

Water quality assessment of river PATALGANAGA

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ABSTRACT

Patalganga River flows in western ghat. It is one of the most important rivers in this vicinity. The banks of this river are flourished with industries as row water is easily available. But now this same industrial growth is killing this river. Vast changes in physical chemical and biological parameters are mainly responsible for this change state of river. As we all know water is a source of life. Many villages in the area are relying on this water for agricultural as well as domestic purpose and even in some cases as a drinking water. In this study river water was tested to check its level of pollution. Based on physico chemical and biological analysis of river it can be concluded that few parameters such as BOD COD are way over minimum and maximum desirable limits whereas other parameters such as turbidity, hardness, color and TDS are above minimum desirable limit. For drinking water purpose IS10500 was used and WHO [2006] standards were referred where ever necessary.

Keyword: - Key word 1 Physico chemical and biological analysis, Keyword 2 IS10500

1. Introduction

Patalganga originates in the escarpment of Sahyadri region near Khandala in Western Ghats. It is located across 18°48'0" N and 73°40'0" E. There are few highlands such as Prabal range and kamala fort range whose steep terrain promotes the discharge in main stream of the river. It is distinguished from banganga (another river in this region) by Manikgarh range. Further its course is defined by tailrace of Tata power station. Then it flows in west of khalapur and khopoli. It concludes its journey near Dharamtar creek. It is a perennial river. Its vicinity lies 70 Km from Mumbai.

1.1 Study area:

Study was conducted in four villages of khalapur district on the bank of river patalganaga
Following table shows the population for four villages on the bank of patalganga

Sr No	Name of villages	population
1	Kharsundi	956
2	Kumbhivli	768
3	Dhamani	1253
4	Savroli	2500

Table No: 1.3 Population of selected villages

1.2 Potential pollutant sources observed:

1. Kapada mills
2. Steel manufacturing plants
3. Chemical manufacturing plants
4. Panavthas near every village.

2. Methodology

2.1 selection of parameters

For surface water analysis parameters are mainly divided into two type monsoon and non monsoon period. According to central pollution control board's guidelines in monsoon period following twenty five parameters should be measured.

Following table shows various parameters to be tested in monsoon season

Table 1.6: Parameters to be measured in monsoon season

Sr No	Type of parameters	Details
1	General	Colour, odour, temp, pH, EC, DO, turbidity, TDS
2	Nutrients	NH ₃ -N, NO ₂ + NO ₃ , Total P
3	Organic Matter	BOD, COD
4	Major ions	K, Na, Ca, Mg, CO ₃ , HCO ₃ , Cl, SO ₄ .
5	Other inorganics	F, B and other location- specific parameter
6	Microbiological	Total and Faecal Coliforms

For remaining period following parameters should be considered: Colour, Odour, Temp., pH, EC, DO, NO₂ + NO₃, BOD, Total and Faecal Coli forms.

2.2 Selection of sampling locations:

There is no proper guideline to select the location of sampling station given to us by any government organization. However, some cook book rules are given by CPCB. According to which sites should be near to possible contaminating resources. In our area such locations were detected. Locations include the critical points such as near the outlet of industries, panvathas and outlet of local sewage line. Access was also played important role as all the critical sites were not accessible. Table 1.8 gives description of sampling station selected for analysis.

Table 1.8. Details of sampling stations

NO OF STATION	NAME OF VILLAGE	DISCRIPTION OF STATION
1	KHARSUNDI	Ruby mills
2	KHARSUNDI	Marutimandir
3	KUMBHIVLI	Hindustan INOX ltd
4	KUMBHIVLI	Panavtha near Vimeet
5	KUMBHIVLI	Vitthalmandir
6	DHAMANI	Hercules hoists limited
7	DHAMANI	Ruby mill ltd
8	SAVROLI	Baba steels
9	SAVROLI	Bhairavnath temple
10	SAVROLI	Garadia steels

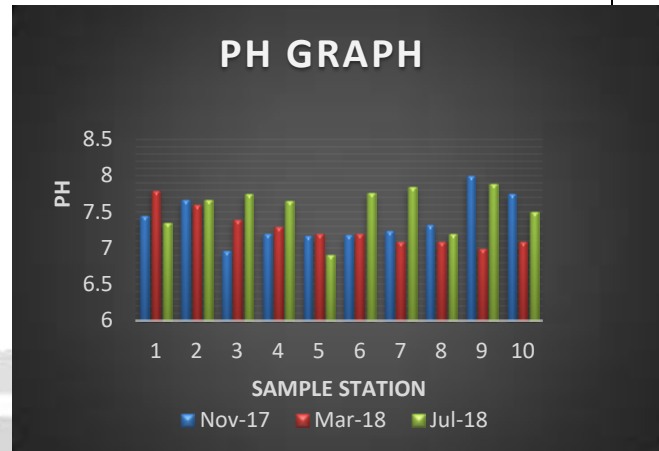
2.3 Frequency of sampling:

According to CPCB sampling should be done once in pre monsoon season and then every month for rest of year. For river monitoring it was advised that after every three months test should be performed. Hence testing of river patalganga was conducted after every three months that is in November 2017, March 2018 and July 2018.

3. RESULTS:

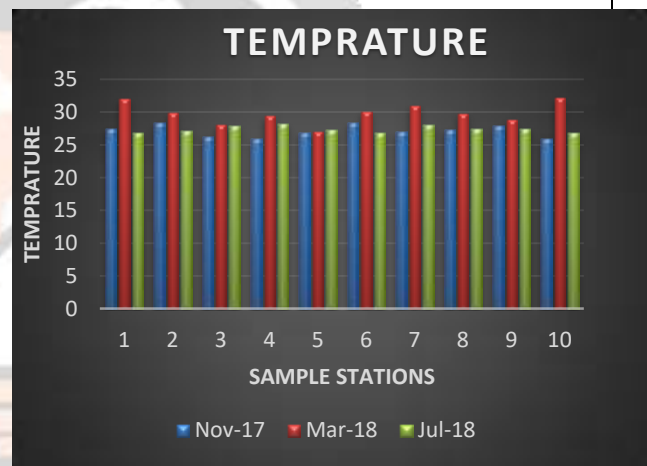
3.1 PH

NO	NOV 2017	MARCH 2018	JULY 2018
1	7.45	7.8	7.36
2	7.67	7.6	7.67
3	7.4	6.97	7.75
4	7.21	7.3	7.65
5	7.17	7.2	6.91
6	7.19	7.2	7.77
7	7.24	7.1	7.85
8	7.33	7.1	7.21
9	8.01	7.0	7.9
10	7.75	7.1	7.51



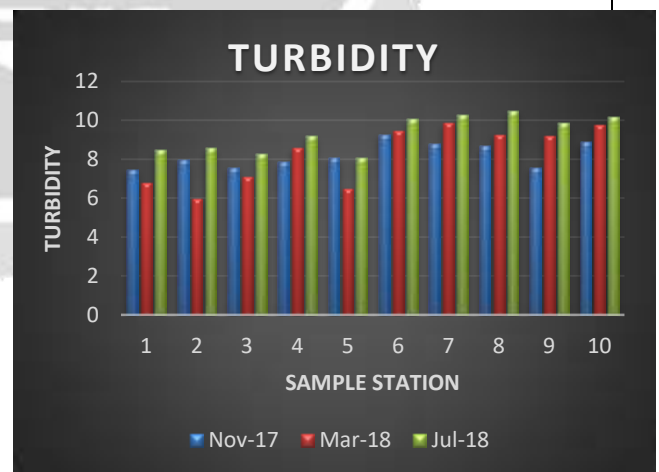
3.2 TEMPERATURE

NO	NOV 2017	MARCH 2018	JULY 2018
1	27.6	32.1	27
2	28.5	30	27.3
3	26.4	28.2	28
4	26	29.5	28.3
5	27	27.1	27.4
6	28.5	30.1	27
7	27.1	31	28.1
8	27.5	29.8	27.6
9	28	29	27.6
10	26	32.3	26.9



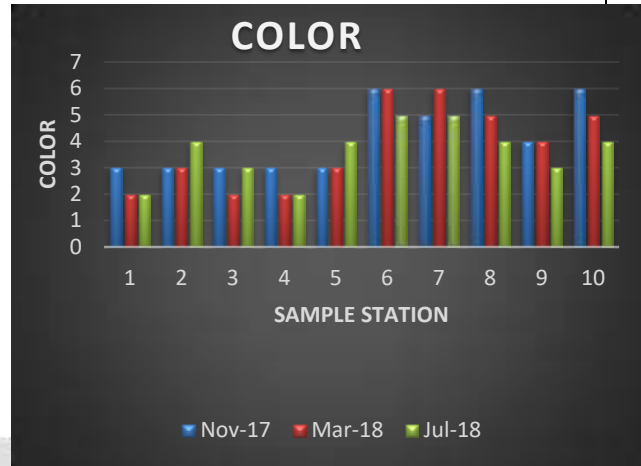
3.3 TURBIDITY

NO	NOV 2017	MAR 2018	JULY 2018
1	7.5	6.8	8.5
2	8	6	8.6
3	7.6	7.1	8.3
4	7.9	8.6	9.2
5	8.1	6.5	8.1
6	9.3	9.5	10.1
7	8.8	9.9	10.3
8	8.7	9.3	10.5
9	7.6	9.2	9.9
10	8.9	9.8	10.2



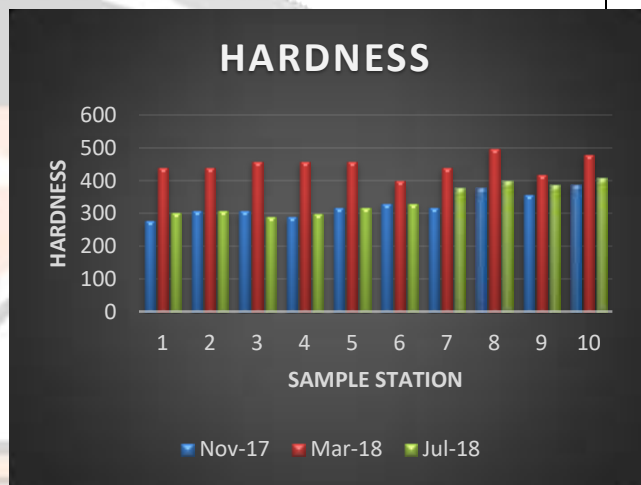
3.4 COLOR

NO	NOV 2017	MARCH 2018	JULY 2018
1	3	2	2
2	3	3	4
3	3	2	3
4	3	2	2
5	3	3	4
6	6	6	5
7	5	6	5
8	6	5	4
9	4	4	3
10	6	5	4



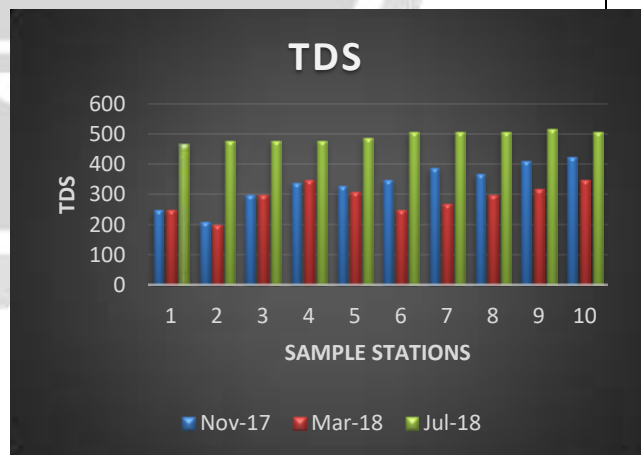
3.5 HARDNESS

NO	NOV 2017	MARCH 2018	JULY 2018
1	250	250	470
2	210	200	480
3	300	300	480
4	340	350	480
5	330	310	490
6	350	250	510
7	390	270	510
8	370	300	510
9	412	320	520
10	425	350	510



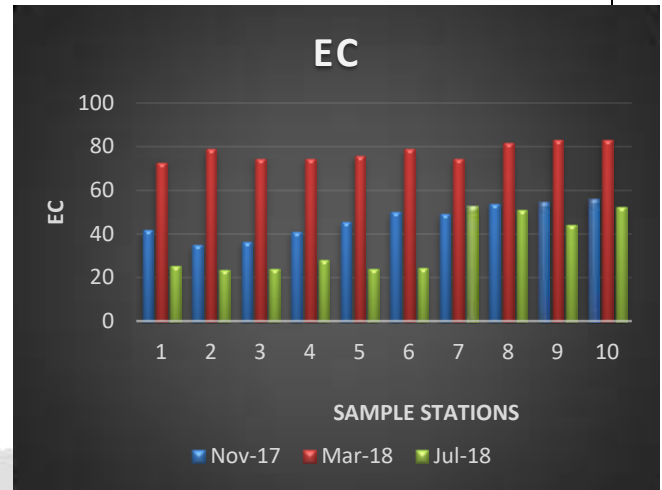
3.6 TDS

NO	NOV 2017	MAR 2018	JULY 2018
1	280	440	305
2	310	440	310
3	310	460	290
4	290	460	300
5	320	460	320
6	330	400	330
7	320	440	380
8	380	500	400
9	360	420	390
10	390	480	410



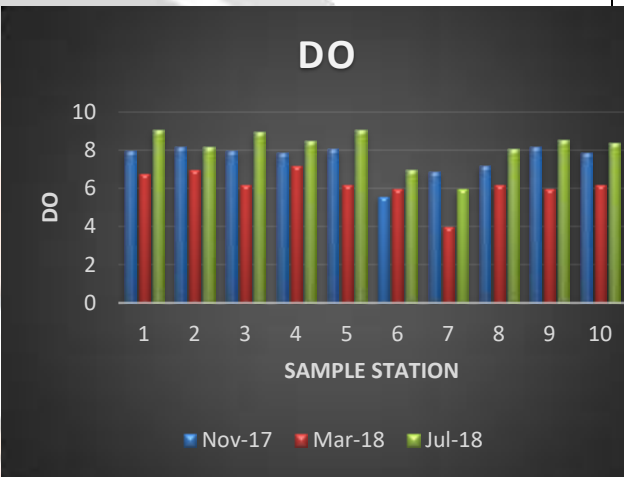
3.7 EC

NO	NOV 2017	MARCH 2018	JULY 2018
1	42.1	73.1	25.7
2	35.2	79.1	23.6
3	36.7	74.6	24.1
4	41.2	74.6	28.6
5	45.6	76.1	24.3
6	50.2	79.1	24.6
7	49.5	74.6	53.2
8	54.3	82	51.2
9	55.1	83.5	44.2
10	56.2	83.5	52.8



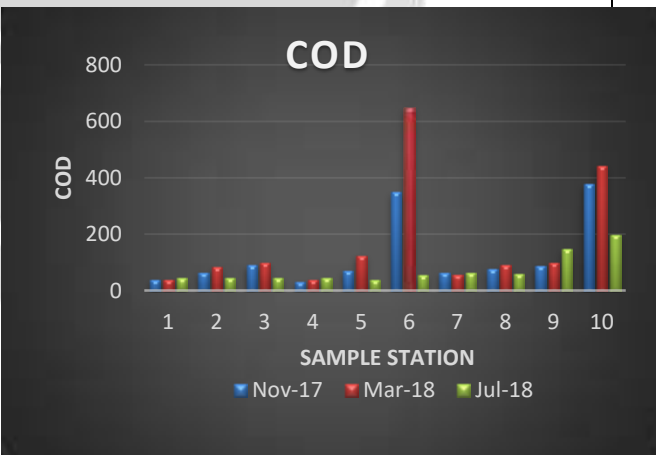
3.8 DO

NO	NOV 2017	MAR 2018	JULY 2018
1	8	6.8	9.1
2	8.2	7	8.2
3	8	6.2	9
4	7.9	7.2	8.5
5	8.1	6.2	9.1
6	5.6	6	7
7	6.9	4.0	6
8	7.2	6.2	8.1
9	8.2	6	8.6
10	7.9	6.2	8.4



3.9 COD

NO	NOV 2017	MAR 2018	JULY 2018
1	41.4	42.2	46
2	66	84.4	48.2
3	92.5	101.3	49
4	34	42.2	49
5	73	126.7	40.1
6	350	650	56.4
7	66	59.1	65
8	79	92.9	61
9	90	101.3	150
10	379	444.7	200



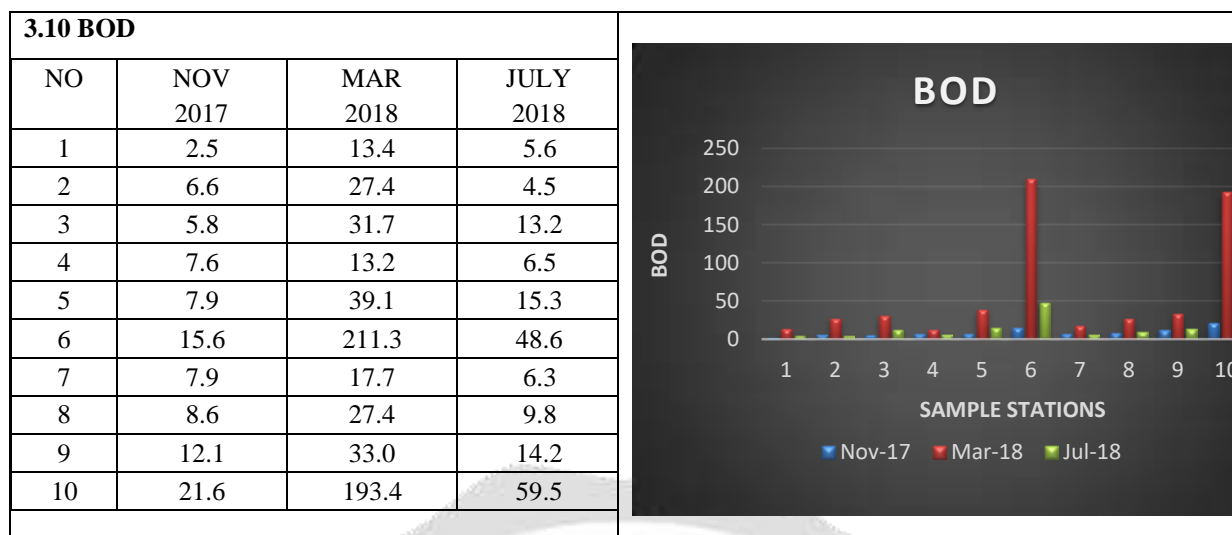


Chart No: 3.1ph, 3.2temperature, 3.3turbidity, 3.4color, 3.5hardness, 3.6TDS, 3.7EC, 3.8DO, 3.9COD and 3.10BOD

4. DISCUSSION

4.1. PH

The highest value of ph is 8.01 which was observed at station nine in winter season. The lowest value was observed in summer season at station three. Values of ph were found within permissible limits. They vary in the range of seven to eight and hardly go above eight or below 7.

4.2. Temperature

Study areas come under kokan region so there is no drastic change in temperature throughout the year highest temperature recorded in summer was 32.3°C. And lowest was 26° which was recorded during winter.

4.3. Turbidity

According to Indian standards allowable turbidity for drinking purpose is 5NTU minimum and 10NTU maximum. In our study there are few stations on which results found were beyond permissible limits. Every reading is crossing the threshold of 5NTU. The highest value was recorded in the month of July at station 8. And lowest value was observed in March at station 2. It is obvious that in monsoon all the water is stirred and flow coming into river brings lot of fine particles. But it was found that station 6 to 10 are more contaminated compared to other probably because of existence of industries in those locations.

4.4. Colour

Minimum permissible limit for drinking of water according to Indian standards is 5 Hazen. There were fluctuations in the results. But station 6 remains contaminated throughout the year. It may be because of presence of hoist manufacturing company and small panavtha is very near to the sampling collection site. Stations 6 to 10 are more contaminated mainly because of presence of dye and steel and other manufacturing industries.

4.5. Hardness

Hardness in winter ranges between 280-390, in summer it is 420-500 and in monsoon it ranges 290-410. Permissible limit according Indian standard is 300 minimum and 600 maximum. All the stations results show that hardness in water is above minimum level. At station eight it is maximum during summer season. This station point is located near steel manufacturing company. Overall this parameter it showing alarming values which may exceed maximum allowable limit very soon.

4.6. TDS

It ranges higher during monsoon (470-510) , in winter TDS ranges between (200-350) and in march it is (200-350). The values remain almost in same range during winter and summer. There is a significant increase in results during rainy season. This could be because of flow in river in monsoon.

4.7. EC

Seasonal variation in electric conductivity ranges as 35.2-56.2 in November, 73.1-83.5 in march and 23.6-53.2 in july. It was found that electric conductivity was high during summer this could be because of sluggish river water flow and discharge from various industries. Highest values were noted at station 9 and 10 which are near the temple and steel manufacturing plant.

4.8. DO

DO was found in range of 5.6-8.2 in winter, 4.0-7.2 in summer and 8.1-9.1 during monsoon. Usually DO four is considered safe for aquatic life. In the given results DO was found well above the minimum permissible level. It shows healthy conditions for aquatic life.

4.9. COD

COD in different seasons ranges between 41.4-379 in November, 42.2-650 in march and 46-200 in july. There are significant fluctuations in the results obtained. Two stations no six and ten are showing alarming results. They are well above the average. Specially station no ten is showing contamination well above average throughout the year. There is steel manufacturing plant outlet present near sample station which could be source of contamination.

4.10. BOD

It indicates biological activities in water. It indicates degree of organic pollutant. According to WHO (2006) permissible limit of BOD in water is 5mg/lit. From the given results it is clear that BOD in this water is very high which shows high concentration of organic pollutant. At station six and ten it is maximum during summer. This could be because of slight rise in temperature.



5. CONCLUSION

Among all the parameters PH Temperature and DO are within permissible limits. Most of the parameters like turbidity; TDS are showing highest of results in monsoon season this could be because of the flow coming from catchment in the rainy season. BOD COD results are alarming during summer it shows the biological activities are at its peak during this season Hardness is high during summer this could be because of sluggish nature of river due to lack of flow. Overall station six to ten are more contaminated many steel and dye manufacturing plants are located near this station which could be the reason for such a poor water quality. In conclusion it can be stated that more effort should be made to understand and analyse biological activities in area especially during summer season.

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BIOGRAPHIES (Not Essential)

<p>Author Photo-1</p> 	<p>Myself Minal R Tikam studying in YTCM college (Mumbai university affiliated). I am in my second year of Masters programme in water resource engineering. I have completed my BE from Mumbai university in year 2014.</p>
<p>Author Photo-2</p> 	<p>Dr. Seema Jagtap: Guide for ME project currently working as HOD in thakur college Kandivli Affiliated to Mumbai university.</p>

