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RESEARCH ARTICLE OPEN ACCESS

Study On Silt Load On Some Of The Major Tributaries Of River Brahmaputra In Upper Assam

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ABTRACT
The river Brahmaputra and some of its tributaries like the Subansiri, Jia Bharali has are exceedingly high-water yield, surpassing most of the world's major rivers. The major factors responsible for the high rates of unit discharge are high monsoon rainfall in the upper catchments and their steep gradients which in turn help generate the high sediment yield from the basin and contribute significantly towards causing drainage congestion in the valley. So, this study aimed to find out tributaries in upper Assam region which is contributing more sediments to the river Brahmaputra and to suggest remedial measures for minimizing the sediment load of that contributing tributaries and the zone where the concentration of sediment is high. The observed data can be used to suggest fruitful approach for desiltation of river Brahmaputra and its certain tributaries.

Keywords: Sediment, Brahmaputra River, Tributaries , Silt load, Upper Assam

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I. INTRODUCTION

River Brahmaputra, which is also called as a moving ocean is geologically new among the major rivers in the world. In Himalayan region, the river Brahmaputra, in the early stage flows 2880 km between Tibet and India and in the end, it unite with the sea in Bangladesh by creating a huge tree like structure. The river has different width at different locations of India. It has been seen that it has surprisingly wide at some of the location. In Assam at Dibrugarh the river has 16 km width, in Pandu it has 1.2 km width which belongs to middle of Assam and in end point in Assam it has 18km width. Generally, the river Brahmaputra is a glacier fed river, which carries the world first position in sediment yield 852.4 t/km^2/y and it has second highest water yield at delta, beside Amazon. (SK Lahiri et al,2012). Brahmaputra performs alike a effectual channel to convey a huge amount of sediment from the source to its end of its journey. It has found that average yearly discharge was 21200 m^3/s at Bangladesh (Latrubuse,2008).

Origin of Brahmaputra begins in the Chemayungdung mountain ranges which approximately 66 miles south-east of Mansarovar lake in the Mount Kailash range in Southern Tibet at an elevation of 5300m. Tsanpo river is called the largest river in the world which originated from a spring namely Tamchok Khambab after it spills from the glaciers which by gaining breath and volume. The river Brahmaputra in Arunachal Pradesh is known by its name called Siang. It is 294.5 km long in Arunachal Pradesh. Siang set foot in the place near Gelling and ends in the junction of river Dibang and river Lohit. In Arunachal Pradesh it has 14965 sq.m catchment area in its entire course and has an elevation of 90m to 5800m approximately. The River Siang joins two chief tributaries of Brahmaputra in the location called Kobo, which is in western side of Sadiya. These two chief tributaries are Dibang and Lohit. From this junction of the three rivers, it is recognized as Brahmaputra till up to Dhubri, Assam. It has a total length of 918km in Assam.

II. STUDY AREA:

Sites from the upper Assam region are taken into consideration and samples were collected from different locations on river Brahmaputra and some of its tributaries at different depth.

The sample sources are -

- Kolong River at Raha.
- Kopili River at Nagaon.
- At Tezpur KaliaBhumura, Brahmaputra River
- Kolong at Nagaon town
- Dhansiri River at Jamuguri,Udalguri
- Gabhoru River at Sonitpur
- Pachmai River at Orang Wild life Sanctuary

III. METHODOLOGY:

Depth integrating sampler technique is used to obtain a sample that accounts for different sediment concentrations throughout the vertical profile of the point that we had considered. Sampler has a water inlet nozzle and an air outlet. As the water and suspended sediment enter, air is displaced through the air outlet. Sampler has a metal body that encloses a metal cylinder for retaining the sample. A shutter is there at the mouth of the cylinder. In the point, depth integrating sampler was lowered to the river at required depth, then the shutter is open with the help of switch given at the top of the handle. The objective is to fill the sampler at the depth, so the shutter was kept closed till we get the depth required. Then we again closed the shutter of the container and taken out of the river. We stored the sample in plastic container so that it doesn't react with metal. Thus, in these way samples were collected paying particular attention to the decreases the risk of contamination.

The sample analysis was performed using the filtration method and the sieve analysis method. Through this, the concentration/grain size distribution of the suspended load was examined..

IV. DATA COLLECTION

Samples have been taken in two batches. First is taken in the month of November' 2019 during lean period and second one is taken in the month of July 2020'.

Table 1.Concentration at different location in month of November 2019

Sl. No.	Location	Date	Latitude longitude	Depth below water level (m)	Concentration (mg/l)
1	Kolong, Raha	29.11.2019	26.227135 92.511777	0	298
2	Kolong, Raha			0.5	330
3	Kolong, Raha			1.0	370
4	Kopili	29.11.2019	26.165717 92.353374	0	104
5	Kopili			0.5	88
6	Kopili			1.0	**8**
7	Brahmaputra, Tezpur	29.11.2019	26.587988 92.862347	0	98
8	Brahmaputra, Tezpur	29.11.2019		2.0	88
9	Brahmaputra, Tezpur			3.0	54
10	Pachmai	29.111.2019	26.702387 92.338635	0	282
11	Pachmai			0.5	**394**
12	Dhansiri	29.11.2019	26.696457 92.255286	0	250
13	Dhansiri			0.5	248
14	Gabhoru	29.11.2019	26.734828 92.631563	0	**8**
15	Gabhoru			0.5	80
16	Kolong (at Nagoan town)	29.11.2019	26.350522 92.681071	0	60
17	Kolong (at Nagoan town)			0.5	68

Table 2.Concentration at different location in month of July 2020

Sl. No.	Location	Date	Latitude, Longitude	Depth below water level (m)	Concentration (mg/lt)
1	Kolong	JULY-20	26.227135, 92.511777	0	480
2	Kolong			-0.5	572
3	Kolong			-1	618
4	Kopili	JULY-20	26.165717, 92.353374	0	402
5	Kopili			-0.5	486
6	Kopili			-1	490
7	Brahmaputra (at Tezpur)	JULY-20	26.587988, 92.862347	0	628
8	Brahmaputra (at Tezpur)			-0.5	664
9	Brahmaputra (at Tezpur)			-1	698
10	Pachmai	JULY-20	26.702387, 92.338635	0	338
11	Pachmai			-0.5	368
12	Pachmai			-1	356
13	Dhansiri	JULY-20	26.696457, 92.255286	0	526
14	Dhansiri			-0.5	620
15	Dhansiri			-1	674
16	Gabhoru	JULY-20	26.734828, 92.631563	0	536
17	Gabhoru			-0.5	578
18	Gabhoru			-1	612
19	Kolong (at Nagoan town)	JULY-20	26.350522, 92.681071	0	352
20	Kolong (at Nagoan town)			-0.5	606

V. RESULT AND ANALYSIS:

These are the Concentration vs Depth graph comparing both the season:

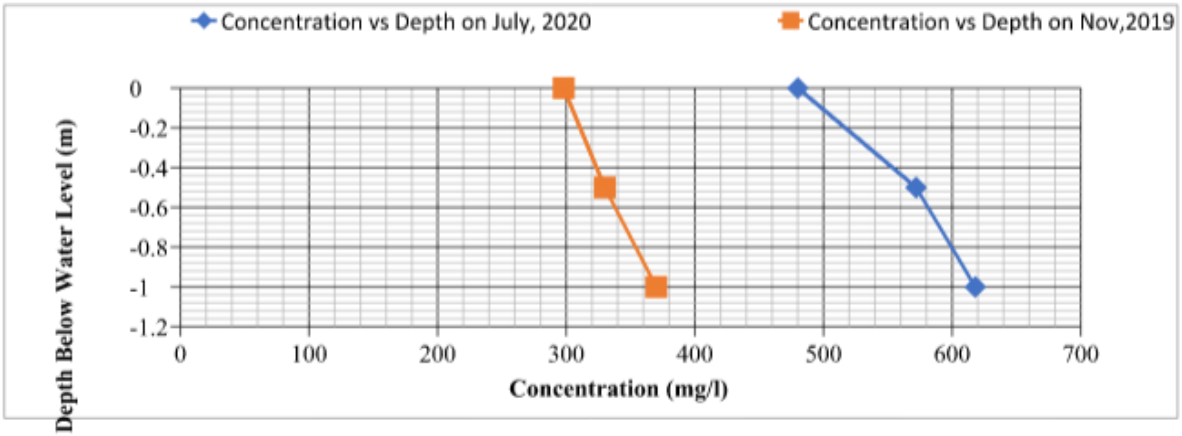

FIG. 1: At river Kolong, Site-Raha

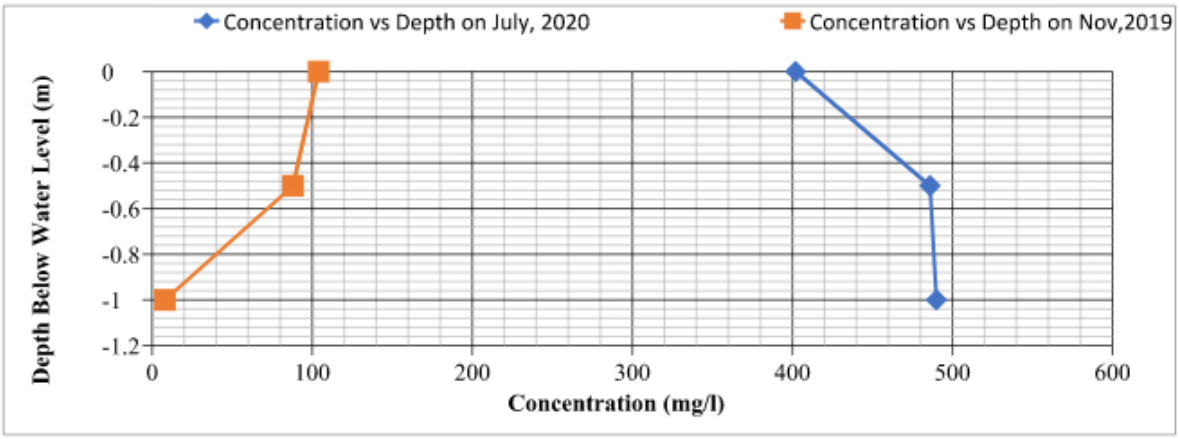

FIG 2: At river Kopili

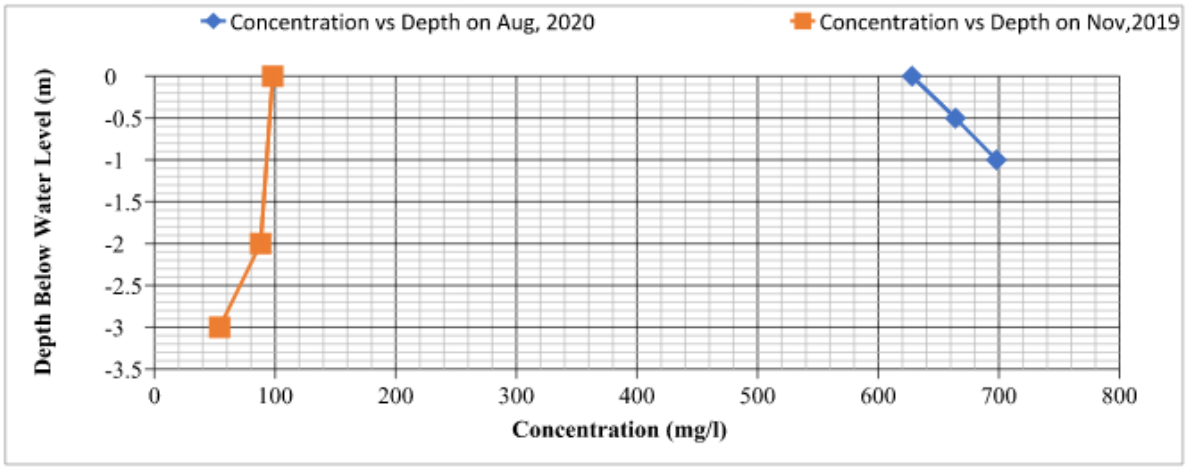

FIG 3: At river Brahmaputra, Tezpur

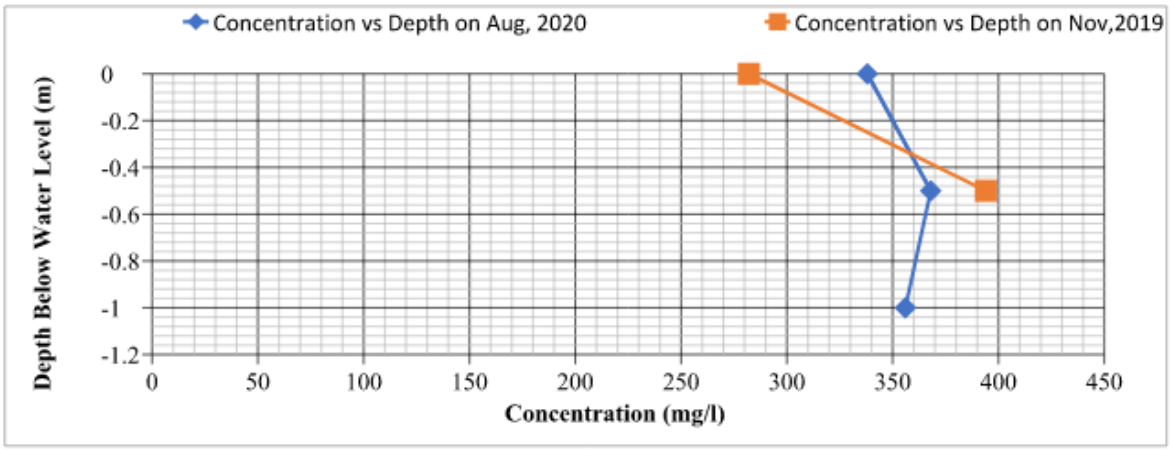

FIG 4: At river Pachmai

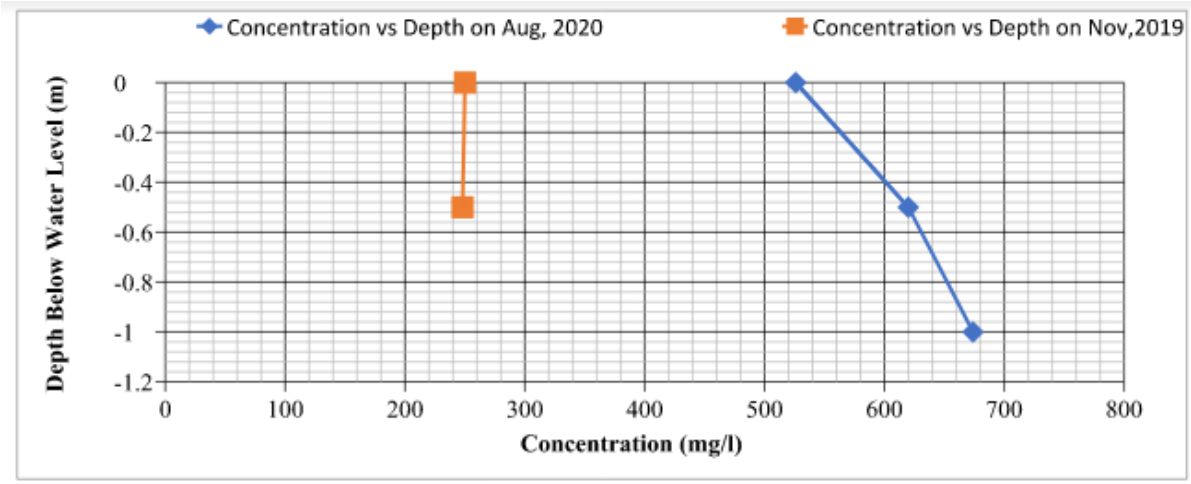

FIG 5: At river Dhansiri

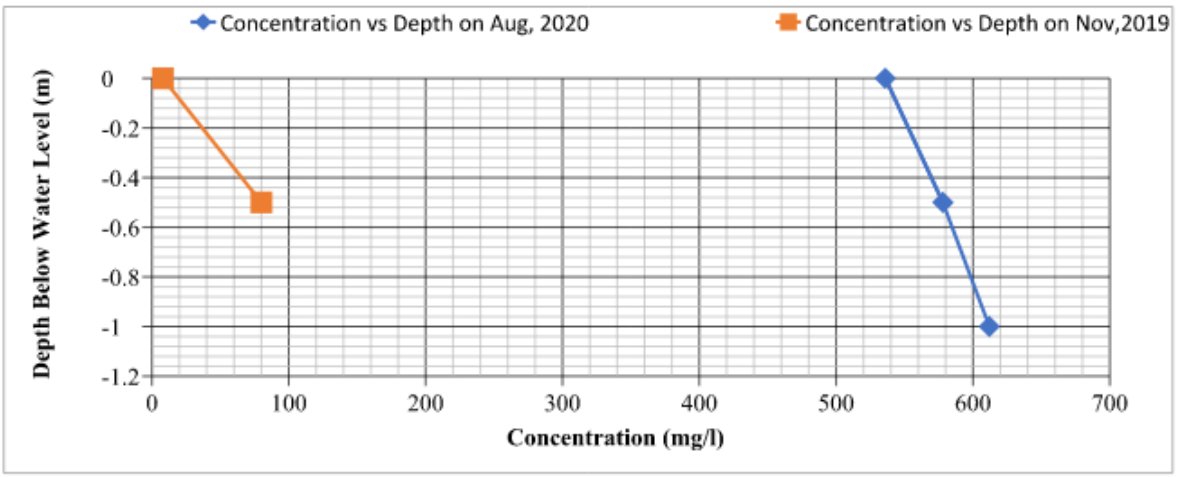

FIG 6: At river Gabhoru

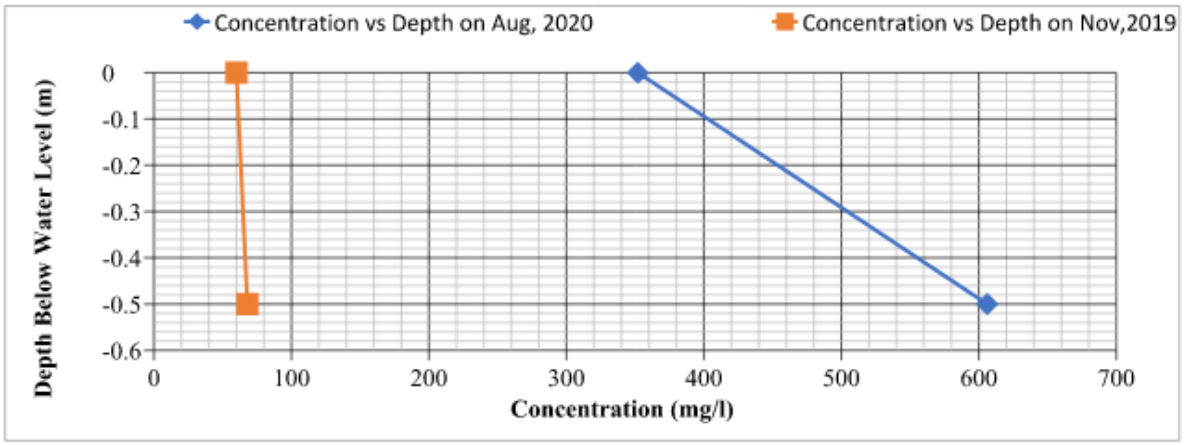

FIG 7: At river Kolong, Site-Nagaon town

VI. OBSERVATIONS:

Water samples being collected in 8 locations, one each in 7 tributaries and one number at river Brahmaputra at Tezpur. Samples were collected during the lean period November 2019 and July 2020. From the observations and analysis of sediment concentration at different level for the tributaries the following conclusions can be drawn:

- It has been observed that sediment concentration level is relatively very less in lean period i.e., in november'2019. However, there is huge change in the scenario during peak period i.e., July 2020.
- In lean period, out of all 8 locations, the highest sediment concentration observed at river Pachmai**,** site-Orang wildlife sanctuary (394 mg/l) and lowest sediment concentration was found in Gabhoru river (8mg/l) at Sonitpur, Assam and Kopili river (8 mg/l) at Raha on 29.11.2019.
- Sediment concentration increases with depth in both the periods at following sites-
  a. River Kolong, Site-Raha (Ref: fig 1)
  b. River Kolong, Site-Nagaon (Ref: fig 7)
  c. River Gabhoru, Site-Sonitpur. (Ref: fig 6)
- Variation of sediment concentration with depth cannot be generalized for the following sites-
- River Kopili. (Ref: fig 2)
- River Brahmaputra at Tezpur. (Ref: fig 3)
- River Pachmai at Orang Wild life Sanctuary (Ref: fig 4)
- River Dhansiri (Ref: fig 5)
- In peak period, the maximum sediment concentration at Tezpur site of river Brahmaputra was observed as 698 mg/l dated 01.07.2020.
- Among the tributaries, the highest sediment concentration during peak period was observed in Dhansiri river (674 mg/l).

It was observed that sediment concentration during peak period is quite high. This is all because the suspended sediment come mostly from resuspension of bed sediments and bank erosion during peak flow in the river Brahmaputra. (Datta et al. 1999).

VII. RECOMMENDATIONS:

Considering the huge sediment concentration in all the tributaries, the process of channel improvement of river Brahmaputra by dredging may not yield a good result. Also, it can be suggest to consider some silt control measures at upstream of each tributaries and river Brahmaputra. Although some erosion. control measures has taken by Govt. of Assam but their efficacy is not very high.

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