

Changes in microbial communities in response to Covid-19 forced lockdown at dolphin spotting site (Garhmukteshwar) of the River Ganga

Diwakar Prakash¹, Raunak Dhanker² and Ram Kumar¹

¹Ecosystem Research Lab, Department of Environmental Science, School of Earth, Biological and Environmental Sciences, Central University of South Bihar, SH-7, Gaya-Panchanpur Rd. Gaya 824236, Bihar, India.

²School of Applied Life Science, GD Goenka University, Gurgaon



Introduction

The River Ganga is the habitat for a considerable number of endemic and endangered species, including the Gangetic River dolphin, *Platanista gangetica gangetica* (Roxburgh, 1801).

Discharging faecal wastes and urination in open spaces near Ganga shoreline makes the Ganga faecal contamination (Reasoner, 1982).

22 Dolphin was recorded in 1993-95 approximately and 56 Dolphins were recorded in 2010 between Bijnor and Narora Barrages (approx. 166 km) (Behera 1995)

In river ecosystems, Dolphins are factors play the important role in aquatic ecology by shaping the composition of microbial community (Winter et al., 2007; Liu et al., 2011)

Objective

To study the changes in microbial communities in response to Covid-19 forced lockdown at dolphin spotting site (Garhmukteshwar) of the River Ganga



Materials and Methods

The water samples collected immediately after dolphin was spotted at the site Garhmukteshwar (28.7601°N , 78.1437°E) Uttar Pradesh, India.

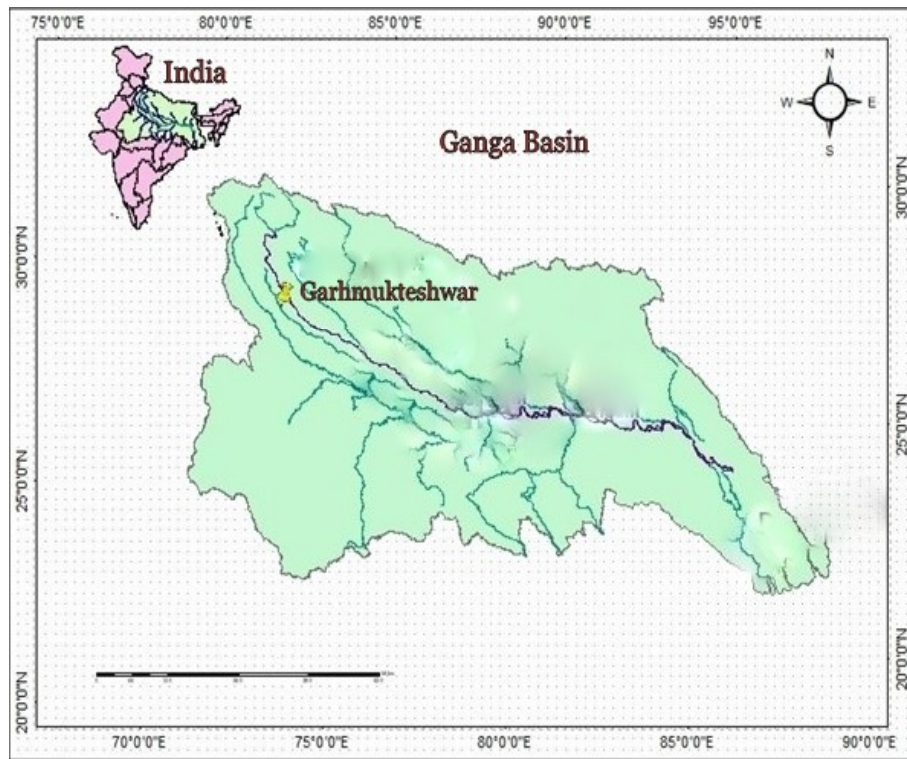


Fig. Sampling site (Garhmukteshwar) in River Ganga



Garhmukteshwar (28.7601°N , 78.1437°E)

Materials and Methods Cont.

- The water samples for bacterial analyses were taken in five replicates at sampling site.
- The bacterial samples were kept in the laboratory at -21°C
- Total coliform was analysed in three steps: MacCkonky Broth,- Brilliant Green Bile Broth- Luria Bertani Agar and finally colony counting method was applied to estimate the density.
- Bacterial identification from the samples collected, immediately after emergence of dolphin in February 2018 was done by genotyping using 16S rRNA

Results

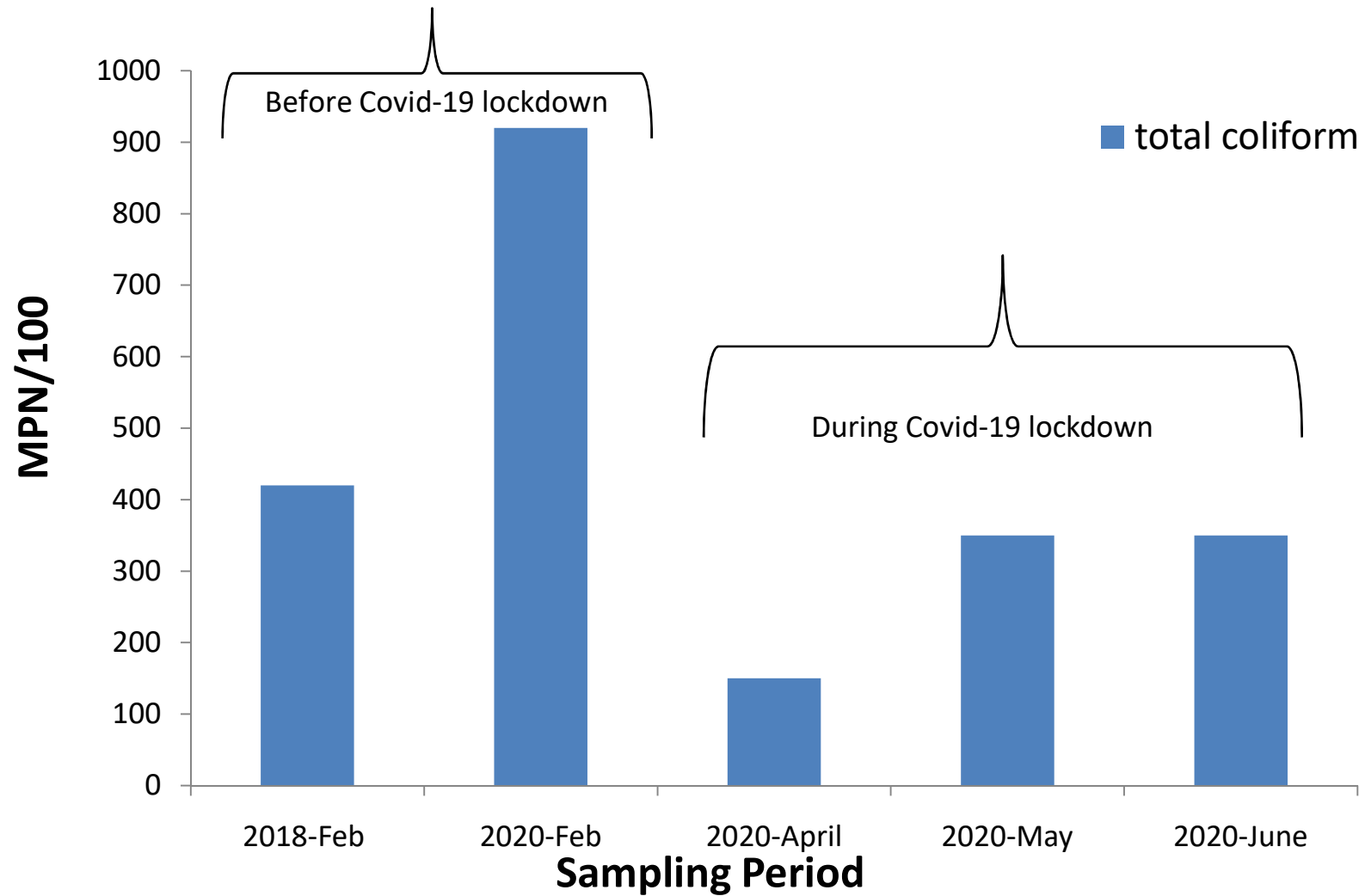
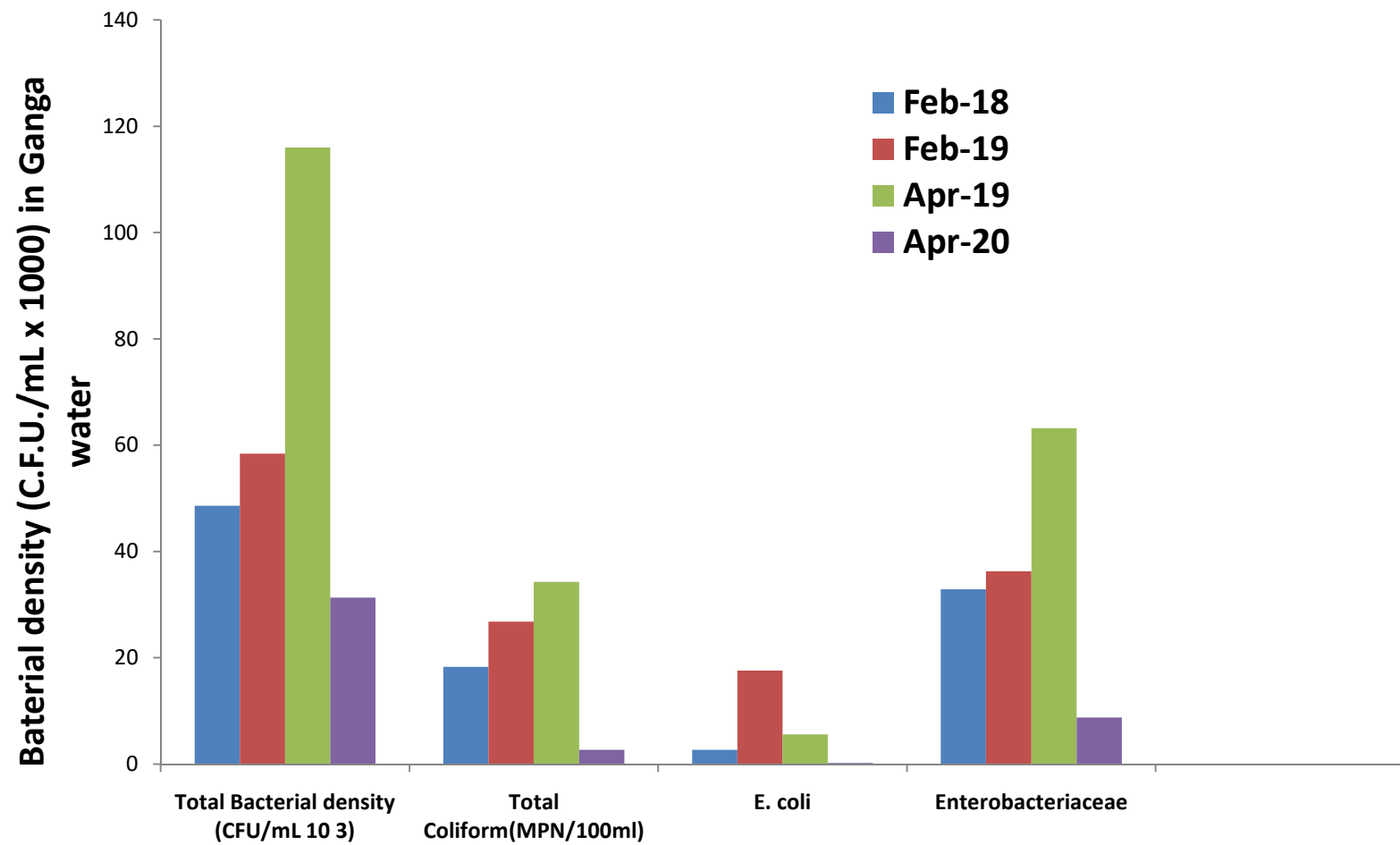


Fig. Most probable Number of total coliform at Garhmukteshwar

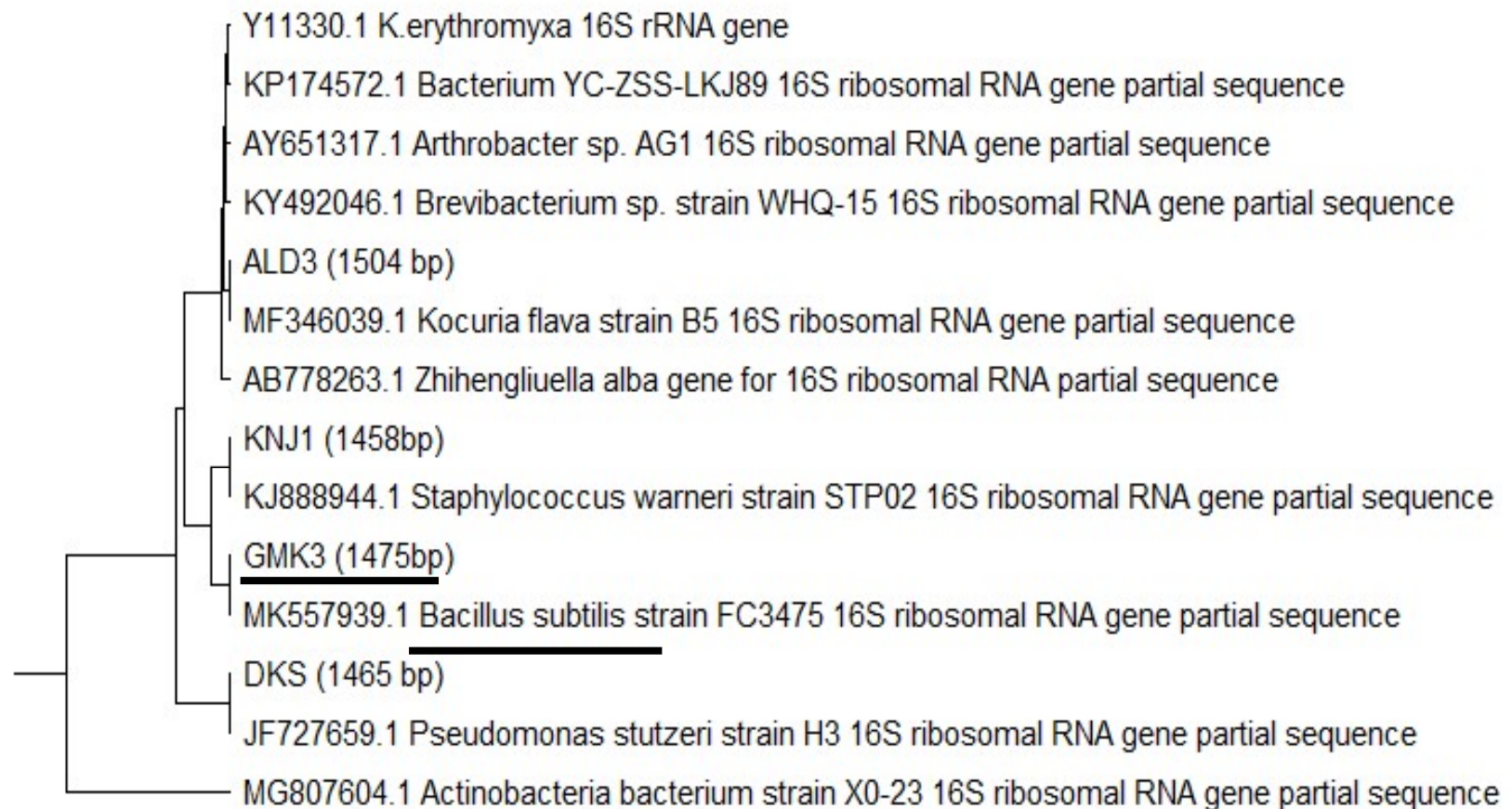
Results



- The total bacterial population was observed 26000 cfu/ml and it was 90% dominated by ***Bacillus subtilis*** in February 2018

Consensus Sequence of *Bacillus subtilis*

CAGGACGAACGCTGGCGGCGTGCCTAATACATGCAAATCGAGCGGACAGATGGGAGCTTG
CTCCCTGATGTTAGCGGCGGACGGGTGAGTAACACGTGGGTAACTGCCTGTAAGACTGG
GATAACTCCGGGAAACCGGGGGTAATACCGGATGGTTGTTTGAACCGCATGGTTCAAACA
TAAAAGGTGGCTTCTGCTATCACTTACAGATGGACCCGCGGCGCATTAGCTAGTTGGTGA
GGTGACGGCTCTCCAAGGCGACGATGCGTAGCCGACCTGAGAGGGTGATCGGCCACACTG
GGAGTGAGACACGGCCCAGACTCCTACGGGAGGCAGCAGTAGGGAATCTTCCGCAATGGA
CGAAAGTCTGACGGAGCAACGCCGCGTGAGTGATGAAGGTTTTTCGGATCGTAAAGCTCTG
TTGTTAGGGAAGAACAAGTACCGTTCAATAGGGCGGTACCTTGACGGTGCCTAACCAGA
AAACCCCGGCTAACTACGTGCCAGCAGCCGCGGTAATACGTAGGTGGCAAGCGTTGTCCG
GAATTATTGGGCGTAAAGGGGTCGCAGGCGGTTTTTTAAGTCTGATGTGAAAACCCCGG
CTCAACCGGGGAGGGTCATTGAAACTGGGGAACCTTGAGTGCAAGAGGAGAGTGGAAT
TCCCCGTGTAGCGGTGAAATGCGTAGAGATGTGGAGGAACACCAGTGGCGAAGGCGACTC
TCTGGTCTGTAAGTACGCTGAGGAGCGAAAGCGTGGGGAGCGAACAGGATTAGATACCC
TGGTAGTCCACGCCGTAAACGATGAGTGCTAAGTGTTAGGGGGTTTCCGCCCTTAGTGC
TGCAGCTAACGCATTAAGCACTCCGCCTGGGGAGTACGGTCGCAAGACTGAACTCAAAG
GAATTGACGGGGGGCCCGCACAAAGCGGTGGAGCATGTGGTTTAATTGCAAGCAACGCGAAG
AACCTTACCAGGTCTTGACATCCTCTGACAATCCTAGAGATAGGACGTCCCCTTCGGGGG
CAGAGTGACAGGTGGTGCATGGTTGTCGTCAGCTCGTGTGAGATGTTGGGTTAAGTC
CCGCAACGAGCGCAACCCTTGATCTTAGTTGCCAGCATTAGTTGGGCACTCTAAGGTGA
CTGCCGGTGACAAACCGGAGGAAGGTGGGGATGACGTCAAATCATCATGCCCTTATGAC
CTGGGCTACACACGTGCTACAATGGACAGAAACAAAGGGCAGCGAAACCGCGAGGTAAAGC
CAATCCCACAAATCTGTTCTCAGTTCGGATCGCAGTCTGCAACTCGACTGCGTGAAGCTG
GAATCGCTAGTAATCGCGGATCAGCATGCCGCGGTGAATACGTTCCCGGGCCTTGTACAC
ACCGCCCGTCACACCACGAGAGTTTGTAAACCCGAAGTCGGTGAGGTAACCTTTTAGGA
GCCAGCCGCCGAAGGTGGGACAGATGATTGGGGTG



0.3 0.2 0.1 0.0

Conclusions

Bacterial community were assessed by collecting sample from the exact site where dolphins were spotted

The observed data clearly indicates that bacterial load has reduced due to Covid-19 lockdown in river Ganga at Garhmukteshwar.

Study revealed the differences of microbiota before and during the lockdown

The present results will form the baseline information for planning the dolphin conservation and restoration of the river Ganga.

The bacterial communities identified in this study might be informative for future health monitoring of Gangetic dolphins.

However, only the data of Feb 2018 were sequenced, a thorough sequencing may provide more constructive conclusion

