**Paani Water quality Data Notes:**

1. There are high concentrations of phosphate in several points of measurement, i.e. >10 mg/L. I have hardly seen (my own observation and references) such a high level of PO4 in natural water. There could be two reasons for this:
2. There must be source of phosphate release from phosphorous rocks or agricultural leachate at point of measurement, and or
3. Presence of silica, at point of measurement, react with phosphate to give high level of PO4 concentration when used AVKO instrument [this fact has been realized by AVKO in a meeting with Paani team].

Hence, I would suggest to delete all measurement >10 mg/L PO4.

1. Ammonia concentrations have been found at high level which has acute toxicity to aquatic animal. NH4 concentration at more than 8 mg/L is lethal to many aquatic organisms except cynobacteria. Special remark is not there to justify the presence of high NH4 concentration at point of measurement. Would suggest to delete NH4 level above 8 mg/L.
2. In some of the measurement sites, DO (dissolve oxygen) level is high reaching to super saturation. In natural flowing water, such high level of oxygen is never expected. Would suggest to delete all measurement above 20 mg/L.
3. Like DO, nitrite has been shown reaching super saturation. It never happen in natural water especially when water is trickled that accelerate nitrification process. Suggest to delete all measurement exceeding 30 mg/L.

**WQI Notes: Analysis of water quality of Rapti, Karnali and Mahakali River basins**

**1. Water quality index (WQI)**

Based on different physico-chemical parameters measured in study area, a WQI was calculated. Following four steps:

1. Assigning weight (w):

In this step, the weights for individual parameter were assigned on the scale of 4 to 1 based on their contribution for water quality. For the most important scale of 5 was assigned and for the least important, the scale of 1 was assigned in this study.

1. Relative weight (W) :Relative weight of each parameter was calculated using the following equation:

W=w/∑ni=1 w (1)

Where, w is weight of each parameter and n is number of parameters.

1. Quality Rating Scale (q)

The quality rating scale q for each parameter was determined by dividing the concentration of each parameter to its respective permissible standards and multiplied by 100

Q=c/s\*100 (2)

Where, c is concentration of each measured parameter and s is the maximum allowable level for that parameter.

1. Sub Index and WQI

To determine the sub index (SI) and WQI, the following equations were used.

Sub Index (SI) = q x W (3)

WQI=∑SI (4)

Where, SI is sub index of each parameter, q is quality rating scale of each parameter and n is number of parameter. Thus, obtained WQI value was described with their respective description value (Table 1).

These calculations were based on standard values for aquatic life derived from different but well recognized literatures (Table 1)

Table 1. Set value of water quality as standard for aquatic life including macroinvertebrates

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Chemical Parameters** | **Standard(s)** | **Standard value to calculate WQI** | **Importance of parameter (Weight, w)** | **References** |
| **Warm water** | **Coldwater** |
| pH | 6.5-9.0 | 6.5-9.0 | 7.0 | 4 | USEPA 1986, 1999a; RBI, 2004 |
| DO (mg/L) | 6 | 9 | 7.0 | 5 | USEPA, 1986; CCREM, 1987 |
| Electrical conductivity (μS/cm) | 500 | 500 | 500.0 | 3 | [https://archive.epa.gov/water/archive/web/html/vms59.html, retrieved on 28.10.2018](https://archive.epa.gov/water/archive/web/html/vms59.html)  |
| Nitrate-N as NO3-N (mg/L) | 3-32.8 | 3-32.8 | 8.3 | 2 | Camargo et al., 2005; Nordin et al., 2009 |
| Ammonium-N as NH3-N (mg/L)  | 0.019 | 0 | 0.02 | 5 | CCME, 2010 |
| Nitrite-N as NO2-N (mg/L) | 0.02-0.06 | 0.02-0.06 | 0.03 | 3 | Nordin et al., 2009 |
| Iron (mg/L) | 0.35-1.0 | 0.35-1.0 | 0.48 | 2 | BCME, 2008 |
| Turbidity | 25 | 25 | 25.0 | 5 | MPCA, (Water Quality/Impaired Waters #3.21 March) 2008 |

**WQI is ranked as:**

|  |  |  |
| --- | --- | --- |
| **WQI Value** | **Description** | **Traffic light (will appear in illustration)** |
| >100 | Poor | Red |
| 75-100 | Fair | Yellow |
| <75 | Good | Green |