site B. The low value of pH is in the month of August and maximum 8.3 in the month of April from both site of dam. The increase in pH values during summer or pre-monsoon period was due to increased concentration of bicarbonates alkalinity. Chandrashekar (1997) noted alkaline pH over 2 year study period in urban centers, pH of water is also highly influenced by nature of pollution in the form of sewage and industrial effluents.

**Table 2. Site "B" Seasonal Variation in Hydro biological parameters of Nathsgar , Dam Paithan.**

Sr No	Month	Temp	PH	Do mg/L	Hardness	Alkalinity mg/L.	TDS mg/L	Chloridemg/L	Free CO <sub>2</sub> mg/L	Phosphate mg/L
1	March	23	7.2	3.0	162	187	334	12.7	4.30	1.06
2	April	24	7.7	3.5	160	183	330	12.1	3.20	1.05
3	May	24	8.2	3.4	158	184	334	12.5	3.0	2.0
4	Jun	23	8.2	3.0	160	177	290	22.0	4.55	0.52
5	July	22	7.8	3.2	153	168	295	22.3	6.5	0.43
6	August	20	7.9	3.1	151	190	280	20.1	7.60	0.65
7	Sept.	21	7.4	3.4	150	174	268	19.1	8.93	0.58
8	Oct.	20	7.1	3.5	155	180	280	20.1	7.0	2.0
9	Nov.	17	7.2	2.7	157	179	287	22.0	8.90	1.8
10	Dec	16	7.1	2.8	162	181	163	23.0	9.98	0.55
11	Jan.	16	7.8	1.8	160	165	179	25.0	8.95	0.65
12	Feb.	17	7.5	2.7	161	175	181	24.0	8.80	0.48

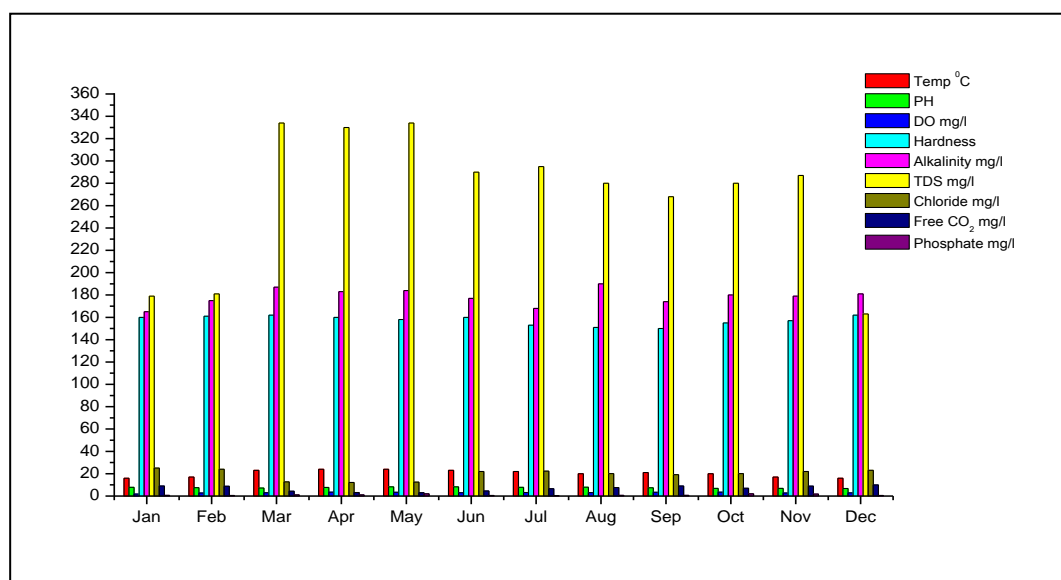
### Dissolved oxygen

DO was estimated by winklers method, the value of DO 1.8 to 3.6 mg/L. site A and 1.8 to 3.5 of site B. the minimum value recorded in the month of January (winter) & maximum value recorded in the month of April

(summer). DO is an important environmental parameter that decides ecological health of stream and protect aquatic life studied by Chang, (2002). High DO recorded during winter season.

It may be due to high photosynthetic rate of phytoplankton communities in clear water that results in higher values of DO studied by Sharma and Rathore, (2000); Ravindra *et al.*, (2003.) oxygen is necessary element to all forms of life. Adequate oxygen levels are necessary to provide for aerobic life forms which carry on stream purifying processes. As DO levels in water is decreased to 5.0 mg/L. then Aquatic life are under stress was studied by APHA (1990); Bandela. *et al.*(2005). Prakash (1982) reported that the concentration of Do is inversely proportional to the concentration of Co<sub>2</sub>.

**Graph 2.** showing seasonal variation Hydro biological parameters side - B



### Free CO<sub>2</sub>

It was recorded by using Titration method by APHA (1990). The CO<sub>2</sub> ranges from 3.0 to 9.98 mg/L of site A while 3.3 to 9.98 mg/L of site B .the maximum value recorded in the month of December(winter) and very low in the month of May (summer) from both site . co<sub>2</sub> is negatively correlated with water temperature indicating that , during the summer season , this content is decreased due to more photosynthesis due to more growth of aquatic plants increasing productivity of lake with more Co<sub>2</sub> utilization in the process of photosynthesis was observed by Atekwana *et al.*, (2003).

### Alkalinity

Alkalinity is a chemical measurement of water ability to neutralize acid. Alkalinity also measure water buffering capacity or its ability to resist changes in pH upon the addition of acids or bases. The ranges of alkalinity from 165 to 190 mg/L of site A , and 165 to 187 mg/L of site B. the maximum value recorded in the month of August, and minimum in the month of January of both site.

The high alkalinity is the function of ions exchange that calcium ions are replaced by sodium ions and later contributed to alkalinity studied by Sharma and john (2009).Nalina and Puttaiah (2006) recorded that alkalinity is maximum in summer season and minimum in rainy season due to dilution of ground water with percolated rainwater.

### Hardness

The value of hardness fluctuates from 150 to 163 mg/L and 153 to 160 mg/L from both site. The maximum hardness value was recorded in the month of January and low in the month of October. Higher values of hardness due to the percentage of calcium is more due to domestic activities studied by .Lokhande *et al.* (2008), according to Sagar *et.al.*, (2015) WHO permissible limit for total hardness of water is 150 mg/L and ISI

desirable limit was 300mg/L of TH means the water was hard, and TH greater than 300 mg/L means the water is very hard. High concentration of hardness may cause the problem of heart disease and kidney stones.

### Chloride

The chloride contents ranges from minimum of 12.1 and maximum from 25.0 mg/L of site A. while 12.0 to 24.3 mg/L of site B. The range of chloride high in month of January and low in month of April from both site. chloride is most important indicator of pollution was studied by Khare *et al.*, (2007).

### Phosphate

The values of phosphate fluctuate between the range of 0.55 to 2.0 mg/L of site A, and 0.55 to 2.0 mg/L of site B. The maximum value recorded in the month of May and minimum in the month of July of both site. Organic phosphate are the part of living and dead plant and animal over 85% of total phosphorous is usually found in organic form suresh kumar *et al.* (2014). Industrial and sewage waste create the pollution due to the presence of phosphates which causes growth of nuisance for microorganisms.

The maximum use of fertilizers is the main source of phosphate which comes from agricultural site of cultivated land of surface water with storm runoff. High phosphate level causes muscle damage, problem with breathing and kidney failure Nyamangara *et al.*, (2013).

### TDS

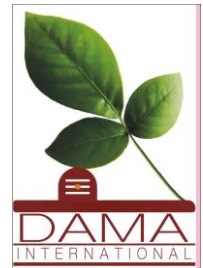
TDS was estimated by the gravimetric method. TDS value recorded Of site A are minimum 165mg/L, and maximum 335 mg/L. and of site B Recorded minimum 163mg/L and maximum 334 mg/L. Total dissolved Solids are the total amount of mobile charged ions, including minerals, salts or metal dissolved in a given volume of water and quality of water purification system and affects everything that consumes, lives in or uses water, whether organic or inorganic, whether better or for bad was studied by Sagar *et al.*, (2015). TDS conductivity and turbidity are positively related with each other was observed by Tamlyukar & Ambore (2006). Shastri *et al.* (2004) and Deshmukh and sathe (2014). Studied increase in TDS increase hardness of water.

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