My Recent Trip to India – Summary Efforts on Rivers and Water Resources

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- After landing in Delhi on January 5th, little after midnight of 4th, I spent a couple hours at the international airport and then took a domestic flight from New Delhi to Guwahati (Northeastern India). The unique feature of the early AM flight is the opportunity to see some of the tallest peaks of the Himalayan Mountain including the Everest and on a clear morning. I was lucky to have a clear morning while flying close to the Everest and Annapurna Peaks and captured the Everest as shown on the right.

- In Guwahati, Assam I met with, Gautam Lahkar, our local coordinator for the Rivers of the World (ROW) and discussed this year's plans and program there. The ROW team conduct annual river bank cleanup and awareness program for the Brahmaputra River, the longest and most turbulent river in north east India, which flows through Guwahati. Later than day I went to Shillong by car, a 3.5-hr. ride, for attending the engagement ceremony of my niece there.

ROW team on the bank of the Brahmaputra River

- Bhubaneswar - In Bhubaneswar, state of Odisha, ROW is working with the SOA University to provide training to students and faculty members in water, environment, and renewable energy. We provided the training to 41 participants on January 12-13th there at the SOA University campus. Went to visit the Daya River on the east and south side of Bhubaneswar.

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Daya River near Bhubaneswar, Odisha (January 14, 2018)

- Went to Delhi next on January 14th, where Jeff Huntington and Julia Gibbs from Annapolis arrived a couple days earlier and then joined me to go to Rishikesh and farther in Uttarakhand by car. Jeff formed a non-profit organization, future history now in Annapolis and has done a number of Murals there involving local communities.
- In Rishikesh – we had a discussion with 140 Students and 10 teachers at the DSB School auditorium fortifying their interest in water testing and monitoring by the students. The reverberating "we will do it" slogan by the students was awe-inspiring.


Picture above at the DSB School auditorium in Rishikesh with students and teachers from a few local schools.

- Ghansali, Himalayan English School was our next destination, a 4.5-hr. ride from Rishikesh through the hilly roads. After a great welcome by the students and teachers, Jeff Huntington started to look for suitable walls to do the mural with the School students, while me and Sucharit Dutta, our ROW coordinator, discussed with the water testing group for their plans and programs for this year. Jeff located a great spot and a suggested a Mural based upon a picture that I provided to him earlier. The School Founder, Mr. Sudhir Nautiyal liked the picture and the spot and we all supported the location to go forward for Jeff to start. Leaving Sucharit, Jeff and Julia there for the

Mural, Mr. Nautiyal and I came back to Rishikesh that night for looking at some cleanup option for the Ganges River near Haridwar, Uttarakhand. We had the updates on the Mural the following days, and it was an amazing Mural that the Students at HES, Jeff, and Julia created in 3 days as shown below.

- Haridwar and Balawali – visited on January 19th and 20th to look at a small section of the Ganges for possible remediation of a small sector of the Ganges River. The engineers from the Haridwar cooperated well to show their operating system, a 27 million litres/day wastewater treatment plant. The plant was operating well. Went to test the water quality of the Ganges River at Balawali, another remote area (Uttarakhand/UP border) next day. Walked to a "Shashan Ghat" or cremating ground unknowingly and came across a big group of people who came there for cremating someone. They were very friendly and helped me with water sampling. I was quite impressed with the local people there who realized the importance and value of the water quality of the Ganges River and wanted to do their share in keeping the Ganges clean □ .
- The results from the water testing revealed good water quality for the Ganges River on that day (January 20, 2018) as measured by the Lamotte TCE instrument. The total dissolved solids (TDS) value was consistent at 130

mg/l on both sides of the River at a water temperature of 16.4^{O} C (61.5^{o} F). Picture above shows water testing – Ganges River at at Balawali (Jan 20, 2018)

- Went to Delhi and Gokul on the bank of the Yamuna River next. Our ROW team is quite active in Gokul and they follow the slogan "Gokul – mera Gaon – use' Hariyali se' Bharao" meaning Gokul is my village, make it fully green. I visited with a number of team members and got re-assurance about their help to keep the river clean. Most alarming change is that they no longer throw Samagris in the river but store them in a bin and then send it to landfill/composting. We have been providing that mantra for the past two years. Jagdish Kewat is our volunteer boatman there. His family have been the local boatman for years. For 17 years Jagdish (picture below) have been operating the boat there. He said he used to drink the clean water of the Yamuna 17 years ago while doing his daily "Achman". But for the past few years he can't drink that water, but he still does his "Achman" without drinking the water. I suggested that he should take a bucket of water from the Yamuna and boil it for about 3 minutes after it reaches the boiling temperature (bubbling). That should take out the volatile organic compounds from that water and then he should just let the water settle down, decant and use the top part of the water leaving the retente at the bottom. He said he will try that.

Pawan Sharma (L) and Jagdish Kewat (R) took me in a boat to conduct water testing of the Yamuna River near the Gokul Ghat.

They are getting ready for the World Water Day 2018 on March 22nd and got their banner ready for the event.

The water quality for the Yamuna River was very poor as measured by the Lamotte TCE instrument. The total dissolved solids (TDS) value ranged from 1140 mg/l to 1220 mg/l at a water temperature of 17.5^{O} C (63.5^{o} F). This is a high level of TDS for any potable use. Moreover, the floating foam was also present in the water as shown in the picture below. The ROW Foundation is discussing with a couple faculty members at the Massachusetts Institute of Technology (MIT) about installing a foam removal and treatment system to alleviate the problem at this site. Picture shows the foaming Yamuna River downstream of Gokul Barrage.