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ORIGINAL ARTICLE

Statistical Interpretation of Important Hydro Biological Parameters in Chambal River at Dholpur District

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ABSTRACT

The Chambal River is a tributary of the Yamuna River in central India, and thus forms part of the greater Gangetic drainage system. The River flows north-northeast through Madhya Pradesh, running for a time through Rajasthan, then forming the boundary between Rajasthan and Madhya Pradesh before turning southeast to join the Yamuna in Uttar Pradesh state. It is a legendary River and finds mention in ancient scriptures. Present study is designed to explore and analyze hydrobiological parameters on the basis of statistical measures to signify the data for scientific use.
***Key words**: water quality, bio monitoring, hardness, turbidity*

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INTRODUCTION

The perennial Chambal originates at janapav, south of Mhow town, near manpur Indore, on the south slope of the Vindhya Range in Madhya Pradesh. The Chambal and its tributaries drain the Malwa region of northwestern Madhya Pradesh, while its tributary, the Banas, which rises in the Aravalli Range, drains southeastern Rajasthan. It ends a confluence of five Rivers, including the Chambal, Kwari, Yamuna, Sind, Pahuj, at Pachnada near Bhareh in Uttar Pradesh state, at the border of Bhind and Etawah districts. The Chambal River is considered pollution free, and hosts an amazing Riverine faunal assemblage including 2 species of crocodilians– the mugger and gharial, 8 species of freshwater turtles, smooth-coated otters, gangetic River dolphins, skimmers, black-bellied terns, sarus cranes and black-necked storks, amongst others.

Rivers play a vital role in integrating and organizing the landscape, and moulding the ecological setting of a basin. River Chambal is the most significant water resource of the state of Madhya Pradesh catering to the demands of a large number of cities and towns situated on its banks. Apart from the supply of potable water, the River is also ecologically very important as it harbours very rich biodiversity. The Chambal River is a tributary of the Yamuna River in central India, and forms part of the greater Gangetic drainage system. It is a legendary River and finds mention in ancient scriptures. The perennial Chambal originates at Manpura, south of Mhow town, near Indore, on the south slope of the Vindhya Range in Madhya Pradesh. The Chambal and its tributaries drain the Malwa region of north western Madhya Pradesh, while its tributary, the Banas, which rises in the Aravalli Range, drains south eastern Rajasthan. It ends a confluence of five Rivers, including the Chambal, Kwari, Yamuna, Sind, Pahuj, at Pachnada near Bhareh in Uttar

Pradesh state, at the border of Bhind and Etawah districts. People along the River use water for many purposes. However, the surface water quality is deteriorating due to anthropogenic activities, industrialization, farming, transportation, urbanization, animal and human excretions and domestic wastes. Pollution is caused when a change in the physical, chemical or biological condition in the environment affect quality of human life including other animals' life and plant. Industrial and municipal wastes are been continuously added to water bodies hence affect the physiochemical quality of water making them unfit for use of livestock and other organisms. The extent of pollution is generally assessed by studying physical and chemical characteristics of the water bodies.

MATERIALS AND METHODS

Statistical Calculations: The statistical calculations were done by the following formula described by Fischer and Yates (1993).

- **Mean**

$$\overline{X} = \frac{\sum X}{N}$$

Where
$\sum X$ = Sum of Observations
N = Total number of observations

- **Standard Deviation (S.D.)**

$$S.D. = \sqrt{\frac{\sum (X - \overline{X})^{2}}{N - 1}}$$

Where
X = Individual observations
$\overline{X}$ = Mean of observations
$(X - X)^2$ = Sum of the square of the deviation from the mean
N = Number of observations
$\sum$ = Summation

RESULTS AND DISCUSSION

Table 1: Analytical

Variable	Number of cases	Mean	Standard deviation
Temperature (^{0}C)			
Upstream	4	23.25	6.65
Downstream	4	24.78	6.63
	Mean difference	1.53	
	S.D. difference		0.02

Table 2: Analytical

Variable	Number of cases	Mean	Standard deviation
Water flow measurement			
Upstream	4	0.83	0.07
Downstream	4	0.83	0.03
	Mean difference	0.0	
	S.D. difference		0.04

Table 3: Analytical

Variable	Number of cases	Mean	Standard deviation
pH Value			
Upstream	4	7.175	0.05
Downstream	4	7.91	0.07
	Mean difference	0.735	
	S.D. difference		0.02

Table 4: Analytical

Variable	Number of cases	Mean	Standard deviation
Turbidity			
Upstream	4	23.75	4.5
Downstream	4	26.75	6.99
	Mean difference	3.0	
	S.D. difference		2.49

Table 5: Analytical

Variable	Number of cases	Mean	Standard deviation
Conductivity			
Upstream	4	0.90	0.05
Downstream	4	0.91	0.06
	Mean difference	0.01	
	S.D. difference		0.01

Table 6: Analytical

Variable	Number of cases	Mean	Standard deviation
Dissolved oxygen (mg/l)			
Upstream	4	7.55	0.53
Downstream	4	5.42	1.44
	Mean difference	2.13	
	S.D. difference		0.91

Table 7: Analytical

Variable	Number of cases	Mean	Standard deviation
B.O.D. (mg/l)			
Upstream	4	11.2	2.02
Downstream	4	11.7	1.86
	Mean difference	0.5	
	S.D. difference		0.16

Table 8: Analytical

Variable	Number of cases	Mean	Standard deviation
C.O.D.			
Upstream	4	29.5	5.0
Downstream	4	47.75	10.28
	Mean difference	18.25	
	S.D. difference		5.28

TEMPERATURE

The temperature of water sample slightly varies considerable at down stream site D and up stream site A, during sampling of Chambal water. Minimum temperature is recorded in the month of Jan 2005 while maximum in the month of July 2005. Water temperature

during summer increases and in winter decline, indicate that their is a close relation between air and surface water. However the temperature of Chambal water at all sampling stations vary significantly after each three months intervals.

WATER FLOW MEASUREMENT

The water flow measurement considerable varies at down stream site D and up stream site A. The minimum water has recorded in the months of Jan 05.

TURBIDITY

In the present investigation non significant increase in turbidity recorded between up stream site A and down stream site D. Maximum turbidity has been recorded in the month of Oct 05, this may be due to high silted River water. An increase trend in turbidity has been recorded in the down stream site D as compared to site A. These higher value at down stream site D may be due to higher concentration of suspended solids comming through sewage and domestic waste. The turbidity of Chambal River water varies after each three months intervals.

ELECTRICAL FLOW CONDUCTIVITY

It is a numerical expression of the ability of an aqueous solution to carryon electric current, depends on the presence of ions, total concentration, mobility, balance and relative concentration as well as on the temperature of measurement. The conductivity increases throughout the investigation. A non significant increase of conductivity has been observed from April 05 to July 05 on account of dilution factor because of rice of water level of Chambal River. The conductivity slightly varies from up stream site A to down stream site D. The significant increase of conductivity most probable due to the discharge of sewage, domestic waste and small scale industry's effluent in Chambal River. The conductivity significantly varies after each three months of intervals. The pH value non significantly increase during study period from Oct 04 to April 05. It has been observed that the nature of Chambal water is alkaline. The pH of Chambal water varies after each three months intervals. This variation in pH values may probabley due to highly pollution load, mixing of sewage and effluent in the River body.

B.O.D. AND C.O.D.

B.O.D. known as oxygen demand of the system, required for its stabilization under biological system. It is therefore, an index of organic content of the biological system which can be utilized by microbes in the process. Present investigation of B.O.D. and C.O.D. significantly increased throughout the study period at down stream site D as compared to up stream site A. Although a non-significant increase in the month of Oct 04 to July 05 may be correlated with more water in Chambal River. B.O.D. and C.O.D. may be due to influx of washing printed clothes from washing-ghat, domestic-sewage and due to high sewage load in the River. All values of B.O.D. and C.O.D. indicate high organic matter load in Chambal River of Dholpur area. The increase value of C.O.D. can be explained on the basis of discharge of effluents from the various small scale industrial sources which are mixed in to the River Chambal at the down stream site D.

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