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जल गुणवत्ता आँकड़े पुस्तक

Water Quality Data Book



नर्मदा बेसिन संगठन
केन्द्रीय जल आयोग, भोपाल
मार्च 2020

NARMADA BASIN ORGANISATION
Central Water Commission, Bhopal
March 2020

केवल सरकारी उपयोग के लिये

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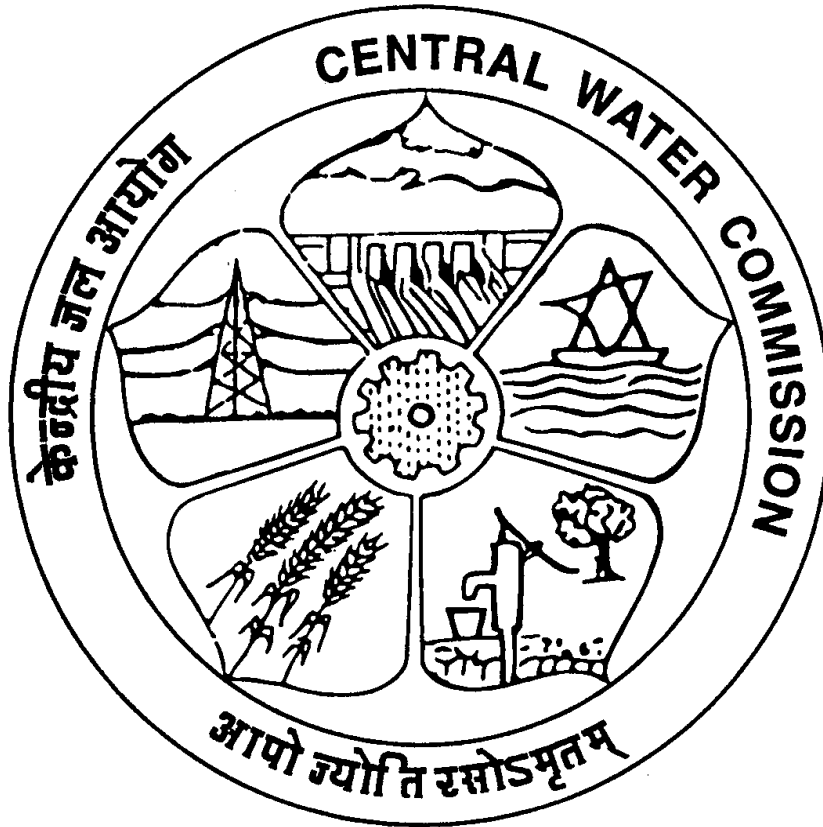
WATER QUALITY DATA BOOK

नर्मदा बेसिन

Narmada Basin

जून 2018 - मई 2019

June 2018 – May 2019



केन्द्रीय जल आयोग

CENTRAL WATER COMMISSION

प्रस्तावना

हमारे पूर्वज यह जानते थे कि पृथ्वी पर जीवों का जीवन तभी स्वस्थ, सुखी और दीर्घ रह सकता है, जब शुद्ध जल और शुद्ध वायु की उपलब्धता हो।

नदी घाटियों के समुचित नियोजन, संरक्षण और विकास में प्रभावी कार्यवाही के लिये केंद्रीय जल आयोग एक शीर्षस्थ तकनीकी संस्था के रूप में कार्यरत है। इस संस्था द्वारा विभिन्न जल विज्ञानीय प्रेक्षण तंत्र का प्रबोधन भारत की वृहद तथा मध्यम नदियों पर स्थित विभिन्न स्थलों से संचालित है। जल के प्रबोधन के लिये इन्हीं कुछ महत्वपूर्ण स्थलों से जल नमूने एकत्रित किये जाते हैं। नर्मदा नदी के जल गुणवत्ता प्रबोधन से संबंधित आकड़ों का संकलन, नर्मदा मंडल, भोपाल तथा ताप्ती मंडल, सूरत स्थित प्रयोगशालाओं में किया जाता है। नर्मदा बेसिन के लिये इन आकड़ों का संकलन वर्ष 1978-79 में सात स्थलों से शुरू किया गया था, वर्तमान में 16 स्थलों पर जल गुणवत्ता आकड़ों का आकलन कार्य किया जा रहा है।

नर्मदा नदी की जल गुणवत्ता के प्रभावी प्रबोधन हेतु जल गुणवत्ता आंकड़े पुस्तक का प्रकाशन किया जा रहा है। इस पुस्तक में वर्ष 2017-18 के दौरान नर्मदा बेसिन में 16 स्थलों के विश्लेषण आकड़ें संकलित किये गए हैं। संकलित आकड़ों के आधार पर ही जानकारी इस पुस्तक में समाहित है इसके आलावा प्रेक्षण तकनीक, आकलन पद्धति, स्थलवार वृत्तपत्र, रासायनिक घटक आदि भी इस पुस्तक में उल्लेखित हैं।

आशा है इस पुस्तक में दी गयी जानकारियां एवं संकलित आकड़ें, जल-गुणवत्ता एवं प्रबोधन के क्षेत्र में कार्य कर रही संस्थाओं के लिए काफी लाभप्रद रहेंगे, इस पुस्तक को और अधिक उपयोगी बनाने के लिये सुझाव आमंत्रित हैं।

इस पुस्तक के आकड़ों से संकलन, विश्लेषण तथा प्रकाशन हेतु नर्मदा बेसिन संगठन के अधिकारियों एवं कर्मचारियों ने समर्पण की भावना से एक दल के रूप में जो कार्य किया है, वह प्रशंसनीय है, मैं सभी का आभार व्यक्त करता हूँ।

स्थान- भोपाल
मार्च 2019

(प्रदीप कुमार ठाकुर)
अधीक्षण अभियंता (समन्वय)

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Abbreviation and Symbols Used

W YEAR	:	Water Year
cumec	:	Cubic metre per second
mmhos/cm	:	Micro mhos per centimetre
+	:	Cation
-	:	Anion
ppm	:	Part per million
m.e./ l	:	Milli equivalent per litre
⁰ C	:	Temperature in degree centigrade
pH	:	Negative logarithm of hydrogen ion concentration
K ⁺	:	Potassium ion
Na ⁺	:	Sodium ion
Ca ⁺⁺	:	Calcium ion
Mg ⁺⁺	:	Magnesium ion
NH ₄ ⁺	:	Ammonium ion
CO ₃ ⁻⁻	:	Carbonate ion
HCO ₃ ⁻	:	Bicarbonate ion
Cl ⁻	:	Chloride ion
F ⁻	:	Fluoride ion
SO ₄ ⁻⁻	:	Sulphate ion
SO ₃ ⁻⁻	:	Sulphite ion
NO ₃ ⁻	:	Nitrate ion
NO ₂ ⁻	:	Nitrite ion
PO ₄ ⁻⁻⁻	:	Phosphate ion
SiO ₃ ⁻⁻	:	Silicate ion
DO	:	Dissolved oxygen
BOD	:	Bio-chemical oxygen demand
Sod % age	:	Sodium percentage
SAR	:	Sodium Adsorption ratio
RSC	:	Residual Sodium Carbonate
NDN	:	Narmada Division
TDN	:	Tapi Division
NBO	:	Narmada Basin Organisation
MPN	:	Most probable number
mg/l	:	Milligram per litre
max	:	Maximum
min	:	Minimum
WQ	:	Water Quality
Sq km	:	Square Kilometre
m	:	Metre
TDS	:	Total Dissolved Solids
SNR	:	Sample not received
NF	:	No flow
RD	:	River dry
NTU	:	Nephelometric Turbidity Unit

1 Introduction

1.1 Scope

Watersheds are valuable resource for the country. Adequate knowledge of these watersheds is necessary for a rational formulation of water management policies. Moreover growth of anthropogenic activities in river basins may lead to river pollution. Keeping this in mind, Central Water Commission observed a number of physico-chemical parameters of surface water to understand the water quality of large watersheds.

Narmada Basin is the fifth largest among the twelve major river basins of the country. Narmada is an interstate river having total length of 1312 km, of which 1079 km flows in Madhya Pradesh, 35 km flows along the common border of Madhya Pradesh and Maharashtra, 39 km flows along the border of Maharashtra, and Gujarat and 159 km flows in Gujarat. The total basin area is approximately 98796 sq km, out of which 85859 sq km lies in Madhya Pradesh, 1538 sq km in Maharashtra and 11399 sq km. lies in Gujarat. The river originates from the Amarkantak Plateau of Maikal range at about 1057 metre above Mean Sea Level (MSL) and major part flows through narrow elongated trough running east to west with slight inclination towards the south, before it drains into the Arabian Sea at the Gulf of Khambat near Bharuch in Gujarat.

In its 1312 km long stretch, tributaries of various sizes contribute water and their pollution load to the Narmada River. A characteristic change in the water quality is expected when the tributaries join the river. There are about 19 major tributaries of Narmada listed by Narmada Water Disputes Tribunal, out of which nine are being considered for water quality assessment during present observation period.

1.2 Sources of Information

During the reporting period of 2018-2019 the results of water sample analysis carried out in the laboratory at Narmada Division Bhopal are compiled in this report. The water samples were collected at 18 hydro meteorological and water quality monitoring stations in Narmada basin on monthly basis, the same are shown in Plate-1. Out of 16, 14 water quality stations are functioning under the administrative control of Narmada Division, Bhopal while two stations (at Sl No. 1 and 2 of the Table1-1) are under the administrative control of Tapi Division, Surat. These stations are functioning under plan scheme viz. “Development of Water Resources Information System”, during 12th Five Year Plan. The sites and the codes of Water Quality Observation Stations in the Narmada basin are given in Table 1-1.

Table 1-1, Water Quality Observation Stations in Narmada Basin Organization

Sr.	Name of River/Station	Code No.	Sr.	Name of River/Station	Code No.
1.	Orsang at Chandwada	10215032	10.	Narmada at Barman	10215011
2.	Narmada at Garudeshwar	10215030	11.	Sher at Belkheri	10215010
3.	Narmada at Mandleshwar	10215026	12.	Hiran at Patan	10215009
4.	Kundi at Kogaon	10215025	13.	Banjar at Bamni	10215006
5.	Narmada at Handia	10215022	14.	Burhner at Mohgaon	10215004
6.	Ganjal at Chhidgaon	10215020	15.	Narmada at Manot	10215002
7.	Narmada at Hoshangabad	10215019	16.	Narmada at Dindori	10215001
8.	Narmada at Sandia	10215013	17.		
9.	Shakkar at Gadarwara	10215012	18.		

1.3 Availability of Water Quality Data

The dates of starting water quality observations on the various water quality stations are given in **Table 1-2**. Long-term monitoring data may facilitate to assess and give an idea of the status of the aquatic environment in the Narmada basin.

Table 1-2, Details of Sites on Narmada River

Sl. No	Name of Site	Site Opening Date	Data availability
Group 'A' : Sites in operation	Orsang at Chandwada	15.03.1980	Up to date
	Narmada at Garudeshwar	15.06.1977	- do -
	Narmada at Barmanghat	01.06.1979	- do -
	Narmada at Mandleshwar	15.06.1979	- do -
	Narmada at Hoshangabad	15.07.1979	- do -
	Narmada at Handia	01.08.1979	- do -
	Shakkar at Gadarwara	16.08.1979	- do -
	Narmada at Sandia	15.09.1979	- do -
	Narmada at Manot	01.01.1980	- do -
	Hiran at Patan	01.09.1986	- do -
	Sher at Belkheri	01.09.1986	- do -
	Burhner at Mohgaon	15.09.1986	- do -
	Kundi at Kogaon	15 .09.1986	- do -
	Ganjal at Chhidgaon	16.09.1986	- do -
	Narmada at Dindori	15.03.1990	- do -
	Banjar at Bamni	20.06.1999	- do -
Group 'B'	Uri at Dhulsar	01.07.2008	Closed on 31.03.2017
	Goi at Pati	01.07.2008	Closed on 01.03.2017

Sl. No	Name of Site	Site Opening Date	Data availability
Sites closed	Narmada at Jamtara	28.10.1971	Closed on 31.03.2001
	Narmada at Rajghat	15.06.1979	Closed on 01.07.2007
	Chhota Tawa at Ginnore	16.07.1979	Closed on 31.03.1999
	Banjar at Hridaynagar	01.09.1986	Closed on 07.04.2002
	Tawa at Manegaon	15.09.1986	Closed on 20.08.1991
	Narmada at Mortakka	01.09.1999	Closed on 01.07.2007

1.4 Common Characteristics of Water

The water samples received at Divisional Laboratories are stored in deep freezer and analysed for various physical, chemical and biological parameters as mentioned in **Table 1-3**.

Table 1-3, Parameters analysed at the Divisional Laboratory

Physical				
1	Colour	3	EC_GEN ($\mu\text{mho/cm}$)	5 TDS (mg/L)
2	Odour	4	pH_GEN (pH units)	6 Temp (deg C)
				7 Turb (NTU)
Chemical				
1	Alk-Phen (mg CaCO_3/L)	6	F (mg/L)	11 NO_2+NO_3 (mg N/L)
2	ALK-TOT (mg CaCO_3/L)	7	HCO_3 (mg/L)	12 $\text{NO}_2\text{-N}$ (mg N/L)
3	Ca (mg/L)	8	K (mg/L)	13 $\text{NO}_3\text{-N}$ (mg N/L)
4	Cl (mg/L)	9	Mg (mg/L)	14 $\text{o-PO}_4\text{-P}$ (mg P/L)
5	CO_3 (mg/L)	10	Na (mg/L)	15 SiO_2 (mg/L)
				16 SO_4 (mg/L)
Biological				
1	BOD (mg/L)	3	DO (mg/L)	
2	COD (mg/L)	4	DO_SAT% (%)	
Chemical Indices				
1	HAR_Ca (mg CaCO_3/L)	3	Na% (%)	5 SAR (-)
2	HAR_Total (mg CaCO_3/L)	4	RSC (-)	

2 Water Quality Observation

2.1 Sampling

The periodicity of collection of water samples is monthly i.e., on the first working day of the month provided that the samples reaches to the Divisional Laboratory at Bhopal on the next day. These water samples are collected at 0.6 times the depth from surface without disturbing the bottom sediments, from the point across the river section having maximum depth or maximum flow along the cross section of the river, so that sample must be representative of the source (i.e. water stream) that is to be evaluated. The samples are collected in clean and pre-rinsed plastic bottles of one litre capacity, filled up to their full capacity without air bubbles. Measurements of some other parameters like in-situ temperature; depth, velocity of water etc. are written on paper slip and pasted on the polythene bottles for identification. The water samples thus collected are sent for analysis to Divisional Laboratory Bhopal by special messenger so as to reach within 24 hours of collection for minimum changes, if any, in the properties during the transit period (time when the samples are collected and the time when they are analysed).

2.2 Method of Analysis

The water sample preserved in laboratory is analysed using standard analytical and/or instrumental methods, which are quick, usually much faster than purely chemical procedures and suited for number of routine analysis. The quantitative estimation for the parameters detailed above are determined by titrimetric methods, electrical methods and optical methods. The applications of different methods to analyse physical and chemical characteristics of water sample are summarized below.

2.2.1 Physical Characteristics

The major physical characteristics or parameters of water are,

- **Discharge** in cumecs is measured by current meter and this average rate of volume of water with concentration of pollutant give the possibility to detect significant pollution sources and its peaking factor.
- **Colour** in water is the result of dissolved extracts from metals in rocks and soil, from organic matter in soil and plants, and occasionally from industrial by-products. The colour of the water sample is determined by visual comparison method.
- **Odour** of the water sample is determined by qualitative human receptor method.
- The in-situ **temperature** in degree centigrade is measured by thermometer and is recorded to decide the intended use of water, the treatment process to remove impurities and its transport.
- The **pH** of water is measure of the acidic or basic nature of the water. Water with pH lower than 7 are acidic and those with a higher pH are basic. This is observed with a pH meter which actually measures the electrical potential exerted by the H^+ ions.

- Measuring its **electrical resistance** between two electrodes dipped in the sample and comparing its resistance with the resistance of a standard solution of potassium chloride at 25° C by Electrical Conductivity meter determines the conductivity of the water sample. The value of conductivity coefficient is measured in micro-mhos/cm and is an indicator of type of dissolved salts in water.
- **Total Dissolved Solids (TDS)** concentration in mg/l, in conjunction with a detailed chemical analysis, is used to assess the suitability of various water sources for alternative uses such as industry or agriculture. Its value should be between 0.55 and 0.70 of the conductivity coefficient. This is measured with a potentiometer.
- **Turbidity** is defined as the presence of soil particles, clay, silt and other colloidal impurities in the water which obstruct the passage of light through water and hence decreases the clarity of water. The degree of turbidity measured in NTU depends on the fineness of the particles and their concentration. This is measured with a turbidity meter (discussed under nephelometric method) by measuring the interference to the passage of light through a water sample. Surface waters in which there is significant increase in the level of turbidity after a rainfall are often identified as "flashing waters". Such water is more difficult to treat than waters in which the level of turbidity remains reasonably constant.

2.2.2 Chemical Characteristics

The common tests used to quantify the inorganic constituents of water are:

- **Titrimetric Method:** The term titrimetric analysis refers to quantitative chemical analysis carried out by determining the volume of a solution of accurately known concentration (standard solution), which is required to react with the known volume of solution of the substance to be determined. The end point of titration is detectable by perceptible change of colour of the solution produced usually by the addition of an auxiliary reagent known as indicator. Parameters determined by this technique are **Carbonate, Bicarbonate, Chloride, Calcium, Magnesium, Oxygen Absorbed in four Hrs, Chemical Oxygen Demand [COD], Dissolved Oxygen [DO] and Biochemical Oxygen Demand [BOD]**.
- **Spectrophotometric/ Colorimetric Method:** This instrument works on measurement of the amount of optical energy of a particular wavelength absorbed/transmitted by the solution. The instruments used in this method are UV Double Beam Spectrophotometer. A series of standard solutions of known concentration are prepared and treated with appropriate reagents to produce colored solution. Then the light of specific wavelength is passed through the standard solutions. The transmittance / absorbency is plotted against the concentration and this is termed as calibration or reference curve. Water samples are treated with the same reagents for colour development under the same experimental conditions and then transmittance/ absorbance is measured. Concentration of the constituent is being determined from calibration curve. Parameters analysed by this method are **Iron, Chromium, Ammonium, Fluoride, Nitrate, Nitrite, Phosphate and Silicate**.

- **Flame Spectrophotometry Method:** This is also an optical method of analysis based on measurement of the amount of energy of a particular wavelength emitted. If a solution containing 'a metallic salt is aspirated into a flame, the metal atoms are excited by the thermal energy of the flame and then electrons in the ultimate shell go to higher energy levels and eventually return to ground state and emit the energy in form of radiation. The filter, interposed between the flame and the photocell detector, is used to select a given emission line. To convert the measured emission values into the concentration of the substance being determined, a calibration curve is plotted by aspirating into the flame, samples of solutions containing known concentration of salts (standard solution). A graph is plotted with measured emission against the concentration of solutions. Then the test samples are aspirated for flame emission and emission intensity is measured. From these values of emission from unknown test solution, concentration of substance can be determined from the calibration curve. Parameters estimated through this method are **Sodium and Potassium**.
- **Nephelometric Method:** The measurement of the intensity of the scattered light at right angles to the direction of the incident light as a function of the concentration of the solution is the basis of nephelometric analysis. The calibration curve is plotted by measuring the scattering intensity of standard sulphate solutions added with barium chloride to inhibit the growth of micro crystals of barium sulphate against concentration of solution. Then the test samples are allowed for scattering. The concentration of sulphate-ion content of unknown solution is determined from the calibration curve. Turbidity of the water sample is measured directly by calibrating the instrument with standard turbid solution of 10% Hexamethylene and 1 % Hydrazine sulphate. The parameter analysed by nephelometric method are **Sulphate and turbidity**.

2.3 Explanatory Notes

For dissemination of processed information, the water quality database has been tabulated in succeeding pages for making realistic assessments. The information is grouped under two headlines, namely, History Sheet and Water Quality Data of hydrological station. Tabular summaries bring together processed data from selected stations detailed previously in this book. These explanatory notes below are designed to assist in the interpretation of characteristics incorporated in the book.

- Frequency of publication of “**Water Quality Data Book**” is annual and water year starts from 1st June of every calendar year to the 31st May of the next calendar year and covers one complete hydrological cycle. This book presents updated water quality data for the period 1st June 2018 to 31st May 2019.
- In the history sheet, a catalogue is designed to identify the hydrological records grouping name of river basin, location, catchments area, period of the stream flow and water quality (including general comment on sediment transport) record and status of water quality.
- Every permanent site is given a unique identifier code that will be used to denote all data and other Information pertinent to the site. A unique nine-column numeric code system is

used for site identification to facilitate multi data storage and its retrieval. The first two columns are identifiers measuring authority. Third and fourth columns are for drainage zone/basin. Fifth and Sixth columns are for Independent River and last three i.e. seventh, eighth and ninth columns are for station numbers within the region.

- The following four chemical indices namely Hardness number, Sodium percentage, Sodium Absorption Ratio and Residual Sodium Carbonate are calculated by empirical formula taking different observed values. These are detailed below:

Hardness number

Calcium and Magnesium are the principle ions that make the water hard. Hardness is expressed in milligrams per litre of equivalent Calcium Carbonate. Hardness Number is expressed by:

$$\text{Hardness Number} = (\text{Ca}^{++} + \text{Mg}^{++}) \times 50$$

Sodium percentage

Salts of Calcium, Magnesium, Sodium and Potassium in irrigation water are critical for almost all crops. In excessive quantities these salts reduce the osmotic activity of plants, preventing the absorption of nutrients by plant and indirect chemical effects on the metabolism of the plant. These ions also affect soil permeability, preventing adequate drainage or aeration. Percent Sodium is defined as the percentage of the Sodium content of water in the total cations content.

Sodium percentage is determined by dividing the Sodium content by the sum of Calcium, Magnesium, Sodium and Potassium contents by formula given below:

$$\text{Sodium Percentage} = \frac{\text{Na}^+ \times 100}{\text{Ca}^{++} + \text{Mg}^{++} + \text{Na}^+ + \text{K}^+}$$

(all expressed as milliequivalents per litre)

Sodium Absorption Ratio

Since Calcium and Magnesium will replace Sodium more readily than vice versa, the ratio reflects the Sodium hazard. The SAR indicates the relative activity of the Sodium ions in exchange reactions with the soil. Irrigation water with a high SAR will cause the soil to tighten up. The Sodium Adsorption Ratio (SAR) is defined as:

$$\text{Sodium Absorption Ratio} = \frac{\text{Na}^+}{\left[\frac{(\text{Ca}^{++} + \text{Mg}^{++})}{2} \right]^{1/2}}$$

(Residual Sodium Carbonate)

Residual Sodium Carbonate is calculated using the following formula

$$\text{Residual Sodium Carbonate} = (\text{CO}_3^{--} + \text{HCO}_3^-) - (\text{Ca}^{++} + \text{Mg}^{++})$$

The U.S. Department of Agriculture has classified irrigation waters in four groups depending on SAR and the specific conductance (Diagram for classification and use of Irrigation Water is given at **Annexure -1**. Classification of water sample for suitability of agriculture as per salinity diagram is indicated lastly on compilation sheet.)

2.4 Comments on Site-wise Data of Water Quality for 2018-19

Orsang at Chandwada

The degree of Hardness Number at this Station showed the range of medium hard water. The fluoride values were within their respective tolerance limits. The pH values were within the tolerance limit. The BOD values was above the tolerance limit on 02.07.2018 (2.1). The load of chemical constituents varied within the tolerance limit, hence water qualified for all use class A, B, C, D, and E.

Narmada at Garudeshwar

The degree of Hardness Number at this Station showed the range of medium hard water. The BOD values were above the tolerance limits on 03.10.2018 (2.3), on 01.02.2019 (2.0) and on 01.03.2019 (2.4). The pH and fluoride values were within their respective tolerance limits. The ionic concentration varied in value below the prescribed limits, hence water stream qualified for all designated classes A, B, C, D, and E.

Narmada at Mandleshwar

The water stream at this site has been found to be generally within 'Medium Hard' range. The pH, fluoride, BOD and other parameters values were within their respective tolerance limits for all designated use classes A, B, C, D, and E.

Kundi at Kogaon

The water at this station was alkaline and hardness number showed the range for 'Hard Water' and diluting to 'Medium Hard' range during monsoon period. The pH, fluoride, BOD and other parameters were within their respective tolerance limits, hence the water stream qualified for all designated classes A, B, C, D, and E.

Narmada at Handia

The hardness number showed the range of 'Medium Hard' water values. The pH, fluoride, BOD and other parameters varied in values below the prescribed limits; hence the water stream at this station qualifies suitable for all usable classes A, B, C, D & E.

Ganjal at Chhidgaon

The degree of hardness number classified the water stream toward 'Hard Water' type. Ionic concentrations were below the prescribed tolerance limit. The BOD values was above the tolerance limits on 01.06.2018 (2.0), The pH and Fluoride values were within the tolerance limit for all designated use classes.

Narmada at Hoshangabad

Generally, the degree of hardness remained within the values of 'Medium Hard Water'. The pH, fluoride and BOD values were within the tolerance limit for all designated use classes. The ionic concentrations of other constituents were quite lower than the tolerance limits hence the same are non-interfering.

Narmada at Sandia

The degree of hardness showed the values more towards 'Medium Hard Water'. The pH fluoride & BOD values recorded were within the tolerance limits. The concentration of anions and cations were lower than their respective tolerance limits, hence the water stream at this station qualifies suitable for all usable classes A, B, C, D & E.

Shakkar at Gadarwara

Hardness number projected the water of 'Medium Hard Water' type throughout the year. The pH and fluoride values were within the tolerance limit for all designated use classes. The BOD value was above the tolerance limit only on 02.07.2018 (2.5).

Narmada at Barmanghat

The water at this station was 'Medium Hard Water' range. The BOD, pH and Fluoride values were within the tolerance limit for all designated use classes A, B, C, D & E.

Sher at Belkheri

The degree of hardness observed towards 'Hard Water' range in most number of samples. The BOD values were within limits. The pH values and fluoride concentrations were within the limit for all designated use classes. Ionic concentrations are non-interfering as pollutants due to their low concentrations from maximum prescribed limit of designated best user classes A, B, C, D and E.

Hiran at Patan

The hardness number values projected water channel as 'Medium Hard Water' range. Ionic concentrations were below the prescribed tolerance limit. The BOD value were above the tolerance limit on 02.07.2018 (2.6), 01.02.2019 (2.5) & on 01.04.2019 (204.), pH and Fluoride values were within the tolerance limit for all designated use classes.

Banjar at Bamni

The degree of hardness at this station is within 'Medium Hard Water' range. Conductivity values are quite low in spite of low discharge. The ionic concentrations of all the chemical constituents analysed were below the tolerance limit attributed to all user classes A, B, C, D and E.

Burhner at Mohgaon

The pH, B.O.D, Fluoride and other chemical parameters were within their respective tolerance limits. The low concentration of pollutant constituents qualifies the water stream suitable for user classes A, B, C, D and E.

Narmada at Manot

The degree of hardness is within 'Medium Hard' range. The pH, BOD and Fluoride values were within their respective tolerance limits for all designated use classes. The low concentration of pollutant constituents qualifies the water stream suitable for all user classes A, B, C, D and E.

Narmada at Dindori

The water exhibited 'Medium Hard' water as per hardness number. The BOD values were above the tolerance limits on 01.01.2019 (2.7), and on 01.02.2019 (2.4). The pH and fluoride values and all other parameters were within their tolerance limit for all designated user classes A,B,C,D and E.

3 Analysis Results

3.1 General

Based on discussion presented in Chapter 1 and 2, the results of chemical analysis carried out at each of 16 sites in respect of 24 parameters are presented in this chapter.

3.1.1 Method of Presentation

In the succeeding pages station wise water quality data/ parameters are presented comprising of history sheet and water quality analysis results in tabular form. The series of the water quality observation stations is arranged from the mouth of the river to the upstream giving priority to an intermediate tributary station in a similar fashion.

History sheets give brief description of the water quality observation station. This sheet also contains the status of water quality at the site as per Bureau of Indian Standard IS: 2296-1982. The water analysis result tables are given for the river water only and for the parameters analysed at the site and at the laboratory. The table showing tolerance limits of water quality parameters for various uses of water as per IS: 2296-1982 is given as Annexure -2.

3.2 Orsang at Chandwada

History Sheet

Water Year : 2018-2019

Site : Orsang at Chandwada

Code : 01 02 15 032

State : Gujarat

District : Vadodara

Basin : Narmada

Independent River : Narmada

Tributary : Orsang

Sub Tributary :

Sub-Sub
Tributary :

Local River : Orsang

Division : Tapi Division,
Surat

Sub-Division : LNSD Bharuch

Drainage Area : 3846 Sq. Km.

Bank : Right

Latitude : 22°01'48"

Longitude : 73°25'30"

Opening Date

Closing Date

Gauge : 11/01/1979

Discharge : 01/11/1979

Sediment : 01/08/1988

Water Quality : 15/03/1980

Water Quality Data Book 2018-19

Water Quality Datasheet for the period : 2018-2019

Station Name : Orsang at Chandwada (01 02 15 032)

Division : Tapi Division, Surat

Local River : Orsang

Sub-Division: LNSD Bharuch

River Water Analysis

S.No	Parameters	01/06/2018	02/07/2018	01/08/2018	04/09/2018	03/10/2018	12/11/2018	03/12/2018	15/01/2019	03/02/2018	03/03/2018	03/04/2018	03/05/2018
		A	A	A	A	A	A	A	A	A	A	A	A
	PHYSICAL												
1	Q (cumec)			16.48	62.82	14.02							
2	Colour_Cod (-)	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear				
3	EC_GEN (µmho/cm)	446	1009	475	485	538	684	649	685				
4	Odour_Code (-)	odour free	odour free	odour free	odour free	odour free	odour free	odour free	odour free				
5	pH_GEN (pH units)	8.1	8.4	8.4	8.3	8.4	8.4	8.4	8.5				
6	SS (mg/L)	65	55	26	44	62	67	75	60				
7	TDS (mg/L)	275	610	298	296	328	420	410	420				
8	Temp (deg C)	27.0	28.0	27.0	27.0	29.0	17.0	17.0	13.0				
9	TS (mg/L)	340											
10	Turb (NTU)	8.0											
	CHEMICAL												
1	Alk-Phen (mgCaCO3/L)	0.0	19.9	14.9	0.0	8.4	8.4	16.8	17.5				
2	ALK-TOT (mgCaCO3/L)	136	212	138	131	147	155	160	189				
3	Ca (mg/L)	35	45	32	33	36	40	40	40				
4	Cl (mg/L)	33.0	135.0	42.0	44.0	50.0	84.0	91.0	90.1				
5	CO3 (mg/L)	0.0	24.0	18.0	0.0	10.1	10.1	20.2	21.1				
6	F (mg/L)	0.19	0.28		0.19	0.21		0.28	0.26				
7	HCO3 (mg/L)	166	210	132	160	159	169	154	188				
8	K (mg/L)				2.7	3.1	3.3	3.4	3.1				
9	Mg (mg/L)	13.6	26.2	16.8	15.3	18.7	16.8	17.7	23.6				
10	Na (mg/L)				31.5	36.6	62.1	68.5	64.8				
11	NH3-N (mg N/L)	0.22	0.08	0.07	0.15	0.10	0.09	0.15	0.07				
12	NO2+NO3 (mg N/L)	0.62	0.33	0.88	1.94	2.16	1.14	1.14	0.27				
13	NO2-N (mgN/L)	0.08	0.03	0.02	0.05	0.04	0.02	0.02	0.00				
14	NO3-N (mgN/L)	0.54	0.30	0.86	1.89	2.12	1.12	1.12	0.27				
15	o-PO4-P (mg P/L)	0.120											
16	P-Tot (mgP/L)	0.120	0.080	0.060	0.030	0.020	0.040	0.030	0.090				
17	SiO2 (mg/L)	34.3	50.2	41.9	43.6	31.5	45.9	21.5	22.5				
18	SO4 (mg/L)	12.3	19.4	17.4	12.2	18.6	26.0	23.0	18.2				
	BIOLOGICAL/BACTERIOLOGICAL												
1	BOD3-27 (mg/L)	1.3	2.1	0.7	0.6	1.8	1.1	1.7	1.9				
2	COD (mg/L)	12.0	18.2	3.8	4.1	7.8	7.5	12.5	9.5				
3	DO (mg/L)	7.4	5.7	6.3	7.3	6.3	7.1	7.4	8.9				
4	DO_SAT% (%)	93	73	79	91	81	73	77	85				
	TRACE & TOXIC												
1	Al (mg/L)	0.08							0.05				
	CHEMICAL INDICES												
1	HAR_Ca (mgCaCO3/L)	88	112	80	83	89	101	101	101				
2	HAR_Total (mgCaCO3/L)	145	222	150	147	167	171	175	199				
3	Na% (%)				31	32	44	45	41				
4	RSC (-)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
5	SAR (-)				1.1	1.2	2.1	2.3	2.0				

Water Quality Data Book 2018-19

Water Quality Summary for the period :2018-2019

Station Name : Orsang at Chandwada (01 02 15 032)

Division : Tapi Division, Surat

Local River : Orsang

Sub-Division : LNSD Bharuch

River Water Summary

S.No	Parameters	Number of Observations	Maximum	Minimum	Mean
	PHYSICAL				
1	Q (cumec)	83	218.7	1.165	36.46
2	EC_GEN (µmho/cm)	8	1009	446	621
3	pH_GEN (pH units)	8	8.5	8.1	8.4
4	SS (mg/L)	8	75	26	57
5	TDS (mg/L)	8	610	275	382
6	Temp (deg C)	8	29.0	13.0	23.1
7	TS (mg/L)	1	340	340	340
8	Turb (NTU)	1	8.0	8.0	8
	CHEMICAL				
1	Alk-Phen (mgCaCO3/L)	8	19.9	0.0	10.7
2	ALK-TOT (mgCaCO3/L)	8	212	131	159
3	Ca (mg/L)	8	45	32	38
4	Cl (mg/L)	8	135.0	33.0	71.1
5	CO3 (mg/L)	8	24.0	0.0	12.9
6	F (mg/L)	6	0.28	0.19	0.24
7	HCO3 (mg/L)	8	210	132	167
8	K (mg/L)	5	3.4	2.7	3.1
9	Mg (mg/L)	8	26.2	13.6	18.6
10	Na (mg/L)	5	68.5	31.5	52.7
11	NH3-N (mg N/L)	8	0.22	0.07	0.12
12	NO2+NO3 (mg N/L)	8	2.16	0.27	1.06
13	NO2-N (mgN/L)	8	0.08	0.00	0.03
14	NO3-N (mgN/L)	8	2.12	0.27	1.03
15	o-PO4-P (mg P/L)	1	0.120	0.120	0.12
16	P-Tot (mgP/L)	8	0.120	0.020	0.059
17	SiO2 (mg/L)	8	50.2	21.5	36.4
18	SO4 (mg/L)	8	26.0	12.2	18.4
	BIOLOGICAL/BACTERIOLOGICAL				
1	BOD3-27 (mg/L)	8	2.1	0.6	1.4
2	COD (mg/L)	8	18.2	3.8	9.4
3	DO (mg/L)	8	8.9	5.7	7
4	DO_SAT% (%)	8	93	73	81
	TRACE & TOXIC				
1	Al (mg/L)	2	0.08	0.05	0.07
	CHEMICAL INDICES				
1	HAR_Ca (mgCaCO3/L)	8	112	80	95
2	HAR_Total (mgCaCO3/L)	8	222	145	172
3	Na% (%)	5	45	31	39
4	RSC (-)	8	0.0	0.0	0
5	SAR (-)	5	2.3	1.1	1.7

Water Quality Data Book 2018-19

Water Quality Seasonal Average for the period: 2014-2019

Station Name : Orsang at Chandwada (01 02 15 032)

Local River : Orsang

Division : Tapi Division, Surat

Sub-Division : LNSD Bharuch

River Water

S.No	Parameters	Flood					Winter					Summer				
		Jun - Oct					Nov - Feb					Mar - May				
		2014	2015	2016	2017	2018	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019	2015	2016	2017	2018	2019
	PHYSICAL															
1	Q (cumec)	48.93	33.80	30.51	31.10	31.11	1.121	0.000	5.356	0.000		0.747	0.000			
2	EC_FLD (µmho/cm)	300	600	350	700		600	600	650			600		300		
3	EC_GEN (µmho/cm)	456	424	383	492	591	480	370	553	535	673	728		580		
4	pH_FLD (pH units)	7.0	7.0	7.8	8.0		7.0	7.0	8.2	7.8		7.0		8.0		
5	pH_GEN (pH units)	8.2	8.2	8.0	8.1	8.3	8.3	8.2	8.2	8.0	8.4	8.0		8.2		
6	SS (mg/L)	163	138	130	169	50	140	110	165	213	67	220		190		
7	TDS (mg/L)	286	274	253	320	361	317	240	359	353	417	480		384		
8	Temp (deg C)	28.3	24.0	25.0	26.0	27.6	19.0	20.0	13.5	16.7	15.7	25.0		24.0		
9	TS (mg/L)	450	789	383	485	340	467		524	670		700		574		
10	Turb (NTU)	5.7	3.0	16.0	1.6	8.0	1.0	1.0	1.0	2.3		1.0		1.0		
	CHEMICAL															
1	Alk-Phen (mgCaCO3/L)	8.6	0.0	0.0	0.0	8.6	7.5	0.0	0.0	0.0	14.2	14.1		0.0		
2	ALK-TOT (mgCaCO3/L)	104	97	93	132	153	95	103	167	127	168	176		100		
3	Ca (mg/L)	35	31	35	42	36	28	34	38	42	40	47		32		
4	Cl (mg/L)	75.3	72.5	71.5	75.6	60.8	66.5	58.0	67.5	66.0	88.4	65.0		58.0		
5	CO3 (mg/L)	10.3	0.0	0.0	0.0	10.4	9.0	0.0	0.0	0.0	17.1	17.0		0.0		
6	F (mg/L)	0.13	0.13	0.10	0.13	0.22	0.20		0.13	0.18	0.27	0.14		0.14		
7	HCO3 (mg/L)	106	118	113	161	165	98	126	204	155	170	180		122		
8	K (mg/L)	3.9	4.1	3.7	5.0	2.9	4.0	3.6	3.6	4.8	3.2	3.6		3.8		
9	Mg (mg/L)	7.7	11.5	7.3	8.9	18.1	10.0	7.3	20.7	8.7	19.4	19.0		4.9		
10	Na (mg/L)	48.7	44.0	43.0	52.4	34.0	45.4	40.4	44.4	45.3	65.1	42.6		41.0		
11	NH3-N (mg N/L)	0.15	0.12	0.13	0.11	0.12	0.12	0.12	0.13	0.17	0.10	0.13		0.12		
12	NO2+NO3 (mg N/L)		0.22	0.17	0.20	1.19		0.19	0.20	0.21	0.85			0.18		
13	NO2-N (mgN/L)		0.09	0.06	0.07	0.04		0.06	0.08	0.09	0.01			0.05		
14	NO3-N (mgN/L)	0.13	0.13	0.11	0.13	1.14	0.13	0.13	0.11	0.12	0.84	0.14		0.13		
15	p-PO4-P (mg P/L)					0.120										
16	P-Tot (mgP/L)	0.177	0.125	0.135	0.130	0.062	0.120	0.150	0.110	0.140	0.053	0.100		0.150		
17	SiO2 (mg/L)	8.4	9.0	11.0	8.4	40.3	7.3	8.0	10.0	8.0	30.0	8.6		8.0		
18	SO4 (mg/L)	8.6	7.5	9.0	9.0	16.0	9.3	6.0	10.0	9.7	22.4	2.0		6.0		
	BIOLOGICAL/BACTERIOLOGICAL															
1	BOD3-27 (mg/L)	1.0	0.5	1.3	1.6	1.3	1.7	0.8	1.6	1.9	1.6	4.8		0.6		
2	COD (mg/L)		82.0	28.0	30.8	9.2	16.0	24.0	22.0	18.7	9.8	37.0		44.0		
3	DO (mg/L)	7.0	6.8	8.0	8.1	6.6	8.0	7.0	7.7	8.1	7.8	8.0		4.5		
4	DO_SAT% (%)	89	79	97	100	83	86	77	73	83	78	97		54		
5	FCol-MPN (MPN/100mL)	483	250	950	940		290	600	1150	733		300		1100		
6	Tcol-MPN (MPN/100mL)	1000	450	2200	2020		500	1100	2450	1733		500		2300		
	TRACE & TOXIC															
1	Al (mg/L)	0.11	0.07	0.07	0.11	0.08	0.07	0.05	0.11	0.12	0.05	0.14		0.08		
	CHEMICAL INDICES															
1	HAR_Ca (mgCaCO3/L)	88	78	88	106	91	71	85	95	106	101	118		80		
2	HAR_Total (mgCaCO3/L)	121	126	118	143	166	112	116	181	143	182	197		100		
3	Na% (%)	46	42	43	43	32	46	42	34	40	43	32		46		
4	RSC (-)	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0		
5	SAR (-)	1.9	1.7	1.7	1.9	1.2	1.9	1.6	1.4	1.7	2.1	1.3		1.8		

3.3 Narmada at Garudeshwar

History Sheet

		Water Year	: 2018-2019
Site	: Narmada at Garudeshwar	Code	: 01 02 15 030
State	: Gujarat	District	Bharuch
Basin	: Narmada	Independent River	: Narmada
Tributary	:	Sub Tributary	:
Sub-Sub Tributary	:	Local River	: Narmada
Division	: Tapi Division, Surat	Sub-Division	: LNSD Bharuch
Drainage Area	: 87892 Sq. Km.	Bank	: Right
Latitude	: 21°53'00"	Longitude	: 73°39'00"
Zero of Gauge (m)	: 10 .000 (M.S.L.)	22/12/1971	
	Opening Date	Closing Date	
Gauge	: 22/12/1971		
Discharge	: 23/03/1972		
Sediment	: 21/03/1973		
Water Quality	: 15/06/1977		

Water Quality Data Book 2018-19

Water Quality Datasheet for the period : 2018-2019

Station Name : Narmada at Garudeshwar (01 02 15 030)

Division : Tapi Division, Surat

Local River : Narmada

Sub-Division : LNSD Bharuch

River Water Analysis

S.No	Parameters	01/06/2018	02/07/2018	01/08/2018	04/09/2018	03/10/2018	12/11/2018	03/12/2018	15/01/2019	01/02/2019	01/03/2019	01/04/2019	01/05/2019
		A	A	A	A	A	A	A	A	A	A	A	A
	PHYSICAL												
1	Q (cumec)	19.67	46.55	46.27	24.08	15.42	18.51	18.10	19.33	18.64	17.89	18.43	17.26
2	Colour_Cod (-)	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear
3	EC_GEN (µmho/cm)	424	440	654	715	452	432	449	770	367	341	351	344
4	Odour_Code (-)	odour free	odour free	odour free	odour free	odour free	odour free	odour free	odour free	odour free	odour free	odour free	odour free
5	pH_FLD (pH units)	6.5		6.2		6.3	6.2	6.4	6.7	6.9	6.5	6.3	6.9
6	pH_GEN (pH units)	8.4	8.2	8.2	8.2	8.1	7.8	8.1	8.3	8.5	8.2	7.9	7.1
7	SS (mg/L)	25	46	29	59	58	35	65	56	54	38	42	46
8	TDS (mg/L)	288	272	385	445	268	265	274	465	225	210	215	202
9	Temp (deg C)	27.0	26.0	25.0	23.0	25.0	19.0	17.0	16.0	14.0	16.0	25.0	28.0
10	TS (mg/L)	313											
	CHEMICAL												
1	Alk-Phen (mgCaCO3/L)	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.7	0.0	0.0	0.0
2	ALK-TOT (mgCaCO3/L)	132	128	127	176	134	134	139	197	120	117	120	124
3	Ca (mg/L)	30	32	38	56	31	34	36	63	29	30	30	30
4	Cl (mg/L)	31.0	41.0	58.0	68.0	30.0	29.0	34.0	97.1	28.0	26.0	28.0	32.0
5	CO3 (mg/L)	4.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.3	0.0	0.0	0.0
6	F (mg/L)	0.23	0.24	0.31	0.31	0.34		0.16	0.28	0.18	0.26	0.37	0.26
7	HCO3 (mg/L)	151	156	155	215	163	163	170	240	127	143	146	151
8	K (mg/L)				2.7	2.4	2.9	2.7	2.7	2.1	2.0	2.5	2.3
9	Mg (mg/L)	14.6	15.1	18.7	18.7	17.5	15.6	14.6	13.4	12.6	11.7	12.6	13.1
10	Na (mg/L)				50.2	21.4	20.4	24.2	70.3	19.1	17.8	18.9	22.1
11	NH3-N (mg N/L)	0.17	0.02	0.05	0.28	0.19	0.07	0.28	0.28	0.00	0.03	0.02	0.07
12	NO2+NO3 (mg N/L)	0.30	0.85	1.66	0.56	0.53	0.64	0.63	1.85	0.46	0.35	0.84	0.38
13	NO2-N (mgN/L)	0.07	0.02	0.10	0.01	0.05	0.03	0.02	0.06	0.01	0.01	0.01	0.03
14	NO3-N (mgN/L)	0.23	0.83	1.56	0.55	0.48	0.61	0.61	1.79	0.45	0.34	0.83	0.35
15	PO4-P (mg P/L)	0.100											
16	P-Tot (mgP/L)	0.100	0.050	0.030	0.060	0.030	0.050	0.040	0.060	0.100	0.040	0.110	0.100
17	SiO2 (mg/L)	42.1	34.6	47.1	48.4	38.1	50.4	28.9	40.8	29.5	18.1	22.3	19.8
18	SO4 (mg/L)	10.7	13.5	19.4	26.0	15.8	12.4	11.0	16.6	5.6	6.0	4.8	7.0
	BIOLOGICAL/BACTERIOLOGICAL												
1	BOD3-27 (mg/L)	1.1	1.9	1.1	1.0	2.3	1.4	1.5	1.6	2.0	2.4	1.6	1.8
2	COD (mg/L)	16.0	16.5	7.6	8.1	19.6	11.3	8.3	12.6	13.4	22.1	14.5	14.0
3	DO (mg/L)	6.1	5.4	5.3	2.9	4.9	5.0	5.5	8.1	9.1	7.3	6.8	6.1
4	DO_SAT% (%)	77	67	64	34	59	54	57	82	88	74	82	78
	TRACE & TOXIC												
1	Al (mg/L)	0.05							0.05	0.12	0.05	0.06	0.05
	CHEMICAL INDICES												
1	HAR_Ca (mgCaCO3/L)	76	79	96	139	77	85	89	158	72	74	74	74
2	HAR_Total (mgCaCO3/L)	137	142	174	217	150	150	150	214	125	123	127	129
3	Na% (%)				33	23	22	26	41	25	24	24	27
4	RSC (-)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	SAR (-)				1.5	0.8	0.7	0.9	2.1	0.7	0.7	0.7	0.8

Water Quality Data Book 2018-19

Water Quality Summary for the period : 2018-2019

S.No	Parameters	Number of Observations	Maximum	Minimum	Mean
	PHYSICAL				
1	Q (cumec)	365	187.4	1.480	22.18
2	EC_GEN (µmho/cm)	12	770	341	478
3	pH_FLD (pH units)	10	6.9	6.2	6.5
4	pH_GEN (pH units)	12	8.5	7.1	8.1
5	SS (mg/L)	12	65	25	46
6	TDS (mg/L)	12	465	202	293
7	Temp (deg C)	12	28.0	14.0	21.8
8	TS (mg/L)	1	313	313	313
	CHEMICAL				
1	Alk-Phen (mgCaCO3/L)	12	7.7	0.0	1
2	ALK-TOT (mgCaCO3/L)	12	197	117	137
3	Ca (mg/L)	12	63	29	37
4	Cl (mg/L)	12	97.1	26.0	41.9
5	CO3 (mg/L)	12	9.3	0.0	1.2
6	F (mg/L)	11	0.37	0.16	0.27
7	HCO3 (mg/L)	12	240	127	165
8	K (mg/L)	9	2.9	2.0	2.5
9	Mg (mg/L)	12	18.7	11.7	14.8
10	Na (mg/L)	9	70.3	17.8	29.4
11	NH3-N (mg N/L)	12	0.28	0.00	0.12
12	NO2+NO3 (mg N/L)	12	1.85	0.30	0.75
13	NO2-N (mgN/L)	12	0.10	0.01	0.03
14	NO3-N (mgN/L)	12	1.79	0.23	0.72
15	o-PO4-P (mg P/L)	1	0.100	0.100	0.1
16	P-Tot (mgP/L)	12	0.110	0.030	0.064
17	SiO2 (mg/L)	12	50.4	18.1	35
18	SO4 (mg/L)	12	26.0	4.8	12.4
	BIOLOGICAL/BACTERIOLOGICAL				
1	BOD3-27 (mg/L)	12	2.4	1.0	1.6
2	COD (mg/L)	12	22.1	7.6	13.7
3	DO (mg/L)	12	9.1	2.9	6
4	DO_SAT% (%)	12	88	34	68
	TRACE & TOXIC				
1	Al (mg/L)	6	0.12	0.05	0.06
	CHEMICAL INDICES				
1	HAR_Ca (mgCaCO3/L)	12	158	72	91
2	HAR_Total (mgCaCO3/L)	12	217	123	153
3	Na% (%)	9	41	22	27
4	RSC (-)	12	0.0	0.0	0
5	SSAR (-)	9	2.1	0.7	1

Water Quality Data Book 2018-19

Water Quality Seasonal Average for the period: 2014-2019

Station Name : Narmada at Garudeshwar (01 02 15 030)

Local River : Narmada

Division : Tapi Division, Surat

Sub-Division : LNSD Bharuch

River Water

S.No	Parameters	Flood					Winter					Summer				
		Jun - Oct					Nov - Feb					Mar - May				
		2014	2015	2016	2017	2018	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019	2015	2016	2017	2018	2019
	PHYSICAL															
1Q (cumec)		590.6	358.3	929.7	39.53	30.40	83.65	26.00	34.17	31.12	18.65	24.09	36.12	234.1		17.86
2EC_FLD (µmho/cm)				348			340	356	405			340	345	500		
3EC_GEN (µmho/cm)		310	357	321	399	537	390	321	317	379	505	330	351	380		345
4pH_FLD (pH units)				7.6	6.9	6.3	7.8	8.1	6.9	6.7	6.5	7.8	7.1	7.0		6.6
5pH_GEN (pH units)		8.2	8.2	7.8	8.1	8.2	8.2	8.0	8.3	8.1	8.1	8.2	8.1	8.0		7.7
6SS (mg/L)		115	120	122	127	43	138	105	100	120	53	100	119	110		42
7TDS (mg/L)		203	231	204	263	332	253	208	205	254	307	213	238	247		209
8Temp (deg C)		24.3	24.3	24.7	25.6	25.2	15.5	18.0	17.5	18.3	16.5	22.0	22.0	24.0		23.0
9TS (mg/L)		318	462	326	390	313	390	352	307	374		313	357	248		
10Turb (NTU)		1.0	1.7	3.3	1.4		1.0	1.0	1.0	1.3		1.0	1.0	1.0		
	CHEMICAL															
1Alk-Phen (mgCaCO3/L)		7.7	0.0	0.0	0.0	0.8	10.0	0.0	0.0	0.0	1.9	5.8	0.0	0.0		0.0
2ALK-TOT (mgCaCO3/L)		97	95	87	105	139	78	92	129	103	147	184	120	115		120
3Ca (mg/L)		33	31	30	40	37	28	34	37	33	40	33	34	30		30
4Cl (mg/L)		66.7	63.0	60.0	82.0	45.6	61.0	61.5	70.0	65.0	47.0	90.0	50.0	65.0		28.7
5CO3 (mg/L)		9.3	0.0	0.0	0.0	1.0	12.0	0.0	0.0	0.0	2.3	7.0	0.0	0.0		0.0
6F (mg/L)		0.15	0.14	0.12	0.14	0.29	0.14	0.13	0.13	0.15	0.21	0.15	0.12	0.13		0.30
7HCO3 (mg/L)		100	116	106	128	168	71	112	158	126	175	210	146	140		147
8K (mg/L)		4.0	3.7	4.2	4.0	2.6	3.9	3.8	3.7	4.5	2.6	4.6	4.0	4.2		2.3
9Mg (mg/L)		6.9	9.3	6.4	8.1	16.9	6.5	7.3	16.4	11.4	14.0	14.4	10.9	10.9		12.5
10Na (mg/L)		44.8	38.7	42.0	48.4	35.8	41.3	40.1	41.0	42.7	33.5	44.8	38.0	47.0		19.6
11NH3-N (mg N/L)		0.13	0.12	0.18	0.10	0.14	0.16	0.13	0.12	0.15	0.16	0.13	0.13	0.13		0.04
12NO2+NO3 (mg N/L)			0.20	0.20	0.21	0.78		0.18	0.17	0.22	0.90		0.18	0.18		0.52
13NO2-N (mgN/L)			0.07	0.08	0.09	0.05		0.05	0.05	0.10	0.03		0.06	0.05		0.02
14NO3-N (mgN/L)		0.12	0.13	0.12	0.12	0.73	0.16	0.13	0.11	0.12	0.87	0.13	0.12	0.13		0.51
15o-PO4-P (mg P/L)						0.100										
16P-Tot (mgP/L)		0.157	0.130	0.120	0.138	0.054	0.180	0.140	0.125	0.143	0.063	0.150	0.120	0.140		0.083
17SiO2 (mg/L)		8.4	8.0	10.7	9.8	42.1	10.4	11.0	12.5	9.3	37.4	5.0	6.0	14.0		20.1
18SO4 (mg/L)		10.2	8.5	9.3	10.0	17.1	11.2	10.5	12.0	10.0	11.4	5.0	11.0	12.0		5.9
	BIOLOGICAL/BACTERIOLOGICAL															
1BOD3-27 (mg/L)		0.7	0.6	1.3	1.6	1.5	1.1	1.4	1.1	1.2	1.6	4.9	2.8	1.0		1.9
2COD (mg/L)			66.7	42.7	28.0	13.6	8.0	118.0	18.0	18.7	11.4	26.0	80.0	40.0		16.9
3DO (mg/L)				7.1	6.3	4.9	6.9	7.6	7.4	7.2	6.9	6.9	7.5	8.1		6.7
4DO_SAT% (%)				81	77	60	65	76	77	76	70	79	86	96		78
5FCol-MPN (MPN/100mL)		400	400	633	600		400	600	500	567		600	500	1000		
6Tcol-MPN (MPN/100mL)		900	833	1373	1340		800	1150	1150	1233		1200	1400	1800		
	TRACE & TOXIC															
1Al (mg/L)		0.11	0.09	0.08	0.11	0.05	0.08	0.09	0.08	0.09	0.09	0.12	0.09			0.05
	CHEMICAL INDICES															
1HAR_Ca (mgCaCO3/L)		83	78	74	101	94	70	85	93	83	101	82	85	75		74
2HAR_Total (mgCaCO3/L)		112	117	100	134	164	97	116	161	131	160	142	131	121		126
3Na% (%)		45	41	46	43	28	48	42	36	41	29	40	38	45		25
4RSC (-)		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9	0.0	0.0		0.0
5SAR (-)		1.8	1.6	1.8	1.8	1.1	1.9	1.6	1.5	1.6	1.1	1.6	1.4	1.9		0.8

3.4 Narmada at Mandleshwar

History Sheet

		Water Year	: 2018-2019
Site	: Narmada at Mandleshwar	Code	: 010215026
State	: Madhya Pradesh	District	Khargone
		Independent	
Basin	: Narmada	River	: Narmada
Tributary	:	Local River	: Narmada
Division	: Narmada Division, Bhopal	Sub-Division	: MNSD-III, Indore
Drainage Area	: 72809 Sq. Km.	Bank	: Right
Latitude	: 22°10'18"	Longitude	: 75°39'39"
Zero of			
Gauge (m)	: 138 .000 (M.S.L.)	16/12/1970	
		Opening Date	Closing Date
Gauge	: 16/12/1970		
Discharge	: 28/08/1971		
Sediment	: 14/04/1972		
Water Quality	: 18/06/1979		

Water Quality Data Book 2018-19

Water Quality Datasheet for the period : 2018-2019

Station Name : Narmada at Mandleshwar (010215026)

Local River : Narmada

Division : Narmada Division, Bhopal

Sub-Division : MNSD-III, Indore

River Water Analysis

S.No	Parameters	01/06/2018	02/07/2018	01/08/2018	03/09/2018	03/10/2018	01/11/2018	03/12/2018	01/01/2019	01/02/2019	01/03/2019	01/04/2019	01/05/2019
		A	A	A	A	A	A	A	A	A	A	A	A
	PHYSICAL												
1	Q (cumec)	196.0	233.4	38.10	1339	439.4	860.1	274.7	651.9	292.1	294.8	1404	621.7
2	Colour_ Cod (-)	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear
3	EC_FLD (µmho/cm)											292	263
4	EC_GEN (µmho/cm)	301	330	388	302	484	267	248	213	240	274	292	263
5	Odour_ Code (-)	odour free	odour free	odour free	odour free	odour free	odour free	odour free	odour free	odour free	odour free	odour free	odour free
6	pH_FLD (pH units)												
7	pH_GEN (pH units)	7.8	8.2	7.8	7.8	8.1	7.6	7.2	7.6	7.2	7.6	7.4	7.6
8	TDS (mg/L)	197	212	244	194	235	166	163	150	167	177	160	155
9	Temp (deg C)	29.0	27.0	27.0	27.0	30.0	26.0	25.0	20.0	20.0	19.0	24.0	28.0
10	Turb (NTU)	0.0	32.0	43.0	49.0	48.0	0.0	0.0	0.0	0.0	0.0		
	CHEMICAL												
1	Alk-Phen (mgCaCO3/L)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	ALK-TOT (mgCaCO3/L)	151	135	148	127	177	111	118	114	130	176	125	120
3	Ca (mg/L)	29	30	33	33	35	26	29	24	29	33	30	25
4	Cl (mg/L)	11.0	13.0	26.0	10.0	22.0	8.0	7.0	6.0	7.0	9.0	11.0	2.0
5	CO3 (mg/L)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	F (mg/L)	0.28	0.30	0.31	0.36	0.76	0.44	0.12	0.16	0.18	0.16	0.14	0.05
7	HCO3 (mg/L)	184	165	180	155	216	135	144	139	159	215	152	146
8	K (mg/L)	2.3	4.3	2.0	1.9	1.6	2.0	1.7	2.0	1.8	2.1	1.9	2.0
9	Mg (mg/L)	11.9	10.5	14.6	8.5	24.5	8.8	8.5	11.7	12.6	10.9	10.5	12.2
10	Na (mg/L)	14.0	10.3	19.9	10.1	17.9	8.5	12.0	13.5	22.6	14.3	14.8	9.6
11	NO2+NO3 (mg N/L)	0.26	3.60	1.04	1.06	1.79	0.52	0.40	0.35	0.25	0.21	1.37	0.59
12	NO2-N (mgN/L)	0.00	2.54	0.02	0.05	0.05	0.03	0.02	0.02	0.03	0.03	0.15	0.15
13	NO3-N (mgN/L)	0.26	1.05	1.02	1.02	1.74	0.49	0.38	0.33	0.22	0.18	1.22	0.45
14	PO4-P (mg P/L)	0.063	0.277	0.071	0.406	0.415	0.066	0.048	0.038	0.034	0.068	0.018	0.034
15	SiO2 (mg/L)	22.6	24.7	26.8	23.3	43.1	22.9	17.0	15.3	15.4	16.6	29.2	35.8
16	SO4 (mg/L)	6.0	16.5	25.5	9.3	17.1	10.3	8.8	8.6	8.0	7.5	8.2	6.2
	BIOLOGICAL/BACTERIOLOGICAL												
1	BOD3-27 (mg/L)	1.2	1.1	0.6	0.6	1.3	0.8	1.2	0.4	0.8	0.9	1.6	1.2
2	COD (mg/L)	53.0	65.0	19.0	22.0	37.0	28.0	23.0	45.0	44.0	47.0	25.0	32.0
3	DO (mg/L)	4.9	5.8	3.5	6.2	5.2	5.9	6.8	7.5	6.6	6.2	5.4	4.5
4	DO_SAT% (%)	64	73	44	78	69	73	82	82	73	67	64	57
	TRACE & TOXIC												
	CHEMICAL INDICES												
1	HAR_Ca (mgCaCO3/L)	72	75	83	83	88	65	73	60	72	82	75	63
2	HAR_Total (mgCaCO3/L)	122	118	143	119	190	102	108	109	124	128	118	113
3	Na% (%)	20	15	23	15	17	15	19	21	28	19	21	15
4	RSC (-)	0.6	0.4	0.1	0.2	0.0	0.2	0.2	0.1	0.1	1.0	0.1	0.1
5	SAR (-)	0.6	0.4	0.7	0.4	0.6	0.4	0.5	0.6	0.9	0.6	0.6	0.4

Water Quality Data Book 2018-19

Water Quality Summary for the period : 2018-2019

Station Name : Narmada at Mandleshwar (010215026) Division : Narmada Division, Bhopal

Local River : Narmada

Sub-Division : MNSD-III, Indore

River Water Summary

S.No	Parameters	Number of Observations	Maximum	Minimum	Mean
	PHYSICAL				
1	Q (cumec)				
2	EC_FLD (µmho/cm)	2	292	263	278
3	EC_GEN (µmho/cm)	12	484	213	300
4	pH_FLD (pH units)	2	7.6	7.4	7.5
5	pH_GEN (pH units)	12	8.2	7.2	7.6
6	TDS (mg/L)	12	244	150	185
7	Temp (deg C)	12	30.0	19.0	25.2
8	Turb (NTU)	10	49.0	0.0	17.2
	CHEMICAL				
1	Alk-Phen (mgCaCO3/L)	12	0.0	0.0	0
2	ALK-TOT (mgCaCO3/L)	12	177	111	136
3	Ca (mg/L)	12	35	24	30
4	Cl (mg/L)	12	26.0	2.0	11
5	CO3 (mg/L)	12	0.0	0.0	0
6	F (mg/L)	12	0.76	0.05	0.27
7	HCO3 (mg/L)	12	216	135	166
8	K (mg/L)	12	4.3	1.6	2.1
9	Mg (mg/L)	12	24.5	8.5	12.1
10	Na (mg/L)	12	22.6	8.5	14
11	NO2+NO3 (mg N/L)	12	3.60	0.21	0.95
12	NO2-N (mgN/L)	12	2.54	0.00	0.26
13	NO3-N (mgN/L)	12	1.74	0.18	0.7
14	o-PO4-P (mg P/L)	12	0.415	0.018	0.128
15	SiO2 (mg/L)	12	43.1	15.3	24.4
16	SO4 (mg/L)	12	25.5	6.0	11
	BIOLOGICAL/BACTERIOLOGICAL				
1	BOD3-27 (mg/L)	12	1.6	0.4	1
2	COD (mg/L)	12	65.0	19.0	36.7
3	DO (mg/L)	12	7.5	3.5	5.7
4	DO_SAT% (%)	12	82	44	69
	TRACE & TOXIC				
	CHEMICAL INDICES				
1	HAR_Ca (mgCaCO3/L)	12	88	60	74
2	HAR_Total (mgCaCO3/L)	12	190	102	125
3	Na% (%)	12	28	15	19
4	RSC (-)	12	1.0	0.0	0.3
5	SAR (-)	12	0.9	0.4	0.5

Water Quality Data Book 2018-19

Water Quality Seasonal Average for the period : 2014-2019

Station Name : Narmada at Mandleshwar (010215026)

Division : Narmada Division, Bhopal

Local River : Narmada

Sub-Division : MNSD-III, Indore

River Water

S.No	Parameters	Flood					Winter					Summer				
		Jun - Oct					Nov - Feb					Mar - May				
		2014	2015	2016	2017	2018	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019	2015	2016	2017	2018	2019
	PHYSICAL															
1	Q (cumec)	524.0	725.6		468.2		632.6	359.5		233.9		853.9	500.2		141.9	
2	EC_FLD (µmho/cm)															278
3	EC_GEN (µmho/cm)	240	213	231	357	361	201	209	261	334	242	201	286	239	313	276
4	pH_FLD (pH units)															7.5
5	pH_GEN (pH units)	7.9	8.1	7.8	7.9	7.9	8.1	8.2	7.9	7.8	7.4	8.1	8.2	7.7	8.0	7.5
6	TDS (mg/L)	153	135	147	228	216	132	133	172	220	162	127	181	155	204	164
7	Temp (deg C)	26.0	22.4	24.8	26.8	28.0	16.3	18.3	21.5	19.5	22.8	20.0	20.3	21.3	23.7	23.7
8	Turb (NTU)	15.8	9.2	33.8	26.8	34.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	CHEMICAL															
1	Alk-Phen (mgCaCO3/L)	0.9	0.0	0.0	0.0	0.0	0.0	1.2	0.0	0.0	0.0	0.0	0.0	0.0	1.7	0.0
2	ALK-TOT (mgCaCO3/L)	140	149	109	151	148	122	122	121	144	118	128	129	119	138	140
3	Ca (mg/L)	28	26	24	33	32	27	27	28	30	27	26	27	29	27	29
4	Cl (mg/L)	19.5	8.3	6.2	14.8	16.4	6.5	8.3	7.8	10.0	7.0	8.6	8.0	8.0	12.0	7.3
5	CO3 (mg/L)	1.0	0.0	0.0	0.0	0.0	0.0	1.4	0.0	0.0	0.0	0.0	0.0	0.0	2.1	0.0
6	F (mg/L)	0.25	0.40	0.26	0.32	0.40	0.35	0.36	0.18	0.32	0.22	0.48	0.26	0.30	0.27	0.11
7	HCO3 (mg/L)	169	181	133	184	180	149	146	148	176	144	156	158	145	164	171
8	K (mg/L)	3.1	2.3	1.8	2.2	2.5	2.0	2.0	1.4	2.9	1.9	1.4	2.0	1.5	2.3	2.0
9	Mg (mg/L)	12.1	11.9	8.7	14.0	14.0	10.1	10.3	9.5	14.0	10.4	11.4	11.6	10.4	13.1	11.2
10	Na (mg/L)	16.7	11.2	9.4	15.0	14.4	10.6	10.1	9.3	15.8	14.1	9.0	10.4	10.6	13.9	12.9
11	NO2+NO3 (mg N/L)	1.53	1.35	1.52	1.46	1.55	1.31	0.51	0.45	2.98	0.38	0.59	0.33	0.30	1.51	0.72
12	NO2-N (mgN/L)	0.03	0.01	0.12	0.05	0.53	0.04	0.06	0.01	0.04	0.02	0.05	0.01	0.02	0.11	0.11
13	NO3-N (mgN/L)	1.50	1.34	1.40	1.41	1.02	1.27	0.45	0.43	2.94	0.35	0.54	0.32	0.28	1.40	0.61
14	p-PO4-P (mg P/L)	0.345	0.199	0.243	0.202	0.246	0.177	0.135	0.086	0.117	0.047	0.112	0.114	0.081	0.084	0.040
15	SiO2 (mg/L)	18.7	16.9	24.8	22.1	28.1	17.5	16.1	18.2	21.9	17.7	16.5	21.8	19.3	21.3	27.2
16	SO4 (mg/L)	18.9	15.2	16.9	16.0	14.9	11.1	4.0	9.3	22.6	8.9	25.5	5.0	7.2	17.0	7.3
	BIOLOGICAL/BACTERIOLOGICAL															
1	BOD3-27 (mg/L)	1.5	0.8	1.0	0.9	1.0	0.9	0.7	0.9	1.1	0.8	0.8	0.8	1.2	1.4	1.2
2	COD (mg/L)	25.6	36.0	39.6	35.6	39.2	42.3	26.0	44.8	32.3	35.0	48.3	33.0	35.0	37.3	34.7
3	DO (mg/L)	6.2	6.1	6.0	5.6	5.1	7.1	7.3	6.7	5.5	6.7	6.6	6.2	5.1	5.0	5.4
4	DO_SAT% (%)	77	71	73	71	65	72	77	75	60	78	72	68	57	59	63
	TRACE & TOXIC															
	CHEMICAL INDICES															
1	HAR_Ca (mgCaCO3/L)	71	66	60	83	80	68	67	71	76	67	66	67	71	67	73
2	HAR_Total (mgCaCO3/L)	121	115	97	141	138	110	110	111	134	111	113	115	115	122	120
3	Na% (%)	21	17	18	18	18	17	16	15	20	21	15	16	17	20	19
4	RSC (-)	0.4	0.7	0.3	0.2	0.2	0.3	0.3	0.2	0.2	0.2	0.3	0.3	0.1	0.3	0.4
5	5AR (-)	0.6	0.5	0.4	0.5	0.5	0.4	0.4	0.4	0.6	0.6	0.4	0.4	0.4	0.5	0.5

3.5 Kundi at Kogaon

History sheet

		Water Year	: 2018-2019
Site	: Kundi at Kogaon	Code	: 010215025
State	: Madhya Pradesh	District	Khargone
		Independent	
Basin	: Narmada	River	: Narmada
Tributary	: Kundi	Local River	: Kundi
Division	: Narmada Division, Bhopal	Sub-Division	: MNSD-III, Indore
Drainage Area	: 3919 Sq. Km.	Bank	: Right
Latitude	: 22°06'06"	Longitude	: 75°41'02"
Zero of	151 .000		
Gauge (m)	: (M.S.L.)	03/02/1978	
	Opening Date	Closing Date	
Gauge	: 03/02/1978		
Discharge	: 01/07/1978		
Sediment	:		
Water Quality	: 15/09/1986		

Water Quality Data Book 2018-19

Water Quality Datasheet for the period : 2018-2019

Station Name : Kundi at Kogaon (010215025)

Local River : Kundi

Division : Narmada Division, Bhopal

Sub-Division : MNSD-III, Indore

River Water Analysis

S.No	Parameters	01/06/2018	02/07/2018	01/08/2018	03/09/2018	03/10/2018	01/11/2018	03/12/2018	01/01/2019	01/02/2019	01/03/2019	01/04/2019	01/05/2019
		A	A	A	A	A	A			A	A	A	
	PHYSICAL												
1	Q (cumec)	00	5.689	4.797	105.3	18.81	00	00	00	00	00	12.53	00
2	Colour_ Cod (-)		Clear	Clear	Clear	Light Brown	Clear					Clear	
3	EC_FLD (µmho/cm)											353	
4	EC_GEN (µmho/cm)		335	431	473	304	437					353	
5	Odour_Code (-)		odour free	odour free	odour free	odour free	odour free					odour free	
6	pH_FLD (pH units)											7.6	
7	pH_GEN (pH units)		8.4	8.3	8.1	7.9	7.8					7.6	
8	TDS (mg/L)		214	271	296	182	263					202	
9	Temp (deg C)		30.5	29.0	27.0	28.5	25.0					26.0	
10	Turb (NTU)		37.0	52.0	44.0	92.0	0.0						
	CHEMICAL												
1	Alk-Phen (mgCaCO3/L)		13.3	8.8	0.0	0.0	0.0					0.0	
2	ALK-TOT (mgCaCO3/L)		164	174	197	139	161					147	
3	Ca (mg/L)		25	25	49	33	33					26	
4	Cl (mg/L)		16.0	26.0	22.0	7.0	20.0					15.0	
5	CO3 (mg/L)		16.0	10.6	0.0	0.0	0.0					0.0	
6	F (mg/L)		0.24	0.21	0.37	0.24	0.59					0.09	
7	HCO3 (mg/L)		168	191	240	169	197					179	
8	K (mg/L)		3.7	1.8	1.3	1.5	2.0					2.1	
9	Mg (mg/L)		13.6	20.1	8.5	10.7	2.0					17.0	
10	Na (mg/L)		13.8	26.9	15.6	8.4	20.9					23.7	
11	NO2+NO3 (mg N/L)		0.88	1.69	1.72	1.28	2.22					1.91	
12	NO2-N (mgN/L)		0.12	0.02	0.05	0.05	0.02					0.03	
13	NO3-N (mgN/L)		0.76	1.68	1.68	1.24	2.20					1.88	
14	PO4-P (mg P/L)		0.354	0.049	0.397	0.351	0.069					0.016	
15	SiO2 (mg/L)		22.6	18.5	46.5	22.1	23.1					44.2	
16	SO4 (mg/L)		13.9	31.6	16.3	10.4	18.7					8.0	
	BIOLOGICAL/BACTERIOLOGICAL												
1	BOD3-27 (mg/L)		1.5	1.3	0.6	1.2	1.0					1.3	
2	COD (mg/L)		62.0	37.0	17.0	34.0	28.0					25.0	
3	DO (mg/L)		4.9	5.6	5.9	6.2	5.9					5.1	
4	DO_SAT% (%)		65	73	74	79	71					63	
	TRACE & TOXIC												
	CHEMICAL INDICES												
1	HAR_Ca (mgCaCO3/L)		62	62	123	82	82					64	
2	HAR_Total (mgCaCO3/L)		119	146	158	126	91					135	
3	Na% (%)		20	28	18	13	33					27	
4	RSC (-)		0.9	0.6	0.8	0.3	1.4					0.2	
5	SAR (-)		0.6	1.0	0.5	0.3	1.0					0.9	

Water Quality Data Book 2018-19

Water Quality Summary for the period : 2018-2019

Station Name : Kundi at Kogaon (010215025)

Division : Narmada Division, Bhopal

Local River : Kundi

Sub-Division : MNSD-III, Indore

River Water Summary

S.No	Parameters	Number of Observations	Maximum	Minimum	Mean
	PHYSICAL				
1	Q (cumec)				
2	EC_FLD (µmho/cm)	1	353	353	353
3	EC_GEN (µmho/cm)	6	473	304	389
4	pH_FLD (pH units)	1	7.6	7.6	7.6
5	pH_GEN (pH units)	6	8.4	7.6	8
6	TDS (mg/L)	6	296	182	238
7	Temp (deg C)	6	30.5	25.0	27.7
8	Turb (NTU)	5	92.0	0.0	45
	CHEMICAL				
1	Alk-Phen (mgCaCO3/L)	6	13.3	0.0	3.7
2	ALK-TOT (mgCaCO3/L)	6	197	139	164
3	Ca (mg/L)	6	49	25	32
4	Cl (mg/L)	6	26.0	7.0	17.7
5	CO3 (mg/L)	6	16.0	0.0	4.4
6	F (mg/L)	6	0.59	0.09	0.29
7	HCO3 (mg/L)	6	240	168	191
8	K (mg/L)	6	3.7	1.3	2
9	Mg (mg/L)	6	20.1	2.0	12
10	Na (mg/L)	6	26.9	8.4	18.2
11	NO2+NO3 (mg N/L)	6	2.22	0.88	1.62
12	NO2-N (mgN/L)	6	0.12	0.02	0.05
13	NO3-N (mgN/L)	6	2.20	0.76	1.57
14	o-PO4-P (mg P/L)	6	0.397	0.016	0.206
15	SiO2 (mg/L)	6	46.5	18.5	29.5
16	SO4 (mg/L)	6	31.6	8.0	16.5
	BIOLOGICAL/BACTERIOLOGICAL				
1	BOD3-27 (mg/L)	6	1.5	0.6	1.1
2	COD (mg/L)	6	62.0	17.0	33.8
3	DO (mg/L)	6	6.2	4.9	5.6
4	DO_SAT% (%)	6	79	63	71
	TRACE & TOXIC				
	CHEMICAL INDICES				
1	HAR_Ca (mgCaCO3/L)	6	123	62	79
2	HAR_Total (mgCaCO3/L)	6	158	91	129
3	Na% (%)	6	33	13	23
4	RSC (-)	6	1.4	0.2	0.7
5	SAR (-)	6	1.0	0.3	0.7

Water Quality Data Book 2018-19

Water Quality Seasonal Average for the period: 2014-2019

Station Name : Kundi at Kogaon (010215025)

Local River : Kundi

Division : Narmada Division, Bhopal

Sub-Division : MNSD-III, Indore

River Water

S.No	Parameters	Flood					Winter					Summer				
		Jun - Oct					Nov - Feb					Mar - May				
		2014	2015	2016	2017	2018	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019	2015	2016	2017	2018	2019
	PHYSICAL															
1	Q (cumec)		11.13					7.067								
2	EC_FLD (µmho/cm)															353
3	EC_GEN (µmho/cm)	312	303	372	425	386	343	349	333	401	437	305				353
4	pH_FLD (pH units)															7.6
5	pH_GEN (pH units)	8.0	8.3	7.8	8.3	8.2	8.3	8.3	7.9	8.0	7.8	8.3				7.6
6	TDS (mg/L)	199	193	237	274	241	226	210	216	265	263	195				202
7	Temp (deg C)	27.7	26.8	29.2	29.4	28.8	22.8	26.5	21.6	21.5	25.0	24.3				26.0
8	Turb (NTU)	123.7	16.0	91.3	23.3	56.3	0.0	0.0	0.0	0.0	0.0	0.0				
	CHEMICAL															
1	Alk-Phen (mgCaCO3/L)	1.7	5.4	0.0	7.1	5.5	4.2	4.6	0.0	0.0	0.0	2.5				0.0
2	ALK-TOT (mgCaCO3/L)	150	170	151	168	168	177	190	156	162	161	169				147
3	Ca (mg/L)	26	32	32	35	33	32	28	33	31	33	29				26
4	Cl (mg/L)	13.2	14.1	9.3	16.8	17.8	23.0	25.0	13.0	16.0	20.0	19.5				15.0
5	CO3 (mg/L)	2.1	6.5	0.0	8.5	6.6	5.1	5.6	0.0	0.0	0.0	3.0				0.0
6	F (mg/L)	0.43	0.46	0.22	0.26	0.27	0.37	0.60	0.19	0.09	0.59	0.74				0.09
7	HCO3 (mg/L)	179	194	184	187	192	206	221	191	198	197	200				179
8	K (mg/L)	3.1	2.2	2.2	1.4	2.1	1.4	1.8	1.3	1.8	2.0	1.6				2.0
9	Mg (mg/L)	20.2	20.9	15.2	20.3	13.2	24.0	24.1	15.6	18.7	2.0	17.9				17.0
10	Na (mg/L)	15.2	18.6	13.2	16.5	16.2	25.4	28.5	12.9	17.4	20.9	19.9				23.7
11	NO2+NO3 (mg N/L)	3.07	2.52	1.83	1.95	1.39	5.88	3.63	0.59	3.49	2.22	1.58				1.91
12	NO2-N (mgN/L)	0.04	0.02	0.07	0.06	0.06	0.03	0.02	0.01	0.04	0.02	0.09				0.03
13	NO3-N (mgN/L)	3.03	2.49	1.76	1.89	1.34	5.85	3.61	0.58	3.45	2.19	1.48				1.88
14	b-PO4-P (mg P/L)	0.438	0.148	0.238	0.246	0.288	0.125	0.192	0.118	0.100	0.069	0.087				0.016
15	SiO2 (mg/L)	21.1	24.8	27.9	20.8	27.4	31.9	27.1	18.9	19.5	23.1	25.8				44.2
16	SO4 (mg/L)	27.8	23.5	30.8	17.1	18.1	17.5	13.2	11.6	20.9	18.7	27.0				8.0
	BIOLOGICAL/BACTERIOLOGICAL															
1	BOD3-27 (mg/L)	0.9	1.0	0.7	1.2	1.2	0.9	1.5	1.2	0.9	1.0	1.9				1.3
2	COD (mg/L)	28.3	32.3	40.7	36.0	37.5	34.7	35.0	48.3	46.5	28.0	34.0				25.0
3	DO (mg/L)	5.9	5.9	6.0	5.5	5.6	7.0	6.0	6.5	6.0	5.9	5.4				5.1
4	DO_SAT% (%)	75	74	78	72	73	81	74	74	68	71	62				63
	TRACE & TOXIC															
	CHEMICAL INDICES															
1	HAR_Ca (mgCaCO3/L)	66	81	79	87	82	79	69	82	77	82	74				64
2	HAR_Total (mgCaCO3/L)	150	168	143	172	137	179	169	147	155	91	148				135
3	Na% (%)	17	19	17	18	20	23	27	16	19	33	22				27
4	RSC (-)	0.1	0.1	0.2	0.0	0.6	0.1	0.5	0.2	0.2	1.4	0.4				0.2
5	SAR (-)	0.5	0.6	0.5	0.6	0.6	0.8	1.0	0.5	0.6	1.0	0.7				0.9

3.6 Narmada at Handia

History Sheet

		Water Year	: 2018-2019
Site	: Narmada at Handia	Code	: 010215022
State	: Madhya Pradesh	District	Harda
Basin	: Narmada	Independent River	: Narmada
Tributary	: -	Sub Tributary	: -
Sub-Sub Tributary	: -	Local River	: Narmada
Division	: Narmada Division,Bhopal	Sub-Division	: MNSD-II Bhopal
Drainage Area	: 54027 Sq. Km.	Bank	: Left
Latitude	: 22°29'25"	Longitude	: 76°59'37"
Zero of Gauge (m)	: 258 .000 (M.S.L.)	09/02/1977	
	Opening Date	Closing Date	
Gauge	: 09/02/1977		
Discharge	: 26/04/1977		
Sediment	: 11/12/1977		
Water Quality	: 01/08/1979		

Water Quality Data Book 2018-19

Water Quality Datasheet for the period : 2018-2019

Station Name : Narmada at Handia (010215022)

Local River : Narmada

Division : Narmada Division, Bhopal

Sub-Division : MNSTD-II, Bhopal

River Water Analysis

S.No	Parameters	01/06/2018	02/07/2018	01/08/2018	03/09/2018	03/10/2018	01/11/2018	03/12/2018	01/01/2019	01/02/2019	01/03/2019	01/04/2019	01/05/2019
		A	A	A	A	A	A	A	A	A	A	A	A
	PHYSICAL												
1	Q (cumec)	92.70	107.0	948.9	3158	479.3	254.3	200.0	265.0	0.0	160.0	37.30	43.10
2	Colour_ Cod (-)	Clear	Clear	Light Brown	Brown	Light Brown	Light Brown	Clear	Clear	Clear	Clear	Clear	Clear
3	EC_FLD (µmho/cm)											295	254
4	EC_GEN (µmho/cm)	220	248	224	254	277	315	317	224	238	245	295	254
5	Odour_Code (-)	odour free	odour free	odour free	odour free	odour free	odour free	odour free	odour free	odour free	odour free	odour free	odour free
6	pH_FLD (pH units)											7.3	8.0
7	pH_GEN (pH units)	7.9	8.2	7.8	7.5	7.8	7.8	7.3	7.8	7.5	7.8	7.3	8.0
8	TDS (mg/L)	146	158	140	161	166	195	209	159	168	154	172	164
9	Temp (deg C)	31.0	27.5	28.5	27.5	26.0	24.5	18.5	16.0	18.0	19.0	23.0	24.0
10	Turb (NTU)	0.0	41.0	144.0	218.0	96.0	0.0	0.0	0.0	0.0	0.0		
	CHEMICAL												
1	Alk-Phen (mgCaCO3/L)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	ALK-TOT (mgCaCO3/L)	112	251	86	90	130	140	144	121	139	120	129	116
3	Ca (mg/L)	22	25	25	31	32	31	32	23	29	29	28	23
4	Cl (mg/L)	8.0	4.0	5.0	5.0	7.0	9.0	10.0	8.0	8.0	9.0	11.0	1.0
5	CO3 (mg/L)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	F (mg/L)	0.22	0.22	0.23	0.36	0.26	0.57	0.11	0.13	0.16	0.19	0.16	0.05
7	HCO3 (mg/L)	137	306	105	110	158	171	176	148	170	147	157	141
8	K (mg/L)	1.3	3.0	1.1	1.6	1.4	1.7	1.4	1.6	1.3	1.4	2.1	1.7
9	Mg (mg/L)	9.7	7.8	7.8	30.4	9.7	11.7	12.9	12.4	11.7	8.6	11.7	12.9
10	Na (mg/L)	7.2	5.1	5.6	6.0	6.5	10.2	18.6	14.4	24.0	11.9	14.7	9.2
11	NO2+NO3 (mg N/L)	0.03	0.36	1.27	1.31	1.12	0.35	0.53	0.24	0.24	0.16	1.54	0.37
12	NO2-N (mgN/L)	0.01	0.12	0.01	0.05	0.03	0.03	0.02	0.02	0.03	0.03	0.07	0.04
13	NO3-N (mgN/L)	0.02	0.24	1.26	1.26	1.09	0.32	0.51	0.22	0.22	0.14	1.47	0.33
14	PO4-P (mg P/L)	0.057	0.162	0.046	0.392	0.330	0.016	0.065	0.021	0.038	0.026	0.094	0.017
15	SiO2 (mg/L)	19.7	24.5	23.2	23.8	23.9	22.7	18.0	17.0	16.0	16.2	41.3	34.6
16	SO4 (mg/L)	0.5	16.2	13.3	20.4	8.7	9.6	10.5	8.7	7.9	7.7	7.6	4.7
	BIOLOGICAL/BACTERIOLOGICAL												
1	BOD3-27 (mg/L)	1.1	0.6	0.6	0.8	1.3	0.7	0.8	0.5	0.7	0.8	1.1	0.8
2	COD (mg/L)	42.0	66.0	44.0	24.0	30.0	22.0	14.0	44.0	45.0	21.0	27.0	33.0
3	DO (mg/L)	5.1	5.8	5.3	6.1	6.7	6.9	6.9	7.7	7.4	6.5	5.1	5.4
4	DO_SAT% (%)	69	73	68	77	83	82	73	78	78	70	59	64
	TRACE & TOXIC												
	CHEMICAL INDICES												
1	HAR_Ca (mgCaCO3/L)	54	62	62	77	79	77	81	58	72	72	69	58
2	HAR_Total (mgCaCO3/L)	95	94	94	203	119	125	134	109	121	108	118	112
3	Na% (%)	14	10	11	6	10	15	23	22	30	19	21	15
4	RSC (-)	0.4	3.1	0.0	0.0	0.2	0.3	0.2	0.3	0.4	0.3	0.2	0.1
5	SAR (-)	0.3	0.2	0.3	0.2	0.3	0.4	0.7	0.6	1.0	0.5	0.6	0.4

Water Quality Data Book 2018-19

Water Quality Summary for the period : 2018-2019

Station Name : Narmada at Handia (010215022)

Division : Narmada Division, Bhopal

Local River : Narmada

Sub-Division : MNSD-II, Bhopal

River Water Summary

S.No	Parameters	Number of Observations	Maximum	Minimum	Mean
	PHYSICAL				
1	Q (cumec)				
2	EC_FLD (µmho/cm)	2	295	254	275
3	EC_GEN (µmho/cm)	13	350	220	266
4	pH_FLD (pH units)	2	8.0	7.3	7.7
5	pH_GEN (pH units)	13	8.2	7.3	7.8
6	TDS (mg/L)	13	210	140	169
7	Temp (deg C)	13	31.0	16.0	23.9
8	Turb (NTU)	11	218.0	0.0	49.4
	CHEMICAL				
1	Alk-Phen (mgCaCO3/L)	13	0.0	0.0	0
2	ALK-TOT (mgCaCO3/L)	13	251	86	134
3	Ca (mg/L)	13	38	22	28
4	Cl (mg/L)	13	11.0	1.0	7.2
5	CO3 (mg/L)	13	0.0	0.0	0
6	F (mg/L)	13	0.57	0.05	0.24
7	HCO3 (mg/L)	13	306	105	164
8	K (mg/L)	13	3.0	1.1	1.6
9	Mg (mg/L)	13	30.4	7.8	12.3
10	Na (mg/L)	13	24.0	5.1	11.1
11	NO2+NO3 (mg N/L)	13	1.54	0.03	0.68
12	NO2-N (mgN/L)	13	0.12	0.01	0.04
13	NO3-N (mgN/L)	13	1.47	0.02	0.64
14	o-PO4-P (mg P/L)	13	0.392	0.016	0.12
15	SiO2 (mg/L)	13	41.3	16.0	23.4
16	SO4 (mg/L)	13	20.4	0.5	9.7
	BIOLOGICAL/BACTERIOLOGICAL				
1	BOD3-27 (mg/L)	13	1.3	0.5	0.8
2	COD (mg/L)	13	66.0	14.0	33.7
3	DO (mg/L)	13	7.7	5.1	6.2
4	DO_SAT% (%)	13	83	59	73
	TRACE & TOXIC				
	CHEMICAL INDICES				
1	HAR_Ca (mgCaCO3/L)	13	94	54	70
2	HAR_Total (mgCaCO3/L)	13	203	94	122
3	Na% (%)	13	30	6	16
4	RSC (-)	13	3.1	0.0	0.4
5	SAR (-)	13	1.0	0.2	0.4

Water Quality Data Book 2018-19

Water Quality Seasonal Average for the period : 2014-2019

Station Name : Narmada at Handia (010215022)

Division : Narmada Division, Bhopal

Local River : Narmada

Sub-Division : MNSD-II, Bhopal

River Water

S.No	Parameters	Flood					Winter					Summer				
		Jun - Oct					Nov - Feb					Mar - May				
		2014	2015	2016	2017	2018	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019	2015	2016	2017	2018	2019
	PHYSICAL															
1	Q (cumec)	373.6	319.3				272.0	152.8				252.9	117.9			
2	EC_FLD (µmho/cm)															275
3	EC_GEN (µmho/cm)	231	231	235	270	262	236	268	279	354	274	197	265	248	333	265
4	pH_FLD (pH units)															7.7
5	pH_GEN (pH units)	8.1	8.3	7.9	7.9	7.9	8.2	8.4	7.9	7.9	7.6	8.3	8.3	7.8	8.2	7.7
6	TDS (mg/L)	148	146	151	174	164	155	172	180	235	183	128	172	161	218	163
7	Temp (deg C)	27.9	29.4	25.6	23.9	28.0	21.4	23.7	18.8	16.4	19.3	26.0	26.2	27.0	26.3	22.0
8	Turb (NTU)	83.2	31.4	85.8	77.0	90.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	CHEMICAL															
1	Alk-Phen (mgCaCO3/L)	4.5	2.3	2.3	1.6	0.0	1.3	5.8	0.0	0.0	0.0	4.2	1.6	0.0	6.1	0.0
2	ALK-TOT (mgCaCO3/L)	140	143	112	121	139	147	161	149	157	136	129	129	131	155	122
3	Ca (mg/L)	27	29	22	28	28	32	33	33	32	29	25	26	31	24	27
4	Cl (mg/L)	7.2	7.3	5.3	7.2	6.2	7.4	7.8	7.3	10.0	8.8	7.9	7.7	6.7	13.3	7.0
5	CO3 (mg/L)	5.4	2.8	2.8	1.9	0.0	1.5	7.0	0.0	0.0	0.0	5.0	1.9	0.0	7.3	0.0
6	F (mg/L)	0.28	0.35	0.25	0.31	0.28	0.40	0.22	0.17	0.28	0.24	0.15	0.31	0.28	0.21	0.13
7	HCO3 (mg/L)	160	169	131	144	170	177	182	181	192	166	147	154	160	175	148
8	K (mg/L)	2.0	2.8	1.7	1.4	1.6	1.5	1.7	1.3	1.9	1.5	1.4	1.5	1.2	1.6	1.7
9	Mg (mg/L)	13.1	11.8	10.2	9.7	13.1	12.5	13.6	11.8	14.2	12.1	11.6	11.3	9.7	15.7	11.1
10	Na (mg/L)	12.7	13.5	8.5	10.4	7.0	13.4	16.0	11.6	15.6	16.8	8.9	8.9	10.8	16.4	11.9
11	NO2+NO3 (mg N/L)	1.54	1.18	1.20	0.91	0.90	2.01	1.42	0.46	1.21	0.34	0.62	1.14	0.32	0.49	0.69
12	NO2-N (mgN/L)	0.02	0.01	0.13	0.04	0.04	0.04	0.02	0.01	0.04	0.02	0.05	0.01	0.01	0.03	0.04
13	NO3-N (mgN/L)	1.53	1.17	1.07	0.87	0.86	1.97	1.40	0.45	1.17	0.32	0.57	1.14	0.31	0.46	0.64
14	p-PO4-P (mg P/L)	0.353	0.339	0.298	0.195	0.214	0.206	0.148	0.088	0.126	0.035	0.120	0.436	0.071	0.089	0.046
15	SiO2 (mg/L)	21.6	18.3	25.5	21.5	23.0	17.9	16.3	18.5	21.3	18.4	17.3	20.5	19.2	19.2	30.7
16	SO4 (mg/L)	13.4	14.7	19.4	15.2	11.7	13.8	6.2	8.8	19.7	9.2	26.9	11.9	6.5	12.0	6.7
	BIOLOGICAL/BACTERIOLOGICAL															
1	BOD3-27 (mg/L)	1.2	0.7	0.7	0.7	0.8	1.0	0.7	1.1	1.1	0.7	0.6	0.9	1.2	1.2	0.9
2	COD (mg/L)	33.2	36.2	38.0	38.8	38.7	35.0	38.5	41.5	37.3	31.3	34.7	35.0	37.0	29.0	27.0
3	DO (mg/L)	6.1	6.3	5.9	5.5	5.8	6.9	7.6	7.0	6.4	7.2	6.8	6.3	5.3	5.9	5.7
4	DO_SAT% (%)	77	82	72	65	74	77	89	75	65	78	84	78	67	73	65
	TRACE & TOXIC															
	CHEMICAL INDICES															
1	HAR_Ca (mgCaCO3/L)	68	73	55	70	71	80	82	83	81	72	63	64	78	61	67
2	HAR_Total (mgCaCO3/L)	122	122	97	111	126	132	138	133	140	122	112	112	119	127	113
3	Na% (%)	18	19	16	17	11	18	20	16	19	22	15	15	16	22	18
4	RSC (-)	0.4	0.4	0.3	0.2	0.7	0.3	0.5	0.3	0.4	0.3	0.4	0.4	0.3	0.6	0.2
5	5AR (-)	0.5	0.5	0.4	0.4	0.3	0.5	0.6	0.4	0.6	0.7	0.4	0.4	0.4	0.6	0.5

3.7 Ganjal at Chhidgaon

History sheet

		Water Year	: 2018-2019
Site	: Ganjal at Chhidgaon	Code	: 010215020
State	: Madhya Pradesh	District	: Harda
Basin	: Narmada	Independent River	: Narmada
Tributary	: Ganjal	Sub Tributary	: -
Sub-Sub Tributary	: -	Local River	: Ganjal
Division	: Narmada Division,Bhopal	Sub-Division	: MNSD-II,Bhopal
Drainage Area	: 1729 Sq. Km.	Bank	: Left
Latitude	: 22°24'21"	Longitude	: 77°18'28"
Zero of Gauge (m)	: 287 .000 (M.S.L.)	02/12/1976	
	Opening Date	Closing Date	
Gauge	: 22/12/1976		
Discharge	: 22/12/1976		
Sediment	:		
Water Quality	: 16/09/1986		

Water Quality Data Book 2018-19

Water Quality Datasheet for the period : 2018-2019

Station Name : Ganjal at Chhidgaon (010215020)

Local River : Ganjal

Division : Narmada Division, Bhopal

Sub-Division : MNSD-II, Bhopal

River Water Analysis

S.No	Parameters	01/06/2018	02/07/2018	01/08/2018	03/09/2018	03/10/2018	01/11/2018	03/12/2018	01/01/2019	01/02/2019	01/03/2019	01/04/2019	01/05/2019
		A	A	A	A	A	A	A	A	A	A	A	A
	PHYSICAL												
1	Q (cumec)	0.0	0.0	12.33	26.25	16.93	0.000	0.000	0.000	0.0	0.0	0.0	0.0
2	Colour_ Cod (-)	Clear	Light Brown	Clear	Light Brown	Brown	Clear	Clear	Clear	Clear	Clear	Clear	Clear
3	EC_FLD (µmho/cm)											583	490
4	EC_GEN (µmho/cm)	450	253	317	300	263	298	440	436	471	514	583	490
5	Odour_Code (-)	odour free	odour free	odour free	odour free	odour free	odour free	odour free	odour free	odour free	odour free	odour free	odour free
6	pH_FLD (pH units)												
7	pH_GEN (pH units)	8.4	7.8	8.0	7.6	7.8	7.9	7.8	7.5	7.7	7.9	7.2	7.4
8	TDS (mg/L)	291	162	198	192	158	246	288	310	323	325	331	283
9	Temp (deg C)	28.5	29.0	27.0	25.5	26.5	21.5	18.5	12.0	14.0	19.0	24.0	26.5
10	Turb (NTU)	0.0	96.0	46.0	140.0	211.0	0.0	0.0	0.0	0.0	0.0		
	CHEMICAL												
1	Alk-Phen (mgCaCO3/L)	14.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	ALK-TOT (mgCaCO3/L)	225	113	134	143	116	182	211	235	249	254	262	240
3	Ca (mg/L)	26	28	34	26	29	36	39	41	50	30	42	31
4	Cl (mg/L)	19.0	5.0	8.0	5.0	7.0	9.0	14.0	12.0	13.0	15.0	17.0	4.0
5	CO3 (mg/L)	17.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	F (mg/L)	0.23	0.24	0.24	0.30	0.24	0.47	0.16	0.15	0.25	0.18	0.03	0.11
7	HCO3 (mg/L)	239	138	164	174	141	222	258	287	304	310	320	293
8	K (mg/L)	1.4	4.4	1.8	1.1	1.4	1.4	1.5	1.5	0.9	1.1	1.7	1.8
9	Mg (mg/L)	20.2	7.8	11.7	11.2	9.7	15.6	19.2	20.2	26.5	24.3	22.8	21.1
10	Na (mg/L)	37.1	5.9	9.6	8.1	5.5	19.2	34.5	38.4	67.9	44.1	41.4	34.1
11	NO2+NO3 (mg N/L)	0.24	2.81	1.78	1.80	1.04	0.43	0.66	0.29	0.51	0.17	0.81	0.33
12	NO2-N (mgN/L)	0.07	1.37	0.01	0.03	0.03	0.01	0.02	0.02	0.05	0.02	0.02	0.06
13	NO3-N (mgN/L)	0.17	1.45	1.77	1.77	1.01	0.42	0.64	0.27	0.45	0.15	0.79	0.28
14	o-PO4-P (mg P/L)	0.007	0.320	0.041	0.298	0.302	0.017	0.037	0.043	0.208	0.120	0.017	0.014
15	SiO2 (mg/L)	31.3	27.9	52.2	36.0	22.9	21.9	17.4	17.4	16.8	15.9	45.9	38.9
16	SO4 (mg/L)	8.0	16.1	19.3	14.2	7.4	8.7	10.3	8.3	9.1	7.4	7.8	6.4
	BIOLOGICAL/BACTERIOLOGICAL												
1	BOD3-27 (mg/L)	2.0	0.9	0.4	0.4	0.8	0.8	0.7	0.7	1.3	0.5	1.2	1.2
2	COD (mg/L)	61.0	35.0	22.0	23.0	12.0	29.0	22.0	47.0	52.0	34.0	29.0	17.0
3	DO (mg/L)	7.3	3.7	5.2	6.1	5.7	7.0	7.6	7.9	8.0	7.2	4.1	4.1
4	DO_SAT% (%)	93	48	65	74	70	79	80	73	78	78	49	51
	TRACE & TOXIC												
	CHEMICAL INDICES												
1	HAR_Ca (mgCaCO3/L)	64	70	84	64	72	91	96	103	125	76	104	78
2	HAR_Total (mgCaCO3/L)	148	103	133	111	113	156	176	187	236	177	199	166
3	Na% (%)	35	11	13	14	10	21	30	31	39	35	31	31
4	RSC (-)	1.5	0.2	0.0	0.7	0.1	0.5	0.7	1.0	0.3	1.6	1.3	1.5
5	SAR (-)	1.3	0.3	0.4	0.3	0.2	0.7	1.1	1.2	1.9	1.4	1.3	1.2

Water Quality Data Book 2018-19

Water Quality Summary for the period : 2018-2019

Station Name : Ganjal at Chhidgaon (010215020)

Division : Narmada Division, Bhopal

Local River : Ganjal

Sub-Division : MNSD-II, Bhopal

River Water Summary

S.No	Parameters	Number of Observations	Maximum	Minimum	Mean
	PHYSICAL				
1	Q (cumec)				
2	EC_FLD (µmho/cm)	2	583	490	537
3	EC_GEN (µmho/cm)	12	583	253	401
4	pH_FLD (pH units)	2	7.4	7.2	7.3
5	pH_GEN (pH units)	12	8.4	7.2	7.8
6	TDS (mg/L)	12	331	158	259
7	Temp (deg C)	12	29.0	12.0	22.7
8	Turb (NTU)	10	211.0	0.0	49.3
	CHEMICAL				
1	Alk-Phen (mgCaCO3/L)	12	14.3	0.0	1.2
2	ALK-TOT (mgCaCO3/L)	12	262	113	197
3	Ca (mg/L)	12	50	26	34
4	Cl (mg/L)	12	19.0	4.0	10.7
5	CO3 (mg/L)	12	17.2	0.0	1.4
6	F (mg/L)	12	0.47	0.03	0.22
7	HCO3 (mg/L)	12	320	138	238
8	K (mg/L)	12	4.4	0.9	1.7
9	Mg (mg/L)	12	26.5	7.8	17.5
10	Na (mg/L)	12	67.9	5.5	28.8
11	NO2+NO3 (mg N/L)	12	2.81	0.17	0.91
12	NO2-N (mgN/L)	12	1.37	0.01	0.14
13	NO3-N (mgN/L)	12	1.77	0.15	0.76
14	o-PO4-P (mg P/L)	12	0.320	0.007	0.119
15	SiO2 (mg/L)	12	52.2	15.9	28.7
16	SO4 (mg/L)	12	19.3	6.4	10.2
	BIOLOGICAL/BACTERIOLOGICAL				
1	BOD3-27 (mg/L)	12	2.0	0.4	0.9
2	COD (mg/L)	12	61.0	12.0	31.9
3	DO (mg/L)	12	8.0	3.7	6.2
4	DO_SAT% (%)	12	93	48	70
	TRACE & TOXIC				
	CHEMICAL INDICES				
1	HAR_Ca (mgCaCO3/L)	12	125	64	86
2	HAR_Total (mgCaCO3/L)	12	236	103	159
3	Na% (%)	12	39	10	25
4	RSC (-)	12	1.6	0.0	0.8
5	SAR (-)	12	1.9	0.2	0.9

Water Quality Data Book 2018-19

Water Quality Seasonal Average for the period : 2014-2019

Station Name : Ganjal at Chhidgaon (010215020)

Local River : Ganjal

Division : Narmada Division, Bhopal

Sub-Division : MNSD-II, Bhopal

River Water

S.No	Parameters	Flood					Winter					Summer				
		Jun - Oct					Nov - Feb					Mar - May				
		2014	2015	2016	2017	2018	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019	2015	2016	2017	2018	2019
	PHYSICAL															
1	Q (cumec)		29.90					7.825					3.466			
2	EC_FLD (µmho/cm)															537
3	EC_GEN (µmho/cm)	299	278	320	326	317	365	404	438	458	411	482	532	476	495	529
4	pH_FLD (pH units)															7.3
5	pH_GEN (pH units)	8.0	8.0	7.7	8.0	7.9	8.1	8.1	7.6	7.8	7.7	8.2	8.1	7.6	8.1	7.5
6	TDS (mg/L)	192	172	207	207	200	242	258	309	302	292	307	346	308	320	313
7	Temp (deg C)	29.2	28.6	29.9	29.5	27.3	20.3	22.0	20.6	19.6	16.5	22.8	26.0	26.0	24.5	23.2
8	Turb (NTU)	100.4	35.2	129.6	51.6	98.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	CHEMICAL															
1	Alk-Phen (mgCaCO3/L)	2.6	0.0	2.3	1.6	2.9	1.3	1.2	0.0	2.0	0.0	3.3	0.0	0.0	2.6	0.0
2	ALK-TOT (mgCaCO3/L)	192	173	155	151	146	244	249	243	210	219	315	265	248	226	252
3	Ca (mg/L)	28	30	26	30	28	40	39	42	35	42	43	37	31	30	34
4	Cl (mg/L)	9.9	8.5	7.7	7.8	8.8	10.3	10.3	11.0	9.5	12.0	17.9	13.0	13.0	17.3	12.0
5	CO3 (mg/L)	3.1	0.0	2.8	1.9	3.4	1.5	1.4	0.0	2.3	0.0	4.0	0.0	0.0	3.1	0.0
6	F (mg/L)	0.24	0.35	0.29	0.37	0.25	0.37	0.28	0.21	0.30	0.26	0.38	0.52	0.44	0.26	0.10
7	HCO3 (mg/L)	228	212	183	180	171	295	301	296	252	268	376	323	302	269	308
8	K (mg/L)	2.1	2.1	1.7	1.1	2.0	1.1	1.3	1.1	1.6	1.3	0.8	1.5	1.3	1.5	1.5
9	Mg (mg/L)	16.6	15.8	14.0	12.5	12.1	21.7	22.2	21.3	19.0	20.4	30.1	22.9	22.9	21.0	22.8
10	Na (mg/L)	26.7	18.5	25.4	15.5	13.2	26.3	30.8	25.1	24.3	40.0	47.8	40.5	35.4	33.2	39.9
11	NO2+NO3 (mg N/L)	1.21	0.65	1.75	0.86	1.53	1.46	1.22	0.58	0.35	0.47	1.55	0.91	0.53	0.28	0.44
12	NO2-N (mgN/L)	0.02	0.01	0.10	0.07	0.30	0.04	0.03	0.02	0.04	0.02	0.09	0.02	0.03	0.03	0.03
13	NO3-N (mgN/L)	1.19	0.64	1.65	0.79	1.23	1.42	1.19	0.56	0.31	0.45	1.47	0.90	0.50	0.25	0.41
14	p-PO4-P (mg P/L)	0.338	0.200	0.224	0.176	0.194	0.219	0.141	0.114	0.092	0.076	0.137	0.173	0.162	0.067	0.050
15	SiO2 (mg/L)	29.8	23.1	28.7	23.9	34.1	27.0	27.6	18.4	19.7	18.4	31.5	24.9	21.0	18.4	33.6
16	SO4 (mg/L)	38.6	15.3	21.3	13.8	13.0	15.4	13.9	9.9	11.1	9.1	35.7	15.8	9.9	14.0	7.2
	BIOLOGICAL/BACTERIOLOGICAL															
1	BOD3-27 (mg/L)	1.1	1.2	1.1	1.0	0.9	0.7	1.0	1.2	1.1	0.9	0.8	0.8	1.2	2.4	1.0
2	COD (mg/L)	35.6	35.0	29.0	23.6	30.6	33.0	23.5	30.0	34.3	37.5	27.7	31.3	35.3	37.3	26.7
3	DO (mg/L)	6.0	5.2	5.6	5.4	5.6	6.8	7.1	6.4	5.8	7.6	6.5	6.6	4.3	6.4	5.1
4	DO_SAT% (%)	79	66	73	71	70	75	81	71	63	77	75	80	53	76	59
	TRACE & TOXIC															
	CHEMICAL INDICES															
1	HAR_Ca (mgCaCO3/L)	71	74	66	76	71	100	97	106	87	104	107	91	78	75	86
2	HAR_Total (mgCaCO3/L)	140	140	125	128	121	191	190	195	166	189	232	187	173	162	181
3	Na% (%)	25	22	31	19	16	23	26	21	24	30	31	32	31	31	32
4	RSC (-)	1.1	0.7	0.7	0.5	0.5	1.1	1.2	1.0	0.9	0.6	1.7	1.6	1.5	1.3	1.5
5	SAR (-)	0.9	0.7	1.0	0.6	0.5	0.8	1.0	0.8	0.8	1.2	1.4	1.3	1.2	1.1	1.3

3.8 Narmada at Hoshangabad

History sheet

		Water Year	: 2018-2019
Site	: Narmada at Hoshangabad	Code	: 010215019
State	: Madhya Pradesh	District	Hoshangabad
Basin	: Narmada	Independent River	: Narmada
Sub-Sub Tributary	:	Local River	: Narmada
Division	: Narmada Division, Bhopal	Sub-Division	: MNSD-1, Hoshangabad
Drainage Area	: 44548 Sq. Km.	Bank	: Left
Latitude	: 22°45'21"	Longitude	: 77°43'58"
Zero of Gauge (m)	: 282 .000 (M.S.L.)	21/05/1972	
	Opening Date	Closing Date	
Gauge	: 21/05/1972		
Discharge	: 16/09/1972		
Sediment	: 29/12/1972		
Water Quality	: 15/07/1979		

Water Quality Data Book 2018-19

Water Quality Datasheet for the period : 2018-2019

Station Name : Narmada at Hoshangabad (010215019)

Local River : Narmada

Division : Narmada Division, Bhopal

Sub-Division : MNSD-1, Hoshangabad

River Water Analysis

S.No	Parameters	01/06/2018	02/07/2018	01/08/2018	03/09/2018	03/10/2018	01/11/2018	03/12/2018	01/01/2019	01/02/2019	01/03/2019	01/04/2019	01/05/2019
		A	A	A	A	A	A	A	A	A	A	A	A
	PHYSICAL												
1	Q (cumec)	110	114.7	750	1370	290	173.3	155.6	178	156.5	106.5	83.19	71.2
2	Colour_Cod (-)	Clear	Clear	Light Brown	Light Brown	Light Brown	Light Brown	Clear	Clear	Clear	Clear	Clear	Clear
3	EC_FLD (µmho/cm)											295	283
4	EC_GEN (µmho/cm)	208	242	231	232	295	294	269	216	215	238	295	283
5	Odour_Code (-)	odour free	odour free	odour free	odour free	odour free	odour free	odour free	odour free	odour free	odour free	odour free	odour free
6	pH_FLD (pH units)											7.4	7.8
7	pH_GEN (pH units)	7.9	7.9	7.4	7.7	8.0	7.9	7.3	7.3	7.8	8.3	7.4	7.8
8	TDS (mg/L)	135	155	150	147	181	182	177	153	148	152	168	163
9	Temp (deg C)	30.0	28.0	25.0	24.0	23.0	27.0	22.0	15.0	16.0	19.0	25.0	27.0
10	Turb (NTU)	0.0	49.0	172.0	151.0	91.0	0.0	0.0	0.0	0.0	0.0		
	CHEMICAL												
1	Alk-Phen (mgCaCO3/L)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.4	0.0	0.0
2	ALK-TOT (mgCaCO3/L)	110	109	95	111	134	140	131	123	123	120	134	122
3	Ca (mg/L)	23	25	28	25	32	33	31	24	28	28	29	31
4	Cl (mg/L)	8.0	7.0	4.0	7.0	5.0	6.0	7.0	6.0	6.0	10.0	9.0	2.0
5	CO3 (mg/L)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.4	0.0	0.0
6	F (mg/L)	0.25	0.13	0.10	0.18	0.40	0.07	0.20	0.14	0.13	0.17	0.08	0.01
7	HCO3 (mg/L)	134	133	116	135	164	171	160	150	150	136	163	149
8	K (mg/L)	1.2	3.5	1.7	1.7	0.7	1.6	1.3	1.1	1.0	1.2	1.6	1.8
9	Mg (mg/L)	8.3	9.2	6.3	8.8	12.8	9.0	11.2	11.7	11.2	11.4	12.6	11.7
10	Na (mg/L)	5.9	5.1	5.8	6.6	5.8	8.2	12.0	12.9	12.4	9.3	13.5	9.2
11	NO2+NO3 (mg N/L)	0.01	0.59	1.23	1.25	1.10	0.36	0.20	0.34	0.23	0.18	0.94	0.53
12	NO2-N (mgN/L)	0.01	0.16	0.01	0.03	0.03	0.02	0.02	0.01	0.02	0.02	0.11	0.02
13	NO3-N (mgN/L)	0.01	0.44	1.22	1.22	1.07	0.34	0.18	0.33	0.21	0.16	0.83	0.51
14	p-PO4-P (mg P/L)	0.020	0.328	0.054	0.406	0.308	0.040	0.048	0.030	0.035	0.016	0.015	0.037
15	SiO2 (mg/L)	17.7	24.8	22.6	24.7	25.0	21.2	16.8	17.0	15.6	16.4	33.3	28.4
16	SO4 (mg/L)	1.8	17.9	11.1	14.3	9.5	7.9	9.9	8.2	8.1	7.7	7.9	7.6
	BIOLOGICAL/BACTERIOLOGICAL												
1	BOD3-27 (mg/L)	1.2	0.5	0.7	0.5	1.0	0.8	1.6	0.7	0.6	0.8	1.0	1.1
2	COD (mg/L)	43.0	68.0	25.0	31.0	20.0	12.0	20.0	46.0	43.0	24.0	25.0	35.0
3	DO (mg/L)	4.9	4.7	5.5	5.5	5.9	6.4	6.7	6.4	7.0	7.4	4.8	5.3
4	DO_SAT% (%)	65	60	67	65	69	80	77	63	71	80	58	67
	TRACE & TOXIC												
	CHEMICAL INDICES												
1	HAR_Ca (mgCaCO3/L)	57	63	70	62	80	81	77	61	70	69	72	79
2	HAR_Total (mgCaCO3/L)	92	101	96	99	134	119	124	110	117	117	124	127
3	Na% (%)	12	9	11	13	9	13	17	20	19	15	19	13
4	RSC (-)	0.4	0.2	0.0	0.2	0.0	0.4	0.2	0.3	0.1	0.1	0.2	0.0
5	SAR (-)	0.3	0.2	0.3	0.3	0.2	0.3	0.5	0.5	0.5	0.4	0.5	0.4

Water Quality Data Book 2018-19

Water Quality Summary for the period : 2018-2019

Station Name : Narmada at Hoshangabad (010215019) Division : Narmada Division, Bhopal

Local River : Narmada

Sub-Division:MNSD-1, Hoshangabad

River Water Summary

S.No	Parameters	Number of Observations	Maximum	Minimum	Mean
	PHYSICAL				
1	Q (cumec)				
2	EC_FLD (µmho/cm)	2	295	283	289
3	EC_GEN (µmho/cm)	12	295	208	252
4	pH_FLD (pH units)	2	7.8	7.4	7.6
5	pH_GEN (pH units)	12	8.3	7.3	7.7
6	TDS (mg/L)	12	182	135	159
7	Temp (deg C)	12	30.0	15.0	23.4
8	Turb (NTU)	10	172.0	0.0	46.3
	CHEMICAL				
1	Alk-Phen (mgCaCO3/L)	12	4.4	0.0	0.4
2	ALK-TOT (mgCaCO3/L)	12	140	95	121
3	Ca (mg/L)	12	33	23	28
4	Cl (mg/L)	12	10.0	2.0	6.4
5	CO3 (mg/L)	12	5.4	0.0	0.4
6	F (mg/L)	12	0.40	0.01	0.16
7	HCO3 (mg/L)	12	171	116	147
8	K (mg/L)	12	3.5	0.7	1.5
9	Mg (mg/L)	12	12.8	6.3	10.3
10	Na (mg/L)	12	13.5	5.1	8.9
11	NO2+NO3 (mg N/L)	12	1.25	0.01	0.58
12	NO2-N (mgN/L)	12	0.16	0.01	0.04
13	NO3-N (mgN/L)	12	1.22	0.01	0.54
14	o-PO4-P (mg P/L)	12	0.406	0.015	0.111
15	SiO2 (mg/L)	12	33.3	15.6	22
16	SO4 (mg/L)	12	17.9	1.8	9.3
	BIOLOGICAL/BACTERIOLOGICAL				
1	BOD3-27 (mg/L)	12	1.6	0.5	0.9
2	COD (mg/L)	12	68.0	12.0	32.7
3	DO (mg/L)	12	7.4	4.7	5.9
4	DO_SAT% (%)	12	80	58	68
	TRACE & TOXIC				
	CHEMICAL INDICES				
1	HAR_Ca (mgCaCO3/L)	12	81	57	70
2	HAR_Total (mgCaCO3/L)	12	134	92	113
3	Na% (%)	12	20	9	14
4	RSC (-)	12	0.4	0.0	0.2
5	SAR (-)	12	0.5	0.2	0.4

Water Quality Data Book 2018-19

Water Quality Seasonal Average for the period : 2014-2019

Station Name : Narmada at Hoshangabad (010215019)

Local River : Narmada

Division : Narmada Division, Bhopal

Sub-Division : MNSD-1, Hoshangabad

River Water

S.No	Parameters	Flood					Winter					Summer				
		Jun - Oct					Nov - Feb					Mar - May				
		2014	2015	2016	2017	2018	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019	2015	2016	2017	2018	2019
	PHYSICAL															
1	Q (cumec)	294.6	487.2				215.7	146.0				198.5	157.1			
2	EC_FLD (µmho/cm)															289
3	EC_GEN (µmho/cm)	221	236	174	259	242	208	260	286	326	249	194	306	243	332	272
4	pH_FLD (pH units)															7.6
5	pH_GEN (pH units)	8.0	8.1	7.6	8.0	7.8	8.1	8.2	7.9	8.0	7.6	8.2	7.7	7.9	7.9	7.8
6	TDS (mg/L)	140	149	113	168	154	138	166	185	215	165	124	199	157	216	161
7	Temp (deg C)	26.3	23.3	19.0	23.2	26.0	17.3	14.9	16.9	18.0	20.0	23.3	16.3	20.0	22.7	23.7
8	Turb (NTU)	122.8	23.0	82.6	130.0	92.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	CHEMICAL															
1	Alk-Phen (mgCaCO3/L)	3.0	0.0	0.0	1.0	0.0	0.0	2.9	0.0	0.0	0.0	1.7	0.0	0.0	0.0	1.5
2	ALK-TOT (mgCaCO3/L)	143	145	95	127	112	135	164	147	154	129	128	150	126	156	125
3	Ca (mg/L)	28	27	20	30	27	30	35	33	31	29	27	30	32	29	29
4	Cl (mg/L)	6.9	8.1	5.8	6.2	6.2	5.9	8.0	7.5	7.8	6.3	6.9	9.3	6.3	11.7	7.0
5	CO3 (mg/L)	3.7	0.0	0.0	1.2	0.0	0.0	3.5	0.0	0.0	0.0	2.0	0.0	0.0	0.0	1.8
6	F (mg/L)	0.31	0.31	0.29	0.28	0.21	0.26	0.22	0.20	0.27	0.14	0.29	0.27	0.15	0.23	0.09
7	HCO3 (mg/L)	167	177	116	152	136	165	193	179	188	158	152	183	153	190	149
8	K (mg/L)	2.8	2.5	1.6	1.5	1.8	1.3	1.6	1.3	1.7	1.3	1.2	1.3	1.1	1.6	1.5
9	Mg (mg/L)	12.8	14.7	7.5	8.5	9.1	11.3	12.2	12.0	14.2	10.8	12.3	11.8	8.7	16.0	11.9
10	Na (mg/L)	10.9	13.8	6.6	200.8	5.8	9.3	14.9	9.8	13.8	11.4	7.8	15.3	9.7	9.7	10.7
11	NO2+NO3 (mg N/L)	1.38	1.25	1.22	0.77	0.84	0.67	0.44	0.37	1.11	0.28	0.41	0.22	0.25	0.50	0.55
12	NO2-N (mgN/L)	0.02	0.02	0.07	0.05	0.05	0.03	0.01	0.01	0.03	0.02	0.06	0.01	0.01	0.09	0.05
13	NO3-N (mgN/L)	1.37	1.23	1.15	0.72	0.79	0.65	0.42	0.36	1.08	0.27	0.36	0.21	0.24	0.42	0.50
14	p-PO4-P (mg P/L)	0.478	0.226	0.221	0.140	0.223	0.198	0.123	0.097	0.073	0.038	0.055	0.099	0.089	0.063	0.023
15	SiO2 (mg/L)	18.3	16.2	17.2	20.3	23.0	18.7	14.5	14.5	20.9	17.6	18.9	13.0	15.8	19.5	26.1
16	SO4 (mg/L)	12.0	11.6	14.6	14.9	10.9	9.0	4.0	8.7	20.7	8.5	17.0	4.1	5.6	13.6	7.7
	BIOLOGICAL/BACTERIOLOGICAL															
1	BOD3-27 (mg/L)	0.9	0.8	0.9	1.1	0.8	0.8	0.6	1.1	0.9	0.9	0.7	1.1	0.8	1.3	1.0
2	COD (mg/L)	28.6	25.2	37.2	35.0	37.4	33.8	32.5	46.8	34.8	30.3	36.0	28.7	42.3	44.3	28.0
3	DO (mg/L)	5.9	5.6	5.9	5.6	5.3	7.1	6.6	6.8	7.0	6.6	6.7	5.5	5.4	6.0	5.8
4	DO_SAT% (%)	73	66	64	65	65	73	65	70	74	73	78	56	59	70	68
	TRACE & TOXIC															
	CHEMICAL INDICES															
1	HAR_Ca (mgCaCO3/L)	69	67	50	76	66	76	88	81	77	72	69	74	81	71	73
2	HAR_Total (mgCaCO3/L)	122	128	81	111	104	123	139	132	136	117	120	123	117	138	123
3	Na% (%)	16	18	15	31	11	14	19	14	18	17	12	20	15	13	16
4	RSC (-)	0.4	0.3	0.3	0.3	0.2	0.3	0.5	0.3	0.4	0.3	0.2	0.6	0.2	0.4	0.1
5	5AR (-)	0.4	0.5	0.3	8.2	0.3	0.4	0.6	0.4	0.5	0.5	0.3	0.6	0.4	0.4	0.4

3.9 Narmada at Sandia

History sheet

		Water Year	: 2018-2019
Site	: Narmada at Sandia	Code	: 010215013
State	: Madhya Pradesh	District	Hoshangabad
Basin	: Narmada	Independent River	: Narmada
Sub-Sub Tributary	:	Local River	: Narmada
Division	: Narmada Division, Bhopal	Sub-Division	: MNSD-1,Hoshangabad
Drainage Area	: 33953.5 Sq. Km.	Bank	: Left
Latitude	: 22°54'57"	Longitude	: 78°20'51"
Zero of Gauge (m)	: 297 .000 (M.S.L.)	01/03/1978	
	Opening Date	Closing Date	
Gauge	: 01/03/1978		
Discharge	: 18/04/1978		
Sediment	: 09/08/1978		
Water Quality	: 15/09/1979		

Water Quality Data Book 2018-19

Water Quality Datasheet for the period : 2018-2019

Station Name : Narmada at Sandia (010215013)

Division : Narmada Division, Bhopal

Local River : Narmada

Sub-Division : MNSD-1, Hoshangabad

River Water Analysis

S.No	Parameters	01/06/2018	02/07/2018	01/08/2018	03/09/2018	03/10/2018	01/11/2018	03/12/2018	01/01/2019	01/02/2019	01/03/2019	01/04/2019	01/05/2019
		A	A	A	A	A	A	A	A	A	A	A	A
	PHYSICAL												
1	Q (cumec)	0	142.6	490	2100	498	148.6	96	190	82.1	64	37.8	33.3
2	Colour_ Cod (-)	Clear	Clear	Light Brown	Brown	Light Brown	Brown	Clear	Clear	Clear	Clear	Clear	Clear
3	EC_FLD (µmho/cm)											284	253
4	EC_GEN (µmho/cm)	193	227	227	194	261	293	260	193	208	227	284	253
5	Odour_Code (-)	odour free	odour free	odour free	odour free	odour free	odour free	odour free	odour free	odour free	odour free	odour free	odour free
6	pH_FLD (pH units)											7.6	7.9
7	pH_GEN (pH units)	7.8	8.1	7.6	7.5	7.8	7.8	7.3	7.6	7.7	7.8	7.6	7.9
8	TDS (mg/L)	125	145	144	122	158	182	173	138	151	144	162	147
9	Temp (deg C)	31.5	27.0	29.0	27.5	29.0	25.0	19.5	15.5	16.0	19.0	24.5	29.0
10	Turb (NTU)	0.0	42.0	151.0	211.0	86.0	0.0	0.0	0.0	0.0	0.0		
	CHEMICAL												
1	Alk-Phen (mgCaCO3/L)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	ALK-TOT (mgCaCO3/L)	96	100	89	86	116	129	125	107	121	114	129	116
3	Ca (mg/L)	22	22	27	24	29	31	28	25	30	28	29	29
4	Cl (mg/L)	7.0	6.0	6.0	2.0	8.0	5.0	7.0	6.0	5.0	7.0	13.0	3.0
5	CO3 (mg/L)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	F (mg/L)	0.19	0.22	0.24	0.23	0.48	0.41	0.21	0.17	0.12	0.15	0.02	0.03
7	HCO3 (mg/L)	117	122	108	105	141	157	152	131	148	139	157	141
8	K (mg/L)	1.1	2.7	1.7	2.1	1.4	1.7	1.3	1.5	0.9	1.3	1.5	1.6
9	Mg (mg/L)	7.5	9.2	6.1	6.8	9.7	11.2	12.9	9.0	12.2	9.5	14.1	11.2
10	Na (mg/L)	4.4	4.1	4.9	3.8	5.5	7.5	8.6	8.0	10.2	6.7	10.8	7.0
11	NO2+NO3 (mg N/L)	0.05	2.21	1.74	1.75	1.05	0.51	0.93	0.40	0.30	0.25	0.49	0.32
12	NO2-N (mgN/L)	0.01	1.83	0.01	0.03	0.03	0.01	0.01	0.02	0.03	0.03	0.01	0.01
13	NO3-N (mgN/L)	0.05	0.38	1.73	1.73	1.01	0.49	0.92	0.39	0.27	0.22	0.47	0.31
14	o-PO4-P (mg P/L)	0.214	0.207	0.128	0.290	0.328	0.037	0.055	0.020	0.057	0.350	0.009	0.012
15	SiO2 (mg/L)	15.9	27.6	23.0	24.1	19.7	22.7	17.2	16.8	15.9	16.7	32.3	22.6
16	SO4 (mg/L)	6.7	14.9	13.5	16.5	8.0	7.5	9.4	8.4	8.1	8.0	8.2	5.3
	BIOLOGICAL/BACTERIOLOGICAL												
1	BOD3-27 (mg/L)	1.0	0.2	0.7	0.9	0.8	1.1	1.1	0.3	0.7	1.0	1.4	0.7
2	COD (mg/L)	50.0	25.0	34.0	21.0	26.0	16.0	18.0	42.0	45.0	16.0	20.0	41.0
3	DO (mg/L)	4.7	4.3	5.3	5.4	4.7	6.2	6.8	6.9	6.7	6.7	5.8	5.7
4	DO_SAT% (%)	63	54	69	68	61	75	73	68	68	72	69	74
	TRACE & TOXIC												
	CHEMICAL INDICES												
1	HAR_Ca (mgCaCO3/L)	55	54	67	59	74	79	71	63	76	69	73	72
2	HAR_Total (mgCaCO3/L)	87	92	92	87	114	125	125	101	127	109	132	118
3	Na% (%)	10	9	10	8	9	11	13	15	15	12	15	11
4	RSC (-)	0.2	0.2	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.1	0.0	0.0
5	SAR (-)	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.4	0.3	0.4	0.3

Water Quality Data Book 2018-19

Water Quality Summary for the period : 2018-2019

Station Name : Narmada at Sandia (010215013)

Division : Narmada Division, Bhopal

Local River : Narmada

Sub-Division:MNSD-1, Hoshangabad

River Water Summary

S.No	Parameters	Number of Observations	Maximum	Minimum	Mean
	PHYSICAL				
1	Q (cumec)				
2	EC_FLD ($\mu\text{mho/cm}$)	2	284	253	269
3	EC_GEN ($\mu\text{mho/cm}$)	12	293	193	235
4	pH_FLD (pH units)	2	7.9	7.6	7.8
5	pH_GEN (pH units)	12	8.1	7.3	7.7
6	TDS (mg/L)	12	182	122	149
7	Temp (deg C)	12	31.5	15.5	24.4
8	Turb (NTU)	10	211.0	0.0	49
	CHEMICAL				
1	Alk-Phen (mgCaCO ₃ /L)	12	0.0	0.0	0
2	ALK-TOT (mgCaCO ₃ /L)	12	129	86	111
3	Ca (mg/L)	12	31	22	27
4	Cl (mg/L)	12	13.0	2.0	6.3
5	CO ₃ (mg/L)	12	0.0	0.0	0
6	F (mg/L)	12	0.48	0.02	0.2
7	HCO ₃ (mg/L)	12	157	105	135
8	K (mg/L)	12	2.7	0.9	1.6
9	Mg (mg/L)	12	14.1	6.1	9.9
10	Na (mg/L)	12	10.8	3.8	6.8
11	NO ₂ +NO ₃ (mg N/L)	12	2.21	0.05	0.83
12	NO ₂ -N (mgN/L)	12	1.83	0.01	0.17
13	NO ₃ -N (mgN/L)	12	1.73	0.05	0.66
14	o-PO ₄ -P (mg P/L)	12	0.350	0.009	0.142
15	SiO ₂ (mg/L)	12	32.3	15.9	21.2
16	SO ₄ (mg/L)	12	16.5	5.3	9.5
	BIOLOGICAL/BACTERIOLOGICAL				
1	BOD ₃₋₂₇ (mg/L)	12	1.4	0.2	0.8
2	COD (mg/L)	12	50.0	16.0	29.5
3	DO (mg/L)	12	6.9	4.3	5.8
4	DO_SAT% (%)	12	75	54	68
	TRACE & TOXIC				
	CHEMICAL INDICES				
1	HAR_Ca (mgCaCO ₃ /L)	12	79	54	68
2	HAR_Total (mgCaCO ₃ /L)	12	132	87	109
3	Na% (%)	12	15	8	12
4	RSC (-)	12	0.2	0.0	0.1
5	SSAR (-)	12	0.4	0.2	0.3

Water Quality Data Book 2018-19

Water Quality Seasonal Average for the period : 2014-2019

Station Name : Narmada at Sandia (010215013)

Local River : Narmada

Division : Narmada Division, Bhopal

Sub-Division : MNSD-1, Hoshangabad

River Water

S.No	Parameters	Flood					Winter					Summer				
		Jun - Oct					Nov - Feb					Mar - May				
		2014	2015	2016	2017	2018	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019	2015	2016	2017	2018	2019
	PHYSICAL															
1	Q (cumec)	309.4	274.5				203.4	103.4				138.6	90.18			
2	EC_FLD (µmho/cm)															269
3	EC_GEN (µmho/cm)	211	227	193	248	220	207	235	258	287	239	191	258	231	305	255
4	pH_FLD (pH units)															7.8
5	pH_GEN (pH units)	8.0	8.2	7.6	7.8	7.8	8.1	8.3	7.8	7.8	7.6	8.2	8.1	7.7	7.7	7.8
6	TDS (mg/L)	138	144	125	160	139	137	150	167	191	161	123	167	150	197	151
7	Temp (deg C)	29.0	28.6	27.3	26.5	28.8	21.0	20.8	18.1	19.1	19.0	25.0	23.8	25.8	25.5	24.2
8	Turb (NTU)	114.2	38.6	145.8	124.4	98.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	CHEMICAL															
1	Alk-Phen (mgCaCO3/L)	2.2	0.0	0.9	0.0	0.0	0.0	2.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	ALK-TOT (mgCaCO3/L)	142	144	92	120	97	135	144	130	133	120	125	130	121	134	119
3	Ca (mg/L)	29	28	23	29	25	29	32	32	30	29	29	27	33	29	29
4	Cl (mg/L)	6.8	7.4	4.9	5.4	5.8	5.9	7.5	6.5	8.3	5.8	7.3	6.3	5.7	14.3	7.7
5	CO3 (mg/L)	2.6	0.0	1.1	0.0	0.0	0.0	2.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	F (mg/L)	0.25	0.32	0.35	0.33	0.27	0.38	0.24	0.19	0.29	0.23	0.13	0.23	0.19	0.21	0.06
7	HCO3 (mg/L)	168	175	110	147	119	165	170	158	162	147	152	158	147	163	146
8	K (mg/L)	2.4	2.7	1.5	1.4	1.8	1.5	1.5	1.2	1.5	1.4	1.1	1.3	1.0	1.8	1.4
9	Mg (mg/L)	14.3	14.3	7.3	8.5	7.9	12.7	12.7	9.7	12.8	11.3	21.6	12.1	7.7	13.0	11.6
10	Na (mg/L)	10.0	10.1	4.9	7.5	4.5	10.5	10.5	7.2	9.2	8.6	7.1	7.9	7.8	9.2	8.2
11	NO2+NO3 (mg N/L)	1.27	1.21	1.85	0.71	1.36	0.79	0.26	0.38	0.73	0.53	0.41	0.07	0.22	0.34	0.35
12	NO2-N (mgN/L)	0.02	0.01	0.10	0.04	0.38	0.03	0.01	0.01	0.03	0.02	0.04	0.01	0.01	0.03	0.02
13	NO3-N (mgN/L)	1.25	1.20	1.75	0.67	0.98	0.76	0.25	0.37	0.70	0.52	0.37	0.06	0.21	0.31	0.33
14	p-PO4-P (mg P/L)	0.299	0.323	0.230	0.179	0.233	0.112	0.103	0.077	0.081	0.042	0.127	0.106	0.075	0.094	0.124
15	SiO2 (mg/L)	17.6	14.7	21.5	22.0	22.1	18.8	14.5	14.8	20.2	18.1	18.1	13.4	15.6	18.2	23.9
16	SO4 (mg/L)	12.6	12.1	12.6	16.1	11.9	11.6	2.1	9.2	22.5	8.3	23.0	2.7	5.1	16.8	7.2
	BIOLOGICAL/BACTERIOLOGICAL															
1	BOD3-27 (mg/L)	1.0	0.7	0.9	1.0	0.7	0.9	0.7	1.2	1.0	0.8	0.6	0.4	1.0	1.0	1.0
2	COD (mg/L)	29.0	29.4	94.8	48.4	31.2	31.5	29.0	49.5	29.5	30.3	33.7	30.7	38.3	45.3	25.7
3	DO (mg/L)	5.6	6.0	5.4	5.4	4.9	7.2	7.5	6.7	6.3	6.6	6.7	6.5	5.3	5.3	6.1
4	DO_SAT% (%)	73	77	69	67	63	80	84	71	68	71	80	76	65	64	72
	TRACE & TOXIC															
	CHEMICAL INDICES															
1	HAR_Ca (mgCaCO3/L)	74	70	59	73	62	73	79	80	75	72	72	68	82	73	71
2	HAR_Total (mgCaCO3/L)	133	130	89	108	94	126	132	121	128	119	162	119	114	127	120
3	Na% (%)	14	14	11	13	9	15	14	11	14	13	9	12	13	13	13
4	RSC (-)	0.2	0.3	0.1	0.2	0.1	0.2	0.2	0.2	0.1	0.1	0.1	0.2	0.2	0.2	0.0
5	5AR (-)	0.4	0.4	0.2	0.3	0.2	0.4	0.4	0.3	0.4	0.3	0.3	0.3	0.3	0.4	0.3

3.10 Shakkar at Gadarwara**History sheet**

		Water Year	: 2018-2019
Site	: Shakkar at Gadarwara	Code	: 010215012
State	: Madhya Pradesh	District	Narsinghpur
Basin	: Narmada	Independent River	: Narmada
Tributary	: Shakkar	Local River	: Shakkar
Division	: Narmada Division, Bhopal	Sub-Division	: MNSD-1, Hoshangabad
Drainage Area	: 2270 Sq. Km.	Bank	: Left
Latitude	: 22°55'26"	Longitude	: 78°47'20"
Zero of Gauge (m)	: 321 .000 (M.S.L.)	01/02/1977	
	Opening Date	Closing Date	
Gauge	: 01/02/1977		
Discharge	: 01/02/1977		
Sediment	: 15/06/1978		
Water Quality	: 16/08/1979		

Water Quality Data Book 2018-19

Water Quality Datasheet for the period : 2018-2019

Station Name : Shakkar at Gadarwara (010215012)

Local River : Shakkar

Division : Narmada Division, Bhopal

Sub-Division : MNSD-1, Hoshangabad

River Water Analysis

S.No	Parameters	01/06/2018	02/07/2018	01/08/2018	03/09/2018	03/10/2018	01/11/2018	03/12/2018	01/01/2019	01/02/2019	01/03/2019	01/04/2019	01/05/2019
		A	A	A	A	A	A	A	A	A	A	A	A
	PHYSICAL												
1	Q (cumec)		9.48	55.56	197.7	44.25	44.25	2.96	0.7				
2	Colour_ Cod (-)		Light Brown	Clear	Light Brown	Light Brown	Light Brown	Clear	Clear				
3	EC_GEN (µmho/cm)		310	385	196	295	266	652	606				
4	Odour_Code (-)		odour free	odour free	odour free	odour free	odour free	odour free	odour free				
5	pH_GEN (pH units)		8.0	7.6	7.7	8	7.6	8.1	7.8				
6	TDS (mg/L)		197	238	120	181	255	431	418				
7	Temp (deg C)		21.0	20.5	21.0	23	22.5	21.5	16.0				
8	Turb (NTU)		136.0	41.0	161.0	91	0.0	0.0	0.0				
	CHEMICAL												
1	Alk-Phen (mgCaCO3/L)		0.0	0.0	0.0	0	0.0	0.0	0.0				
2	ALK-TOT (mgCaCO3/L)		129	139	89		173	293	265				
3	Ca (mg/L)		31	40	22	32	37	51	33				
4	Cl (mg/L)		11.0	15.0	5.0	5	7.0	53.0	68.0				
5	CO3 (mg/L)		0.0	0.0	0.0	0	0.0	0.0	0.0				
6	F (mg/L)		0.24	0.23	0.26	0.4	0.43	0.29	0.13				
7	HCO3 (mg/L)		157	169	108	164	211	358	323				
8	K (mg/L)		5.8	2.3	1.1	0.7	1.2	9.7	10.3				
9	Mg (mg/L)		9.7	12.4	7.3	12.8	14.3	33.9	37.4				
10	Na (mg/L)		8.5	11.6	4.0	5.8	9.9	37.5	53.7				
11	NO2+NO3 (mg N/L)		1.89	0.38	0.39	1.1	0.61	2.49	0.26				
12	NO2-N (mgN/L)		0.17	0.02	0.03	0.029	0.02	0.03	0.02				
13	NO3-N (mgN/L)		1.73	0.36	0.36	1.07	0.58	2.47	0.24				
14	PO4-P (mg P/L)		0.426	0.280	0.293	0.308	0.033	0.127	0.082				
15	SiO2 (mg/L)		25.3	36.2	24.4	25	22.2	20.9	16.0				
16	SO4 (mg/L)		16.3	20.3	6.0	9.5	7.2	11.8	7.9				
	BIOLOGICAL/BACTERIOLOGICAL												
1	BOD3-27 (mg/L)		2.5	0.6	0.7	1	0.8	1.8	3.1				
2	COD (mg/L)		60.0	19.0	36.0	20	22.0	12.0	55.0				
3	DO (mg/L)		3.7	3.4	6.0	5.9	5.5	5.9	7.2				
4	DO_SAT% (%)		42	37	67	69	63	66	73				
	TRACE & TOXIC												
	CHEMICAL INDICES												
1	HAR_Ca (mgCaCO3/L)		78	100	54	80	93	128	83				
2	HAR_Total (mgCaCO3/L)		119	151	84	134	153	270	239				
3	Na% (%)		13	14	9	9	12	23	32				
4	RSC (-)		0.2	0.0	0.1	0	0.4	0.5	0.6				
5	SAR (-)		0.3	0.4	0.2	0.2	0.3	1.0	1.5				

Water Quality Data Book 2018-19

Water Quality Summary for the period : 2018-2019

Station Name : Shakkar at Gadarwara (010215012)

Division : Narmada Division, Bhopal

Local River : Shakkar

Sub-Division:MNSD-1, Hoshangabad

River Water Summary

S.No	Parameters	Number of Observations	Maximum	Minimum	Mean
	PHYSICAL				
1	Q (cumec)				
2	EC_GEN (µmho/cm)	7	652	196	387
3	pH_GEN (pH units)	7	8.1	7.6	7.8
4	TDS (mg/L)	7	431	120	263
5	Temp (deg C)	7	23.0	16.0	20.8
6	Turb (NTU)	6	161.0	0.0	56.3
	CHEMICAL				
1	Alk-Phen (mgCaCO3/L)	6	0.0	0.0	0
2	ALK-TOT (mgCaCO3/L)	6	293	89	181
3	Ca (mg/L)	7	51	22	35
4	Cl (mg/L)	7	68.0	5.0	23.4
5	CO3 (mg/L)	7	0.0	0.0	0
6	F (mg/L)	7	0.43	0.13	0.28
7	HCO3 (mg/L)	7	358	108	213
8	K (mg/L)	7	10.3	0.7	4.4
9	Mg (mg/L)	7	37.4	7.3	18.3
10	Na (mg/L)	7	53.7	4.0	18.7
11	NO2+NO3 (mg N/L)	6	2.49	0.26	1
12	NO2-N (mgN/L)	6	0.17	0.02	0.05
13	NO3-N (mgN/L)	6	2.47	0.24	0.96
14	PO4-P (mg P/L)	6	0.426	0.033	0.207
15	P-Tot (mgP/L)	1	0.308	0.308	0.308
16	SiO2 (mg/L)	7	36.2	16.0	24.3
17	SO4 (mg/L)	7	20.3	6.0	11.3
	BIOLOGICAL/BACTERIOLOGICAL				
1	BOD3-27 (mg/L)	7	3.1	0.6	1.5
2	COD (mg/L)	7	60.0	12.0	32
3	DO (mg/L)	7	7.2	3.4	5.4
4	DO_SAT% (%)	7	73	37	60
	TRACE & TOXIC				
	CHEMICAL INDICES				
1	HAR_Ca (mgCaCO3/L)	7	128	54	88
2	HAR_Total (mgCaCO3/L)	7	270	84	164
3	Na% (%)	7	32	9	16
4	RSC (-)	7	0.6	0.0	0.3
5	SAR (-)	7	1.5	0.2	0.6

Water Quality Data Book 2018-19

Water Quality Seasonal Average for the period : 2014-2019

Station Name : Shakkar at Gadarwara (010215012)

Local River : Shakkar

Division : Narmada Division, Bhopal

Sub-Division : MNSD-1, Hoshangabad

River Water

S.No	Parameters	Flood					Winter					Summer				
		Jun - Oct					Nov - Feb					Mar - May				
		2014	2015	2016	2017	2018	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019	2015	2016	2017	2018	2019
	PHYSICAL															
1	Q (cumec)	50.34	47.91				3.611	1.540				1.889	0.006			
2	EC_GEN (µmho/cm)	233	247	228	285	297	311	290	420	529	508	279	370	545	843	
3	pH_GEN (pH units)	7.9	8.2	7.5	8.0	7.7	8.1	8.3	7.8	7.7	7.8	8.2	8.0	7.6	7.7	
4	TDS (mg/L)	150	155	147	183	185	206	184	272	349	368	176	242	354	535	
5	Temp (deg C)	23.0	23.8	24.0	23.8	20.8	18.3	20.3	19.8	21.0	20.0	25.3	21.0	21.8	21.0	
6	Turb (NTU)	96.6	8.2	155.0	93.0	112.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	CHEMICAL															
1	Alk-Phen (mgCaCO3/L)	3.9	2.0	0.0	1.3	0.0	1.3	5.2	0.0	0.0	0.0	2.5	0.0	0.0	0.0	
2	ALK-TOT (mgCaCO3/L)	150	156	103	127	119	204	167	204	234	244	189	170	250	293	
3	Ca (mg/L)	26	30	26	31	31	41	34	44	49	41	32	23	46	59	
4	Cl (mg/L)	8.1	8.1	4.8	7.0	10.3	8.7	7.8	9.0	19.8	42.7	10.7	15.0	27.0	86.0	
5	CO3 (mg/L)	4.7	2.4	0.0	1.6	0.0	1.5	6.3	0.0	0.0	0.0	3.0	0.0	0.0	0.0	
6	F (mg/L)	0.26	0.26	0.37	0.34	0.24	0.40	0.20	0.15	0.36	0.28	0.11	0.25	0.24	0.30	
7	HCO3 (mg/L)	173	185	126	151	145	246	192	249	285	297	225	207	305	358	
8	K (mg/L)	2.2	1.7	1.8	1.2	3.1	1.6	0.8	1.0	3.6	7.1	1.1	3.1	2.6	2.4	
9	Mg (mg/L)	14.5	16.2	9.2	12.1	9.8	20.4	19.6	20.0	25.0	28.6	19.5	20.9	27.2	42.0	
10	Na (mg/L)	11.3	9.4	6.0	7.3	8.0	12.0	10.9	11.2	20.0	33.7	11.7	15.6	29.6	12.4	
11	NO2+NO3 (mg N/L)	1.37	1.31	1.80	1.30	0.89	1.69	0.27	0.53	2.32	1.12	0.34	0.06	0.79	2.12	
12	NO2-N (mgN/L)	0.04	0.03	0.19	0.08	0.07	0.06	0.01	0.02	0.06	0.02	0.05	0.01	0.04	0.08	
13	NO3-N (mgN/L)	1.34	1.28	1.61	1.23	0.82	1.63	0.26	0.51	2.27	1.09	0.29	0.05	0.75	2.04	
14	PO4-P (mg P/L)	0.319	0.219	0.345	0.260	0.333	0.187	0.104	0.092	0.175	0.081	0.120	0.182	0.146	0.134	
15	SiO2 (mg/L)	23.4	19.0	25.1	22.4	28.6	22.4	20.6	17.3	21.2	19.7	19.9	21.6	19.2	21.7	
16	SO4 (mg/L)	10.6	9.4	20.6	15.1	14.2	18.2	2.5	10.8	18.0	9.0	41.0	2.2	9.9	24.3	
	BIOLOGICAL/BACTERIOLOGICAL															
1	BOD3-27 (mg/L)	1.0	0.8	0.9	1.0	1.3	1.0	0.6	1.0	1.1	1.9	1.0	3.0	0.8	1.7	
2	COD (mg/L)	28.6	28.4	41.5	48.0	38.3	39.0	25.8	36.8	34.3	29.7	27.3	44.0	40.0	21.0	
3	DO (mg/L)	5.8	6.2	4.9	5.2	4.4	6.8	7.6	6.6	4.6	6.2	7.1	3.0	4.3	4.8	
4	DO SAT% (%)	68	74	59	62	49	72	83	72	52	67	86	34	48	54	
	TRACE & TOXIC															
	CHEMICAL INDICES															
1	HAR_Ca (mgCaCO3/L)	65	76	64	78	77	101	84	109	122	101	80	57	114	148	
2	HAR_Total (mgCaCO3/L)	125	143	103	128	118	186	166	193	226	220	162	144	227	324	
3	Na% (%)	16	13	11	11	12	12	13	11	15	22	14	19	21	8	
4	RSC (-)	0.5	0.3	0.1	0.0	0.1	0.4	0.3	0.2	0.2	0.5	0.6	0.5	0.5	0.0	
5	SAR (-)	0.4	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.6	1.0	0.4	0.6	0.8	0.3	

3.11 Narmada at Barman

History Sheet

		Water Year	: 2018-2019
Site	: Narmada at Barman	Code	: 010215011
State	: Madhya Pradesh	District	Narsinghpur
Basin	: Narmada	Independent River	: Narmada
Tributary	:	Sub Tributary	:
Sub-Sub Tributary	:	Local River	: Narmada
Division	: Narmada Division, Bhopal	Sub-Division	: MNSD-1, Hoshangabad
Drainage Area	: 26453 Sq. Km.	Bank	: Right
Latitude	: 23°01'52"	Longitude	: 79°00'56"
Zero of Gauge (m)	: 306 .000 (M.S.L.)	09/12/1970	
	Opening Date	Closing Date	
Gauge	: 09/12/1970		
Discharge	: 20/11/1971		
Sediment	: 27/08/1972		
Water Quality	: 01/06/1979		

Water Quality Data Book 2018-19

Water Quality Datasheet for the period : 2018-2019

Station Name : Narmada at Barman (010215011)

Local River : Narmada

Division : Narmada Division, Bhopal

Sub-Division : MNSD-1, Hoshangabad

River Water Analysis

S.No	Parameters	01/06/2018	02/07/2018	01/08/2018	03/09/2018	03/10/2018	01/11/2018	03/12/2018	01/01/2019	01/02/2019	01/03/2019	01/04/2019	01/05/2019
		A	A	A	A	A	A	A	A	A	A	A	A
	PHYSICAL												
1	Q (cumec)	84.3	114.7	750	1390	237	63.3	120	111	44.7	41	33.8	40.3
2	Colour_Cod (-)	Clear	Light Brown	Light Brown	Light Brown	Clear	Light Brown	Clear	Clear	Clear	Clear	Clear	Clear
3	EC_FLD (µmho/cm)											270	234
4	EC_GEN (µmho/cm)	196	229	216	7	363	325	252	180	212	226	270	234
5	Odour_Code (-)	odour free	odour free	odour free	odour free	odour free	odour free	odour free	odour free	odour free	odour free	odour free	odour free
6	pH_FLD (pH units)											7.5	7.8
7	pH_GEN (pH units)	7.9	8.0	7.6	7.5	7.8	7.6	7.1	7.5	7.7	8.3	7.5	7.8
8	TDS (mg/L)	128	145	133	123	221	200	169	132	151	143	149	136
9	Temp (deg C)	30.0	29.0	27.0	30.0	28.0	25.0	20.6	17.0	17.0	23.0	25.0	27.0
10	Turb (NTU)	0.0	98.0	139.0	156.0	21.0	0.0	0.0	0.0	0.0	0.0		
	CHEMICAL												
1	Alk-Phen (mgCaCO3/L)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.7	0.0	0.0
2	ALK-TOT (mgCaCO3/L)	101	102	84	93	175	136	111	101	116	109	104	102
3	Ca (mg/L)	22	22	25	25	39	33	30	24	28	29	27	25
4	Cl (mg/L)	8.0	7.0	5.0	3.0	3.0	9.0	6.0	6.0	4.0	8.0	13.0	2.0
5	CO3 (mg/L)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.0	0.0	0.0
6	F (mg/L)	0.20	0.19	0.18	0.31	0.63	0.26	0.20	0.14	0.14	0.16	0.10	0.09
7	HCO3 (mg/L)	123	125	102	113	213	166	136	123	142	117	127	124
8	K (mg/L)	1.2	4.1	1.7	1.6	0.7	1.8	1.4	1.4	1.0	1.6	1.5	1.5
9	Mg (mg/L)	9.7	9.5	6.6	6.1	16.3	11.2	10.2	8.3	13.9	8.8	14.1	10.2
10	Na (mg/L)	4.2	5.3	4.5	4.2	8.2	8.7	8.3	7.3	11.2	8.1	7.1	5.6
11	NO2+NO3 (mg N/L)	0.30	2.74	1.07	1.07	1.33	0.09	0.63	0.63	0.30	0.22	0.60	0.63
12	NO2-N (mgN/L)	0.01	1.94	0.03	0.03	0.04	0.01	0.02	0.02	0.03	0.02	0.02	0.01
13	NO3-N (mgN/L)	0.30	0.80	1.03	1.03	1.29	0.09	0.60	0.62	0.27	0.19	0.58	0.62
14	p-PO4-P (mg P/L)	0.035	0.263	0.054	0.315	0.388	0.048	0.052	0.025	0.057	0.031	0.031	0.017
15	SiO2 (mg/L)	18.9	24.2	20.0	20.8	36.4	23.8	16.7	15.4	16.2	15.8	24.6	23.6
16	SO4 (mg/L)	4.9	17.3	12.1	14.9	10.4	8.8	9.0	8.0	8.5	7.8	7.7	5.5
	BIOLOGICAL/BACTERIOLOGICAL												
1	BOD3-27 (mg/L)	1.3	0.3	1.1	0.7	0.6	1.0	1.7	0.3	1.0	1.3	0.9	0.5
2	COD (mg/L)	41.0	44.0	31.0	48.0	163.0	32.0	11.0	63.0	44.0	31.0	23.0	36.0
3	DO (mg/L)	4.2	4.7	6.0	6.1	5.5	5.9	6.8	6.7	6.5	6.1	5.3	5.0
4	DO_SAT% (%)	56	61	75	81	70	71	75	69	67	71	64	63
	TRACE & TOXIC												
	CHEMICAL INDICES												
1	HAR_Ca (mgCaCO3/L)	56	55	63	63	96	83	74	60	70	72	67	63
2	HAR_Total (mgCaCO3/L)	97	94	90	89	164	130	117	94	128	108	126	106
3	Na% (%)	9	10	10	9	10	13	13	14	16	14	11	10
4	RSC (-)	0.1	0.2	0.0	0.1	0.2	0.1	0.0	0.1	0.0	0.0	0.0	0.0
5	SAR (-)	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.4	0.3	0.3	0.2

Water Quality Data Book 2018-19

Water Quality Summary for the period : 2018-2019

Station Name : Narmada at Barman (010215011)

Division : Narmada Division, Bhopal

Local River : Narmada

Sub-Division:MNSD-1, Hoshangabad

River Water Summary

S.No	Parameters	Number of Observations	Maximum	Minimum	Mean
	PHYSICAL				
1	Q (cumec)				
2	EC_FLD (µmho/cm)	2	270	234	252
3	EC_GEN (µmho/cm)	12	363	7	226
4	pH_FLD (pH units)	2	7.8	7.5	7.7
5	pH_GEN (pH units)	12	8.3	7.1	7.7
6	TDS (mg/L)	12	221	123	153
7	Temp (deg C)	12	30.0	17.0	24.9
8	Turb (NTU)	10	156.0	0.0	41.4
	CHEMICAL				
1	Alk-Phen (mgCaCO3/L)	12	6.7	0.0	0.6
2	ALK-TOT (mgCaCO3/L)	12	175	84	111
3	Ca (mg/L)	12	39	22	27
4	Cl (mg/L)	12	13.0	2.0	6.2
5	CO3 (mg/L)	12	8.0	0.0	0.7
6	F (mg/L)	12	0.63	0.09	0.22
7	HCO3 (mg/L)	12	213	102	134
8	K (mg/L)	12	4.1	0.7	1.6
9	Mg (mg/L)	12	16.3	6.1	10.4
10	Na (mg/L)	12	11.2	4.2	6.9
11	NO2+NO3 (mg N/L)	12	2.74	0.09	0.8
12	NO2-N (mgN/L)	12	1.94	0.01	0.18
13	NO3-N (mgN/L)	12	1.29	0.09	0.62
14	PO4-P (mg P/L)	12	0.388	0.017	0.11
15	SiO2 (mg/L)	12	36.4	15.4	21.4
16	SO4 (mg/L)	12	17.3	4.9	9.6
	BIOLOGICAL/BACTERIOLOGICAL				
1	BOD3-27 (mg/L)	12	1.7	0.3	0.9
2	COD (mg/L)	12	163.0	11.0	47.3
3	DO (mg/L)	12	6.8	4.2	5.7
4	DO_SAT% (%)	12	81	56	69
	TRACE & TOXIC				
	CHEMICAL INDICES				
1	HAR_Ca (mgCaCO3/L)	12	96	55	69
2	HAR_Total (mgCaCO3/L)	12	164	89	112
3	Na% (%)	12	16	9	12
4	RSC (-)	12	0.2	0.0	0.1
5	SAR (-)	12	0.4	0.2	0.3

Water Quality Data Book 2018-19

Water Quality Seasonal Average for the period : 2014-2019

Station Name : Narmada at Barman (010215011)

Local River : Narmada

Division : Narmada Division, Bhopal

Sub-Division : MNSD-1, Hoshangabad

River Water

S.No	Parameters	Flood					Winter					Summer				
		Jun - Oct					Nov - Feb					Mar - May				
		2014	2015	2016	2017	2018	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019	2015	2016	2017	2018	2019
	PHYSICAL															
1	Q (cumec)	274.1	191.3				175.5	85.17				139.3	93.33			
2	EC_FLD (µmho/cm)															252
3	EC_GEN (µmho/cm)	185	193	198	250	202	167	201	224	266	242	168	224	221	250	243
4	pH_FLD (pH units)															7.7
5	pH_GEN (pH units)	7.8	8.2	7.7	7.9	7.7	8.1	8.2	7.9	7.8	7.5	8.1	8.1	7.8	7.6	7.9
6	TDS (mg/L)	118	121	130	160	150	111	127	145	175	163	108	146	144	165	143
7	Temp (deg C)	27.8	28.4	28.2	28.6	28.8	20.5	21.8	21.5	20.3	19.9	24.0	25.3	25.0	25.7	25.0
8	Turb (NTU)	54.4	25.4	82.0	84.6	82.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	CHEMICAL															
1	Alk-Phen (mgCaCO3/L)	0.0	0.0	0.0	0.0	0.0	0.0	2.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.2
2	ALK-TOT (mgCaCO3/L)	131	117	91	115	111	109	119	106	116	116	110	107	110	109	105
3	Ca (mg/L)	27	27	23	29	27	25	29	25	28	29	24	25	31	25	27
4	Cl (mg/L)	8.6	7.8	4.7	7.0	5.2	5.9	7.8	6.3	10.3	6.3	8.0	6.7	9.3	11.3	7.7
5	CO3 (mg/L)	0.0	0.0	0.0	0.0	0.0	0.0	3.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.7
6	F (mg/L)	0.26	0.33	0.32	0.29	0.30	0.20	0.23	0.15	0.29	0.18	0.14	0.32	0.20	0.20	0.12
7	HCO3 (mg/L)	160	143	111	141	135	133	138	130	142	142	134	130	135	133	123
8	K (mg/L)	2.3	2.3	1.5	1.4	1.9	1.2	1.5	1.1	1.5	1.4	1.2	1.4	1.0	1.5	1.5
9	Mg (mg/L)	13.8	11.2	7.6	9.1	9.6	9.7	9.5	10.4	12.4	10.9	10.7	10.0	7.8	11.3	11.0
10	Na (mg/L)	10.0	8.2	5.1	7.5	5.3	6.5	9.6	5.2	8.5	8.9	5.5	6.2	6.5	6.5	6.9
11	NO2+NO3 (mg N/L)	1.50	0.89	1.05	0.68	1.30	0.64	0.30	0.26	0.42	0.41	0.37	0.05	0.18	0.16	0.48
12	NO2-N (mgN/L)	0.03	0.01	0.08	0.05	0.41	0.03	0.01	0.01	0.03	0.02	0.06	0.01	0.01	0.03	0.02
13	NO3-N (mgN/L)	1.46	0.87	0.98	0.63	0.89	0.61	0.29	0.25	0.39	0.39	0.31	0.05	0.17	0.12	0.46
14	PO4-P (mg P/L)	0.167	0.396	0.230	0.162	0.211	0.120	0.107	0.073	0.137	0.046	0.118	0.103	0.072	0.097	0.026
15	SiO2 (mg/L)	23.6	16.7	19.3	19.3	24.1	21.7	15.8	14.3	18.7	18.1	14.3	15.0	16.5	17.4	21.3
16	SO4 (mg/L)	9.5	9.2	14.5	13.2	11.9	5.2	4.9	9.6	11.2	8.5	27.7	3.0	6.0	10.2	7.0
	BIOLOGICAL/BACTERIOLOGICAL															
1	BOD3-27 (mg/L)	1.2	0.8	0.9	0.5	0.8	0.8	1.7	1.2	1.1	1.0	0.5	0.4	1.0	1.2	0.9
2	COD (mg/L)	29.8	31.0	35.4	29.8	65.4	44.0	36.8	33.5	32.5	37.5	27.0	23.7	29.0	42.3	30.0
3	DO (mg/L)	5.1	5.9	6.0	5.4	5.3	7.1	6.4	6.2	6.4	6.5	6.5	5.6	5.4	5.7	5.5
4	DO_SAT% (%)	64	76	76	69	69	78	72	70	71	71	77	67	65	69	66
	TRACE & TOXIC															
	CHEMICAL INDICES															
1	HAR_Ca (mgCaCO3/L)	66	67	57	72	67	63	73	63	69	72	59	62	78	61	67
2	HAR_Total (mgCaCO3/L)	124	114	89	110	107	103	113	106	121	117	104	104	111	108	113
3	Na% (%)	14	13	11	13	10	12	15	10	13	14	10	11	11	11	12
4	RSC (-)	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.0
5	SAR (-)	0.4	0.3	0.2	0.3	0.2	0.3	0.4	0.2	0.3	0.4	0.2	0.3	0.3	0.3	0.3

3.12 Sher at Belkheri**History sheet**

		Water Year	: 2018-2019
Site	: Sher at Belkheri	Code	: 010215010
State	: Madhya Pradesh	District	Narsinghpur
Basin	: Narmada	Independent River	: Narmada
Tributary	: Sher	Local River	: Sher
Division	: Narmada Division, Bhopal	Sub-Division	: MNSD-1, Hoshangabad
Drainage Area	: 1508 Sq. Km.	Bank	: Right
Latitude	: 22°55'40"	Longitude	: 79°20'23"
Zero of Gauge (m)	: 340 .000 (M.S.L.)	01/02/1977	
	: 340 .000 (M.S.L.)	16/03/1977	
	Opening Date	Closing Date	
Gauge	: 16/03/1977		
Discharge	: 16/03/1977		
Sediment	:		
Water Quality	: 01/09/1986		

Water Quality Data Book 2018-19

Water Quality Datasheet for the period : 2018-2019

Station Name : Sher at Belkheri (010215010)

Local River : Sher

Division : Narmada Division, Bhopal

Sub-Division : MNSD-1, Hoshangabad

River Water Analysis

S.No	Parameters	01/06/2018	02/07/2018	01/08/2018	03/09/2018	03/10/2018	01/11/2018	03/12/2018	01/01/2019	01/02/2019	01/03/2019	01/04/2019	01/05/2019
		A	A	A	A	A	A	A	A	A	A	A	A
	PHYSICAL												
1	Q (cumec)		0	7.00	1390	6.48	0	0	0	0	0	0	0
2	Colour_ Cod (-)	Clear	Light Brown	Clear	Light Brown	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear
3	EC_FLD (µmho/cm)											559	514
4	EC_GEN (µmho/cm)	450	257	310	198	485	515	534	489	509	501	559	514
5	Odour_ Code (-)	odour free	odour free	odour free	odour free	odour free	odour free	odour free	odour free	odour free	odour free	odour free	odour free
6	pH_FLD (pH units)											7.3	7.4
7	pH_GEN (pH units)	8.1	8.0	7.7	7.6	7.6	7.5	7.3	7.3	7.2	7.4	7.3	7.4
8	TDS (mg/L)	290	144	194	186	286	318	352	345	325	316	319	304
9	Temp (deg C)	30.0	29.0	27.0	26.0	28.5	27.0	22.0	15.0	16.0	17.0	26.0	29.0
10	Turb (NTU)	0.0	105.0	47.0	147.0	39.0	0.0	0.0	0.0	0.0	0.0		
	CHEMICAL												
1	Alk-Phen (mgCaCO3/L)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	ALK-TOT (mgCaCO3/L)	266	96	121	140	227	249	307	318	323	286	287	269
3	Ca (mg/L)	38	24	37	34	57	46	47	47	50	50	48	50
4	Cl (mg/L)	9.0	4.0	8.0	6.0	17.0	9.0	7.0	4.0	16.0	8.0	12.0	2.0
5	CO3 (mg/L)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	F (mg/L)	0.21	0.32	0.31	0.42	0.79	0.33	0.32	0.17	0.30	0.18	0.15	0.12
7	HCO3 (mg/L)	324	117	148	171	277	304	374	388	394	349	350	328
8	K (mg/L)	1.2	3.2	1.7	0.8	3.6	0.9	0.8	3.8	8.4	0.7	1.3	1.4
9	Mg (mg/L)	28.2	9.5	9.5	12.4	16.8	26.7	34.8	37.2	39.1	30.6	32.8	27.7
10	Na (mg/L)	18.3	5.4	4.7	6.5	12.9	15.3	27.2	29.3	35.1	23.5	23.3	15.6
11	NO2+NO3 (mg N/L)	0.15	2.78	1.91	1.43	1.79	0.62	0.55	0.63	0.57	0.35	1.04	0.98
12	NO2-N (mgN/L)	0.01	1.16	0.03	0.03	0.04	0.02	0.02	0.01	0.07	0.03	0.02	0.01
13	NO3-N (mgN/L)	0.14	1.62	1.88	1.41	1.75	0.60	0.53	0.61	0.50	0.32	1.02	0.97
14	PO4-P (mg P/L)	0.080	0.292	0.051	0.360	0.424	0.036	0.050	0.022	0.366	0.021	0.021	0.022
15	SiO2 (mg/L)	19.2	21.5	37.2	38.2	18.6	24.7	19.3	16.1	17.8	16.2	53.9	44.3
16	SO4 (mg/L)	0.4	15.3	20.6	11.5	18.4	10.3	11.2	9.0	9.4	8.1	7.7	4.7
	BIOLOGICAL/BACTERIOLOGICAL												
1	BOD3-27 (mg/L)	1.8	0.6	0.6	0.9	1.4	1.0	0.6	0.4	2.5	0.9	1.0	0.8
2	COD (mg/L)	62.0	45.0	22.0	21.0	30.0	28.0	12.0	49.0	56.0	12.0	22.0	26.0
3	DO (mg/L)	5.6	4.3	5.4	5.8	4.6	5.9	7.5	7.3	6.4	6.1	5.2	4.6
4	DO_SAT% (%)	74	56	68	71	59	74	86	72	65	63	64	60
	TRACE & TOXIC												
	CHEMICAL INDICES												
1	HAR_Ca (mgCaCO3/L)	94	61	92	84	142	114	118	116	125	125	120	124
2	HAR_Total (mgCaCO3/L)	212	100	131	136	212	225	263	271	288	252	256	239
3	Na% (%)	16	10	7	9	12	13	18	19	20	17	16	12
4	RSC (-)	1.1	0.0	0.0	0.1	0.3	0.5	0.9	1.0	0.7	0.7	0.6	0.6
5	SAR (-)	0.5	0.2	0.2	0.2	0.4	0.4	0.7	0.8	0.9	0.6	0.6	0.4

Water Quality Data Book 2018-19

Water Quality Summary for the period : 2018-2019

Station Name : Sher at Belkheri (010215010)

Division : Narmada Division, Bhopal

Local River : Sher

Sub-Division:MNSD-1Hoshangabad

River Water Summary

S.No	Parameters	Number of Observations	Maximum	Minimum	Mean
PHYSICAL					
1	Q (cumec)				
2	EC_FLD (µmho/cm)	2	559	514	537
3	EC_GEN (µmho/cm)	12	559	198	443
4	pH_FLD (pH units)	2	7.4	7.3	7.3
5	pH_GEN (pH units)	12	8.1	7.2	7.5
6	TDS (mg/L)	12	352	144	282
7	Temp (deg C)	12	30.0	15.0	24.4
8	Turb (NTU)	10	147.0	0.0	33.8
CHEMICAL					
1	Alk-Phen (mgCaCO3/L)	12	0.0	0.0	0
2	ALK-TOT (mgCaCO3/L)	12	323	96	241
3	Ca (mg/L)	12	57	24	44
4	Cl (mg/L)	12	17.0	2.0	8.5
5	CO3 (mg/L)	12	0.0	0.0	0
6	F (mg/L)	12	0.79	0.12	0.3
7	HCO3 (mg/L)	12	394	117	294
8	K (mg/L)	12	8.4	0.7	2.3
9	Mg (mg/L)	12	39.1	9.5	25.4
10	Na (mg/L)	12	35.1	4.7	18.1
11	NO2+NO3 (mg N/L)	12	2.78	0.15	1.07
12	NO2-N (mgN/L)	12	1.16	0.01	0.12
13	NO3-N (mgN/L)	12	1.88	0.14	0.95
14	PO4-P (mg P/L)	12	0.424	0.021	0.145
15	SiO2 (mg/L)	12	53.9	16.1	27.3
16	SO4 (mg/L)	12	20.6	0.4	10.5
BIOLOGICAL/BACTERIOLOGICAL					
1	BOD3-27 (mg/L)	12	2.5	0.4	1
2	COD (mg/L)	12	62.0	12.0	32.1
3	DO (mg/L)	12	7.5	4.3	5.7
4	DO_SAT% (%)	12	86	56	68
TRACE & TOXIC					
CHEMICAL INDICES					
1	HAR_Ca (mgCaCO3/L)	12	142	61	110
2	HAR_Total (mgCaCO3/L)	12	288	100	216
3	Na% (%)	12	20	7	14
4	RSC (-)	12	1.1	0.0	0.6
5	SAR (-)	12	0.9	0.2	0.5

Water Quality Data Book 2018-19

Water Quality Seasonal Average for the period : 2014-2019

Station Name : Sher at Belkheri (010215010)

Local River : Sher

Division : Narmada Division, Bhopal

Sub-Division : MNSD-1, Hoshangabad

River Water

S.No	Parameters	Flood					Winter					Summer				
		Jun - Oct					Nov - Feb					Mar - May				
		2014	2015	2016	2017	2018	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019	2015	2016	2017	2018	2019
	PHYSICAL															
1	Q (cumec)		11.46					0.646					0.359			
2	EC_FLD (µmho/cm)															537
3	EC_GEN (µmho/cm)	282	286	296	287	340	373	404	521	474	512	305	523	451	504	525
4	pH_FLD (pH units)															7.3
5	pH_GEN (pH units)	7.9	8.0	7.6	7.8	7.8	8.1	8.0	7.8	7.8	7.3	8.0	7.8	7.7	8.0	7.4
6	TDS (mg/L)	181	178	191	181	220	248	258	339	311	335	199	341	290	327	313
7	Temp (deg C)	28.4	29.0	27.4	27.0	28.1	22.8	23.5	21.5	22.0	20.0	26.3	25.0	25.7	26.0	24.0
8	Turb (NTU)	60.8	17.6	96.2	62.4	67.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	CHEMICAL															
1	Alk-Phen (mgCaCO3/L)	0.0	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	ALK-TOT (mgCaCO3/L)	188	187	99	148	170	258	269	274	250	299	214	284	259	270	281
3	Ca (mg/L)	29	33	28	30	38	46	38	49	42	47	33	42	39	34	49
4	Cl (mg/L)	8.9	8.5	5.2	6.4	8.8	8.6	8.0	8.5	6.3	9.0	21.0	7.3	9.7	7.0	7.3
5	CO3 (mg/L)	0.0	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	F (mg/L)	0.32	0.34	0.33	0.31	0.41	0.30	0.23	0.20	0.26	0.28	0.23	0.47	0.51	0.24	0.15
7	HCO3 (mg/L)	230	226	121	180	207	315	329	335	305	365	262	346	316	330	342
8	K (mg/L)	2.0	1.6	1.1	0.8	2.1	0.8	0.9	0.8	1.1	3.5	1.0	1.1	0.9	1.3	1.1
9	Mg (mg/L)	19.8	21.3	15.8	15.3	15.3	28.9	33.3	27.2	26.9	34.4	23.2	31.8	27.8	30.7	30.4
10	Na (mg/L)	11.0	11.0	7.4	8.5	9.6	14.2	16.3	14.5	15.5	26.7	9.3	16.1	17.5	19.4	20.8
11	NO2+NO3 (mg N/L)	1.37	1.25	1.09	0.68	1.61	0.90	0.78	0.75	0.22	0.59	0.67	0.07	0.76	1.02	0.79
12	NO2-N (mgN/L)	0.03	0.03	0.13	0.05	0.25	0.03	0.01	0.05	0.03	0.03	0.05	0.01	0.05	0.06	0.02
13	NO3-N (mgN/L)	1.34	1.22	0.96	0.64	1.36	0.86	0.77	0.69	0.20	0.56	0.62	0.07	0.72	0.96	0.77
14	p-PO4-P (mg P/L)	0.349	0.627	0.262	0.165	0.241	0.091	0.103	0.204	0.075	0.118	0.066	0.291	0.213	0.073	0.021
15	SiO2 (mg/L)	29.8	23.7	23.0	22.3	27.0	29.7	37.3	22.4	20.2	19.5	27.8	30.9	27.3	19.3	38.2
16	SO4 (mg/L)	11.0	10.4	17.3	13.1	13.2	4.2	5.6	13.3	12.1	10.0	9.0	12.5	11.3	9.3	6.8
	BIOLOGICAL/BACTERIOLOGICAL															
1	BOD3-27 (mg/L)	1.0	0.5	0.9	0.9	1.1	0.9	0.8	1.4	0.9	1.1	0.9	1.1	1.3	2.2	0.9
2	COD (mg/L)	34.8	22.2	41.2	41.6	36.0	44.8	25.3	40.0	46.3	36.3	27.7	27.3	35.7	40.7	20.0
3	DO (mg/L)	5.7	5.7	5.1	5.4	5.1	7.3	6.7	7.6	6.8	6.8	6.0	5.3	5.3	5.7	5.3
4	DO_SAT% (%)	73	74	64	68	66	84	78	85	78	74	74	64	65	70	62
	TRACE & TOXIC															
	CHEMICAL INDICES															
1	HAR_Ca (mgCaCO3/L)	73	83	71	74	95	115	95	122	106	118	83	105	98	85	123
2	HAR_Total (mgCaCO3/L)	155	172	136	138	158	235	234	236	218	262	179	237	214	213	249
3	Na% (%)	12	13	11	11	11	12	13	11	13	18	10	13	15	17	15
4	RSC (-)	0.7	0.3	0.2	0.2	0.3	0.5	0.7	0.8	0.7	0.8	0.7	1.0	0.9	1.2	0.7
5	SAR (-)	0.4	0.4	0.3	0.3	0.3	0.4	0.5	0.4	0.5	0.7	0.3	0.5	0.5	0.6	0.6

3.13 Hiran at Patan

History sheet

		Water Year	: 2018-2019
Site	: Hiran at Patan	Code	: 010215009
State	: Madhya Pradesh	District	Jabalpur
Basin	: Narmada	Independent River	: Narmada
Tributary	: Hiran	Sub Tributary	:
Sub-Sub Tributary	:	Local River	: Hiran
Division	: Narmada Division, Bhopal	Sub-Division	: UNSD, Jabalpur
Drainage Area	: 3950 Sq. Km.	Bank	: Left
Latitude	: 23°18'42"	Longitude	: 79°39'46"
Zero of Gauge (m)	: 341.5 .000 (M.S.L.)	30/08/1979	
	Opening Date	Closing Date	
Gauge	: 30/08/1979		
Discharge	: 30/08/1979		
Sediment	:		
Water Quality	: 01/09/1986		

Water Quality Data Book 2018-19

Water Quality Datasheet for the period : 2018-2019

Station Name : Hiran at Patan (010215009)

Local River : Hiran

Division : Narmada Division, Bhopal

Sub-Division : UNSD, Jabalpur

River Water Analysis

S.No	Parameters	01/06/2018	02/07/2018	01/08/2018	03/09/2018	03/10/2018	01/11/2018	03/12/2018	01/01/2019	01/02/2019	01/03/2019	01/04/2019	01/05/2019
		A	A	A	A	A	A	A	A	A	A	A	A
	PHYSICAL												
1	Q (cumec)		8.26	45.68	618.8	25.1		0					
2	Colour_Cod (-)		Clear	Light Brown	Light Brown	Light Brown	Clear	Clear	Clear	Clear	Clear	Clear	Clear
3	EC_FLD (µmho/cm)											561	581
4	EC_GEN (µmho/cm)		936	256	199	170	428	559	423	582	530	561	581
5	Odour_Code (-)		odour free	odour free	odour free	odour free	odour free	odour free	odour free	odour free	odour free	odour free	odour free
6	pH_FLD (pH units)											8.2	7.9
7	pH_GEN (pH units)		7.9	7.1	7.2	7.8	7.4	7.3	7.2	7.3	7.5	8.2	7.9
8	TDS (mg/L)		609	159	122	101	264	368	300	398	337	318	343
9	Temp (deg C)		29.0	27.0	26.0	25.5	24.5	21.0	16.0	18.0	20.0	26.0	28.0
10	Turb (NTU)		45.0	167.0	126.0	89.0	0.0	0.0	0.0	0.0	0.0		
	CHEMICAL												
1	Alk-Phen (mgCaCO3/L)		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	ALK-TOT (mgCaCO3/L)		293	42	86	73	189	329	213	256	206	211	235
3	Ca (mg/L)		67	31	24	18	44	63	49	61	47	50	55
4	Cl (mg/L)		95.0	8.0	9.0	5.0	13.0	28.0	21.0	47.0	40.0	45.0	10.0
5	CO3 (mg/L)		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	F (mg/L)		0.36	0.36	0.35	0.12	0.53	0.27	0.22	0.32	0.24	0.21	0.19
7	HCO3 (mg/L)		358	51	105	89	230	401	260	312	251	257	287
8	K (mg/L)		26.6	3.0	1.8	1.3	3.9	7.5	6.1	16.0	11.1	11.9	12.5
9	Mg (mg/L)		20.4	4.6	6.1	6.1	15.3	21.1	18.7	37.4	17.7	15.3	16.8
10	Na (mg/L)		12.5	7.5	4.4	5.1	14.2	28.9	28.9	59.8	32.9	35.1	31.8
11	NO2+NO3 (mg N/L)		3.03	2.43	1.66	1.02	0.06	2.37	1.00	0.61	1.04	3.87	3.24
12	NO2-N (mgN/L)		0.37	0.16	0.03	0.03	0.01	0.01	0.03	0.08	0.05	0.02	2.26
13	NO3-N (mgN/L)		2.65	2.27	1.63	0.99	0.06	2.36	0.97	0.53	0.99	3.85	0.98
14	o-PO4-P (mg P/L)		0.987	0.184	0.411	0.319	0.203	0.136	0.521	0.354	1.138	0.644	0.672
15	SiO2 (mg/L)		35.1	16.3	16.2	31.3	21.7	19.9	18.2	18.4	18.3	30.4	42.5
16	SO4 (mg/L)		20.2	17.6	9.7	6.0	7.1	11.4	10.5	9.3	8.9	9.9	8.6
	BIOLOGICAL/BACTERIOLOGICAL												
1	BOD3-27 (mg/L)		2.6	0.7	0.8	1.0	1.0	1.7	0.6	2.5	1.4	2.4	1.0
2	COD (mg/L)		31.0	37.0	21.0	25.0	19.0	50.0	59.0	56.0	37.0	42.0	28.0
3	DO (mg/L)		2.8	4.4	5.5	5.5	5.1	4.5	6.2	5.1	3.3	2.9	1.2
4	DO_SAT% (%)		36	55	68	67	61	50	63	54	36	36	15
	TRACE & TOXIC												
	CHEMICAL INDICES												
1	HAR_Ca (mgCaCO3/L)		167	79	61	45	111	159	122	153	118	124	137
2	HAR_Total (mgCaCO3/L)		252	98	86	70	175	247	200	309	192	188	207
3	Na% (%)		9	14	10	13	15	20	23	28	26	27	24
4	RSC (-)		0.8	0.0	0.0	0.1	0.3	1.7	0.3	0.0	0.3	0.5	0.6
5	SAR (-)		0.3	0.3	0.2	0.3	0.5	0.8	0.9	1.5	1.0	1.1	1.0

Water Quality Data Book 2018-19

Water Quality Summary for the period : 2018-2019

Station Name : Hiran at Patan (010215009)

Division : Narmada Division, Bhopal

Local River : Hiran

Sub-Division : UNSD, Jabalpur

River Water Summary

S.No	Parameters	Number of Observations	Maximum	Minimum	Mean
	PHYSICAL				
1	Q (cumec)				
2	EC_FLD (μmho/cm)	2	581	561	571
3	EC_GEN (μmho/cm)	11	936	170	475
4	pH_FLD (pH units)	2	8.2	7.9	8
5	pH_GEN (pH units)	11	8.2	7.1	7.5
6	TDS (mg/L)	11	609	101	302
7	Temp (deg C)	11	29.0	16.0	23.7
8	Turb (NTU)	9	167.0	0.0	47.4
	CHEMICAL				
1	Alk-Phen (mgCaCO3/L)	11	0.0	0.0	0
2	ALK-TOT (mgCaCO3/L)	11	329	42	194
3	Ca (mg/L)	11	67	18	46
4	Cl (mg/L)	11	95.0	5.0	29.2
5	CO3 (mg/L)	11	0.0	0.0	0
6	F (mg/L)	11	0.53	0.12	0.29
7	HCO3 (mg/L)	11	401	51	236
8	K (mg/L)	11	26.6	1.3	9.2
9	Mg (mg/L)	11	37.4	4.6	16.3
10	Na (mg/L)	11	59.8	4.4	23.7
11	NO2+NO3 (mg N/L)	11	3.87	0.06	1.85
12	NO2-N (mgN/L)	11	2.26	0.01	0.28
13	NO3-N (mgN/L)	11	3.85	0.06	1.57
14	o-PO4-P (mg P/L)	11	1.138	0.136	0.506
15	SiO2 (mg/L)	11	42.5	16.2	24.4
16	SO4 (mg/L)	11	20.2	6.0	10.8
	BIOLOGICAL/BACTERIOLOGICAL				
1	BOD3-27 (mg/L)	11	2.6	0.6	1.4
2	COD (mg/L)	11	59.0	19.0	36.8
3	DO (mg/L)	11	6.2	1.2	4.2
4	DO_SAT% (%)	11	68	15	49
	TRACE & TOXIC				
	CHEMICAL INDICES				
1	HAR_Ca (mgCaCO3/L)	11	167	45	116
2	HAR_Total (mgCaCO3/L)	11	309	70	184
3	Na% (%)	11	28	9	19
4	RSC (-)	11	1.7	0.0	0.4
5	SAR (-)	11	1.5	0.2	0.7

Water Quality Data Book 2018-19

Water Quality Seasonal Average for the period : 2014-2019

Station Name : Hiran at Patan (010215009)

Local River : Hiran

Division : Narmada Division, Bhopal

Sub-Division : UNSD, Jabalpur

River Water Analysis

S.No	Parameters	Flood					Winter					Summer				
		Jun - Oct					Nov - Feb					Mar - May				
		2014	2015	2016	2017	2018	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019	2015	2016	2017	2018	2019
	PHYSICAL															
1	Q (cumec)		56.63					10.41					2.302			
2	EC_FLD (µmho/cm)															571
3	EC_GEN (µmho/cm)	395	273	269	254	390	376	402	483	480	498	411	448	314		557
4	pH_FLD (pH units)															8.0
5	pH_GEN (pH units)	7.9	8.0	7.5	7.8	7.5	8.1	8.1	7.6	7.6	7.3	8.2	8.3	7.6		7.8
6	TDS (mg/L)	257	166	172	163	248	249	258	311	315	333	263	294	204		333
7	Temp (deg C)	29.1	28.8	29.4	29.8	26.9	22.5	22.8	21.1	26.0	19.9	26.3	22.8	24.0		24.7
8	Turb (NTU)	31.0	303.6	130.0	98.8	106.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0
	CHEMICAL															
1	Alk-Phen (mgCaCO3/L)	2.6	1.5	0.0	0.0	0.0	2.5	3.5	0.0	0.0	0.0	4.2	6.9	0.0		0.0
2	ALK-TOT (mgCaCO3/L)	235	159	115	114	124	226	221	211	202	247	233	188	149		217
3	Ca (mg/L)	47	33	28	30	35	49	50	52	45	54	48	39	36		51
4	Cl (mg/L)	28.7	17.0	5.4	7.3	29.3	21.6	16.5	18.3	12.0	27.3	32.4	20.5	14.0		31.7
5	CO3 (mg/L)	3.1	1.8	0.0	0.0	0.0	3.0	4.2	0.0	0.0	0.0	5.0	8.4	0.0		0.0
6	F (mg/L)	0.58	0.37	0.35	0.33	0.30	0.68	0.32	0.20	0.29	0.33	0.43	0.53	0.43		0.21
7	HCO3 (mg/L)	281	190	140	140	151	270	261	258	246	301	274	213	182		265
8	K (mg/L)	7.3	4.9	2.8	2.3	8.2	4.8	5.9	4.1	3.4	8.4	6.7	5.5	3.2		11.8
9	Mg (mg/L)	21.0	15.3	8.7	7.8	9.3	19.0	18.3	17.1	15.3	23.1	19.6	14.5	13.2		16.6
10	Na (mg/L)	24.9	16.6	14.1	9.0	7.4	19.5	20.4	15.5	12.3	33.0	24.0	18.8	13.8		33.2
11	NO2+NO3 (mg N/L)	3.00	1.34	1.65	1.21	2.04	4.35	2.43	0.72	1.20	1.01	2.13	2.17	0.76		2.72
12	NO2-N (mgN/L)	0.19	0.12	0.28	0.06	0.15	0.44	0.09	0.04	0.05	0.03	0.07	0.08	0.04		0.77
13	NO3-N (mgN/L)	2.82	1.21	1.36	1.15	1.89	3.91	2.34	0.68	1.15	0.98	2.06	2.09	0.73		1.94
14	PO4-P (mg P/L)	0.528	0.537	0.346	0.246	0.475	0.546	0.632	0.247	0.222	0.304	0.732	0.281	0.192		0.818
15	SiO2 (mg/L)	19.4	15.4	18.4	20.9	24.7	20.2	13.0	15.9	18.7	19.5	16.0	24.6	20.2		30.4
16	SO4 (mg/L)	18.0	13.2	17.5	10.5	13.4	10.2	5.1	10.8	3.1	9.6	13.8	8.9	5.5		9.1
	BIOLOGICAL/BACTERIOLOGICAL															
1	BOD3-27 (mg/L)	1.9	0.8	0.7	1.0	1.3	1.3	1.7	2.5	1.0	1.5	1.0	1.4	1.6		1.6
2	COD (mg/L)	39.0	26.0	40.0	35.5	28.5	36.3	40.3	38.3	38.0	46.0	31.7	36.5	46.0		35.7
3	DO (mg/L)	4.7	5.2	4.7	4.2	4.6	6.3	5.9	6.1	5.8	5.2	5.3	5.3	4.6		2.5
4	DO_SAT% (%)	61	67	62	55	57	72	68	67	71	57	65	62	54		29
	TRACE & TOXIC															
	CHEMICAL INDICES															
1	HAR_Ca (mgCaCO3/L)	119	83	70	75	88	124	125	129	112	136	121	97	90		126
2	HAR_Total (mgCaCO3/L)	206	146	107	108	127	202	202	200	176	232	203	157	145		196
3	Na% (%)	18	18	23	16	11	17	18	14	13	22	20	20	17		26
4	RSC (-)	0.6	0.3	0.2	0.1	0.2	0.5	0.4	0.3	0.5	0.6	0.6	0.6	0.1		0.5
5	SAR (-)	0.7	0.6	0.6	0.4	0.3	0.6	0.6	0.5	0.4	0.9	0.7	0.7	0.5		1.0

3.14 Banjar at Bamni

History sheet

Water Year : 2018-2019

Site	: Banjar at Bamni	Code	: CWC SITE
State	: Madhya Pradesh	District	Mandla
Basin	: Narmada	Independent River	: Narmada
Tributary	: Banjar	Sub Tributary	:
Sub-Sub Tributary	:	Local River	: Banjar
Division	: Narmada Division, Bhopal	Sub-Division	: UNSD, Jabalpur
Drainage Area	: 1864 Sq. Km.	Bank	: Left
Latitude	: 22°29'06"	Longitude	: 80°22'58"
Zero of Gauge (m)	: 440 .000 (M.S.L.)	20/06/1999	
	Opening Date	Closing Date	
Gauge	: 20/06/1999		
Discharge	: 30/11/1999		
Sediment	: 01/07/2002		
Water Quality	: 01/07/2002		

Water Quality Data Book 2018-19

Water Quality Datasheet for the period : 2018-2019

Station Name : Banjar at Bamni

Local River : Banjar

Division : Narmada Division, Bhopal

Sub-Division : UNSD, Jabalpur

River Water Analysis

S.No	Parameters	01/06/2018	02/07/2018	01/08/2018	03/09/2018	03/10/2018	01/11/2018	03/12/2018	01/01/2019	01/02/2019	01/03/2019	01/04/2019	01/05/2018
		A	A	A	A	A	A	A	A	A	A	A	A
	PHYSICAL												
1	Q (cumec)			22.41	43.58	13.34	0	0	0	0	0	0	0
2	Colour_Cod (-)		Brown	Light Brown	Light Brown	Clear							
3	EC_GEN (µmho/cm)		158	152	160	296							
4	Odour_Code (-)		odour free	odour free	odour free	odour free							
5	pH_GEN (pH units)		7.9	7.4	7.3	7.9							
6	TDS (mg/L)		101	159	98	160							
7	Temp (deg C)		26.0	25.0	24.0	26.0							
8	Turb (NTU)		218.0	149.0	137.0	59.0							
	CHEMICAL												
1	Alk-Phen (mgCaCO3/L)		0.0	0.0	0.0	0.0							
2	ALK-TOT (mgCaCO3/L)		66	42	68	123							
3	Ca (mg/L)		18	17	19	26							
4	Cl (mg/L)		6.0	6.0	6.0	10.0							
5	CO3 (mg/L)		0.0	0.0	0.0	0.0							
6	F (mg/L)		0.28	0.24	0.22	0.42							
7	HCO3 (mg/L)		81	51	83	150							
8	K (mg/L)		5.6	2.2	1.5	1.9							
9	Mg (mg/L)		4.1	3.7	5.1	12.4							
10	Na (mg/L)		5.9	4.9	4.7	8.9							
11	NO2+NO3 (mg N/L)		2.84	0.97	0.96	1.11							
12	NO2-N (mgN/L)		1.83	0.03	0.03	0.04							
13	NO3-N (mgN/L)		1.00	0.93	0.93	1.06							
14	PO4-P (mg P/L)		0.276	0.090	0.373	0.358							
15	SiO2 (mg/L)		20.7	20.8	33.3	22.1							
16	SO4 (mg/L)		11.7	20.2	4.8	13.7							
	BIOLOGICAL/BACTERIOLOGICAL												
1	BOD3-27 (mg/L)		0.9	0.6	0.8	0.6							
2	COD (mg/L)		65.0	58.0	23.0	21.0							
3	DO (mg/L)		4.4	5.3	5.9	5.2							
4	DO_SAT% (%)		54	64	70	64							
	TRACE & TOXIC												
	CHEMICAL INDICES												
1	HAR_Ca (mgCaCO3/L)		45	41	48	66							
2	HAR_Total (mgCaCO3/L)		62	57	69	118							
3	Na% (%)		16	15	13	14							
4	RSC (-)		0.1	0.0	0.0	0.1							
5	SAR (-)		0.3	0.3	0.2	0.4							

Water Quality Data Book 2018-19

Water Quality Summary for the period : 2018-2019

Station Name : Banjar at Bamni

Division : Narmada Division, Bhopal

Local River : Banjar

Sub-Division : UNSD, Jabalpur

River Water Summary

S.No	Parameters	Number of Observations	Maximum	Minimum	Mean
	PHYSICAL				
1	Q (cumec)				
2	EC_GEN ($\mu\text{mho/cm}$)	4	296	152	192
3	pH_GEN (pH units)	4	7.9	7.3	7.6
4	TDS (mg/L)	4	160	98	130
5	Temp (deg C)	4	26.0	24.0	25.3
6	Turb (NTU)	4	218.0	59.0	140.8
	CHEMICAL				
1	Alk-Phen (mgCaCO ₃ /L)	4	0.0	0.0	0
2	ALK-TOT (mgCaCO ₃ /L)	4	123	42	75
3	Ca (mg/L)	4	26	17	20
4	Cl (mg/L)	4	10.0	6.0	7
5	CO ₃ (mg/L)	4	0.0	0.0	0
6	F (mg/L)	4	0.42	0.22	0.29
7	HCO ₃ (mg/L)	4	150	51	91
8	K (mg/L)	4	5.6	1.5	2.8
9	Mg (mg/L)	4	12.4	3.7	6.3
10	Na (mg/L)	4	8.9	4.7	6.1
11	NO ₂ +NO ₃ (mg N/L)	4	2.84	0.96	1.47
12	NO ₂ -N (mgN/L)	4	1.83	0.03	0.48
13	NO ₃ -N (mgN/L)	4	1.06	0.93	0.98
14	PO ₄ -P (mg P/L)	4	0.373	0.090	0.274
15	SiO ₂ (mg/L)	4	33.3	20.7	24.2
16	SO ₄ (mg/L)	4	20.2	4.8	12.6
	BIOLOGICAL/BACTERIOLOGICAL				
1	BOD ₃₋₂₇ (mg/L)	4	0.9	0.6	0.7
2	COD (mg/L)	4	65.0	21.0	41.8
3	DO (mg/L)	4	5.9	4.4	5.2
4	DO SAT% (%)	4	70	54	63
	TRACE & TOXIC				
	CHEMICAL INDICES				
1	HAR_Ca (mgCaCO ₃ /L)	4	66	41	50
2	HAR_Total (mgCaCO ₃ /L)	4	118	57	76
3	Na% (%)	4	16	13	14
4	RSC (-)	4	0.1	0.0	0.1
5	SAR (-)	4	0.4	0.2	0.3

Water Quality Data Book 2018-19

Water Quality Seasonal Average for the period : 2014-2019

Station Name : Banjar at Bamni

Local River : Banjar

Division : Narmada Division, Bhopal

Sub-Division : UNSD, Jabalpur

River Water

S.No	Parameters	Flood					Winter					Summer				
		Jun - Oct					Nov - Feb					Mar - May				
		2014	2015	2016	2017	2018	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019	2015	2016	2017	2018	2019
	PHYSICAL															
1	Q (cumec)	32.27	30.64				17.33	3.859				0.796	0.166			
2	EC_GEN (µmho/cm)	121	134	127	131	192	198	174	220	276		197	372	268	315	
3	pH_GEN (pH units)	7.6	7.9	7.3	7.9	7.6	7.9	8.0	7.5	7.6		8.0	8.1	7.6	7.9	
4	TDS (mg/L)	75	84	80	85	130	131	111	143	182		126	241	174	205	
5	Temp (deg C)	26.3	26.8	26.4	25.9	25.3	18.0	18.6	15.4	18.1		22.3	23.8	19.7	18.0	
6	Turb (NTU)	52.3	47.8	138.5	113.3	140.8	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	
	CHEMICAL															
1	Alk-Phen (mgCaCO3/L)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	1.6	0.0	0.0	
2	ALK-TOT (mgCaCO3/L)	66	76	54	56	75	122	98	98	130		117	153	137	144	
3	Ca (mg/L)	15	19	14	13	20	26	22	24	29		26	23	29	30	
4	Cl (mg/L)	6.2	6.2	4.1	4.0	7.0	7.1	4.5	6.5	4.8		10.1	21.7	11.3	7.0	
5	CO3 (mg/L)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	1.9	0.0	0.0	
6	F (mg/L)	0.36	0.27	0.28	0.27	0.29	0.27	0.22	0.15	0.25		0.20	0.28	0.32	0.26	
7	HCO3 (mg/L)	81	93	66	69	91	149	120	120	158		143	183	168	176	
8	K (mg/L)	3.4	4.0	3.1	1.6	2.8	1.4	2.0	1.5	1.7		2.5	5.4	2.1	2.1	
9	Mg (mg/L)	7.4	7.6	5.3	5.0	6.3	13.4	9.8	7.4	11.1		10.5	14.9	11.3	12.9	
10	Na (mg/L)	6.6	8.2	4.2	4.5	6.1	12.1	8.0	7.1	8.2		8.7	30.0	13.3	9.3	
11	NO2+NO3 (mg N/L)	1.09	0.74	0.93	0.69	1.47	0.45	0.10	0.15	0.16		0.78	0.07	0.14	0.11	
12	NO2-N (mgN/L)	0.03	0.03	0.13	0.04	0.48	0.01	0.01	0.01	0.03		0.08	0.01	0.01	0.02	
13	NO3-N (mgN/L)	1.05	0.71	0.79	0.65	0.98	0.44	0.09	0.14	0.13		0.70	0.05	0.13	0.08	
14	PO4-P (mg P/L)	0.456	0.346	0.344	0.261	0.274	0.112	0.081	0.070	0.068		0.090	0.099	0.051	0.052	
15	SiO2 (mg/L)	18.4	12.3	17.9	18.9	24.2	18.5	12.5	15.0	17.0		15.8	19.1	17.0	15.9	
16	SO4 (mg/L)	10.1	16.6	15.2	12.4	12.6	12.0	5.9	8.5	12.3		26.6	4.1	3.2	10.8	
	BIOLOGICAL/BACTERIOLOGICAL															
1	BOD3-27 (mg/L)	1.2	0.8	0.8	0.6	0.7	0.6	0.6	1.0	1.1		0.8	1.9	1.8	1.5	
2	COD (mg/L)	36.8	26.5	36.0	47.5	41.8	30.0	26.0	39.8	30.8		35.0	35.3	36.0	33.0	
3	DO (mg/L)	5.9	6.3	4.6	5.1	5.2	7.0	6.8	6.5	6.4		5.8	5.3	4.5	4.2	
4	DO SAT% (%)	72	78	58	63	63	74	72	66	67		65	61	47	44	
	TRACE & TOXIC															
	CHEMICAL INDICES															
1	HAR_Ca (mgCaCO3/L)	38	47	35	31	50	64	55	60	72		64	57	73	74	
2	HAR_Total (mgCaCO3/L)	68	79	57	52	76	120	96	91	118		108	119	120	128	
3	Na% (%)	16	18	13	15	14	18	15	14	13		15	35	19	14	
4	RSC (-)	0.0	0.0	0.0	0.1	0.1	0.2	0.1	0.2	0.2		0.2	0.7	0.4	0.3	
5	SAR (-)	0.3	0.4	0.2	0.3	0.3	0.5	0.4	0.3	0.3		0.4	1.3	0.5	0.4	

3.15 Burhner at Mohgaon**History Sheet**

		Water Year	: 2018-2019
Site	: Burhner at Mohgaon	Code	: 010215004
State	: Madhya Pradesh	District	Mandla
Basin	: Narmada	Independent River	: Narmada
Tributary	: Burhner	Sub Tributary	:
Sub-Sub Tributary	:	Local River	: Burhner
Division	: Narmada Division, Bhopal	Sub-Division	: UNSD, Jabalpur
Drainage Area	: 3919 Sq. Km.	Bank	: Right
Latitude	: 22°45'57"	Longitude	: 80°37'22"
Zero of Gauge (m)	: 447 .000 (M.S.L.)	13/01/1977	
	Opening Date	Closing Date	
Gauge	: 13/01/1977		
Discharge	: 13/01/1977		
Sediment	: 27/08/1992		
Water Quality	: 16/09/1986		

Water Quality Data Book 2018-19

Water Quality Datasheet for the period : 2018-2019

Station Name : Burhner at Mohgaon (010215004)

Local River : Burhner

Division : Narmada Division, Bhopal

Sub-Division : UNSD, Jabalpur

River Water Analysis

S.No	Parameters	01/06/2018	02/07/2018	01/08/2018	03/09/2018	03/10/2018	01/11/2018	03/12/2018	01/01/2019	01/02/2019	01/03/2019	01/04/2019	01/05/2019
		A	A	A	A	A	A	A	A	A	A	A	A
	PHYSICAL												
1	Q (cumec)	.02	55.6	78.06	188.2	24.69	8.27	4.96	4.53	6.72	2.47		
2	Colour_ Cod (-)	Clear	Brown	Light Brown	Light Brown	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear
3	EC_FLD (µmho/cm)											270	289
4	EC_GEN (µmho/cm)	293	131	209	204	243	264	252	213	218	233	270	289
5	Odour_ Code (-)	odour free	odour free	odour free	odour free	odour free	odour free	odour free	odour free	odour free	odour free	odour free	odour free
6	pH_FLD (pH units)											7.6	7.5
7	pH_GEN (pH units)	7.9	7.7	7.7	7.4	7.9	7.6	7.1	7.3	7.6	7.7	7.6	7.5
8	TDS (mg/L)	188	82	130	124	145	163	167	152	150	148	155	169
9	Temp (deg C)	29.5	27.5	24.0	25.5	28.0	24.0	18.0	15.0	15.0	21.0	25.0	27.0
10	Turb (NTU)	0.0	210.0	154.0	121.0	35.0	0.0	0.0	0.0	0.0	0.0		
	CHEMICAL												
1	Alk-Phen (mgCaCO3/L)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	ALK-TOT (mgCaCO3/L)	141	53	95	95	116	127	127	132	132	120	122	134
3	Ca (mg/L)	25	16	22	24	30	29	30	26	23	27	24	22
4	Cl (mg/L)	15.0	5.0	4.0	4.0	6.0	4.0	5.0	7.0	29.4	6.0	14.0	3.0
5	CO3 (mg/L)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	F (mg/L)	0.21	0.16	0.13	0.11	0.17	0.18	0.16	0.15	0.16	0.17	0.06	0.06
7	HCO3 (mg/L)	172	65	116	116	141	155	155	161	161	147	149	163
8	K (mg/L)	3.3	4.6	1.3	1.0	0.9	1.0	1.0	1.0	0.9	1.2	1.9	2.7
9	Mg (mg/L)	11.4	3.9	7.3	7.3	7.8	9.7	9.7	12.9	13.4	10.7	11.9	14.3
10	Na (mg/L)	17.0	3.9	4.5	4.2	4.8	5.6	8.6	3.9	10.0	9.1	11.5	12.1
11	NO2+NO3 (mg N/L)	0.13	3.15	1.30	1.30	1.27	0.09	0.07	0.29	0.33	0.20	0.26	0.40
12	NO2-N (mgN/L)	0.01	2.00	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.01	0.12
13	NO3-N (mgN/L)	0.12	1.15	1.26	1.26	1.23	0.07	0.05	0.27	0.31	0.19	0.25	0.28
14	o-PO4-P (mg P/L)	0.020	0.242	0.105	0.368	0.350	0.032	0.066	0.021	0.062	0.009	0.017	0.018
15	SiO2 (mg/L)	16.7	17.6	35.3	40.0	30.9	21.4	18.0	16.6	16.8	16.1	27.7	25.9
16	SO4 (mg/L)	4.3	11.4	14.9	4.0	9.2	8.5	9.4	8.7	7.8	8.0	7.8	5.7
	BIOLOGICAL/BACTERIOLOGICAL												
1	BOD3-27 (mg/L)	1.2	0.8	0.6	0.5	0.6	0.6	1.0	0.3	0.9	0.8	1.0	1.5
2	COD (mg/L)	64.0	57.0	48.0	24.0	20.0	16.0	19.0	44.0	43.0	31.0	30.0	31.0
3	DO (mg/L)	3.5	4.7	5.9	5.9	5.1	5.7	6.7	6.6	6.1	5.6	5.8	3.4
4	DO_SAT% (%)	46	59	70	71	65	68	70	65	60	63	70	43
	TRACE & TOXIC												
	CHEMICAL INDICES												
1	HAR_Ca (mgCaCO3/L)	62	40	55	59	76	72	76	66	58	66	61	55
2	HAR_Total (mgCaCO3/L)	109	56	85	89	108	112	117	120	113	111	111	115
3	Na% (%)	25	12	10	9	9	10	14	7	16	15	18	18
4	RSC (-)	0.6	0.0	0.2	0.1	0.2	0.3	0.2	0.3	0.4	0.2	0.2	0.4
5	SAR (-)	0.7	0.2	0.2	0.2	0.2	0.2	0.3	0.2	0.4	0.4	0.5	0.5

Water Quality Data Book 2018-19

Water Quality Summary for the period : 2018-2019

Station Name : Burhner at Mohgaon (010215004)

Division : Narmada Division, Bhopal

Local River : Burhner

Sub-Division : UNSD, Jabalpur

River Water Summary

S.No	Parameters	Number of Observations	Maximum	Minimum	Mean
	PHYSICAL				
1	Q (cumec)				
2	EC_FLD (µmho/cm)	2	289	270	280
3	EC_GEN (µmho/cm)	12	293	131	235
4	pH_FLD (pH units)	2	7.6	7.5	7.6
5	pH_GEN (pH units)	12	7.9	7.1	7.6
6	TDS (mg/L)	12	188	82	148
7	Temp (deg C)	12	29.5	15.0	23.3
8	Turb (NTU)	10	210.0	0.0	52
	CHEMICAL				
1	Alk-Phen (mgCaCO3/L)	12	0.0	0.0	0
2	ALK-TOT (mgCaCO3/L)	12	141	53	116
3	Ca (mg/L)	12	30	16	25
4	Cl (mg/L)	12	29.4	3.0	8.5
5	CO3 (mg/L)	12	0.0	0.0	0
6	F (mg/L)	12	0.21	0.06	0.14
7	HCO3 (mg/L)	12	172	65	142
8	K (mg/L)	12	4.6	0.9	1.7
9	Mg (mg/L)	12	14.3	3.9	10
10	Na (mg/L)	12	17.0	3.9	7.9
11	NO2+NO3 (mg N/L)	12	3.15	0.07	0.73
12	NO2-N (mgN/L)	12	2.00	0.01	0.19
13	NO3-N (mgN/L)	12	1.26	0.05	0.54
14	PO4-P (mg P/L)	12	0.368	0.009	0.109
15	SiO2 (mg/L)	12	40.0	16.1	23.6
16	SO4 (mg/L)	12	14.9	4.0	8.3
	BIOLOGICAL/BACTERIOLOGICAL				
1	BOD3-27 (mg/L)	12	1.5	0.3	0.8
2	COD (mg/L)	12	64.0	16.0	35.6
3	DO (mg/L)	12	6.7	3.4	5.4
4	DO_SAT% (%)	12	71	43	63
	TRACE & TOXIC				
	CHEMICAL INDICES				
1	HAR_Ca (mgCaCO3/L)	12	76	40	62
2	HAR_Total (mgCaCO3/L)	12	120	56	104
3	Na% (%)	12	25	7	14
4	RSC (-)	12	0.6	0.0	0.3
5	SAR (-)	12	0.7	0.2	0.3

Water Quality Data Book 2018-19

Water Quality Seasonal Average for the period : 2014-2019

Station Name : Burhner at Mohgaon (010215004)

Local River : Burhner

Division : Narmada Division, Bhopal

Sub-Division : UNSD, Jabalpur

River Water

S.No	Parameters	Flood					Winter					Summer				
		Jun - Oct					Nov - Feb					Mar - May				
		2014	2015	2016	2017	2018	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019	2015	2016	2017	2018	2019
	PHYSICAL															
1	Q (cumec)	64.34	60.38				14.56	9.371				5.471	1.499			
2	EC_FLD (µmho/cm)															280
3	EC_GEN (µmho/cm)	150	157	176	205	216	174	192	214	256	237	189	279	253	286	264
4	pH_FLD (pH units)															7.6
5	pH_GEN (pH units)	7.8	8.1	7.6	7.9	7.7	8.1	8.2	7.8	7.7	7.4	8.2	8.0	7.8	7.9	7.6
6	TDS (mg/L)	95	97	114	135	134	115	121	138	169	158	121	181	164	187	157
7	Temp (deg C)	27.8	27.9	28.6	28.5	26.9	20.3	20.5	19.1	19.3	18.0	25.8	25.8	24.3	24.7	24.3
8	Turb (NTU)	134.4	131.4	168.4	76.6	104.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	CHEMICAL															
1	Alk-Phen (mgCaCO3/L)	0.0	1.9	1.4	1.0	0.0	1.3	2.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	ALK-TOT (mgCaCO3/L)	98	101	82	101	100	121	126	123	129	130	126	139	141	140	125
3	Ca (mg/L)	22	22	17	23	23	27	29	29	30	27	28	26	30	27	24
4	Cl (mg/L)	6.0	7.2	6.1	6.2	6.8	5.5	6.0	5.3	4.8	11.4	7.6	6.3	7.3	13.7	7.7
5	CO3 (mg/L)	0.0	2.3	1.7	1.3	0.0	1.5	2.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	F (mg/L)	0.21	0.36	0.26	0.30	0.16	0.21	0.15	0.13	0.41	0.16	0.14	0.22	0.22	0.18	0.10
7	HCO3 (mg/L)	120	119	96	121	122	144	148	150	157	158	154	169	172	171	153
8	K (mg/L)	2.5	2.2	1.8	1.3	2.2	0.9	1.1	0.8	1.1	1.0	1.6	1.8	1.6	2.0	1.9
9	Mg (mg/L)	10.2	9.4	8.7	8.6	7.5	13.0	12.8	10.8	10.6	11.4	12.1	14.5	12.1	12.7	12.3
10	Na (mg/L)	6.9	6.6	5.3	6.8	6.9	5.8	6.4	5.5	6.5	7.0	6.7	8.7	10.6	11.5	10.9
11	NO2+NO3 (mg N/L)	1.03	0.88	0.72	0.39	1.43	0.19	0.06	0.19	0.10	0.20	0.30	0.04	0.18	0.08	0.29
12	NO2-N (mgN/L)	0.03	0.01	0.08	0.04	0.42	0.02	0.01	0.01	0.01	0.02	0.05	0.01	0.01	0.01	0.05
13	NO3-N (mgN/L)	1.01	0.87	0.64	0.35	1.01	0.17	0.06	0.18	0.08	0.18	0.25	0.03	0.18	0.07	0.24
14	PO4-P (mg P/L)	0.332	0.203	0.300	0.200	0.217	0.089	0.075	0.079	0.070	0.045	0.108	0.070	0.048	0.235	0.015
15	SiO2 (mg/L)	21.1	20.9	21.6	17.2	28.1	19.6	19.5	15.5	16.3	18.2	19.6	19.6	17.7	15.9	23.2
16	SO4 (mg/L)	8.1	8.1	13.8	9.5	8.8	9.4	1.5	8.8	8.2	8.6	20.3	2.6	3.8	4.7	7.2
	BIOLOGICAL/BACTERIOLOGICAL															
1	BOD3-27 (mg/L)	0.6	0.6	0.6	0.7	0.7	0.5	0.4	1.0	0.7	0.7	0.7	1.1	1.4	1.4	1.1
2	COD (mg/L)	30.6	28.0	27.8	22.4	42.6	30.0	27.5	25.3	31.0	30.5	35.7	26.3	38.0	40.7	30.7
3	DO (mg/L)	5.5	5.9	5.3	5.1	5.0	6.7	6.9	6.4	6.2	6.3	6.0	5.3	4.5	5.0	4.9
4	DO_SAT% (%)	69	76	67	65	62	74	76	69	67	66	74	64	54	60	59
	TRACE & TOXIC															
	CHEMICAL INDICES															
1	HAR_Ca (mgCaCO3/L)	54	56	43	58	58	67	72	72	74	68	70	65	74	67	61
2	HAR_Total (mgCaCO3/L)	96	95	80	94	90	121	125	117	118	115	120	126	124	120	112
3	Na% (%)	13	13	12	12	13	10	10	9	11	12	11	13	15	17	17
4	RSC (-)	0.1	0.1	0.1	0.2	0.2	0.1	0.1	0.1	0.2	0.3	0.1	0.3	0.3	0.4	0.3
5	SAR (-)	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.4	0.5	0.4

3.16 Narmada at Manot**History Sheet**

		Water Year	: 2018-2019
Site	: Narmada at Manot	Code	: 010215002
State	: Madhya Pradesh	District	Mandla
Basin	: Narmada	Independent River	: Narmada
Sub-Sub Tributary	:	Local River	: Narmada
Division	: Narmada Division, Bhopal	Sub-Division	: UNSD, Jabalpur
Drainage Area	: 4667 Sq. Km.	Bank	: Right
Latitude	: 22°44'08"	Longitude	: 80°30'44"
Zero of Gauge (m)	: 442 .000 (M.S.L.)	16/12/1976	
	Opening Date	Closing Date	
Gauge	: 16/12/1976		
Discharge	: 16/12/1976		
Sediment	: 09/11/1979		
Water Quality	: 01/01/1980		

Water Quality Data Book 2018-19

Water Quality Datasheet for the period : 2018-2019

Station Name : Narmada at Manot (010215002)

Local River : Narmada

Division : Narmada Division, Bhopal

Sub-Division : UNSD, Jabalpur

River Water Analysis

S.No	Parameters	01/06/2018	02/07/2018	01/08/2018	03/09/2018	03/10/2018	01/11/2018	03/12/2018	01/01/2019	01/02/2019	01/03/2019	01/04/2019	01/05/2019
		A	A	A	A	A	A	A	A	A	A	A	A
	PHYSICAL												
1	Q (cumec)	6.72	19.65	189.6	218.3	45.21	11.39	93.37	10.92	9.95	8.13		
2	Colour_ Cod (-)	Clear	Brown	Light Brown	Light Brown	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear
3	EC_FLD (µmho/cm)											303	298
4	EC_GEN (µmho/cm)	209	234	214	206	248	284	269	235	267	266	303	298
5	Odour_Code (-)	odour free	odour free	odour free	odour free	odour free	odour free	odour free	odour free	odour free	odour free	odour free	odour free
6	pH_FLD (pH units)											7.5	7.7
7	pH_GEN (pH units)	7.6	7.9	7.7	7.2	7.8	7.6	7.0	7.5	7.6	7.2	7.5	7.7
8	TDS (mg/L)	137	148	135	126	148	181	178	168	173	170	175	176
9	Temp (deg C)	28.0	24.0	23.0	23.0	29.0	24.0	19.0	21.0	21.0	22.0	24.0	27.0
10	Turb (NTU)	0.0	222.0	163.0	116.0	27.0	0.0	0.0	0.0	0.0	0.0		
	CHEMICAL												
1	Alk-Phen (mgCaCO3/L)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	ALK-TOT (mgCaCO3/L)	112	102	86	89	118	134	135	143	155	148	143	145
3	Ca (mg/L)	25	24	24	25	30	30	29	26	32	29	31	26
4	Cl (mg/L)	14.0	5.0	6.0	5.0	3.0	7.0	5.0	7.0	5.0	7.0	12.0	2.0
5	CO3 (mg/L)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	F (mg/L)	0.18	0.19	0.19	0.15	0.16	0.22	0.23	0.14	0.12	0.18	0.00	0.03
7	HCO3 (mg/L)	137	125	105	108	144	163	165	175	189	180	174	177
8	K (mg/L)	1.3	4.4	1.1	0.9	0.7	0.7	0.7	0.7	0.7	0.6	1.1	1.5
9	Mg (mg/L)	10.5	9.2	8.6	7.3	9.0	11.9	12.9	16.0	24.3	14.3	12.6	16.6
10	Na (mg/L)	4.5	6.3	4.0	4.1	5.2	6.5	9.9	12.4	14.9	11.2	13.5	11.5
11	NO2+NO3 (mg N/L)	0.03	1.49	1.52	1.53	1.22	0.12	0.08	0.34	0.32	0.23	0.35	0.71
12	NO2-N (mgN/L)	0.01	0.40	0.03	0.04	0.04	0.01	0.01	0.01	0.02	0.02	0.01	0.01
13	NO3-N (mgN/L)	0.03	1.09	1.49	1.49	1.18	0.11	0.07	0.33	0.29	0.21	0.34	0.70
14	o-PO4-P (mg P/L)	0.008	0.254	0.124	0.355	0.231	0.027	0.950	0.016	0.074	0.013	0.013	0.020
15	SiO2 (mg/L)	16.0	18.8	29.3	32.2	30.2	22.0	18.1	16.2	17.1	16.4	39.7	33.2
16	SO4 (mg/L)	1.1	10.4	26.2	8.6	9.5	7.7	9.6	8.0	7.9	8.3	8.2	6.1
	BIOLOGICAL/BACTERIOLOGICAL												
1	BOD3-27 (mg/L)	1.0	0.8	0.8	1.0	0.9	0.8	0.6	0.4	0.9	0.6	1.1	0.8
2	COD (mg/L)	63.0	56.0	48.0	29.0	20.0	26.0	21.0	48.0	45.0	27.0	33.0	28.0
3	DO (mg/L)	4.3	5.4	4.0	5.6	5.6	6.4	6.5	6.4	6.3	5.5	5.3	4.9
4	DO_SAT% (%)	55	64	47	65	73	76	70	72	71	63	63	61
	TRACE & TOXIC												
	CHEMICAL INDICES												
1	HAR_Ca (mgCaCO3/L)	61	61	59	63	75	74	73	64	79	71	77	64
2	HAR_Total (mgCaCO3/L)	105	100	95	93	112	123	127	131	180	131	129	133
3	Na% (%)	8	12	8	9	9	10	14	17	15	16	18	16
4	RSC (-)	0.2	0.1	0.0	0.0	0.1	0.2	0.2	0.3	0.0	0.3	0.3	0.3
5	SAR (-)	0.2	0.3	0.2	0.2	0.2	0.3	0.4	0.5	0.5	0.4	0.5	0.4

Water Quality Data Book 2018-19

Water Quality Summary for the period : 2018-2019

Station Name : Narmada at Manot (010215002)

Division : Narmada Division, Bhopal

Local River : Narmada

Sub-Division : UNSD, Jabalpur

River Water Summary

S.No	Parameters	Number of Observations	Maximum	Minimum	Mean
	PHYSICAL				
1	Q (cumec)				
2	EC_FLD (µmho/cm)	2	303	298	301
3	EC_GEN (µmho/cm)	12	303	206	253
4	pH_FLD (pH units)	2	7.7	7.5	7.6
5	pH_GEN (pH units)	12	7.9	7.0	7.5
6	TDS (mg/L)	12	181	126	160
7	Temp (deg C)	12	29.0	19.0	23.8
8	Turb (NTU)	10	222.0	0.0	52.8
	CHEMICAL				
1	Alk-Phen (mgCaCO3/L)	12	0.0	0.0	0
2	ALK-TOT (mgCaCO3/L)	12	155	86	126
3	Ca (mg/L)	12	32	24	27
4	Cl (mg/L)	12	14.0	2.0	6.5
5	CO3 (mg/L)	12	0.0	0.0	0
6	F (mg/L)	12	0.23	0.00	0.15
7	HCO3 (mg/L)	12	189	105	154
8	K (mg/L)	12	4.4	0.6	1.2
9	Mg (mg/L)	12	24.3	7.3	12.8
10	Na (mg/L)	12	14.9	4.0	8.7
11	NO2+NO3 (mg N/L)	12	1.53	0.03	0.66
12	NO2-N (mgN/L)	12	0.40	0.01	0.05
13	NO3-N (mgN/L)	12	1.49	0.03	0.61
14	PO4-P (mg P/L)	12	0.950	0.008	0.174
15	SiO2 (mg/L)	12	39.7	16.0	24.1
16	SO4 (mg/L)	12	26.2	1.1	9.3
	BIOLOGICAL/BACTERIOLOGICAL				
1	BOD3-27 (mg/L)	12	9.0	0.4	1.5
2	COD (mg/L)	12	63.0	20.0	37
3	DO (mg/L)	12	6.5	4.0	5.5
4	DO_SAT% (%)	12	76	47	65
	TRACE & TOXIC				
	CHEMICAL INDICES				
1	HAR_Ca (mgCaCO3/L)	12	79	59	69
2	HAR_Total (mgCaCO3/L)	12	180	93	122
3	Na% (%)	12	18	8	13
4	RSC (-)	12	0.3	0.0	0.2
5	SAR (-)	12	0.5	0.2	0.3

Water Quality Data Book 2018-19

Water Quality Seasonal Average for the period: 2014-2019

Station Name : Narmada at Manot (010215002)

Local River : Narmada

Division : Narmada Division, Bhopal

Sub-Division : UNSD, Jabalpur

River Water

S.No	Parameters	Flood					Winter					Summer				
		Jun - Oct					Nov - Feb					Mar - May				
		2014	2015	2016	2017	2018	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019	2015	2016	2017	2018	2019
	PHYSICAL															
1	Q (cumec)	78.22	59.96				23.78	11.70				8.394	2.726			
2	EC_FLD (µmho/cm)															301
3	EC_GEN (µmho/cm)	176	151	207	236	222	213	208	277	262	264	193	304	260	285	289
4	pH_FLD (pH units)															7.6
5	pH_GEN (pH units)	7.8	8.0	7.7	7.8	7.6	7.7	8.3	7.7	7.8	7.4	8.2	8.0	7.9	7.9	7.5
6	TDS (mg/L)	113	94	134	147	139	141	133	181	174	175	124	197	169	186	174
7	Temp (deg C)	27.7	27.7	26.6	25.3	25.4	20.0	19.5	19.3	19.0	21.3	23.5	20.3	22.2	20.7	24.3
8	Turb (NTU)	97.2	273.8	121.0	77.2	105.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	CHEMICAL															
1	Alk-Phen (mgCaCO3/L)	0.0	1.0	0.0	0.0	0.0	0.0	4.6	0.0	0.0	0.0	3.3	0.0	0.0	0.0	0.0
2	ALK-TOT (mgCaCO3/L)	114	100	114	112	101	121	142	143	135	142	133	156	148	143	145
3	Ca (mg/L)	25	23	22	25	26	31	28	32	28	29	29	27	32	26	28
4	Cl (mg/L)	6.8	6.3	5.4	5.6	6.6	7.6	7.8	6.3	4.3	6.0	6.8	7.3	6.3	8.7	7.0
5	CO3 (mg/L)	0.0	1.2	0.0	0.0	0.0	0.0	5.6	0.0	0.0	0.0	4.0	0.0	0.0	0.0	0.0
6	F (mg/L)	0.21	0.17	0.26	0.27	0.17	0.18	0.15	0.16	0.40	0.18	0.11	0.26	0.19	0.18	0.07
7	HCO3 (mg/L)	139	119	139	137	124	148	163	175	165	173	154	190	181	174	177
8	K (mg/L)	2.7	2.5	1.7	1.0	1.7	0.6	0.7	0.5	0.6	0.7	1.0	1.0	0.8	0.8	1.0
9	Mg (mg/L)	10.7	9.3	11.5	9.6	8.9	12.0	16.0	12.9	13.5	16.3	12.1	16.5	11.8	14.3	14.5
10	Na (mg/L)	7.6	6.2	7.4	7.4	4.8	6.5	8.2	7.0	7.6	10.9	7.2	9.8	11.0	10.8	12.1
11	NO2+NO3 (mg N/L)	1.17	0.82	1.05	0.49	1.16	0.42	0.07	0.17	0.27	0.21	0.33	0.05	0.15	0.14	0.43
12	NO2-N (mgN/L)	0.02	0.02	0.05	0.05	0.10	0.02	0.01	0.01	0.04	0.01	0.05	0.01	0.01	0.02	0.01
13	NO3-N (mgN/L)	1.14	0.80	1.00	0.44	1.05	0.39	0.07	0.16	0.24	0.20	0.27	0.04	0.14	0.12	0.42
14	PO4-P (mg P/L)	0.404	0.324	0.307	0.181	0.194	0.147	0.102	0.093	0.075	0.267	0.141	0.082	0.066	0.051	0.015
15	SiO2 (mg/L)	23.1	19.7	23.2	19.3	25.3	31.8	21.3	20.3	17.7	18.4	23.8	20.8	24.8	17.0	29.7
16	SO4 (mg/L)	10.1	8.8	16.0	10.1	11.1	30.0	1.8	10.3	7.9	8.3	25.9	3.0	6.1	4.1	7.5
	BIOLOGICAL/BACTERIOLOGICAL															
1	BOD3-27 (mg/L)	1.3	0.5	1.0	0.6	0.9	0.8	0.6	0.9	0.9	2.7	1.1	1.0	1.3	1.0	0.8
2	COD (mg/L)	30.6	33.0	46.2	38.4	43.2	36.5	28.8	40.8	37.0	35.0	28.7	35.7	40.0	35.0	29.3
3	DO (mg/L)	5.7	6.1	5.3	5.2	5.0	7.2	7.3	6.6	6.5	6.4	6.6	5.9	5.5	5.2	5.2
4	DO_SAT% (%)	72	78	66	64	61	78	80	72	69	72	77	65	63	58	62
	TRACE & TOXIC															
	CHEMICAL INDICES															
1	HAR_Ca (mgCaCO3/L)	62	58	55	64	64	79	70	79	70	73	72	68	81	64	71
2	HAR_Total (mgCaCO3/L)	107	97	103	103	101	129	136	133	126	140	122	136	130	124	131
3	Na% (%)	12	12	13	13	9	10	12	10	12	14	11	14	15	16	17
4	RSC (-)	0.2	0.1	0.2	0.2	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.4	0.4	0.4	0.3
5	SAR (-)	0.3	0.3	0.3	0.3	0.2	0.3	0.3	0.3	0.3	0.4	0.3	0.4	0.4	0.4	0.5

3.17 Narmada at Dindori**History Sheet**

		Water Year	: 2018-2019
Site	: Narmada at Dindori	Code	: 010215001
State	: Madhya Pradesh	District	Dindori
Basin	: Narmada	Independent River	: Narmada
Tributary	:	Sub Tributary	:
Sub-Sub Tributary	:	Local River	: Narmada
Division	: Narmada Division, Bhopal	Sub-Division	: UNSD, Jabalpur
Drainage Area	: 2292 Sq. Km.	Bank	: Left
Latitude	: 22°56'53"	Longitude	: 81°04'34"
Zero of Gauge (m)	: 660 .000 (M.S.L.)	26/06/1988	
	Opening Date	Closing Date	
Gauge	: 26/06/1988		
Discharge	: 01/08/1988		
Sediment	:		
Water Quality	: 15/03/1990		

Water Quality Data Book 2018-19

Water Quality Datasheet for the period : 2018-2019

Station Name : Narmada at Dindori (010215001)

Local River : Narmada

Division : Narmada Division, Bhopal

Sub-Division : UNSD, Jabalpur

River Water Analysis

S.No	Parameters	01/06/2018	02/07/2018	01/08/2018	03/09/2018	03/10/2018	01/11/2018	03/12/2018	01/01/2019	01/02/2019	01/03/2019	01/04/2019	01/05/2019
		A	A	A	A	A	A	A	A	A	A	A	A
	PHYSICAL												
1	Q (cumec)	0.32	97.9	45.73	72.66	13.5			4.38	3.61	11.95		
2	Colour_Cod (-)	Clear	Dark Brown	Light Brown	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear
3	EC_FLD (µmho/cm)											314	344
4	EC_GEN (µmho/cm)	304	179	270	308	280	333	301	275	301	289	314	344
5	Odour_Code (-)	odour free	odour free	odour free	odour free	odour free	odour free	odour free	odour free	odour free	odour free	odour free	odour free
6	pH_FLD (pH units)											7.0	7.2
7	pH_GEN (pH units)	7.4	7.5	7.6	7.3	7.4	7.4	7.1	7.4	7.5	7.7	7.0	7.2
8	TDS (mg/L)	198	110	177	189	178	206	200	194	205	188	184	204
9	Temp (deg C)	29.0	26.0	23.5	23.0	26.5	24.0	16.0	11.5	10.0	14.0	15.0	19.0
10	Turb (NTU)	0.0	366.0	159.0	43.0	43.0	0.0	0.0	0.0	0.0	0.0	0.0	
	CHEMICAL												
1	Alk-Phen (mgCaCO3/L)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	ALK-TOT (mgCaCO3/L)	165	80	110	128	134	143	149	161	177	154	149	165
3	Ca (mg/L)	26	19	30	36	33	39	36	34	40	33	34	62
4	Cl (mg/L)	11.0	4.0	9.0	9.0	5.0	9.0	8.0	11.0	10.0	9.0	8.0	3.0
5	CO3 (mg/L)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	F (mg/L)	0.07	0.00	0.05	0.11	0.15	0.01	0.10	0.19	0.21	0.20	0.08	0.07
7	HCO3 (mg/L)	201	98	134	156	164	174	182	197	216	188	182	201
8	K (mg/L)	2.1	2.8	1.4	1.3	0.7	1.2	1.0	1.2	1.4	1.3	1.2	2.6
9	Mg (mg/L)	17.0	10.5	10.0	12.4	13.9	8.8	15.6	14.8	19.4	13.9	12.9	1.7
10	Na (mg/L)	17.0	3.4	6.1	7.8	6.7	9.6	12.1	15.5	2.3	14.8	14.4	14.6
11	NO2+NO3 (mg N/L)	0.18	2.13	1.31	1.31	1.25	0.88	0.45	0.36	0.41	0.36	1.36	3.60
12	NO2-N (mgN/L)	0.01	0.80	0.04	0.04	0.04	0.03	0.02	0.02	0.03	0.03	0.01	2.16
13	NO3-N (mgN/L)	0.16	1.33	1.27	1.27	1.21	0.85	0.44	0.34	0.38	0.32	1.35	1.44
14	o-PO4-P (mg P/L)	0.258	0.036	0.068	0.269	0.244	0.148	0.073	0.152	0.101	0.112	0.128	0.229
15	SiO2 (mg/L)		20.4	30.9	32.0	30.5	23.2	18.8	17.7	17.6	18.0	37.8	35.0
16	SO4 (mg/L)	1.9	15.9	16.8	10.3	8.3	7.9	8.2	9.9	8.3	9.6	9.8	8.3
	BIOLOGICAL/BACTERIOLOGICAL												
1	BOD3-27 (mg/L)	0.9	0.7	0.7	1.6	1.0	1.3	1.4	2.7	2.4	1.1	1.2	2.2
2	COD (mg/L)	40.0	51.0	31.0	33.0	29.0	27.0	33.0	53.0	57.0	13.0	22.0	22.0
3	DO (mg/L)	1.3	4.5	5.3	5.4	5.3	4.1	5.1	5.8	5.3	5.6	3.0	3.2
4	DO_SAT% (%)	17	55	62	63	65	49	52	53	47	54	30	34
	TRACE & TOXIC												
	CHEMICAL INDICES												
1	HAR_Ca (mgCaCO3/L)	64	48	74	91	82	97	89	85	100	83	84	156
2	HAR_Total (mgCaCO3/L)	135	91	116	143	140	133	154	146	181	141	138	163
3	Na% (%)	21	7	10	11	9	13	15	19	3	19	18	16
4	RSC (-)	0.6	0.0	0.0	0.0	0.0	0.2	0.0	0.3	0.0	0.3	0.2	0.1
5	SAR (-)	0.6	0.2	0.2	0.3	0.2	0.4	0.4	0.6	0.1	0.5	0.5	0.5

Water Quality Data Book 2018-19

Water Quality Summary for the period : 2018-2019

Station Name : Narmada at Dindori (010215001)

Division : Narmada Division, Bhopal

Local River : Narmada

Sub-Division : UNSD, Jabalpur

River Water Summary

S.No	Parameters	Number of Observations	Maximum	Minimum	Mean
	PHYSICAL				
1	Q (cumec)				
2	EC_FLD ($\mu\text{mho/cm}$)	2	344	314	329
3	EC_GEN ($\mu\text{mho/cm}$)	12	344	179	292
4	pH_FLD (pH units)	2	7.2	7.0	7.1
5	pH_GEN (pH units)	12	7.7	7.0	7.4
6	TDS (mg/L)	12	206	110	186
7	Temp (deg C)	12	29.0	10.0	19.8
8	Turb (NTU)	11	366.0	0.0	55.5
	CHEMICAL				
1	Alk-Phen (mgCaCO ₃ /L)	12	0.0	0.0	0
2	ALK-TOT (mgCaCO ₃ /L)	12	177	80	143
3	Ca (mg/L)	12	62	19	35
4	Cl (mg/L)	12	11.0	3.0	8
5	CO ₃ (mg/L)	12	0.0	0.0	0
6	F (mg/L)	12	0.21	0.00	0.1
7	HCO ₃ (mg/L)	12	216	98	174
8	K (mg/L)	12	2.8	0.7	1.5
9	Mg (mg/L)	12	19.4	1.7	12.6
10	Na (mg/L)	12	17.0	2.3	10.3
11	NO ₂ +NO ₃ (mg N/L)	12	3.60	0.18	1.13
12	NO ₂ -N (mgN/L)	12	2.16	0.01	0.27
13	NO ₃ -N (mgN/L)	12	1.44	0.16	0.86
14	PO ₄ -P (mg P/L)	12	0.269	0.036	0.151
15	SiO ₂ (mg/L)	11	37.8	17.6	25.6
16	SO ₄ (mg/L)	12	16.8	1.9	9.6
	BIOLOGICAL/BACTERIOLOGICAL				
1	BOD ₃₋₂₇ (mg/L)	12	2.7	0.7	1.4
2	COD (mg/L)	12	57.0	13.0	34.3
3	DO (mg/L)	12	5.8	1.3	4.5
4	DO_SAT% (%)	12	65	17	48
	TRACE & TOXIC				
	CHEMICAL INDICES				
1	HAR_Ca (mgCaCO ₃ /L)	12	156	48	88
2	HAR_Total (mgCaCO ₃ /L)	12	181	91	140
3	Na% (%)	12	21	3	13
4	RSC (-)	12	0.6	0.0	0.1
5	SAR (-)	12	0.6	0.1	0.4

Water Quality Data Book 2018-19

Water Quality Seasonal Average for the period : 2014-2019

Station Name : Narmada at Dindori (010215001)

Division : Narmada Division, Bhopal

Local River : Narmada

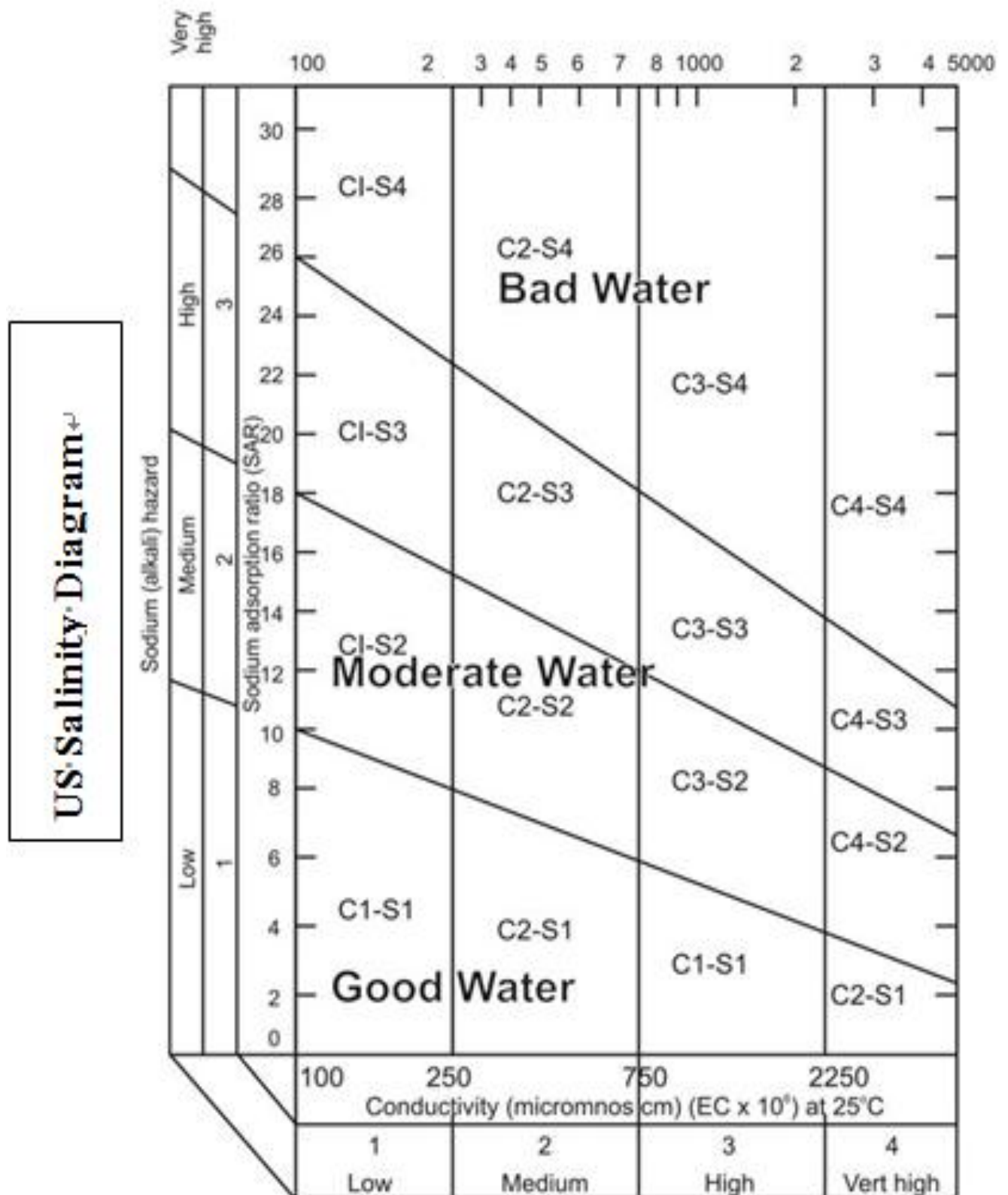
Sub-Division : UNSD, Jabalpur

River Water

S.No	Parameters	Flood					Winter					Summer				
		Jun - Oct					Nov - Feb					Mar - May				
		2014	2015	2016	2017	2018	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019	2015	2016	2017	2018	2019
	PHYSICAL															
1	Q (cumec)		20.07					5.603					1.864			
2	EC_FLD (µmho/cm)															329
3	EC_GEN (µmho/cm)	192	198	225	267	268	326	241	300	322	303	217	323	288	322	316
4	pH_FLD (pH units)															7.1
5	pH_GEN (pH units)	7.8	7.9	7.5	7.6	7.4	8.1	8.1	7.4	7.7	7.3	8.1	7.9	7.5	7.6	7.3
6	TDS (mg/L)	124	124	147	175	170	216	152	197	214	201	139	210	192	210	192
7	Temp (deg C)	28.9	26.4	26.5	25.8	25.6	17.3	18.0	17.8	15.9	15.4	22.0	22.3	23.5	18.2	16.0
8	Turb (NTU)	131.8	57.0	162.6	91.2	122.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	CHEMICAL															
1	Alk-Phen (mgCaCO3/L)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.7	0.0	0.0	0.0	0.0
2	ALK-TOT (mgCaCO3/L)	125	122	108	124	123	177	154	150	151	158	144	157	155	147	156
3	Ca (mg/L)	26	26	25	31	29	44	34	33	34	37	31	31	31	28	43
4	Cl (mg/L)	8.3	7.0	6.9	8.8	7.6	16.1	8.0	7.0	8.3	9.5	7.7	9.0	9.3	12.0	6.7
5	CO3 (mg/L)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0	0.0	0.0	0.0	0.0
6	F (mg/L)	0.21	0.17	0.22	0.19	0.07	0.30	0.15	0.15	0.10	0.13	0.14	0.27	0.25	0.08	0.11
7	HCO3 (mg/L)	152	149	132	152	151	216	188	183	184	192	172	191	189	180	190
8	K (mg/L)	1.9	2.4	2.0	1.4	1.7	0.8	1.1	0.8	1.1	1.2	1.1	1.7	1.3	1.9	1.7
9	Mg (mg/L)	12.6	12.5	10.1	10.2	12.7	18.1	15.8	13.9	16.0	14.6	14.3	14.3	15.1	14.3	9.5
10	Na (mg/L)	8.1	9.0	6.0	8.9	8.2	19.6	8.8	7.7	9.4	9.8	7.8	12.1	13.6	13.1	14.6
11	NO2+NO3 (mg N/L)	1.37	1.57	0.91	0.48	1.23	3.78	0.33	0.29	0.08	0.53	0.34	0.12	0.21	0.56	1.77
12	NO2-N (mgN/L)	0.04	0.11	0.04	0.03	0.19	0.03	0.14	0.06	0.02	0.02	0.06	0.02	0.02	0.01	0.74
13	NO3-N (mgN/L)	1.33	1.46	0.87	0.45	1.05	3.74	0.19	0.22	0.07	0.50	0.28	0.11	0.20	0.54	1.04
14	PO4-P (mg P/L)	0.231	0.283	0.232	0.151	0.175	0.139	0.087	0.105	0.074	0.118	0.163	0.132	0.082	0.139	0.156
15	SiO2 (mg/L)	23.4	17.9	24.8	19.4	28.4	19.1	16.6	18.2	17.3	19.3	24.6	20.3	18.5	16.5	30.3
16	SO4 (mg/L)	10.2	12.1	20.2	12.5	10.7	29.9	2.7	11.5	9.7	8.6	20.0	3.1	7.4	8.3	9.2
	BIOLOGICAL/BACTERIOLOGICAL															
1	BOD3-27 (mg/L)	1.4	1.0	0.9	1.2	1.0	0.6	1.3	1.3	1.2	2.0	1.2	1.9	2.2	1.6	1.5
2	COD (mg/L)	34.6	30.2	38.4	60.8	36.8	36.0	33.0	50.5	44.3	42.5	34.3	33.7	46.3	38.3	19.0
3	DO (mg/L)	4.7	5.0	4.3	4.7	4.4	7.1	5.3	5.7	5.4	5.1	5.5	6.0	4.2	4.3	3.9
4	DO_SAT% (%)	61	61	53	58	53	74	56	60	54	50	62	69	50	45	40
	TRACE & TOXIC															
	CHEMICAL INDICES															
1	HAR_Ca (mgCaCO3/L)	66	65	63	78	72	111	85	83	84	93	78	76	78	71	108
2	HAR_Total (mgCaCO3/L)	118	118	105	121	125	186	151	141	151	154	138	136	141	131	147
3	Na% (%)	12	14	11	14	12	15	11	10	12	12	11	16	17	18	18
4	RSC (-)	0.2	0.1	0.1	0.2	0.1	0.1	0.2	0.2	0.1	0.1	0.1	0.4	0.3	0.3	0.2
5	SAR (-)	0.3	0.4	0.3	0.4	0.3	0.5	0.3	0.3	0.3	0.4	0.3	0.4	0.5	0.5	0.5

Annexure 1 U. S. Salinity diagram

U. S. Salinity diagram for the classification of irrigation of water



Water Quality Data for the period 2018-19

Annexure 2 Tolerance Limits as prescribed by the Bureau of Indian Standards

Tolerance Limits in respect of selected pollution characteristics for inland surface water required for different uses as prescribed by the Bureau of Indian Standards (IS 2296-1982)

Sr.	Characteristics	Class A*	Class B*	Class C*	Class D*	Class E*
1.	pH value	6.5-8.5	6.5-8.5	6.5-8.5	6.5-8.5	6.5-8.5
2.	Conductivity at 25° C u mhos/cm (max)				1000	2250
3.	Color, Hazen units, Max	10	300	300		
4.	Dissolved Oxygen, mg/l, Min	6	5	4	4	
5.	Biochemical oxygen demand (5 days at 20° C), mg/l, Max	2	3	3		
6.	Total dissolved solids, mg/l, Max	500		1500		2100
7.	Total Hardness as (CaCO ₃) mg/l, max	300				--
8.	Calcium Hardness as (CaCO ₃) mg/l, max	200				
9.	Magnesium as (CaCO ₃) mg/l, max	100				
10.	Iron (as Fe), mg/l, Max	0.3		5		
11.	Copper (as Cu), mg/l, Max	1.5		1.5		
12.	Chlorides (as Cl), mg/l, Max	250		600		600
13.	Fluorides (as F), mg/l, Max	1.5	1.5	1.5		
14.	Sulphates (as SO ₄), mg/l, Max	400		400		1000
15.	Nitrate (as NO ₃), mg/l, max	20		50		
16.	Free Ammonia				1.2	
17.	Chromium (as Cr), mg/l, Max	0.05	0.05	0.05		
18.	Boron, mg/l, Max					2
19.	Percent Sodium, Max					60
20.	Sodium Adsorption Ratio, Max					26

* For use classes A to E refer table below

Sr.	Class of stream	Designated best use
1.	Class A	Drinking water source without conventional treatment but after disinfection
2.	Class B	Outdoor bathing (Organised)
3.	Class C	Drinking water source with conventional treatment followed by disinfection.
4.	Class D	Fish culture and wild life propagation
5.	Class E	Irrigation, industrial cooling or controlled waste disposal

Water Quality Data for the period 2018-19

Plate 1: Line Diagram of Narmada Basin

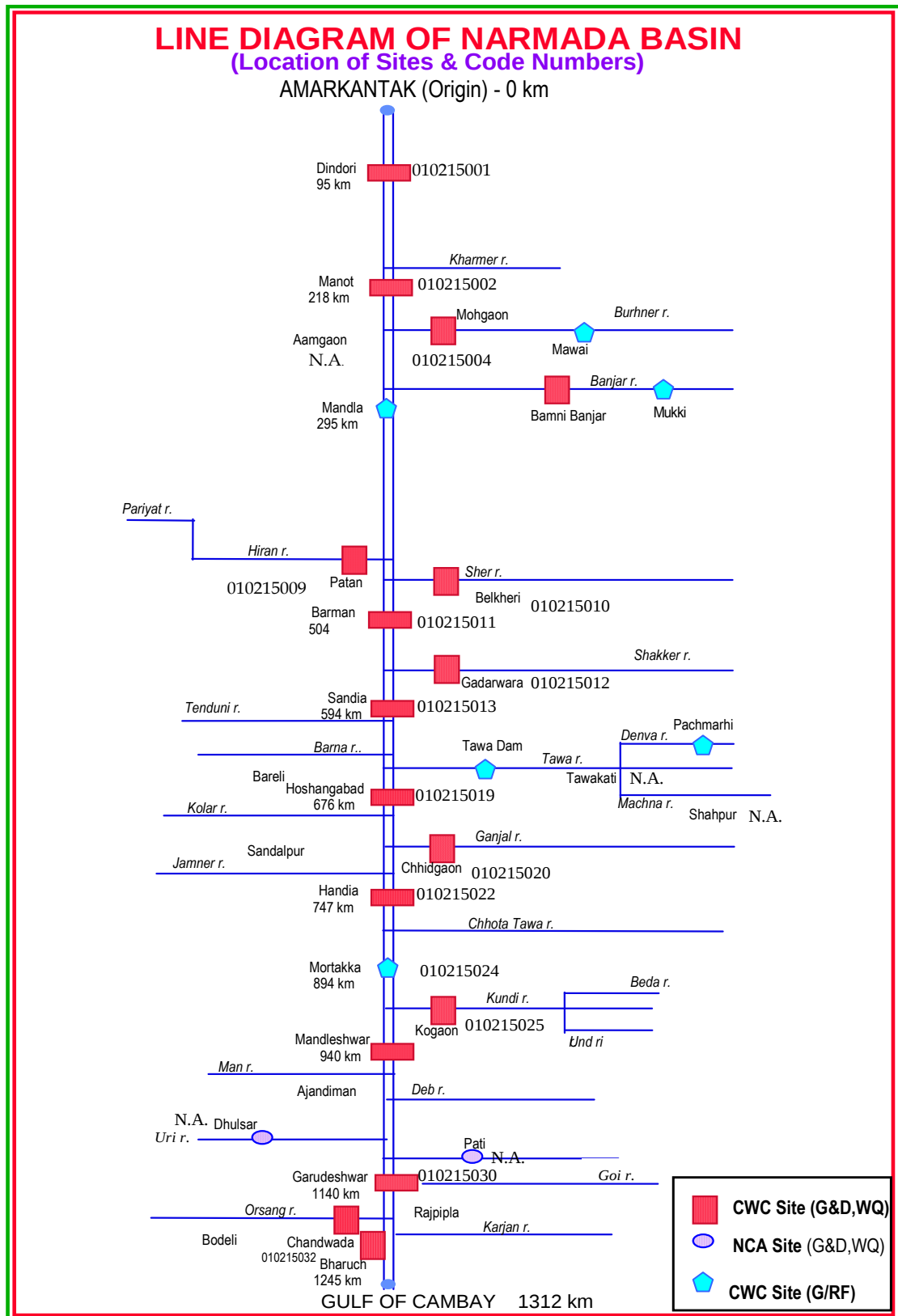
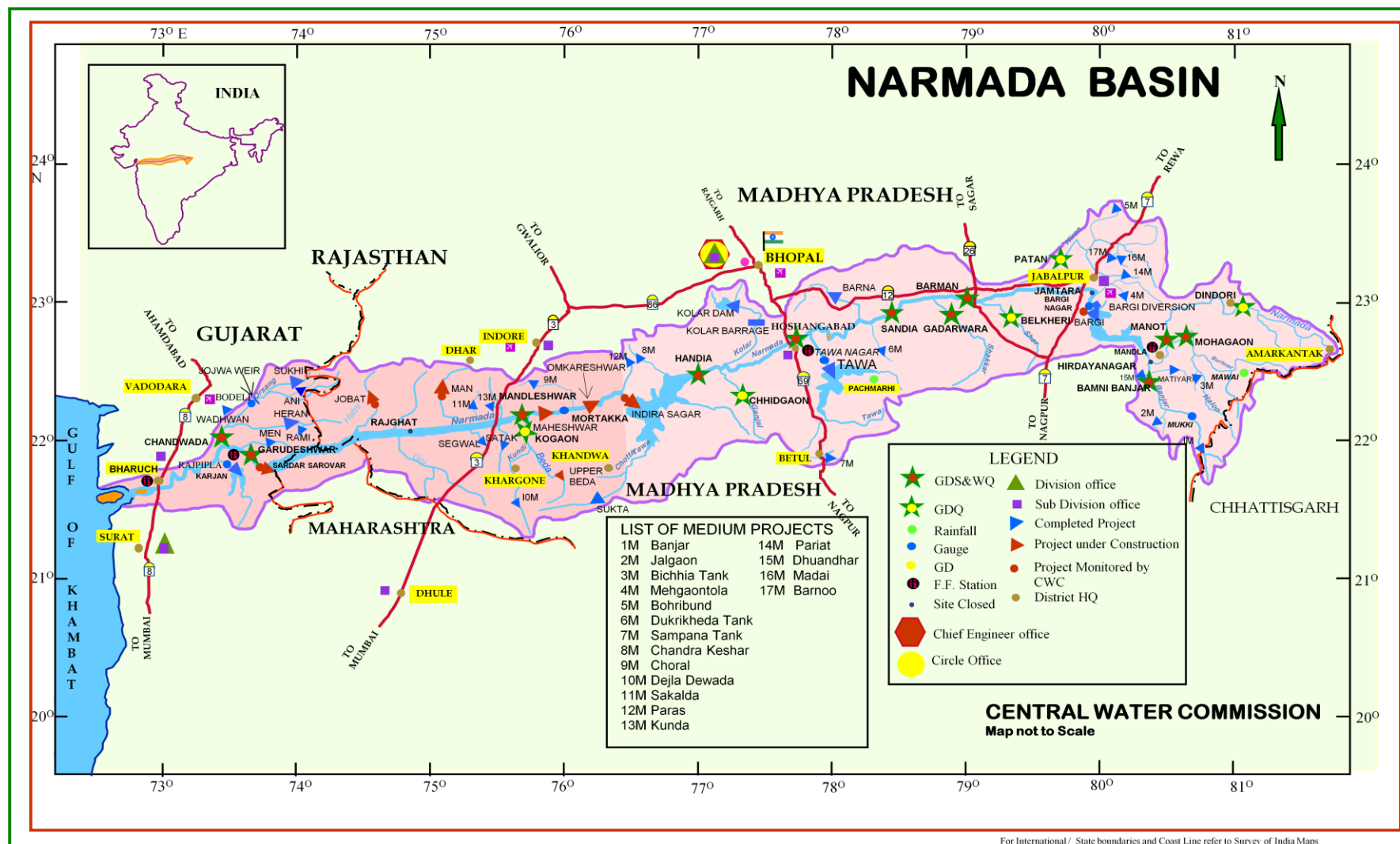


Plate 2: Index Map of Narmada Basin



Water Quality Data for the period 2018-19

Water Quality Data for the period 2018-19