# DISTILLERY EFFLUENT INDUCED CHANGES IN LIMNO-CHEMISTRY OF RIVER NARMADA AT KHEDI GHAT, BARWAHA, M. P.

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## ABSTRACT

The effluent discharged from distillery industries has shown higher values of physico-chemical parameters in the study area. The values of temperature, pH, TS, TDS, TSS, DO, BOD, COD, chloride and potassium were found to be increased in the River Narmada at the study point II to VI in comparison to the study point I taken as control. This showed that the entry of distillery effluents altered limno-chemistry of River Narmada in the study area, which may put an adverse effect on the aquatic life.

## INTRODUCTION

The Narmada river is one of the major rivers of Madhya Pradesh. The Narmada basin is vibrating with industrial activity at number of towns and cites in M.P. Large number of small and medium scale industries, situated on its both the sides of the river, discharge large amount of industrial effluents, domestic waste, pesticides and fertilizers and disturb its limno-chemistry.

Distillery industry produce alcoholic beverages through fermentation process. Effluents from distillery contains a large amount of organic matter, which affects physico-chemical properties of water. The effluents increase the pollution load and cause severe damage to the aquatic life, which in turn affect the human life (Chakrobarty 1964, Singh & Sharma 1984, Singh et al. 1995, Malik et al. 2002, Yadav et al. 2004). Looking to the importance of the Narmada river, the present study has been undertaken to study its limno-chemistry and effects of distillery effluents at Khedi Ghat, Barwaha, M.P.

## MATERIALS AND METHODS

Water of River Narmada and effluents of Associated Alcohol and Beverages, Khodigram, Barwaha were selected for the present investigation.

### Collection of Samples

The present study was carried out at six study points out of which three were located in the river and three were in to effluent stream. Water samples were collected from the surface at 8 a.m. throughout the study period. Following six study locations were selected for the present study.

**a. Study Point I:** River Narmada at Khedi Ghat, which is 700 meter before the effluent discharge from the respective factory into the river.

**b. Study Point II:** River Narmada at Mehta Khedi village where mixing of effluent takes place.

**c. Study Point III:** River Narmada near Vimaleshwar temple, 500 meter after the effluent mixing point.

**d. Study Point IV:** Untreated factory effluent at factory.

**e. Study Point V:** Treated effluent of factory at factory.

**f. Study Point VI:** Finally treated effluent at factory, which is finally discharge into the river.

Samples were collected from the above stations once in 15 days, for a period of one year from April, 2003 to March, 2004. The methods used for the analysis of various physico-chemical parameters are as given in standard methods for the examination of water and waste (APHA, AWWA, WPCF 1995).

## RESULTS AND DISCUSSION

The values of some important limno-chemistry parameters of the study area are presented in Table 1. The physico-chemical parameters of Narmada river at the study point I were taken as control values. The value of different parameters like temperature, TS, TDS, TSS, chloride, BOD, COD and potassium were progressively higher from the study points I, II to III. However, DO was absent at the study point IV, V and VI and the pH was lowered down very much. Water at the study points I, II and III was odourless, while at study points IV, V and VI it has an odour. Similarly, colour of water at the study points IV, V and VI turned brown and turbid. Thus, the higher values of different parameters may be due to large amount of solids in wastewater from the distillery. Agrawal (1976) and Malik et al. (2002) reported that distillery effluents affect river water quality to a great extent. In the present investigation, effluent of distillery is highly acidic and responsible to make acidic environment in the river at the mixing point. Similar results have also been reported by Singh & Singh (2004).

BOD is an essential parameter in pollution control management of streams. The Royal Commission on Sewage Disposal (1912) has suggested a 5-day BOD test for rivers and streams. The permissible limit of BOD for raw surface water is 2.0 mg/L (ISI 1982). In the present investigation water samples from all the stations, especially IV, V and VI exceeded the permissible limit of BOD and COD and indicated by a fairly good amount of pollution by distillery effluent. These finding corroborate with the finding of Singh et al. (1995) and Yadav et al. (2004). At the study point III the values of all the parameters except pH and DO were decreasing in comparison to the study point II

Table 1: Range of physico-chemical parameters at different study points (I toVI).

| Parameters | Physico-chemical parameters at study points | | | | | |
|---|---|---|---|---|---|---|
| | I | II | III | IV | V | VI |
| Temperature | 16-32.6 | 17.2-32.8 | 17.5-33.6 | 19.3-30.6 | 19.0-28.3 | 19.3-27.6 |
| pH | 7.5-8.36 | 5-6.2 | 6.8-8.2 | 3.0-4.3 | 5.0-7.3 | 7.0-7.8 |
| TS | 248-460 | 410-840 | 260-442 | 85020-345690 | 42862-98453 | 13467-36315 |
| TDS | 200-267 | 160-440 | 140-270 | 71628-134573 | 34938-90970 | 10499-32789 |
| TSS | 23-230 | 180-610 | 65-380 | 10332-221117 | 6564-49892 | 2190-4580 |
| Chloride | 11-26 | 30-60 | 11-35 | 7500-140000 | 6000-15000 | 3200-9000 |
| DO | 5-11.4 | 4.3-7.3 | 6.3-10.2 | Nil | Nil | Nil |
| BOD | 2.3-14.2 | 4.6-17.6 | 3.6-13.2 | 11000-72000 | 6000-32000 | 11000-16400 |
| COD | 10-45 | 30-68 | 13.6-60 | 24000-130000 | 4600-56000 | 1000-4000 |
| Potassium | 0.23-0.93 | 2.2-9.4 | 1.2-4.2 | 5700-7800 | 4300-6600 | 1000-4000 |

The parameters are in mg/L except temperature (°C) and pH.

due to subsequent mixing of effluents in the river water at this confluence point. Similar results have been observed at confluence point of distillery effluent by Malik et al. (2002), and sewage and other industrial effluents by Saxena (1966) and Shankar et al. (1987). The River Narmada, which has been affected by distillery effluent, however, restores almost to its original level at a distance of about half kilometre downstream from the confluence point by the natural process of self-purification. The river with self-purification capacity could assimilate the existing load (Lester 1967).

According to the present Indian environmental pollution control regulations, factories are required to setup effluent treatment system either individually or collectively, and the treated effluent should meet the pollution control norms. In the present investigation, parameters like BOD, COD, chloride, TS, TDS, TSS of treated effluent are too high in comparison to recommended standard values. This shows that distillery at Barwaha is not following proper treatment of the effluent. Thus, an urgent attention of the factory management authority, local administration and Pollution Control Board is needed to save the Narmada river from pollution.

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