Water quality status of dams located across Chandrapur district of Maharashtra

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Abstract

It is of high importance that water to be used for drinking and agricultural purpose should be safe therefore there is a need for regular and proper assessment of water from various resources. One of the most common reservoirs where rain water is stored and used for drinking and other recreational purpose are dams. In present study water quality of eight water resources i.e. dams from Chandrapur district of Maharashtra were analysed using parameters like pH, Turbidity, Transparency, DO, CO2 concentration, Turbidity, Hardness, Alkalinity, TDS for checking its suitability for Drinking and other purposes and it was found that almost all the parameters are well within the standard limits for seven out of eight dams but in one of the dam i.e. Irai dam the parameters like Turbidity, TDS, Hardness are higher than permissible limits while DO and Transparency are lower than standard limits. but these parameters can be corrected if water is treated by conventional treatment methods.

Key words: Transparency, BOD bottle, TDS, Dams, Reservoirs, Alkalinity.

Introduction

As we all know that water is a most essential factor for the survival of life on earth (**Annan.K., 2005**), in most parts of the earth rainwater is the only source of fresh water which is stored in dams for different purposes like drinking, livestock, agriculture, industries, etc. In

Chandrapur district of Maharashtra the rain is seasonal and hence dams play a very crucial role in the water supply system (**Tortajada, Cecilia. 2014).** Polluted water harms human health and causes various diseases in humans that may be pathogenic as well as metabolic like Fluorosis, Kidney stones, etc. (**Li P et al., 2017**) and also affects various industrial and agricultural processes, therefore it is important to assess the quality of water. Chandrapur is a district in Maharashtra that is highly industrialized and a lot of wastewater from industries is poured into adjoining water bodies therefore there is a need to analyse the water quality of dams (**Dinh Dap, Nguyen. 2019**) to provide quantitative and qualitative results that indicate potability of water for consumption by humans.

In the present study, 08 prominent dams from Chandrapur district were selected i.e. Amalnala dam, Asolamendha dam, Chandai dam, Chargaon dam, Ghodazari dam, Dongargaon dam, Irai dam, and Pakkadiguddam dam, all these dams are located in different tehsils of Chandrapur. The important water parameters that were studied are pH, Temperature, Turbidity, Transparency, Alkalinity, Hardness, TDS, DO, CO2, and conductivity.

Materials and Methods

Water sample form each dam was collected in post monsoon season during the month of December and January. Water sample was collected in BOD bottles (**Kodarkar, M.S. , 1992**)in early morning, each water sample was collected on separate day and parameters like Temperature, pH , TDS, conductivity were measured on spot with the help of Thermometer, pH meter, conductometer and TDS meter respectively while other factors like Hardness, DO, Alkalinity were measured in laboratory by standard titrimetric methods as per APHA guidelines (**APHA, 1995**).APHA standards for different parameters are shown in Table no.1 while water holding capacities of each of the selected dams is shown in Table no. 2.

Table 1. Standards for different parameters of water

S.N.	Parameter	Standard value
1	pH	6.5-8.5
2	Turbidity(NTU)	5
3	Alkalinity(mg/lit)	500
4	Hardness(ppm)	200-600
5	TDS(ppm)	500-2000
6	Conductivity	300
7	DO(ppm)	5
8	Temperature	30°C

Table.2 Water holding capacity and Dimension of dams

S.N.	Name of Dam	Water holding capacity (Million Litres)	Dimensions in Thousand Hectors
1	Amalnala	2448	8.45
2	Asolamendha	47290	24.55
3	Chandai	1069	5.5
4	Chargaon	19866	14.83
5	Dongargaon	1418	5.45
6	Ghodazari	43163	9.06
7	Irai	1930	55
8	Pakkadiguddam	13307	5.11

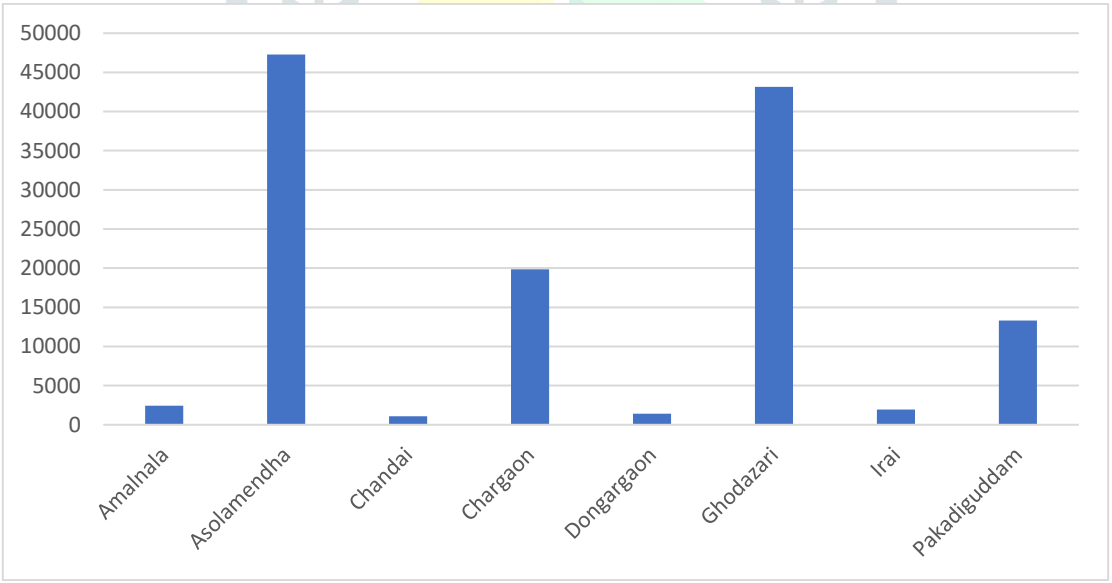


Fig.1 . Water holding capacities of selected Dams

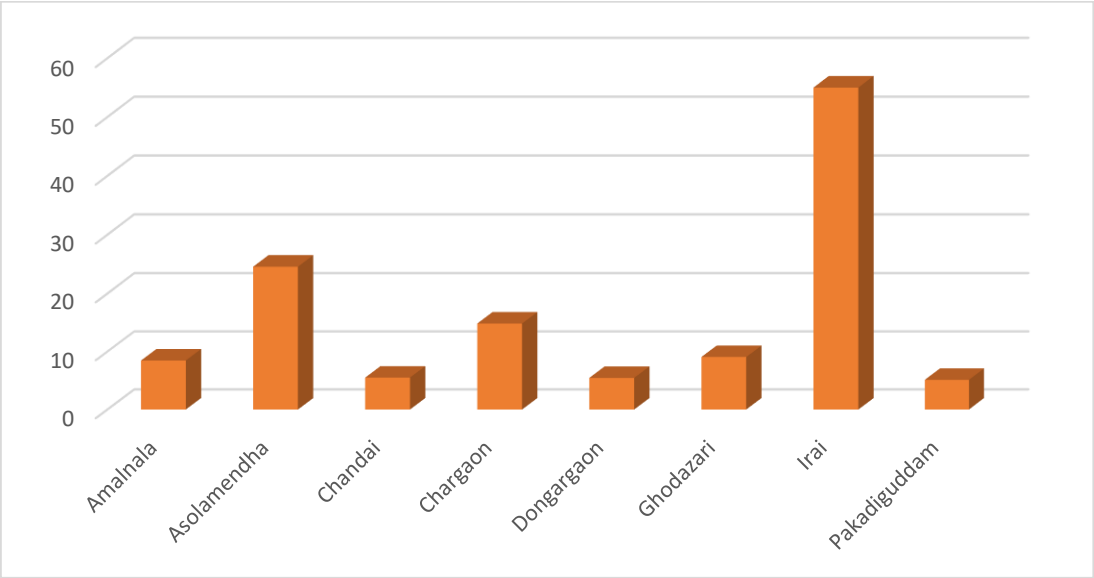


Fig.2. Area of Dams in Thousand Hectors

Table.3.Data of parameters analysed for water samples from selected Dams

Name of Dam	Parameters									
	Temp.	pH	Turbidity	Transparency	Alkalinity	Hardness	TDS	DO	CO2	Conductivity
Amalnala	27°C	7.8	5.6	3	239	115	370	6.9	4.2	0.6
Asolamendha	25°C	8.4	4	3	320	230	585	5	1.8	0.7
Chandai	24°C	8.2	3.5	2.8	211	321	440	7.1	2.9	0.5
Chargaon	27°C	8.7	4.2	3.5	530	513	480	6.3	3.1	1
Dongargaon	28°C	7.6	2.3	3.5	312	345	538	5.8	4.6	1
Ghodazari	25°C	7.4	4.5	5.5	432	169	325	7.4	5.4	0.4
Irai	28°C	8.9	6	2.3	534	550	860	4.8	7.1	1.2
Pakkadigudda m	25°C	7.7	3.2	5.5	354	234	230	6.5	5.3	0.4

Results and Discussion

All the data of different parameters tested for water samples from 08 selected dams is shown on Table. 3,from analysis it was observed that pH values ranges between 7.4 to 8.9, the lowest value of 7.4 was recorded from Ghodazari dam water while highest value of pH was recorded form water sample of Irai dam, according to standards water is said to be drinkable when pH values ranges between 6.5 to 8.5(Table 1) therefore except Irai dam and Chargaon dam water from all other dams is safe for consumption, agricultural and industrial purpose.

Temperature: permissible value of temperature for water in reservoirs is 30°C, so all the reservoirs has water temperature well within permissible limit.

Turbidity : Turbidity readings fluctuates between 2.3 NTU to 6NTU , lowest value of 2.3 NTU is for Dongargaon dam while highest value of 6 NTU is for Irai dam, the standard permissible limit for turbidity is 5 NTU so out of the 08 selected dams Amalnala dam and Irai dam water shows higher turbidity levels than normal.

Transparency : The values of transparency for water samples ranged between 2.3 – 5.5 , the lowest value was of Irai dam and highest value was of Ghodazari and Pakkadiguddam dam. As we can see there is a inverse relationship between turbidity and transparency therefore as Irai dam has highest turbidity it has lowest transparency.

Alkalinity : Alkalinity values ranged between 211mg/lit to 534mg/lit, lowest value was for water sample from Chandai dam while highest value was for water sample from Irai dam. As per standards Alkalinities of Irai and Chargaon dams were found to be higher than permissible limits.

Hardness : Hardness of water samples ranged between 115 mg/lit to 550 mg/lit. lowest hardness was found in water from Amalnala dam while highest hardness was found for water from Irai dam. So all the dams have water hardness well within permissible limits.

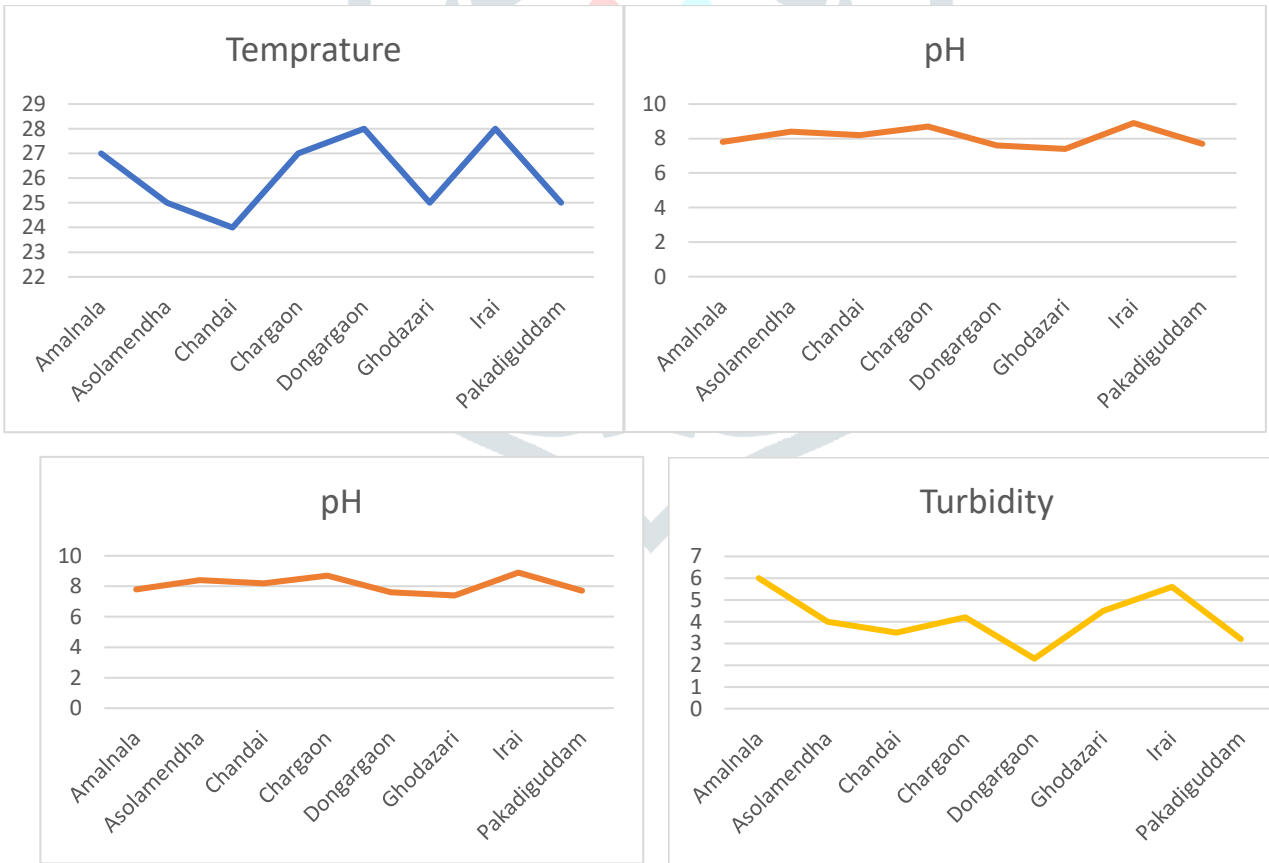
TDS : Total dissolved solids 230 mg/lit to 880 mg/lit the lowest value was found to be for water samples from Pakkadiguddam dam and highest TDS was found to be for water from Irai dam but values of TDS from all the dams are well within permissible limits of 500-2000 (**BIS, 2012**)

DO : It is one of the most important characteristic for drinking water, the DO values were found to be ranging between 4.8 to 7.4, according to standards the minimum DO should be 5mg / lit so only one dam i.e. Irai dam has less DO than standards.

Conductivity : Conductivity ranges between 0.4 to 1.0 , lowest value is from water of Ghodazari dam while highest value is from water of Chargaon and Dongargaon dam.

CO_2 Concentration : CO_2 concentration ranged between 1.8 to 7.1 , lowest was found to be in Asolamendha dam water while highest was found to be in Irai dam water, but all the dam has CO2 concentration in their water well within standard limits.

On the basis of above observations it is clearly seen that water from all the dams except Irai dam seems suitable for drinking, agricultural as well as industrial purpose , for Irai dam out of all the tested parameters 05 parameters namely pH , Turbidity, Transparency, Alkalinity, DO are failed parameters.



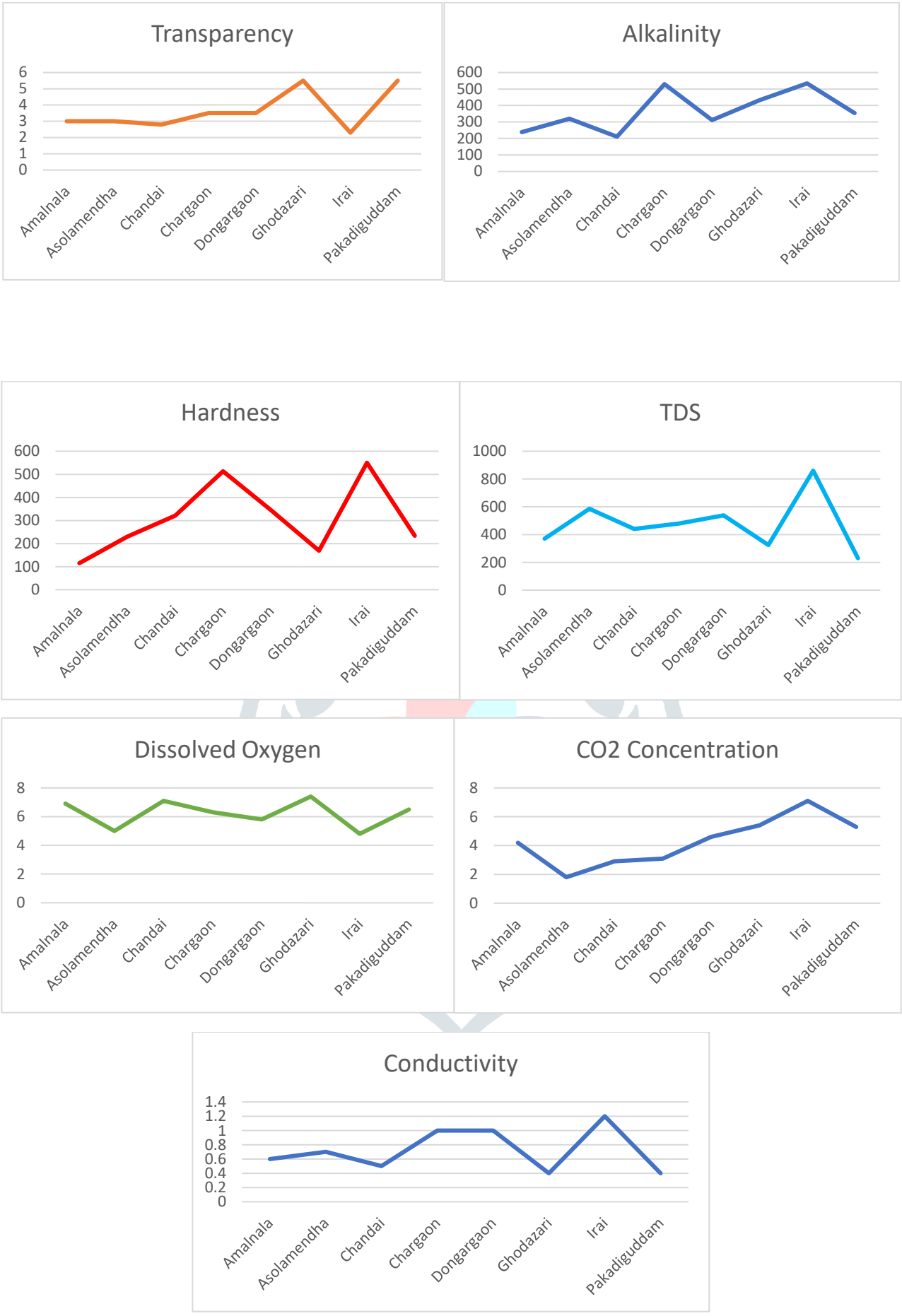


Fig. 3. Trends of different parameters in water samples from selected Dams

Table. 4. Data showing failed parameters for each Dam

S.N.	Name of Dam	Failed parameters
1.	Amalnala	Turbidity,
2.	Asolamendha	Nil
3.	Chandai	Nil
4.	Chargaon	Alkalinity,
5.	Dongargaon	Nil
6.	Ghodazari	Nil
7.	Irai	pH, Turbidity, Alkalinity, DO, Transparency
8.	Pakkadiguddam	Nil

Conclusion

In present study different parameters were applied for analysis of water samples taken from 08 different dams located in Chandrapur district of Maharashtra, from analysis it was concluded that all the dams have water which can be directly used for Drinking, Agricultural and Industrial purpose except Irai dam whose water is found to be unsuitable because of higher values of pH , Turbidity, Transparency, Alkalinity and lower values of DO but these parameters can be corrected and water from Irai dam also can be made safe for consumption through conventional water treatment methods (**Afolabi et.al., 2012**).

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