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# Levels of Ammonia and Phosphates as Indicators of Organic Pollution of Morna River, Akola District of Maharashtra, India

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**ABSTRACT**

Contamination of Morna river water due to untreated domestic wastewater from various parts of Akola city is directly discharged into river Morna leading to gross pollution. The present investigation was undertaken to assess the magnitude of sewage pollution by monitoring two key water quality parameters, Ammonia, and Phosphates. High levels of Ammonia and Phosphates in the river water, indicate its gross pollution

***Key words:*** *Ammonia, Phosphates, Morna River*

## Introduction

The river Morna of Akola district (M.S) has been grossly polluted by the city (Mussadiq, 2000). Water pollution is mainly due to rapid population growth (Trivedi *et al.,* 1992). Untreated domestic sewage generally contains large quantities of nitrogenous matter and its disposal tends to increase ammonia as an end product of microbial decomposition of the latter. The nitrogen-containing organic compounds are usually broken down by a series of microbial enzymatic actions resulting in the formation of Ammonia, Carbon Dioxide, and other end products (Shivnikar *et al.,* 2000). It was reported that ammonia is the most reliable single parameter for measuring the quality of river water (Loster, 1975).

The majority of inputs of phosphates into an aquatic ecosystem comes from domestic sewage, detergents, residual fertilizer-rich agricultural run-off, and industrial waste (Shivnikar *et al.,* 2000). The surface water can have significant phosphorous concentration contributed by soil erosion and wastewater discharges.

Welzel (1983) concluded that phosphorous was the most important limiting factor responsible for eutrophication of water all over the world. The present investigation was undertaken to study levels of ammonia and phosphates in the river Morna over one year (Nov. 20 to Oct. 21) to monitor the issue of river pollution.

## Materials and Methods

Four sampling locations were selected of Morna riverat Akola, within a distance of around 25 km. Water samples were collected from 8.00 am to 10 amin all seasons. The levels of ammonia and phosphates were estimated by NEERI (1998).

## Results and Discussion

The range of ammonia in the river water was 0.41 to

**Table 1.** Ammonia and Phosphate values (mg/l) at four sampling stations

| Sr. No. | Months | Ammonia mg/l Sampling sites | | | | | Phosphate mg/l Sampling sites | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | A | B | C | D | Avg. value | A | B | C | D | Avg. value |
| 1. | Nov, 20 | 0.410 | 2.20 | 2.15 | 2.10 | 1.715 | 0.90 | 0.78 | 0.94 | 1.20 | 0.955 |
| 2. | Dec, 20 | 0.515 | 1.90 | 1.90 | 1.80 | 1.528 | 0.92 | 0.90 | 1.25 | 1.21 | 1.067 |
| 3. | Jan 21 | 0.710 | 1.60 | 1.85 | 1.50 | 1.415 | 1.15 | 1.20 | 1.10 | 1.20 | 1.162 |
| 4. | Feb 21 | 1.50 | 1.15 | 1.20 | 1.15 | 1.250 | 1.15 | 1.15 | 1.50 | 1.40 | 1.300 |
| 5. | Mar 21 | 1.0 | 0.90 | 0.90 | 0.90 | 0.925 | 1.20 | 1.30 | 1.55 | 1.70 | 1.437 |
| 6. | Apr 21 | 1.5 | 0.90 | 0.90 | 0.90 | 1.050 | 1.50 | 1.55 | 1.57 | 2.30 | 1.730 |
| 7. | May 21 | 2.0 | 1.15 | 1.25 | 1.30 | 1.425 | 1.80 | 1.70 | 2.15 | 2.45 | 2.025 |
| 8. | Jun 21 | 1.5 | 1.20 | 1.15 | 1.15 | 1.250 | 1.20 | 1.30 | 1.50 | 2.15 | 1.537 |
| 9. | Jul 21 | 1.0 | 0.95 | 0.90 | 0.85 | 0.925 | 1.15 | 1.15 | 1.50 | 1.60 | 1.350 |
| 10. | Aug 21 | 1.5 | 0.98 | 0.85 | 0.85 | 1.045 | 0.90 | 0.92 | 1.70 | 1.12 | 1.160 |
| 11. | Sep 21 | 1.8 | 1.15 | 0.70 | 0.90 | 1.375 | 0.80 | 0.75 | 1.40 | 1.12 | 1.017 |
| 12. | Oct 21 | 1.5 | 1.25 | 2.15 | 1.90 | 1.700 | 0.57 | 0.65 | 1.12 | 1.15 | 0.875 |

**Table 2.** Comparative average value of ammonia and phosphates at different sampling stations in summer and winter

| Sr. No. | Parameters mg/l | Sampling stations | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | A | | B | | C | | D | |
| | | Summer | Winter | Summer | Winter | Summer | Winter | Summer | Winter |
| 1. | Ammonia | 1.50 | 0.78 | 1.03 | 1.712 | 1.05 | 1.775 | 1.062 | 1.637 |
| 2. | Phosphates | 1.412 | 1.03 | 1.425 | 1.007 | 1.68 | 1.197 | 2.125 | 1.252 |

Sampling Stations: A –Upstream, B & C- Midstream, D- Downstream
Limits: Ammonia- NMT 0.5 mg/l for domestic water, Phosphates -<0-1 mg/l for Natural water

2.20 mg/l at all sampling sites. It can be noted that the concentration of ammonia was maximum in summer and minimum in winter upstream (Site A), while maximum in winter and minimum in summer in mid and downstream zones (Site B, C & D). This might be due to increased anaerobic decomposition of benthic organic matter and dissolved organic matter and dissolved organic matter by microbial population.

Kofoid (1993) has stated that ammonia a product of decomposition of organic matters tends to be high in the water polluted by sewage which occurred in the present study. Similar results were reported by Shivnikar *et al.* (2000).

The range of phosphate in the Morna river water was 0.65 to 2.45 mg/l. The maximum phosphate concentration was recorded in summer and minimum in winter. The source of phosphate is sewage in the zones of all sampling stations. Young *et al.* (1973); Shivnikar *et al*. (2000) have recorded similar results.

To summarize, the presence of ammonia and phosphate well above the permissible limits in Morna river water indicates heavy pollution and sewage treatment should be given top priority to restore water quality of the river.

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