

ASSESSMENT OF FEW IMPACTS OF MASS BATHING ON RIVER WATER QUALITY AT PRAYAG DURING MAHA KUMBHA MELA 2013, ALLAHABAD

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Abstract

The primary aim of this study was to assess few impacts on river water quality of mass gathering and taking a holy dip at Triveni Sangam during Maha Kumbha mela 2013 and to make a comparison of few parameters in the pre-mela period and during the mela days. Mid-stream water samples were collected from five locations (ghats) and were analyzed for a few physico-chemical parameters keeping the designated best use classification of rivers & streams in mind. All the ghats were most polluted on 10th, 11th and 12th of February 2013, as maximum people arrived at Sangam on 10th of February, being the most sacred day of 'Mauni Amavasya'. It was also observed that all parameters were found in low levels at the Saraswati Ghat, which was the least used for bathing by pilgrims and remains least disturbed zone among the sampling sites, whereas almost all parameters were elevated at Main Sangam, the site used most by the pilgrims. Saraswati ghat remained in category 'A' of the Designated Best Use classification before and during the mela days, while all the other ghats remained in category 'D' during the 90% of the times and very often coming into the 'C' category.

Keywords: Mass bathing, Water Quality, Environmental Management, Kumbha Mela, Sanitation

1. INTRODUCTION

In the Hindu cosmic philosophy, number 12 holds a lot of importance, as it signifies completion of a cycle and end of an era. Thus, 12 times 12 means the completion of an entire Karmic cycle and this is why a Maha Kumbha is held after the completion of 12 Purna Kumbhs at Prayag (i.e.) after every 144 years [1].

Allahabad, earlier called 'Sangam' is considered most significant among the four places where the nectar spilled during the 'Amrit Manthan' and hence Kumbha is held, with Nasik, Haridwar and Ujjain being the other three. At the ghats of Yamuna, 'Akshay Vat' is there where Shri Ram rested for three days during their vanvaas. The confluence of three rivers, Ganga, Yamuna and Sarasvati (became underground) makes the sangam all the more special and earns the name 'Triveni'.

More than 12 crore pilgrims and visitors took a holy dip during the 55 days of Maha Kumbh mela, which was by far the highest in Allahabad [2]. This was only the second Maha Kumbha of this century and probably the only one we would have witnessed. This heavy gathering is very rightly perceived to bring the water quality down.

The whole sangam area, which covered around 1936.56 hectares, was divided into 14 sectors and given all jurisdiction as that of a district. The maintenance and other arrangements for such a huge gathering is a very tough task and the authorities involved had few tough times as well

during the mela period because of a number of mis-happenings, the biggest was the Railway station stampede, happened on 10th of February 2013, where as many as 36 people died [3].

The organic matter increases in such cases of mass bathing [4] as the flowers, milk, ghee is being offered during many sacred practices. Bathing also add the body hairs etc. to the river water which in turn provided food to bacteria and hence BOD increases [5]. Studies on water quality during Maha Kumbha at Haridwar also indicated poor river water quality and showed the skewed values of various parameters during the mela [6].

It is believed that a dip in "Holy River" washes away all the sins. Consider it faith, people bath in holy rivers at some special occasions like as Deepawali, Amavasya, Purnima, Ganaga Dashara, Makar Sankranti, etc. Such mass bathing poses a great threat to river health with respect to water pollution in general [7]. Although the same people taking a dip, pollutes the river in first place, by washing their clothes, defecating in the upstream etc.

Hence, a suitable analysis was carried out to assess the impact on water quality of such a huge gathering on river water quality in Allahabad.

2. SCENARIOS DURING MELA

The various scenarios and schedule of the Maha Kumbha mela are discussed below.

2.1 Rituals Performed

During the mela period Yogis, saints, sadhus, and pilgrims from all over the world gather at one place. This huge gathering is beneficial in so many ways and the rituals performed during the auspicious mela signifies the importance. Mental peace is achieved through the holy dip, listening to the various spiritual lessons by different saints, religious discussions, listening to devotional singings. A very peaceful and soothing time is during the Ganga Arti, which gives a special feeling of belongingness towards our culture and heritage.

2.2 Akharas, Peshwai and Shahi Snan

Various Akharas gathered at the sangam from even the remotest of the places and made the auspicious occasion even more special. The list of various Akharas is given below:

Akharas of Sanyasees:

1. Shri Taponidhi Niranjani Akhara Panchayati
2. Shri Panchayati Anand Akhara
3. Shri Panchdashnam Juna Akhara
4. Shri Panch Ahvan Akhara
5. Shri Agni Akhara
6. Shri Panchayat Akhara Mahanirvani
7. Shri Panch Atal Akhara

Akharas of Bajrangi

1. Shri Nirvani Akhara
2. Shri Digambar Akhara
3. Shri Nimrohi Akhara

Akharas of Nirmal

1. Shri Panchayati Akhara
2. Shri Udasin Panchayati Naya Akhara
3. Shri Nirmal Panchayati Akhara

2.3 Shahi Peshwai at kumbha

Saints of different Akharas are allotted a time schedule during which they proceed to their camps on vehicles, horses, elephants, and chariots. This is called Peshwai and is often confused with Shahi Snan.

2.4 Shahi Snan

Saints of all the akharas, in their given time schedule, proceed towards the sangam with all their companions and Bands etc. for the holy dip. They have the first right to take the dip. People gather to see them and seek their blessings in form of flowers thrown by the sages and their companions.

2.5 Schedule of Maha Kumbha 2013

The main bathing dates were as follows [8]:

Table 1: Main bathing dates

S. No.	Occasion	Date	Crowd (in Lakhs)	Remarks
1	Makar Sankranti	14.1.13	110	Shahi Snan
2	Paush Purnima	27.1.13	55	--
3	Mauni Amavasya	10.2.13	305	Shahi Snan
4	Basant Panchami	15.2.13	193	Shahi Snan
5	Maghi Purnima	25.2.13	165	--
6	Maha Shivaratri	10.3.13	55	--

3. MATERIALS AND METHODS

In this study, a comparative study of various physical water quality parameters was done during pre mela and during the mela dates. The parameters were chosen keeping the designated-best-use for fresh and saline waters in mind.

Central Pollution Control Board (CPCB), India, gave the definition of Designated Best Use (DBU) of streams. They felt a problem while preparing a use-map of rivers and found if a stretch of river has more than one use it might get difficult to prepare the use map. Five categories were defined according to the best possible use from A to E. The classification has been made in such a way that the water quality requirement becomes lower as one progresses from A to E. Besides, the water quality of any one of the five categories also satisfies the requirements of categories lower than the chosen one [9]. These criteria are summarized in Table-2 [10].

The parameters which were chosen accordingly were, Color measure in Hazen, pH, Dissolved Oxygen (DO) measured in mg/L & Biochemical Oxygen Demand (BOD) measured in mg/L. DO was fixed on the site itself and 5 day BOD tests were performed in the lab using the methods described by American Public Health Association [11]. Earlier it was planned to estimate the bacterial count as well and perform the Most Probable Number (MPN) test on the samples, but due to limited availability of resources and lab facilities there, it was decided to go ahead without the MPN test.

Table 2: Designated Best Use Classification of Streams

S. No.	Designated best use	Primary Quality Criteria	Quality Class
1	Drinking water source without conventional treatment but after disinfection	6.5-8.5 (pH); 6 or more (DO); 2 or less (BOD);	A
2	Outdoor bathing (organized)	6.5-8.5 (pH); 5 or more (DO); 3 or less (BOD);	B

3	Drinking water with conventional treatment followed by disinfections	6.5-8.5 (pH); 4 or more (DO); 3 or less (BOD);	C
4	Propagation of wild life, fisheries	6.5-8.5 (pH); 4 or more (DO); NA (BOD);	D
5	Irrigation, industrial cooling, controlled wastewater disposal	6.0-8.5 (pH); NA (DO); NA (BOD);	E
NA : Not Applicable			

The five chosen ghats for sample collection were, Rasoolabad Ghat (U/S Ganga), D/S Shastri bridge (D/S Salori Nala) Ganga, Main Sangam, Saraswati Ghat (Yamuna River), Mawaiya ghat (D/s Sangam). The sampling & analysis work was started from 15th of December 2012 and continued until 11th of March 2013 i.e. the end of the Maha Kumbha mela. All the samples were collected from the middle of the stream using a boat.

4. RESULTS

The comparison of individual parameters for all the ghats have been done for pre-mela duration and during the mela days. Fig. 1-4 shows the variation in Color, pH, DO & BOD respectively.

Additionally, Table 3 shows the values of all the parameters for all the ghats is prepared to show the variations, on main bathing dates (Table 1).

Also, a summary of the results is given below:

Color: Color for pre-mela duration ranged from 10 Hazen to 20 Hazen for all the ghats, with the average value being 10 Hazen most of time with 25 Hazen on 19 December 2014 at U/s Ganga and D/s Shastri Bridge. During the mela period, color was more or less same and the average values mostly remained 15 Hazen.

pH: Values for pH ranged from 8.1 to 8.46 with an average of 8.26 during the pre-mela period and the corresponding figures for the mela duration were, 8.08 to 8.52 with an average of 8.33. The maximum value for pH (8.56) was found at Main Sangam on 10th of February, which is attributed the biggest crowd of Mauni Amavasya

DO: For the pre-mela period, DO ranged from 7.4 mg/L to 10.8 mg/L and correspondingly from 7.3 mg/L to 11.1 mg/L during the mela. Again the DO was maximum just after the Mauni Amavasya (12.02.2013) at Rasoolabad ghat.

BOD: During pre-mela period values for BOD ranged from 1.8 mg/L to 6.4 mg/L and during the mela, it ranged from 1.5 mg/L to 8.5 mg/L. As expected the date on which maximum value of BOD was recorded was 10th of Feb (Mauni Amavasya).

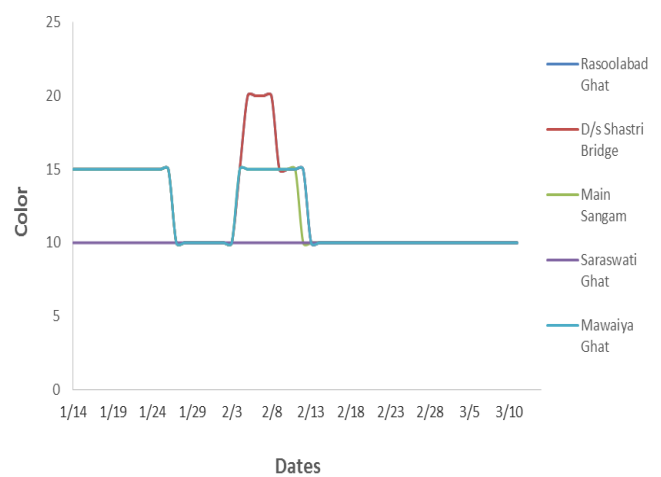
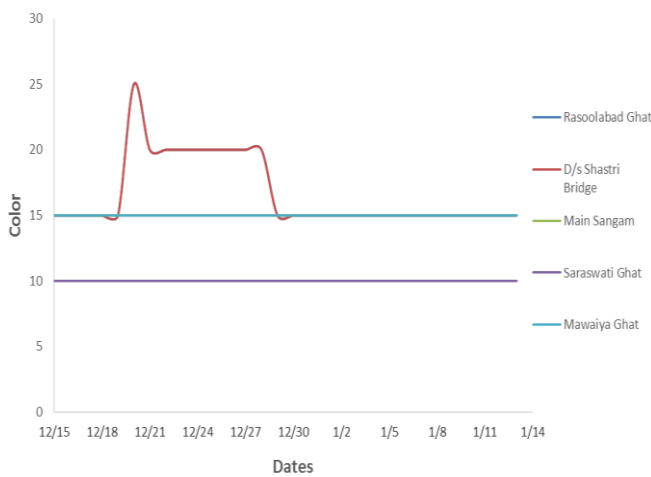


Fig 1: Variation of ‘Color’ at all the ghats (a) Pre-mela duration, and (b) During the mela

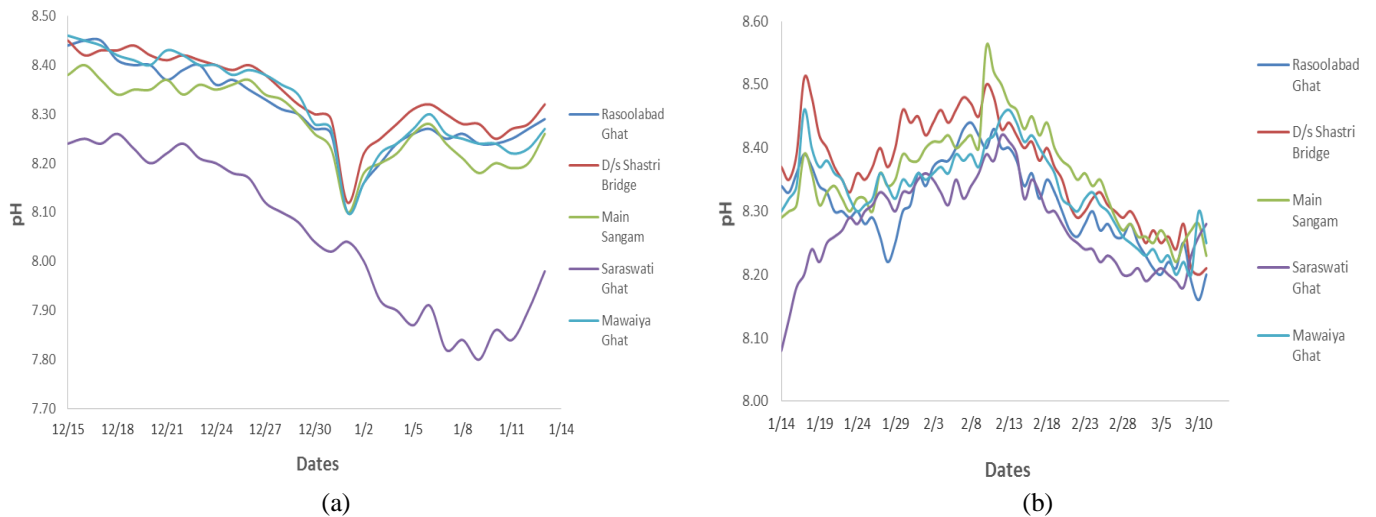


Fig 2: Variation of ‘pH’ at all the ghats (a) Pre-mela duration, and (b) During the mela

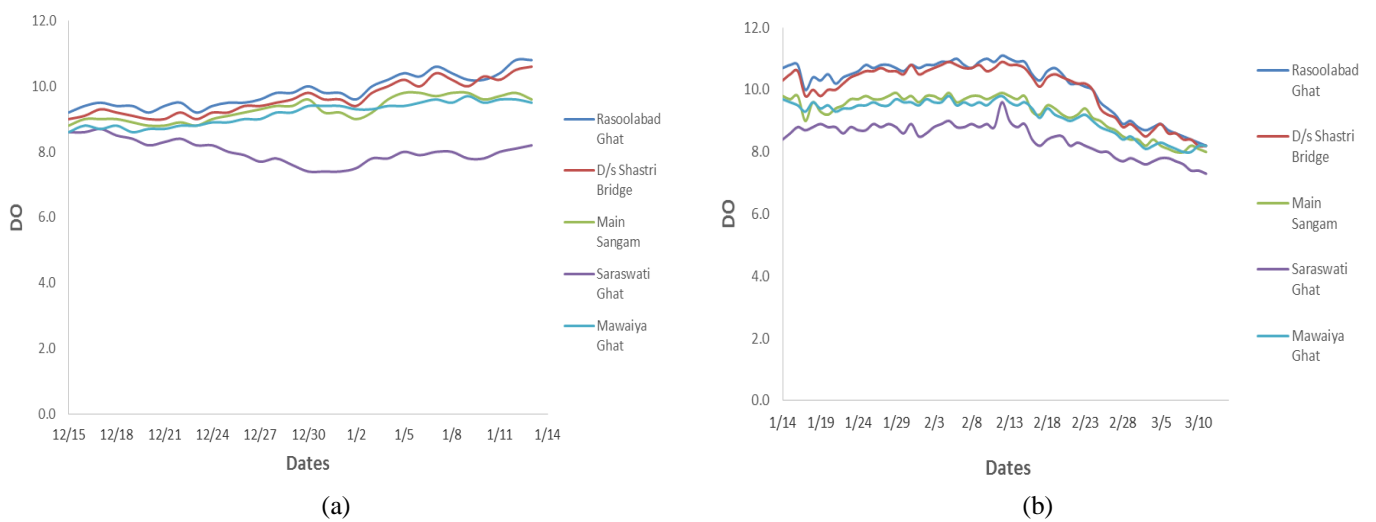


Fig 3: Variation of ‘DO’ at all the ghats (a) Pre-mela duration, and (b) During the mela



Fig 4: Variation of ‘BOD’ at all the ghats (a) Pre-mela duration, and (b) During the mela

Table 3: Sampling location wise Variation of all the parameters on main bathing dates

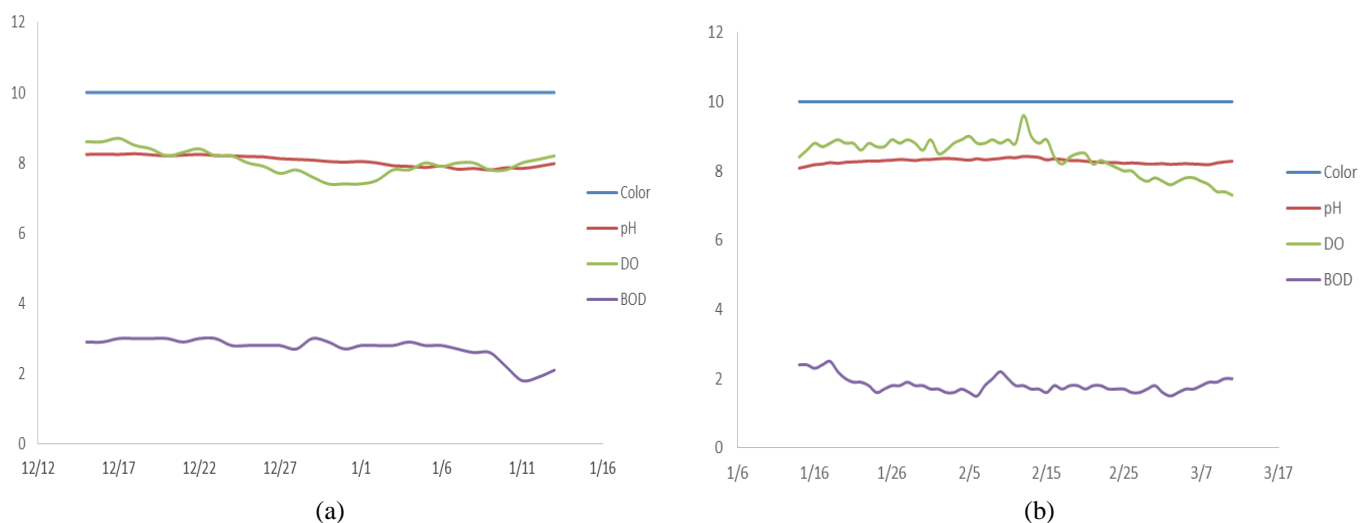
Sampling Site	Parameters	14-Jan-13	27-Jan-13	10-Feb-13	15-Feb-13	25-Feb-13	10-Mar-13
Rasoolabad Ghat	Color	15	10	15	10	10	10
	pH	8.34	8.26	8.40	8.34	8.27	8.16
	DO	10.7	10.8	11.0	10.9	9.6	8.3
	BOD	5.6	4.4	5.0	4.5	4.2	3.0
D/S Shastri bridge	Color	15	10	15	10	10	10
	pH	8.37	8.40	8.50	8.40	8.33	8.20
	DO	10.3	10.7	10.6	10.7	9.4	8.2
	BOD	7.0	5.1	6.8	5.8	5.3	3.4
Main Sangam	Color	15	10	15	10	10	10
	pH	8.29	8.36	8.56	8.43	8.35	8.28
	DO	9.8	9.7	9.7	9.8	9.0	8.1
	BOD	7.4	5.3	8.5	7.8	6.0	3.3
Saraswati Ghat	Color	10	10	10	10	10	10
	pH	8.08	8.33	8.39	8.32	8.22	8.26
	DO	8.4	8.8	8.9	8.9	8.0	7.4
	BOD	2.4	1.8	2.0	1.6	1.7	2.0
Mawaiya Ghat	Color	15	10	15	10	10	10
	pH	8.30	8.36	8.41	8.41	8.31	8.30
	DO	9.7	9.5	9.5	9.6	8.8	8.2
	BOD	6.0	4.8	6.0	5.4	5.0	3.1

5. DISCUSSION

It is clear from the graphs shown in Fig. 1-4, that the least polluted site was Saraswati Ghat, whether during the mela or in the pre-mela duration. This is due to the fact that it was situated on Yamuna River and it was the least used ghat for all the rituals. Also, the mostly polluted site was Main Sangam but only during the mela dates. This was because of the fact that this was the most used ghat for bathing and all the other rituals. But, during the pre-mela period the D/s Shastri bridge ghat was the most polluted site closely followed by Rasoolabad ghat. This fact is supported by the fact that the

discharge from Salori nala seeps into the river Ganga at D/s of Shastri Bridge. Although, all the drains were ordered to be tapped for the mela period and hence, this site didn't show elevated pollution levels during the mela period.

Hence, the difference between pollution levels of these three sites viz. Saraswati ghat (least polluted site), Main Sangam (most polluted site during the mela period), and D/s Shastri Bridge (most polluted site in pre-mela period) in the mela duration and the pre-mela duration are shown in Fig. 5-7.

**Fig 5:** Variation of all the parameters at Saraswati ghat in (a) Pre-mela period, and (b) During the mela period

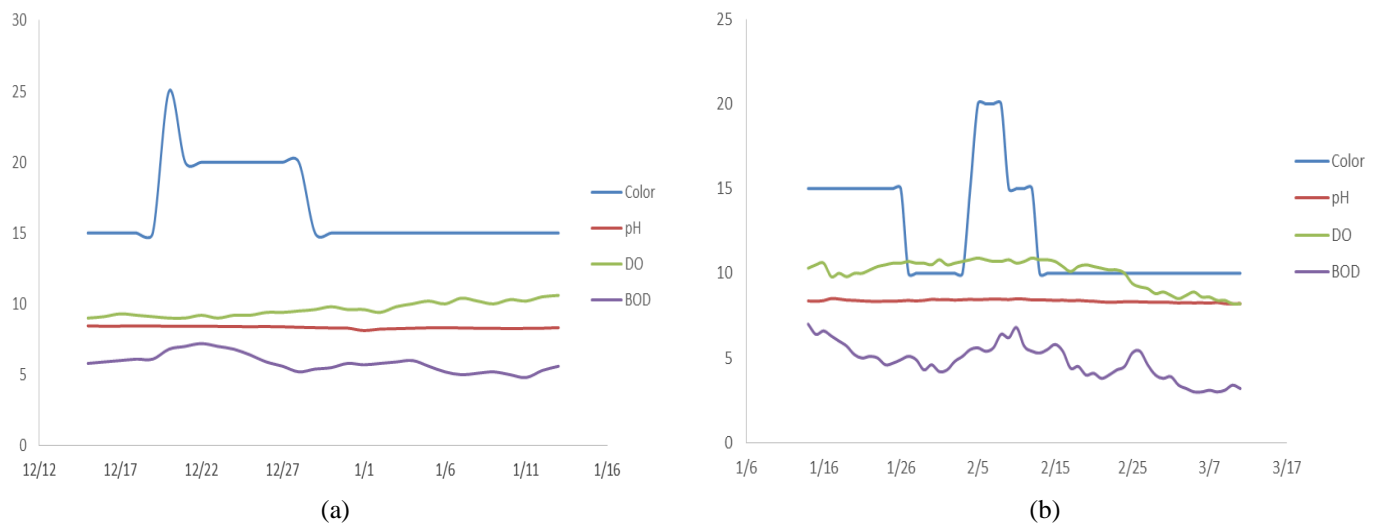


Fig 6: Variation of all the parameters at D/s Shastri Bridge in (a) Pre-mela period, and (b) During the mela period

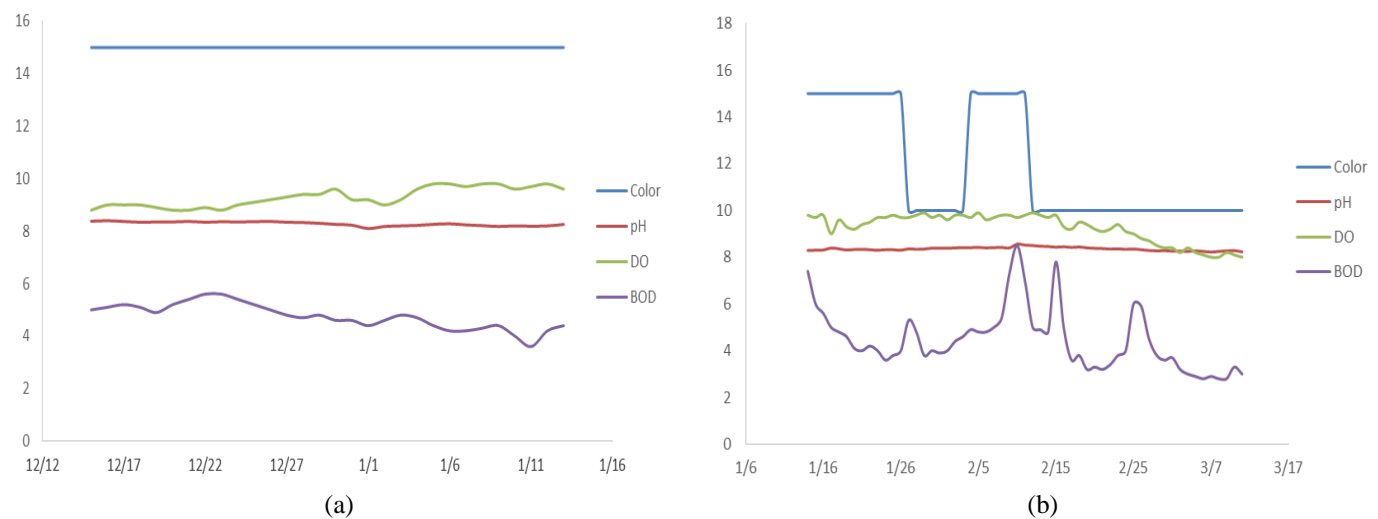


Fig 7: Variation of all the parameters at Main Sangam in (a) Pre-mela period, and (b) During the mela period

Table 3 signifies that the river was most polluted mostly at all the sites on 10th of Feb, which was the day when maximum number of people were there at the Sangam (Table 1). Similarly on 10th of March the pollution levels are at the lowest as most of the pilgrims were gone by then.

Water at Saraswati ghat in the pre-mela duration was of ‘B’ category according to the DBU, but as the date of mela arrived the category raised to ‘A’ as river water was diluted by the water left from Tehri. Surprisingly though, the BOD values reduced during the mela days, and the category mainly remained in ‘A’ class.

Whether it was before the mela (pre-mela duration) or during the mela days, all the other ghats remained in the ‘D’ category of DBU mostly (almost 90% of the time) with often belonging to ‘C’ category at best.

6. CONCLUSION

It can be said that the water quality at all the ghats except for Saraswati ghat was very poor, and it can only be attributed towards the ill practices of the pilgrims taking holy dip. People staying in the mela as ‘Kalpvaas’ mostly defecated in open, washed their clothes in the river, all these factors contributed towards the river pollution.

Better management of resources and provision of basic facilities although, could minimize the elevated levels of water pollution.

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BIOGRAPHIES



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