

Comparison of Biological Water Quality of River Ganga (2014-18)

Major Findings:

In Uttarakhand stretch of the River Ganga, at Haridwar barrage (UK-6) biological water quality improves from Slight pollution to clean. However, downstream of Jagjeetpur STP outfall is one of the most impactful location on entire stretch where a gradual deterioration of water quality was observed from clean to heavy pollution in consecutive 4 years.

In Uttar Pradesh stretch, biological water quality is consistently moderately polluted in all the rounds during the period from 2014 to 2018 except River Ganga of mainstream in Kannauj (UP 16) after confluence with 2 tributaries i.e. River Ramganga and Garra where river water is in Heavy Pollution range in Post-monsoon season during 2017-18. Tributaries such as Ramganga, Pandu, Varuna etc. were found to be more impactful locations with respect to biological water quality before confluence with the mainstream of River Ganga. Biological water quality of tributary River Ramganga d/s of Moradabad (UP 10) is found to be improved from Heavy (2014-16) to Moderate Pollution in the following year (2017-18). River Pandu was found to be biologically dead in the pre-monsoon sampling of 2017-18 (Severe Pollution) while oligochaetes colonization was observed in abundance (Total no. 256) after monsoon (Heavy pollution). Biological water quality of River Varuna was found to be improved from Severe to Moderate pollution after monsoon (2017-18). Subsequently, biological water quality of River Ganga after confluence with River Tons (UP 40) observed to be degraded from Slight (2014-15) to Moderate Pollution [2015-16; 2017-18 (pre- & post-monsoon)]. Biological water quality of River Ganga at Ghatia ghat, Farrukhabad (UP14) was found to be moderately polluted during 2014-15; 2015-16 & 2017-18 (Post-Monsoon) whereas in pre-monsoon season of 2017-18, it was found to be slightly polluted.

In Bihar, River Ganga at Gandhi ghat in Patna city (BH 12a) was in Heavy Pollution range during 2015-16 while all other locations in all rounds of bio-monitoring were consistently found moderately polluted.

In West Bengal, River Ganga downstream of Srirampore (WB 22 downstream) was found in Slight pollution range during 2017-18 (pre-monsoon) while all other locations in all rounds of bio-monitoring were consistently found in moderate pollution range.

The summary table of above comparison is attached at Annexure-I along with locational details attached at Annexure-II.

Annexure-I

Comparison of Biological Water Quality of River Ganga (2014-18)

| Location City | Code | 2014-15 (First Round) | | | | 2015-16 (Second Round) | | | | 2017-18 pre-monsoon | | | | 2017-18 post-monsoon | | | |
|---------------|-----------|-----------------------|------|----------|------|------------------------|------|----------|------|---------------------|------|----------|------|----------------------|------|----------|------|
| | | DS | SS | BWQ | BWQC | DS | SS | BWQ | BWQC | DS | SS | BWQ | BWQC | DS | SS | BWQ | BWQC |
| Haridwar | UK6 | 0.79 | 6.5 | Slight | B | 0.68 | 6.28 | Slight | B | 0.6 | 7.16 | Clean | A | 0.66 | 7.25 | Clean | A |
| Jagjeetpur | UK8a | - | - | - | - | 7.5 | 0.8 | Clean | A | 0.64 | 6.21 | Slight | B | 0.77 | 5.94 | Moderate | C |
| Jagjeetpur | UK8b | 0.6 | 7.16 | Clean | A | 0.64 | 6.21 | Slight | B | 0.48 | 5.75 | Moderate | C | 0.28 | 2.28 | Heavy | D |
| Bijnour | UP2 | 0.54 | 3.7 | Moderate | C | 0.77 | 4.17 | Moderate | C | 0.54 | 5.47 | Moderate | C | 0.77 | 4.3 | Moderate | C |
| Muzaffarnagar | UP3 | 0.84 | 4.2 | Moderate | C | 0.78 | 4.93 | Moderate | C | 0.71 | 5.13 | Moderate | C | 0.59 | 5.55 | Moderate | C |
| Anupshahr | UP6 | 0.89 | 5.09 | Moderate | C | 0.65 | 4.44 | Moderate | C | 0.71 | 5 | Moderate | C | 0.62 | 5.33 | Moderate | C |
| Narora | UP8 | 0.77 | 4.54 | Moderate | C | 0.84 | 5.13 | Moderate | C | 0.66 | 5.25 | Moderate | C | 0.66 | 4.31 | Moderate | C |
| Badaun | UP9 | 0.77 | 5.43 | Moderate | C | 0.8 | 5.3 | Moderate | C | 0.61 | 5.25 | Moderate | C | 0.67 | 4.71 | Moderate | C |
| Muradabad | UP10 | 0.4 | 3.8 | Heavy | D | 0.4 | 4.25 | Heavy | D | 0.45 | 4.4 | Moderate | C | 0.43 | 4.56 | Moderate | C |
| Khudaganj | UP13 | 0.56 | 5 | Moderate | C | 0.74 | 5.9 | Moderate | C | 0.69 | 5 | Moderate | C | - | - | - | - |
| Ghatia Ghat | UP14 | 0.79 | 4.6 | Moderate | C | 0.61 | 5.27 | Moderate | C | 0.81 | 6.17 | Slight | B | 0.4 | 5.09 | Moderate | C |
| Kannauj | UP16 | - | - | - | - | - | - | - | - | 0.7 | 6 | Moderate | C | 0.23 | 4.64 | Heavy | D |
| Kannauj | UP17 | - | - | - | - | - | - | - | - | 0.56 | 4.47 | Moderate | C | 0.6 | 5.1 | Moderate | C |
| Bithoor | UP18 | 0.71 | 5.78 | Moderate | C | 0.675 | 5 | Moderate | C | 0.51 | 5.5 | Moderate | C | 0.48 | 5.4 | Moderate | C |
| Kanpur | UP19 | 0.78 | 5.33 | Moderate | C | 0.7 | 4.81 | Moderate | C | 0.82 | 4.71 | Moderate | C | 0.7 | 4.77 | Moderate | C |
| Kanpur | UP24 | 0.7 | 5.5 | Moderate | C | 0.49 | 4.75 | Moderate | C | 0.76 | 4.76 | Moderate | C | 0.68 | 4.76 | Moderate | C |
| Shuklaganj | UP26 | - | - | - | - | - | - | - | - | 0.8 | 5.28 | Moderate | C | 0.6 | 5.15 | Moderate | C |
| Pandu River | UP29 | 0.46 | 4.72 | Moderate | C | 0.76 | 4 | Moderate | C | 0 | 0 | Severe | E | 0.29 | 4 | Heavy | D |
| Pandu River | UP29A u/s | - | - | - | - | - | - | - | - | 0 | 0 | Severe | E | - | - | - | - |
| Fatehpur | UP32 | 0.73 | 4.80 | Moderate | C | 0.59 | 5.66 | Moderate | C | 0.79 | 5 | Moderate | C | 0.46 | 4.42 | Moderate | C |
| Allahabad | UP40 | 0.61 | 6.2 | Slight | B | 0.54 | 4.28 | Moderate | C | 0.71 | 5.14 | Moderate | C | 0.67 | 5.4 | Moderate | C |
| Allahabad | UP46 | - | - | - | - | - | - | - | - | 0.71 | 5.14 | Moderate | C | 0.61 | 5.05 | Moderate | C |
| Allahabad | UP47 | - | - | - | - | - | - | - | - | 0.6 | 5.22 | Moderate | C | 0.48 | 4.76 | Moderate | C |
| Varanasi | UP51 | 0.54 | 5.1 | Moderate | C | 0.5 | 5.42 | Moderate | C | 0.46 | 4.9 | Moderate | C | 0.88 | 4.78 | Moderate | C |
| Varanasi | UP53 | 0.53 | 4.55 | Moderate | C | 0.47 | 5.3 | Moderate | C | 0.76 | 4.72 | Moderate | C | 0.51 | 5 | Moderate | C |
| Varanasi | UP54 | 0.59 | 4.9 | Moderate | C | 0.68 | 4.9 | Moderate | C | 0.06 | 1.67 | Severe | E | 0.54 | 3.6 | Moderate | C |
| Varanasi | UP55 | 0.64 | 5.6 | Moderate | C | 0.65 | 5.4 | Moderate | C | 0.73 | 4.7 | Moderate | C | 0.75 | 5 | Moderate | C |
| Varanasi | UP56 | - | - | - | - | - | - | - | - | 0.63 | 5.43 | Moderate | C | 0.84 | 5.09 | Moderate | C |

| | | | | | | | | | | | | | | | | | |
|---------------|--------------|------|------|----------|---|------|------|------------------|--------------|------|------|----------|---|------|------|----------|---|
| Patna | Bh7A u/s | 0.4 | 6.11 | Moderate | C | 0.66 | 5.25 | Moderate | C | 0.63 | 4.93 | Moderate | C | 0.85 | 5.29 | Moderate | C |
| Patna | BH12C d/s | - | - | - | - | - | - | - | - | 0.72 | 5.2 | Moderate | C | 0.49 | 4.64 | Moderate | C |
| Patna | BH12 | - | - | - | - | - | - | - | - | 4.5 | 0.79 | Moderate | C | 4.82 | 0.73 | Moderate | C |
| Patna | BH12a | 0.76 | 5.08 | Moderate | C | 0.16 | 3.71 | Heavy | D | 0.7 | 5.06 | Moderate | C | 0.64 | 5.25 | Moderate | C |
| Falgu River | WB5 | - | - | - | - | 0.81 | 5.6 | Moderate | C | 0.68 | 5.87 | Moderate | C | 0.6 | 5.7 | Moderate | C |
| Falgu River | WB6 | - | - | - | - | 0.67 | 5.1 | Moderate | C | 0.74 | 5.41 | Moderate | C | 0.87 | 4.82 | Moderate | C |
| Murshidabad | WB10 | - | - | - | - | 0.65 | 5.94 | Moderate | C | 0.63 | 5.57 | Moderate | C | 0.66 | 4.22 | Moderate | C |
| Behrampore | WB11 | 0.7 | 4.65 | Moderate | C | 0.58 | 5.86 | Moderate | C | 0.66 | 5.76 | Moderate | C | 0.56 | 5.57 | Moderate | C |
| Srirampore | WB-22 d/s | 0.66 | 5.69 | Moderate | C | - | - | - | - | 0.57 | 6.3 | Slight | B | 0.58 | 5.06 | Moderate | C |
| Belgharia | WB23 | 0.33 | 6 | Moderate | C | - | - | No Collection | High Tide | 0.62 | 5.37 | Moderate | C | 0.55 | 4.96 | Moderate | C |
| Ballykhal | WB24 d/s | - | - | - | - | - | - | - | - | 0.56 | 5.17 | Moderate | C | 0.56 | 4.93 | Moderate | C |
| Howrah Bridge | WB27 | - | - | - | - | 0.38 | 6 | Moderate | C | 0.5 | 6 | Moderate | C | 0.3 | 5.67 | Moderate | C |
| Garden Reach | WHG- 1 | - | - | - | - | - | - | - | - | 0.09 | 6 | Moderate | C | 0.6 | 5.25 | Moderate | C |

DS- Diversity Score; SS- Saprobic Score; BWQ- Biological water quality w.r.t. pollution; BWQC- Biological water quality class

Note: Total 93 unique locations were covered during 2014-16.Out of which 66 locations were covered in first round and 86 locations were covered in second round.

Annexure-II**Locational Details of River Ganga**

| Sr. No. | Location Name | Location code |
|----------------|--|----------------------|
| 1. | Haridwar Barrage (Ganga) | UK6 |
| 2. | Jagjeetpur STP U/S (Ganga) | UK8a |
| 3. | Jagjeetpur STP D/S (Ganga) | UK8b |
| 4. | Madhya Ganga Barrage | UP2 |
| 5. | Shukratal Ghat (Saloni River) | UP3 |
| 6. | Bridge at Anupshahar (Ganga) | UP6 |
| 7. | Barrage at Narora (Ganga) | UP8 |
| 8. | River Ganga Kacchla Ghat | UP9 |
| 9. | Ramganga d/s of Moradabad | UP10 |
| 10. | Bridge on Kali River at Kanpur-Farrukhabad Road near Khudaganj | UP13 |
| 11. | Bridge at Ghatia Ghat on River Ganga | UP14 |
| 12. | Bridge SH21 d/s Kannauj | UP16 |
| 13. | Bridge SH40 d/s Of Kannauj | UP17 |
| 14. | Bridge at Bithoor | UP18 |
| 15. | Barrage U/S Kanpur | UP19 |
| 16. | U/s Bathing Ghat Kanpur (Deorighat) d/s Kanpur | UP24 |
| 17. | Bridge at KanpurI (Bridge at Shukla Ganj) | UP26 |
| 18. | Bridge 2 at Kanpur NH25 (River Pandu) | UP29 |
| 19. | Between Road rail bridge Bhrti near Panki (River Pandu) | UP29a upstream |
| 20. | Bridge on River Ganga near Fatehpur (Asni Village) | UP32 |
| 21. | Bridge d/s of tributaroy near Sirsa (pontoon bridge near Sirsa, Allahabad) | UP40 |
| 22. | Nalla at Allahabad 4 | UP46 |
| 23. | Bridge on GT Road, Allahabad | UP47 |
| 24. | Varanasi Upstream | UP51 |
| 25. | Varanasi downstream (d/s Rajghat bridge) | UP53 |
| 26. | Bathing Ghat at Varanasi 1 (Puranapul) | UP54 |
| 27. | Bridge on (river Gomti) tributary in Varanasi | UP55 |
| 28. | Tribuatry at Rajwari (CCS Pump Canal Pumping station) | UP56 |
| 29. | Dighaghat (Janardan Ghat) Patna | Bh7A upstream |
| 30. | River Ganga at Fatuha | BH12c downstream |
| 31. | River Ganga at Malsalami | BH12 |
| 32. | River Ganga at Gandhi Ghat | BH12a |
| 33. | 1 st inlet stream from west u/s of Ganga Nallah (Falgu River) | WB5 |
| 34. | 2 nd inlet stream u/s of Ganga Nallah | WB6 |
| 35. | Ganga river d/s Murshidabad (u/s Beharmpore) | WB10 |
| 36. | Ganga river d/s of Murshidabad (d/s of Beharmpore) | WB11 |
| 37. | Nalla opposite Ghat d/s of Srirampore | WB-22 downstream |
| 38. | Ganga river Near Belgharia | WB23 |
| 39. | Nalla at Ballykhal | WB24 downstream |
| 40. | River Ganga near Howrah Bridge | WB27 |
| 41. | River Ganga at Garden Reach | WHG-1 |