

## Soil Composition , Texture and Pollution Parameters

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**Abstract:** Sai river is one of the ancient rivers. The great saint Balmiki has mentioned the presence of Sai river in his slokas in "Ramayana" and Goswami Tulsi Das has also expressed the crossing of Sai river by Bharat in "Ram Charit Manas". Keeping view of these occurrence, it can be mentioned that Sai river has been under existence since long period and many million people have been benefitted by this river but it is a matter of strange that yet it has been ignored by the governments and investigators in the field of river pollution control. Sai river originates from a lake in Hardoi district and passing through Lucknow, Unnav, Raebareli, Pratapgarh and Jaunpur districts. It congruents to Gomati river at Jalalpur in Jaunpur. The samples of soils have been taken from cultivated lands in vicinity of the stations Rajghat (S1), Saheedsmarakghat (S2), Behtaghat (S3) and Kakarahaghat (S4) in Raebareli; Korighat (S5), Garaighat (S6), Karaundighat (S7), Belaghat (S8) in Pratapgarh and Bargudarghat (S9) and Saijalalpurghat (S10) in Jaunpur district and put for physical and chemical analyses. The soil was found most polluted at Behtaghat and it was found least polluted at Saijalalpurghat.

### Introduction

Soil is the weathered top surface of earth crust constituted by mineral matters (of sand, silt and clay), organic matter in different stages of decomposition (humus), microorganisms (bacteria, fungi etc.) mixed together in such a way as to have capillary and noncapillary pore spaces filled with moisture and air. This is the medium of storage and supply of nutrient and water for the plants and in turn plants are the ultimate source of food for all animals and human beings. The greatest soil pollution, by far occurs due to deforestation, flood in river, urbanisation and concentration of population<sup>1,2</sup>. Soil suspended particulate matter (SPM) and bottom sediments from the Kali river<sup>3</sup> were all found enriched with Al, Fe, Ni and Co. but strongly depleted in Na, Ca, K, Mg, Rb and Sr due to intense chemical weathering. Numerous works have been reported due to several investigators<sup>9,11-25</sup>, on soil degradation and its conservation. In the present investigation, the cultivated lands, which are 50-100 meter away from stretches of Sai river and are influenced by the river, have been studied for pollution parameters.

Table -I  
Soil Characteristics

| Site No. | Location                    | pH   | Moisture Content (%) | Grain size |          |          | Texture Class         | Colour          | Nitrogen (%) | Chlorine (%) | Organic Carbon (%) | Water soluble salts (%) | Potassium (ppm) | Sodium (ppm) | Calcium (ppm) | Iron (ppm) |
|----------|-----------------------------|------|----------------------|------------|----------|----------|-----------------------|-----------------|--------------|--------------|--------------------|-------------------------|-----------------|--------------|---------------|------------|
|          |                             |      |                      | Sand (%)   | Silt (%) | Clay (%) |                       |                 |              |              |                    |                         |                 |              |               |            |
| S1       | Raj ghat, Raibareli         | 8.4  | 6.73                 | 8          | 22       | 70       | Clay loam             | Brown           | 0.062        | 0.058        | 0.482              | 0.831                   | 0.56            | 0.32         | 2.67          | 4.22       |
| S2       | SahidSmarak ghat, Raibareli | 9.9  | 7.53                 | 12         | 24       | 64       | clay loam             | Darkbrown       | 0.068        | 0.054        | 0.517              | 0.627                   | 0.42            | 0.35         | 2.79          | 5.11       |
| S3       | Behta ghat, Raibareli       | 10.7 | 9.74                 | 13         | 28       | 59       | clay loam             | Darkbrown       | 0.089        | 0.067        | 0.713              | 0.782                   | 0.65            | 0.48         | 3.21          | 5.92       |
| S4       | Kakraha ghat, Raibareli     | 8.9  | 8.25                 | 10         | 28       | 62       | clay loam             | Lightbrown      | 0.072        | 0.043        | 0.618              | 0.731                   | 0.49            | 0.51         | 2.92          | 4.81       |
| S5       | Kori ghat, Pratapgath       | 7.8  | 7.64                 | 52         | 23       | 25       | Sand loam             | Greyishbrown    | 0.058        | 0.038        | 0.626              | 0.638                   | 0.52            | 0.42         | 2.74          | 5.21       |
| S6       | Garaighat, Pratapgath       | 7.1  | 8.27                 | 70         | 15       | 15       | Sand loam             | Yellowish brown | 0.063        | 0.042        | 0.574              | 0.479                   | 0.48            | 0.41         | 2.68          | 4.71       |
| S7       | Karaundighat, Pratapgath    | 8.2  | 6.92                 | 69         | 18       | 13       | Sand loam             | Yellowish brown | 0.054        | 0.043        | 0.512              | 0.498                   | 0.54            | 0.46         | 2.72          | 4.68       |
| S8       | Bela ghat, Pratapgath       | 9.8  | 8.67                 | 55         | 21       | 24       | sand loam             | Lightbrown      | 0.076        | 0.048        | 0.628              | 0.557                   | 0.42            | 0.44         | 2.65          | 4.98       |
| S9       | Bargudarghat, Jaunpur       | 7.9  | 7.2                  | 50         | 16       | 34       | Sand loam             | Lightbrown      | 0.028        | 0.053        | 0.712              | 0.436                   | 0.46            | 0.51         | 2.71          | 2.85       |
| S10      | Sai Jalalpur ghat, Jaunpur  | 7.4  | 6.9                  | 42         | 18       | 40       | Mixed (claysand) loam | Brown           | 0.052        | 0.046        | 0.694              | 0.487                   | 0.49            | 0.48         | 2.82          | 3.21       |

Fig. 1: Graphical representation of quantity parameters of soils of different sites in Feb, 2002

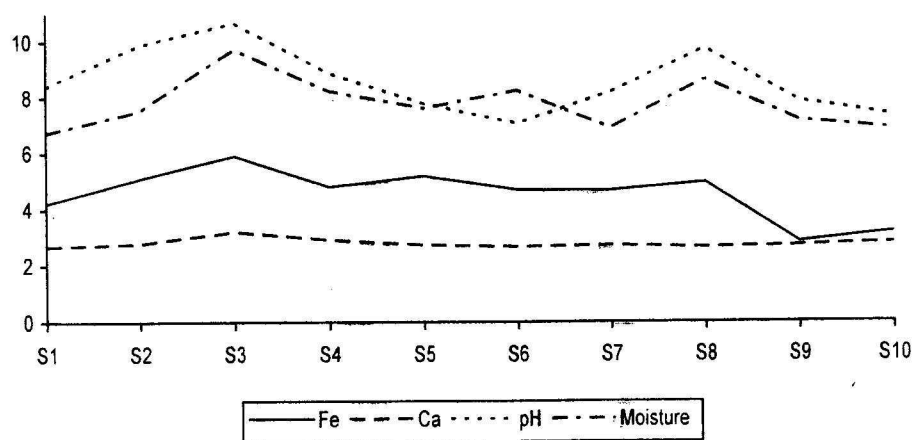


Fig. 2: Graphical representation of quantity parameters of soils of different sites in Feb, 2002

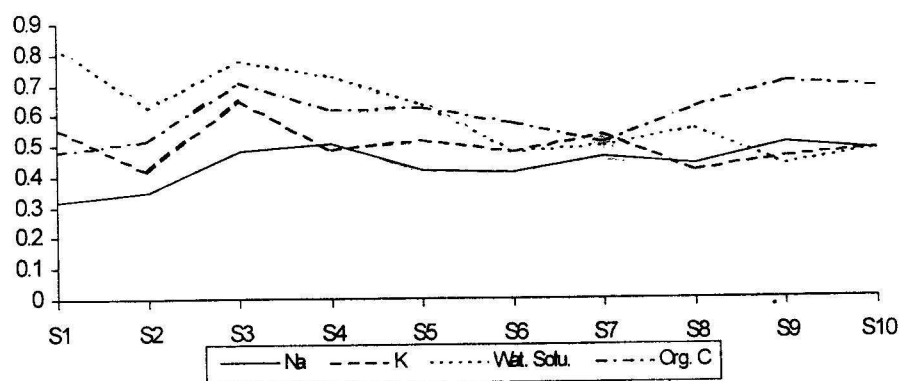


Fig. 3: Graphical representation of quantity parameters of soils of different sites in Feb. 2002

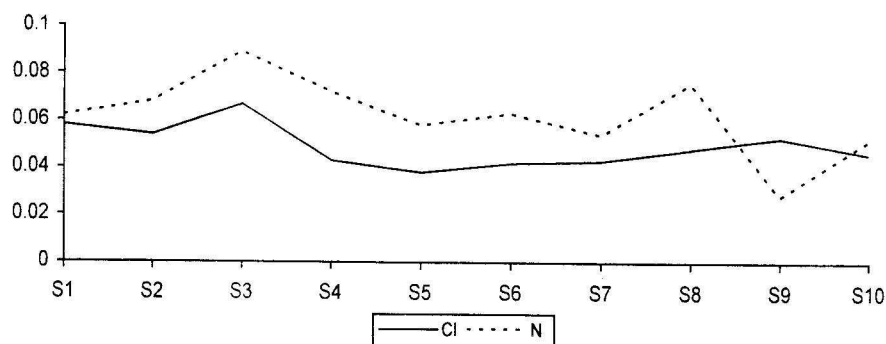
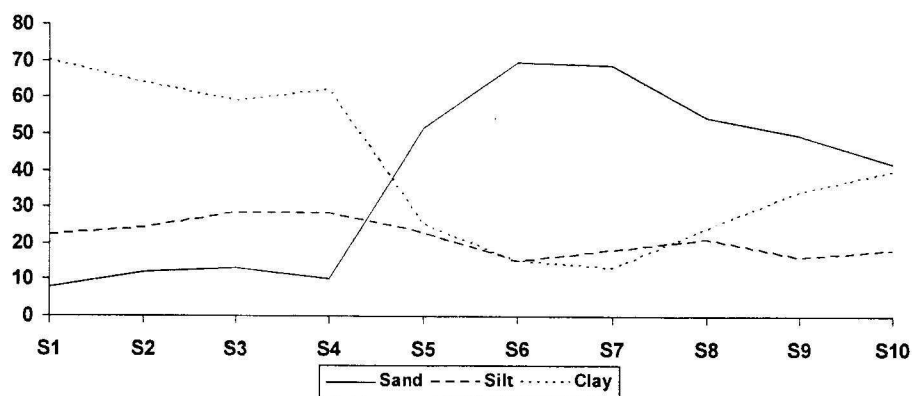


Fig. 4: Graphical representation of quantity parameters of soils of different sites in Feb. 2002



### Method and Discussion

To assess the level of soil pollution, soil samples were collected in February 2002, from selected places in the study area and the parameters obtained by applying the usual methods<sup>4-8,10</sup>. For this ten samples were taken from different parts of Raebareli, Pratapgarh and Jaunpur districts and most of them were collected from cultivated lands and out side the main city, and a few of the samples were from its parks and near sewage treatment plant. The ten sampling stations were selected in the vicinity of Rajghat (S1), Saheedsmarakghat (S2), Behtaghat (S3), Kakarahaghat (S4), Korighat (S5), Garaighat (S6), Karaundighat (S7), Belaghat (S8), Bargudarghat (S9) and Saijalalpurghat (S10).

The curve of the texture shows the highest value of pH (10.7) at Behtaghat in Raebareli and the lowest value (7.4) at Saijalalpurghat in Jaunpur. After Behataghat a second peak (9.8) in the curve of pH is observed at Belaghat in Pratapgarh. The inferences may be traced out that the soil from Raebareli to Jaunpur are all alkaline in nature. From the curve it can be concluded that the content of iron is maximum (5.92 ppm) at S3 and minimum (2.85 ppm) at S9. The same curve also shows that the content of Ca remains almost constant at all sites from Raebareli to Jaunpur but somehow a little higher value is observed at Behtaghat. The most moisturous texture is observed at S3 and least one is found at S10. The curves express that the maximum values of  $\text{Cl}^-$  and N are found at Behtaghat (0.058 and 0.062% respectively) and lowest values of these variants are seen at Korighat in Pratapgarh. The maximum percent (70) of the clay is observed at Rajghat and more than 60 percent is reported at all the study stations in Raebareli, showing that the texture in Raebareli comes under the clay loam class. Similarly from the curve in Figure 4 the textures at S5, S6, S7, S8 and S9 come under sand loam class and somehow (clay-sand) mixed loam is found at S10.

Highest Na content (0.51 ppm) is seen in the curve (fig. 3) at Behtaghat and the lowest value of this parameter appears at Saheed Smarakghat. The largest contents of K, water soluble salts and organic carbon are seen at S3, S1 and S2 respectively and with a zig-zag changes the minimum values of these parameters are observed from the curve at S2 and S8; S9 and S1 respectively.

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