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केवल कार्यालय उपयोग हेतु

भारत सरकार

जल गुणवत्ता आँकड़े पुस्तक

नर्मदा बेसिन

जून 2019- मई 2020

Water Quality Data Book

Narmada Basin

June 2019 – May 2020

Photo-Omkareshwar

केन्द्रीय जल आयोग

नर्मदा बेसिन संगठन

भोपाल

CENTRAL WATER COMMISSION

Narmada Basin Organisation

Bhopal

अगस्त 2021/ August 2021

केवल सरकारी उपयोग के लिये

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नर्मदा बेसिन

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WATER QUALITY DATA BOOK

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नर्मदा बेसिन संगठन

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CENTRAL WATER COMMISSION

Narmada Basin Organisation

August 2021

प्रस्तावना

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 इन्ही कुछ महत्वपूर्ण स्थलों से जल नमूने एकत्रित किये जाते है | 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 18 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 2019-20 के दौरान नर्मदा बेसिन में 18 स्थलों के विश्लेषण आकड़ें संकलित किये गए है | संकलित आकड़ों के आधार पर ही जानकारी इस पुस्तक में समाहित है इसके आलावा प्रेक्षण तकनीक, आकलन पद्धति, स्थलवार वृतपत्र, रासायनिक घटक आदि भी इस पुस्तक में उल्लेखित है |

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

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 |

(मनोज तिवारी)
अधीक्षण अभियंता (समन्वय)

स्थान- भोपाल
अगस्त 2021

PREFACE

The Central Water Commission is functioning as an apex technical body for effective action in proper planning, conservation and development of river basins. The monitoring of various hydrological observation systems by this institution is conducted from various sites located on the major and medium rivers of India. Water samples are collected from some of these important places for monitoring of water quality. The data related to water quality monitoring of Narmada River is collected in laboratories located in Narmada Division, Bhopal and Tapi Division, Surat. The compilation of these data for Narmada basin was started in the year 1978-79 from seven sites. At present, work is being done to assess the water quality data at 18 sites.

The book "Water Quality Data" is being published for effective monitoring of the water quality of Narmada River. In this book, analysed data of 18 sites in Narmada basin have been compiled during the year 2019-20. Information contained in this book is only on the basis of the collected data. Apart from this, observation techniques, estimation method, site wise circular, chemical components etc. are also mentioned in this book.

Hope the information and collected data given in this book will be very beneficial for the organizations working in the field of water quality and management, suggestions are invited to make this book more useful.

The work done by the officers and employees of Narmada Basin Organization in the form of a team with the spirit of dedication for compilation, analysis and publication of the data for this book is commendable for which I express my gratitude to all.

(Manoj Tiwari)
Superintending Engineer (C)

Place-Bhopal
Aug.2021

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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
^0C	:	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	:	Nephelometeric 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 eight are being considered for water quality assessment during present observation period.

1.2 Sources of Information

During the reporting period of 2019-2020 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 18, 16 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/ Stations	Code No.	Sr.	Name of River/ Stations	Code No.
1.	Orsang at Chandwada	CW1NAL000513	10.	Narmada at Barmanghat	CW1NAU000188
2.	Narmada at Garudeshwar	CW1NAL000434	11.	Sher at Belkheri	CW1NAU000395
3.	Narmada at Mandleshwar	CW1NAM000189	12.	Hiran at Patan	CW1NAU000530
4.	Kundi at Kogaon	CW1NAM000442	13.	Banjar at Bamni	CW1NAU000781
5.	Narmada at Handia	CW1NAM000392	14.	Burhner at Mohgaon	CW1NAU000390
6.	Ganjal at Chhidgaon	CW1NAM000379	15.	Narmada at Manot	CW1NAU000378
7.	Narmada at Hoshangabad	CW1NAM000278	16.	Narmada at Dindori	CW1NAU000672
8.	Narmada at Sandia	CW1NAU000450	17.	Narmada at Mandla	CW1NAU000327
9.	Shakkar at Gadarwara	CW1NAU000391	18	Gaur at Bhalwara	CW1NAU001445

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	18.06.1979	- 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	16.09.1986	- do -
	Kundi at Kogaon	01.08.1986	- do -
	Ganjal at Chhidgaon	16.09.1986	- do -
	Narmada at Dindori	15.03.1990	- do -
	Banjar at Bamni	20.06.1999	- do -
	Narmada at Mandla	03/09/2019	-do-
	Gaur at Bhalwara	01.06.2019	-do-

Sl. No	Name of Site	Site Opening Date	Data availability
Group 'B' Sites closed	Uri at Dhulsar	01.07.2008	Closed on 31.03.2017
	Goi at Pati	01.07.2008	Closed on 01.03.2017
	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 (µmho/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	NO_2-N (mg N/L)
3	Ca (mg/L)	8	K (mg/L)	13	NO_3 -N (mg N/L)
4	Cl (mg/L)	9	Mg (mg/L)	14	o-PO_4-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 nephelometeric 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].**

- **Spectrophotometeric/ Colorimeteric 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 Spectrophotometery 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**.

- **Nephelometeric 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 2019 to 31st May 2020.

- 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:

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

  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:

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

(*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:

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

(Residual Sodium Carbonate)

Residual Sodium Carbonate is calculated using the following formula

$$\textbf{Residual Sodium Carbonate} = (\mathbf{CO_3^{--} + HCO_3^{-}}) - (\mathbf{Ca^{++} + Mg^{++}})$$

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 2019-20

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 BOD value was above the tolerance limit on 01.08.2019 (3.5) and on 02.12.2019 (2.0). 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 pH values were in tolerance limit and BOD values were above the tolerance limit on 03.06.2019 (2.4) and on 01.07.2019 (2.9) and on 02.12.2019 (2.2) 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 values were above the tolerance limits on 01.11.2019 (2.9) and on

02.12.2019 (4.1) other parameters values were within their respective tolerance limits for all designated use classes.

Kundi at Kogaon

The 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 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. The values of all chemical and physical parameters were within the prescribed limit for designated use classes A, B, C, D & E . The BOD value was above the tolerance limit only on 02.03.2020 (2.0) .

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, fluoride and BOD values were within the tolerance limit only on 01.01.2020 (2.0) and 02.03.2020 (2.0) for all designated use classes.

Narmada at Barmanghat

The water at this station was alkaline and towards 'Medium Hard Water' range. The pH, BOD and Fluoride values were within the tolerance limit for all designated use classes.

Sher at Belkheri

The degree of hardness observed towards 'Hard Water' range in most number of samples. The BOD value was above the tolerance limits only on 05.05.2020 (3.8). 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 values were above the tolerance limits on 01.07.2019 (4.3) and 02.12.2019 (2.3) and 01.01.2020 (2.6)and 03.02.2020 (2.8) and on 02.03.2020 (3.4) and on 05.05.2020 (2.0) The 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. The BOD value was above the tolerance limit .

Burhner at Mohgaon

The pH, B.O.D, Fluoride is above the tolerance limit 01.11.2019 (6.0) 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 level is above the tolerance limit is on 03.06.2019 (2.0) 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 Ph, BOD and fluoride values and all other parameters were within their tolerance limit for all designated user classes A,B,C,D and E.

Narmada at Mandla

The water exhibited 'Medium Hard' water as per hardness number. The Ph, BOD and fluoride values and all other parameters were within their tolerance limit for all designated user classes A,B,C,D and E.

Gaur at Bhalwara

The water exhibited 'Medium Hard' water as per hardness number. The Ph, fluoride, BOD values are above tolerance limit on 01.07.2019 (3.2) and 03.10.2019 (2.2) and 02.03.2020 (3.2), 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 18 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.

Plate 1: Line Diagram of Narmada Basin

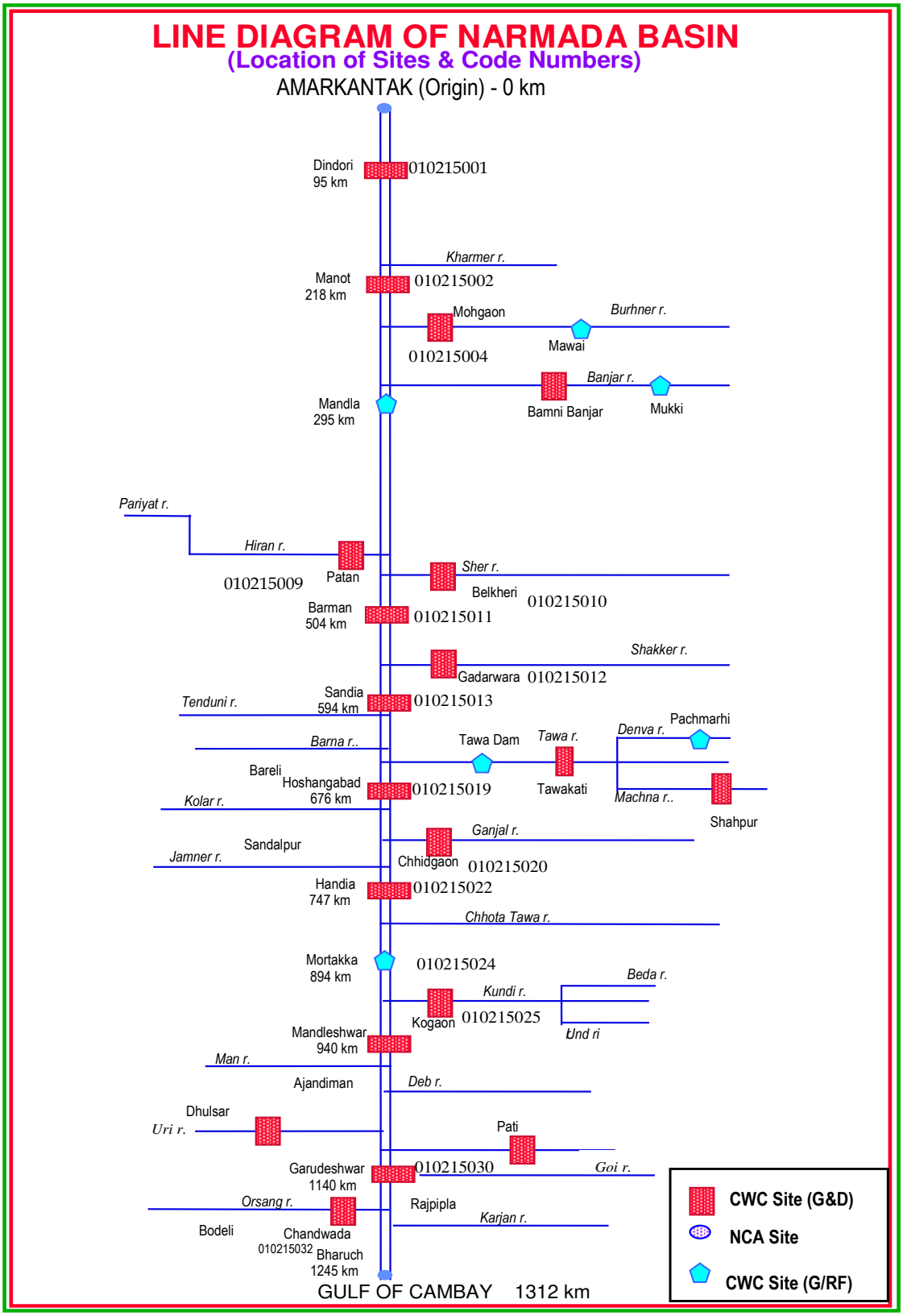
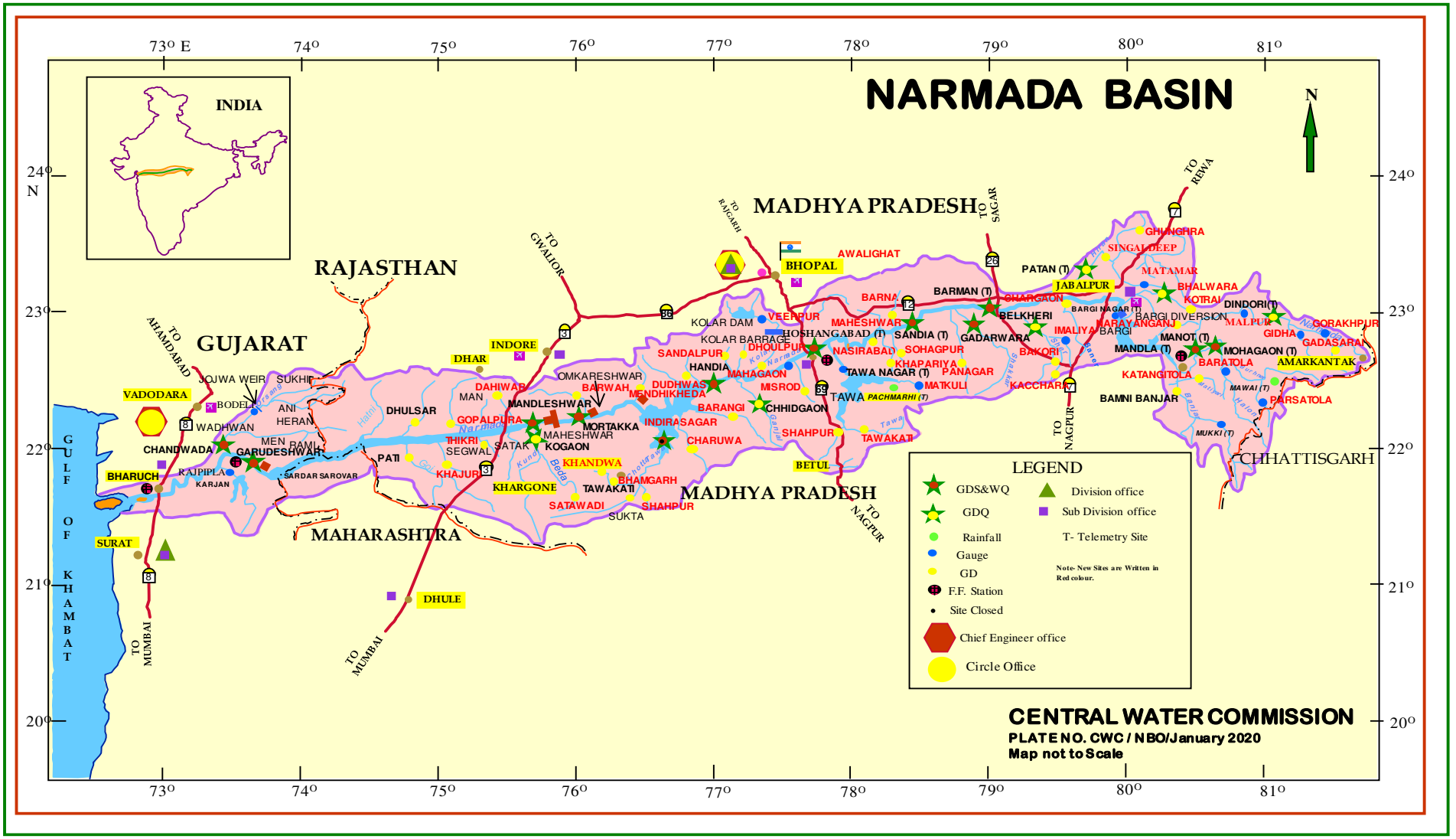


Plate 2: Index Map of Narmada Basin



For International / State boundaries and Coast Line refer to Survey of India Maps

3.2 Orsang at Chandwada

History Sheet

			Water Year	**:**	**2019-2020**
Site	**:**	**Orsang at Chanwada**	**Code**	**:**	CW1NAL000513
State	:	Gujarat	District		Vadodara
Basin	:	Narmada	Independent River	:	Narmada
Tributary	:	Orsang	Sub Tributary	:	
Sub-Sub Tributary	:		Local River	:	
Division	:		Sub-Division	:	
Drainage Area	:	Sq. Km.	Bank	:	
Latitude	:	22°03'00"	Longitude	:	73°27'58"
		Opening Date	Closing Date		
Gauge	:	11/01/1979	31/12/2015		
Discharge	:	01/11/1979	31/12/2015		
Sediment	:	01/08/1988	31/12/2015		
Water Quality	:	15/03/1980	31/12/2015		

Water Quality Datasheet for the period : 2019-2020

Station Name : Orsang at Chandwada (CW1NAL000513) Division : Tapi Division, Surat
Local River : Orsang Sub-Division: LNSD Bharuch

River Water Analysis

S.No	Parameters	01/06/2019	01/07/2019	01/08/2019	03/09/2019	04/10/2019	01/11/2019	02/12/2019	01/01/2020	03/02/2020	02/03/2020	01/04/2020	01/05/2020
		A	A	A	A	A	A	A	A	A	A	A	A
	PHYSICAL												
1	Q (cumec)												
2	Colour_Cod (-)			Dark Brown	Light Brown	Light Brown	Clear	Clear					
3	EC_GEN (µmho/cm)			273	423	462	509	634					
4	Odour_Code (-)			odour free	odour free	odour free	odour free	odour free					
5	pH_GEN (pH units)			7.7	8.3	8.3	8.2	8.1					
6	SS (mg/L)			368	165	90	68	65					
7	TDS (mg/L)			170	258	281	295	384					
8	Temp (deg C)			26.0	27.0	25.0	23.0	19.0					
	CHEMICAL												
1	Alk-Phen (mgCaCO3/L)			0.0	0.0	0.0	0.0	0.0					
2	ALK-TOT (mgCaCO3/L)			78	134	149	155	185					
3	Ca (mg/L)			18	37	41	40	41					
4	Cl (mg/L)			34.0	44.0	45.0	53.0	81.0					
5	CO3 (mg/L)			0.0	0.0	0.0	0.0	0.0					
6	F (mg/L)			0.10	0.52	0.56	0.48	0.73					
7	HCO3 (mg/L)			95	163	182	189	226					
8	K (mg/L)			2.8	1.5	1.9	2.4	3.0					
9	Mg (mg/L)			10.9	14.8	14.8	16.0	22.1					
10	Na (mg/L)			25.5	31.0	33.4	38.1	59.3					
11	NH3-N (mg N/L)	River Dry	River Dry	0.68	0.09	0.09	0.06	0.05	No Flow	No Flow	No Flow	Nationwide Lockdown	River Dry
12	NO2+NO3 (mg N/L)			1.69	1.85	2.16	1.69	2.22					
13	NO2-N (mgN/L)			0.14	0.01	0.01	0.01	0.03					
14	NO3-N (mgN/L)			1.55	1.84	2.15	1.68	2.19					
15	P-Tot (mgP/L)			0.110	0.090	0.070	0.060	0.020					
16	SiO2 (mg/L)			29.1	36.0	40.9	28.8	32.8					
17	SO4 (mg/L)			15.0	14.2	13.2	11.8	13.6					
	BIOLOGICAL/BACTERIOLOGICAL												
1	BOD3-27 (mg/L)			3.5	1.2	1.0	1.4	2.0					
2	COD (mg/L)			17.5	9.8	8.7	10.8	10.8					
3	DO (mg/L)			6.9	6.9	6.7	5.6	8.4					
4	DO_SAT% (%)			85	86	81	65	91					
	TRACE & TOXIC												
	CHEMICAL INDICES												
1	HAR_Ca (mgCaCO3/L)			45	93	102	99	103					
2	HAR_Total (mgCaCO3/L)			91	155	164	166	195					
3	Na% (%)			37	30	31	33	39					
4	RSC (-)			0.0	0.0	0.0	0.0	0.0					
5	SAR (-)			1.2	1.1	1.1	1.3	1.9					
	PESTICIDES												

Water Quality Summary for the period :2019-2020

Station Name : Orsang at Chandwada CW1NAL000513) 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)				
2	EC_GEN (µmho/cm)	5	634	273	460
3	pH_GEN (pH units)	5	8.3	7.7	8.1
4	SS (mg/L)	5	368	65	151
5	TDS (mg/L)	5	384	170	278
6	Temp (deg C)	5	27.0	19.0	24
	CHEMICAL				
1	Alk-Phen (mgCaCO3/L)	5	0.0	0.0	0
2	ALK-TOT (mgCaCO3/L)	5	185	78	140
3	Ca (mg/L)	5	41	18	35
4	Cl (mg/L)	5	81.0	34.0	51.4
5	CO3 (mg/L)	5	0.0	0.0	0
6	F (mg/L)	5	0.73	0.10	0.48
7	HCO3 (mg/L)	5	226	95	171
8	K (mg/L)	5	3.0	1.5	2.3
9	Mg (mg/L)	5	22.1	10.9	15.7
10	Na (mg/L)	5	59.3	25.5	37.4
11	NH3-N (mg N/L)	5	0.68	0.05	0.19
12	NO2+NO3 (mg N/L)	5	2.22	1.69	1.92
13	NO2-N (mgN/L)	5	0.14	0.01	0.04
14	NO3-N (mgN/L)	5	2.19	1.55	1.88
15	P-Tot (mgP/L)	5	0.110	0.020	0.07
16	SiO2 (mg/L)	5	40.9	28.8	33.5
17	SO4 (mg/L)	5	15.0	11.8	13.6
	BIOLOGICAL/BACTERIOLOGICAL				
1	BOD3-27 (mg/L)	5	3.5	1.0	1.8
2	COD (mg/L)	5	17.5	8.7	11.5
3	DO (mg/L)	5	8.4	5.6	6.9
4	DO_SAT% (%)	5	91	65	82
	TRACE & TOXIC				
	CHEMICAL INDICES				
1	HAR_Ca (mgCaCO3/L)	5	103	45	89
2	HAR_Total (mgCaCO3/L)	5	195	91	154
3	Na% (%)	5	39	30	34
4	RSC (-)	5	0.0	0.0	0
5	SAR (-)	5	1.9	1.1	1.3

Water Quality Seasonal Average for the period: 2015-2020

Station Name : Orsang at Chandwada (CW1NAL000513) Division : Tapi Division, Surat

Local River : Orsang Sub-Division : LNSD Bharuch

River Water

S.No	Parameters	Flood					Winter					Summer				
		Jun - Oct							Nov - Feb					Mar - May		
		2015	2016	2017	2018	2019	2015-2016	2016-2017	2017-2018	2018-2019	2019-2020	2016	2017	2018	2019	2020
	PHYSICAL															
1	Q (cumec)															
2	EC_FLD (µmho/cm)	600	350	700			600	650					300			
3	EC_GEN (µmho/cm)	424	383	492	591	386	370	553	572	673	572		580	1535		
4	pH_FLD (pH units)	7.0	7.8	8.0			7.0	8.2	7.9				8.0	9.3		
5	pH_GEN (pH units)	8.2	8.0	8.1	8.3	8.1	8.2	8.2	7.9	8.4	8.2		8.2	8.6		
6	SS (mg/L)	138	130	165	50	208	110	165	228	67	67		190	67		
7	TDS (mg/L)	274	253	320	361	236	240	359	377	417	340		384	912		
8	Temp (deg C)	24.0	25.0	26.0	27.6	26.0	20.0	13.5	16.3	15.7	21.0		24.0	28.0		
9	TS (mg/L)	789	383	485	340			524	632				574	979		
10	Turb (NTU)	3.0	16.0	1.6	8.0		1.0	1.0	2.3				1.0	2.0		
	CHEMICAL															
1	Alk-Phen (mgCaCO3/L)	0.0	0.0	0.0	8.6	0.0	0.0	0.0	0.0	14.2	0.0		0.0	20.8		
2	ALK-TOT (mgCaCO3/L)	97	93	127	153	120	103	167	125	168	170		100	189		
3	Ca (mg/L)	31	35	42	36	32	34	38	41	40	40		32	45		
4	Cl (mg/L)	72.5	71.5	75.6	60.8	41.0	58.0	67.5	68.0	88.4	67.0		58.0	156.0		
5	CO3 (mg/L)	0.0	0.0	0.0	10.4	0.0	0.0	0.0	0.0	17.1	0.0		0.0	25.0		
6	F (mg/L)	0.13	0.10	0.13	0.22	0.39		0.13	0.17	0.27	0.61		0.14	0.31		
7	HCO3 (mg/L)	118	113	155	165	147	126	204	153	170	208		122	179		
8	K (mg/L)	4.1	3.7	5.0	2.9	2.1	3.6	3.6	4.6	3.2	2.7		3.8			
9	Mg (mg/L)	11.5	7.3	8.9	18.1	13.5	7.3	20.7	10.2	19.4	19.1		4.9	23.6		
10	Na (mg/L)	44.0	43.0	52.4	34.0	30.0	40.4	44.4	45.5	65.1	48.6		41.0			
11	NH3-N (mg N/L)	0.12	0.13	0.11	0.12	0.29	0.12	0.13	0.16	0.10	0.05		0.12	0.22		
12	NO2+NO3 (mg N/L)	0.22	0.17	0.20	0.62	1.90	0.19	0.20	0.20	0.27	1.95		0.18	0.64		
13	NO2-N (mgN/L)	0.09	0.06	0.07	0.08	0.05	0.06	0.08	0.08	0.00	0.02		0.05	0.09		
14	NO3-N (mgN/L)	0.13	0.11	0.13	0.54	1.85	0.13	0.11	0.12	0.27	1.94		0.13	0.55		
15	o-PO4-P (mg P/L)				0.120									0.080		
16	P-Tot (mgP/L)	0.125	0.135	0.130	0.062	0.090	0.150	0.110	0.137	0.053	0.040		0.150	0.080		
17	SiO2 (mg/L)	9.0	11.0	8.8	40.3	35.3	8.0	10.0	8.5	30.0	30.8		8.0	38.9		
18	SO4 (mg/L)	7.5	9.0	9.0	16.0	14.1	6.0	10.0	8.8	22.4	12.7		6.0	19.4		
	BIOLOGICAL/BACTERIOLOGICAL															
1	BOD3-27 (mg/L)	0.5	1.3	1.6	1.3	1.9	0.8	1.6	1.9	1.6	1.7		0.6	2.5		
2	COD (mg/L)	82.0	28.0	30.8	9.2	12.0	24.0	22.0	16.5	9.8	10.8		44.0			
3	DO (mg/L)	6.8	8.0	8.1	6.6	6.8	7.0	7.7	8.1	7.8	7.0		4.5	5.2		
4	DO_SAT% (%)	79	97	100	83	84	77	73	83	78	78		54	67		
5	FCol-MPN (MPN/100mL)	250	950	940			600	1150	625				1100			
6	Tcol-MPN (MPN/100mL)	450	2200	2020			1100	2450	1475				2300			
	TRACE & TOXIC															
1	Al (mg/L)	0.07	0.07	0.11	0.08		0.05	0.11	0.12	0.05			0.08	0.07		
	CHEMICAL INDICES															
1	HAR_Ca (mgCaCO3/L)	78	88	106	91	80	85	95	102	101	101		80	113		
2	HAR_Total (mgCaCO3/L)	126	118	143	166	137	116	181	145	182	181		100	211		
3	Na% (%)	42	43	43	32	33	42	34	40	43	36		46			
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 (-)	1.7	1.7	1.9	1.2	1.1	1.6	1.4	1.7	2.1	1.6		1.8			

3.3 Narmada at Garudeshwar

History Sheet

			Water Year	**:**	**2019-2020**
Site	**:**	**Narmada at Garudeshwar**	**Code**	**:**	CW1NAL000434
State	:	Gujarat	District		Bharuch
Basin	:	Narmada	Independent River	:	Narmada
Tributary	:		Sub Tributary	:	
Sub-Sub Tributary	:		Local River	:	
Division	:	TAPI DIVISION SURAT	Sub-Division	:	LNSD
Drainage Area	:	87892 Sq. Km.	Bank	:	
Latitude	:	21°53'11"	Longitude	:	73°39'16"
		Opening Date	Closing Date		
Gauge	:	22/12/1971			
Discharge	:	22/03/1972			
Sediment	:	21/01/1973			
Water Quality	:	15/06/1977			

Water Quality Datasheet for the period : 2019-2020

Station Name : Narmada at Garudeshwar (CW1NAL000434) Division : Tapi Division, Surat

Local River : Narmada Sub-Division : LNSD Bharuch

River Water Analysis

S.No	Parameters	03/06/2019	01/07/2019	01/08/2019	03/09/2019	04/10/2019	01/11/2019	02/12/2019	01/01/2020	03/02/2020	02/03/2020	01/04/2020	02/05/2020	11/05/2020	21/05/2020
		A	A	A	A	A	A	A	A	A	A	A	A	A	A
	PHYSICAL														
1	Q (cumec)														
2	Colour_Cod (-)	Clear	Clear	Light Brown	Clear	Clear	Clear	Clear	Clear	Clear	Clear		Clear	Clear	Clear
3	EC_GEN (µmho/cm)	349	369	404	343	327	403	376	426	406	925		373	367	385
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	odour free
5	pH_FLD (pH units)		6.4	6.3	6.5				7.1	7.3	6.3		7.3	7.3	7.3
6	pH_GEN (pH units)	7.3	7.8	7.3	8.3	8.3	8.3	8.1	8.2	8.1	7.6		8.2	8.2	8.3
7	SS (mg/L)	20	40	48	46	35	40	48	29	32	40		34	28	40
8	TDS (mg/L)	210	224	245	210	192	230	220	248	238	538		224	215	220
9	Temp (deg C)	30.0	26.0	25.0	27.0	26.0	26.0	27.5	22.0	22.0	27.0		25.0	28.0	29.0
	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	0.0
2	ALK-TOT (mgCaCO3/L)	126	123	127	110	108	134	131	150	139	328		135	131	135
3	Ca (mg/L)	31	33	29	31	31	33	32	42	39	71		31	32	32
4	Cl (mg/L)	32.0	34.0	44.0	38.0	27.0	31.0	31.0	31.0	35.0	74.0		33.0	31.0	33.0
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	0.0
6	F (mg/L)	0.35	0.08	0.42	0.38	0.25	0.27	0.46	0.10	0.59	0.66		0.29	0.25	0.24
7	HCO3 (mg/L)	154	150	155	134	132	163	160	183	170	400		165	160	165
8	K (mg/L)	3.0	3.2	2.9	2.0	1.5	2.3	2.1	2.0	2.2	3.0		2.0	1.8	2.1
9	Mg (mg/L)	12.9	10.7	16.0	11.7	9.7	15.1	14.6	14.8	12.6	43.3		14.6	13.6	14.6
10	Na (mg/L)	22.5	24.3	30.8	24.8	19.9	22.1	22.5	22.1	23.9	50.9		23.9	20.8	22.1
11	NH3-N (mg N/L)	0.06	0.05	0.05	0.05		0.05	0.05	0.10	0.22	0.67		0.05	0.05	0.05
12	NO2+NO3 (mg N/L)	0.32	0.43	1.55	1.65	1.93	1.93	2.10	2.73	1.91	3.04		0.85	0.83	0.93
13	NO2-N (mgN/L)	0.02	0.05	0.05	0.00	0.01	0.01	0.01	0.01	0.02	0.28		0.01	0.01	0.01
14	NO3-N (mgN/L)	0.30	0.38	1.50	1.65	1.92	1.92	2.09	2.72	1.89	2.76		0.84	0.82	0.92
15	P-Tot (mgP/L)	0.100	0.010	0.050	0.040	0.030	0.030	0.030	0.010	0.020	0.030		0.070	0.070	0.080
16	SiO2 (mg/L)	21.9	29.9	35.7	31.8	34.3	28.2	30.0	34.8	33.8	29.5		25.7	26.8	29.7
17	SO4 (mg/L)	9.2	8.4	11.7	9.2	7.8	8.7	6.4	9.0	6.2	20.4		5.3	5.2	4.8
	BIOLOGICAL/BACTERIOLOGICAL														
1	BOD3-27 (mg/L)	2.4	2.9	1.5	1.5	1.4	1.2	2.2	1.2	1.0	1.4		1.6	1.4	1.6
2	COD (mg/L)	14.8	18.2	11.7	12.7	10.7	9.8	12.7	10.7	7.8	8.2		9.8	10.8	11.8
3	DO (mg/L)	6.0	6.9	6.1	7.9	7.3	6.4	8.2	7.1	7.6	6.1		8.8	8.4	8.0
4	DO_SAT% (%)	80	85	74	100	90	79	103	81	87	76		106	107	103
	TRACE & TOXIC														
1	Al (mg/L)	0.05													
	CHEMICAL INDICES														
1	HAR_Ca (mgCaCO3/L)	78	83	73	77	78	82	79	105	97	178		77	81	81
2	HAR_Total (mgCaCO3/L)	132	128	140	126	119	145	140	167	150	359		138	138	142
3	Na% (%)	27	29	32	30	26	25	26	22	25	24		27	25	25
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	0.0
5	SAR (-)	0.9	0.9	1.1	1.0	0.8	0.8	0.8	0.7	0.9	1.2		0.9	0.8	0.8

Nationwide Lockdown

Water Quality Summary for the period : 2019-2020

S.No	Parameters	Number of Observations	Maximum	Minimum	Mean
	PHYSICAL				
1	Q (cumec)				
2	EC_GEN (µmho/cm)	13	925	327	419
3	pH_FLD (pH units)	9	7.3	6.3	6.8
4	pH_GEN (pH units)	13	8.3	7.3	8
5	SS (mg/L)	13	48	20	37
6	TDS (mg/L)	13	538	192	247
7	Temp (deg C)	13	30.0	22.0	26.2
	CHEMICAL				
1	Alk-Phen (mgCaCO3/L)	13	0.0	0.0	0
2	ALK-TOT (mgCaCO3/L)	13	328	108	144
3	Ca (mg/L)	13	71	29	36
4	Cl (mg/L)	13	74.0	27.0	36.5
5	CO3 (mg/L)	13	0.0	0.0	0
6	F (mg/L)	13	0.66	0.08	0.33
7	HCO3 (mg/L)	13	400	132	176
8	K (mg/L)	13	3.2	1.5	2.3
9	Mg (mg/L)	13	43.3	9.7	15.7
10	Na (mg/L)	13	50.9	19.9	25.4
11	NH3-N (mg N/L)	12	0.67	0.05	0.12
12	NO2+NO3 (mg N/L)	13	3.04	0.32	1.55
13	NO2-N (mgN/L)	13	0.28	0.00	0.04
14	NO3-N (mgN/L)	13	2.76	0.30	1.52
15	P-Tot (mgP/L)	13	0.100	0.010	0.044
16	SiO2 (mg/L)	13	35.7	21.9	30.2
17	SO4 (mg/L)	13	20.4	4.8	8.6
	BIOLOGICAL/BACTERIOLOGICAL				
1	BOD3-27 (mg/L)	13	2.9	1.0	1.6
2	COD (mg/L)	13	18.2	7.8	11.5
3	DO (mg/L)	13	8.8	6.0	7.3
4	DO_SAT% (%)	13	107	74	90
	TRACE & TOXIC				
1	Al (mg/L)	1	0.05	0.05	0.05
	CHEMICAL INDICES				
1	HAR_Ca (mgCaCO3/L)	13	178	73	90
2	HAR_Total (mgCaCO3/L)	13	359	119	156
3	Na% (%)	13	32	22	26
4	RSC (-)	13	0.0	0.0	0
5	SAR (-)	13	1.2	0.7	0.9
	PESTICIDES				

Water Quality Seasonal Average for the period: 2015-2020

Station Name : Narmada at Garudeshwar (CW1NAL000434) Division : Tapi Division, Surat

Local River : Narmada Sub-Division : LNSD Bharuch

River Water

S.No	Parameters			Flood					Winter					Summer		
				Jun - Oct					Nov - Feb					Mar - May		
	PHYSICAL	**2015**	**2016**	**2017**	**2018**	**2019**	**2015-2016**	**2016-2017**	**2017-2018**	**2018-2019**	**2019-2020**	**2016**	**2017**	**2018**	**2019**	**2020**
1	Q (cumec)															
2	EC_FLD (µmho/cm)		348				356	405				345	500			
3	EC_GEN (µmho/cm)	357	321	399	537	358	321	317	391	505	403	351	380	456	345	513
4	pH_FLD (pH units)		7.6	6.9	6.3	6.4	8.1	6.9	6.8	6.5	7.2	7.1	7.0	6.4	6.6	7.0
5	pH_GEN (pH units)	8.2	7.8	8.1	8.2	7.8	8.0	8.3	8.1	8.1	8.2	8.1	8.0	8.2	7.7	8.1
6	SS (mg/L)	120	122	127	43	38	105	100	135	53	37	119	110	32	40	36
7	TDS (mg/L)	231	204	263	332	216	208	205	260	307	234	238	247	287	209	299
8	Temp (deg C)	24.3	24.7	25.6	25.2	26.8	18.0	17.5	19.0	16.5	24.4	22.0	24.0	27.0	23.0	27.3
9	TS (mg/L)	462	326	390	313		352	307	395			357	248	319		
10	Turb (NTU)	1.7	3.3	1.4			1.0	1.0	1.3			1.0	1.0	1.0		
	CHEMICAL															
1	Alk-Phen (mgCaCO3/L)	0.0	0.0	0.0	0.8	0.0	0.0	0.0	0.0	1.9	0.0	0.0	0.0	0.0	0.0	0.0
2	ALK-TOT (mgCaCO3/L)	95	87	105	139	119	92	129	102	147	139	120	115	126	120	182
3	Ca (mg/L)	31	30	40	37	31	34	37	34	40	36	34	30	29	30	42
4	Cl (mg/L)	63.0	60.0	82.0	45.6	35.0	61.5	70.0	66.3	47.0	32.0	50.0	65.0	32.0	28.7	42.8
5	CO3 (mg/L)	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	2.3	0.0	0.0	0.0	0.0	0.0	0.0
6	F (mg/L)	0.14	0.12	0.14	0.29	0.30	0.13	0.13	0.15	0.21	0.35	0.12	0.13	0.20	0.30	0.36
7	HCO3 (mg/L)	116	106	128	168	145	112	158	125	175	169	146	140	154	147	222
8	K (mg/L)	3.7	4.2	3.8	2.6	2.5	3.8	3.7	4.6	2.6	2.1	4.0	4.2		2.3	2.2
9	Mg (mg/L)	9.3	6.4	8.1	16.9	12.2	7.3	16.4	11.6	14.0	14.3	10.9	10.9	15.8	12.5	21.5
10	Na (mg/L)	38.7	42.0	49.2	35.8	24.4	40.1	41.0	41.0	33.5	22.6	38.0	47.0		19.6	29.5
11	NH3-N (mg N/L)	0.12	0.18	0.10	0.15	0.05	0.13	0.12	0.14	0.17	0.11	0.13	0.13	0.16	0.06	0.21
12	NO2+NO3 (mg N/L)	0.20	0.20	0.21	0.30	1.18	0.18	0.17	0.22	1.16	2.17	0.18	0.18	0.31	0.52	1.41
13	NO2-N (mgN/L)	0.07	0.08	0.09	0.07	0.03	0.05	0.05	0.10	0.03	0.01	0.06	0.05	0.08	0.02	0.08
14	NO3-N (mgN/L)	0.13	0.12	0.12	0.23	1.15	0.13	0.11	0.12	1.12	2.15	0.12	0.13	0.23	0.51	1.33
15	o-PO4-P (mg P/L)				0.100									0.110		
16	P-Tot (mgP/L)	0.130	0.120	0.138	0.054	0.046	0.140	0.125	0.140	0.063	0.022	0.120	0.140	0.110	0.083	0.062
17	SiO2 (mg/L)	8.0	10.7	9.8	42.1	30.7	11.0	12.5	11.0	37.4	31.7	6.0	14.0	38.7	20.1	27.9
18	SO4 (mg/L)	8.5	9.3	10.0	17.1	9.3	10.5	12.0	10.0	11.4	7.6	11.0	12.0	9.1	5.9	8.9
	BIOLOGICAL/BACTERIOLOGICAL															
1	BOD3-27 (mg/L)	0.6	1.3	1.6	1.5	1.9	1.4	1.1	1.1	1.6	1.4	2.8	1.0	0.9	1.9	1.5
2	COD (mg/L)	66.7	42.7	28.0	13.6	13.6	118.0	18.0	16.8	11.4	10.3	80.0	40.0		16.9	10.1
3	DO (mg/L)		7.1	6.3	4.9	6.8	7.6	7.4	7.1	6.9	7.3	7.5	8.1	6.0	6.7	7.8
4	DO_SAT% (%)		81	77	60	85	76	77	76	70	88	86	96	75	78	98
5	FCol-MPN (MPN/100mL)	400	633	600			600	500	525			500	1000			
6	Tcol-MPN (MPN/100mL)	833	1373	1340			1150	1150	1225			1400	1800			
	TRACE & TOXIC															
1	Al (mg/L)	0.09	0.08	0.11	0.05	0.05	0.09	0.08	0.10	0.09		0.09		0.03	0.05	
	CHEMICAL INDICES															
1	HAR_Ca (mgCaCO3/L)	78	74	101	94	78	85	93	85	101	91	85	75	73	74	104
2	HAR_Total (mgCaCO3/L)	117	100	134	164	129	116	161	133	160	150	131	121	139	126	194
3	Na% (%)	41	46	43	28	29	42	36	39	29	24	38	45		25	25
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	0.0	0.0	0.0
5	SAR (-)	1.6	1.8	1.9	1.1	0.9	1.6	1.5	1.6	1.1	0.8	1.4	1.9		0.8	0.9

3.4 Narmada at Mandleshwar

History Sheet

HISTORY SHEET

			Water Year	**:**	**2019-2020**
Site	**:**	**Narmada at Mandleshwar**	**Code**	**:**	CW1NAM000189
State	:	Madhya Pradesh	District		Khargone
Basin	:	Narmada	Independent River	:	Narmada
Tributary	:		Sub Tributary	:	
Sub-Sub Tributary	:		Local River	:	Narmada
Division	:	Narmada Div. Cwc Bhopal	Sub-Division	:	MNSD III CWC INDORE
Drainage Area	:	72809 Sq. Km.	Bank	:	Right
Latitude	:	22°10'06"	Longitude	:	75°39'36"
		Opening Date	Closing Date		
Gauge	:	16/12/1970			
Discharge	:	28/08/1971			
Sediment	:	14/04/1972			
Water Quality	:	18/06/1979			

Water Quality Datasheet for the period : 2019-2020

Station Name : Narmada at Mandleshwar (CW1NAM000189) Division : Narmada Division, Bhopal

Local River : Narmada Sub-Division : MNSD-III, Indore

River Water Analysis

S.No	Parameters	03/06/2019	01/07/2019	01/08/2019	03/09/2019	03/10/2019	01/11/2019	02/12/2019	01/01/2020	03/02/2020	02/03/2020	01/04/2020	05/05/2020
	PHYSICAL	A	A	A	A	A	A	A	A	A	A	A	A
1	Q (cumec)	359.4	195.9	326.7	3223	5467	853.4	336.5	0.000	346.6	226.1		187.4
2	Colour_Cod (-)	Clear	Clear	Clear	Brown	Clear	Clear	Clear	Clear	Clear	Clear		Clear
3	EC_GEN (µmho/cm)	290	336	317	253	222	304	316	272	284	328		235
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
5	pH_GEN (pH units)	7.1	7.1	7.9	7.4	7.8	7.7	7.6	7.9	7.4	7.8		7.6
6	TDS (mg/L)	172	209	190	164	147	161	209	195	198	203		179
7	Temp (deg C)	27.0	26.0	26.0	26.0	26.0	26.0	25.0	20.0	20.0	22.0		27.0
8	Turb (NTU)		15.0	23.0	167.0	30.0	38.0	26.0	0.0	4.0	0.4		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
2	ALK-TOT (mgCaCO3/L)	138	148	128	104	102		134	137	72	156		127
3	Ca (mg/L)	28	30	32	26	28	31	32	31	38	34		29
4	Cl (mg/L)	14.0	4.0	14.0	8.0	6.0	9.0	8.0	6.0	7.0	8.0		7.8
5	CO3 (mg/L)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0
6	F (mg/L)	0.05	0.05	0.12	0.10	0.11	0.11	0.11					
7	HCO3 (mg/L)	168	180	156	127	124	145	163	167	88	190		155
8	K (mg/L)	2.2	5.4	5.1	3.8	1.4	1.7	1.7	1.9	1.7	2.8		3.4
9	Mg (mg/L)	12.4	12.2	9.7	8.8	5.8	10.0	10.9	11.7	6.8	9.8		10.0
10	Na (mg/L)	11.9	15.3	9.5	7.6	6.0	9.2	10.6	10.1	9.5	17.9		57.9
11	NH3-N (mg N/L)	0.23	1.04	0.06	0.03	0.05	0.10	0.08	0.08	0.05	0.07		0.12
12	NO2+NO3 (mg N/L)	0.42	1.12	1.15	1.16	0.70	0.54	0.35	0.12	0.13	0.17		0.44
13	NO2-N (mgN/L)	0.03	0.69	0.10	0.09	0.00	0.02	0.02	0.04	0.03	0.02		0.01
14	NO3-N (mgN/L)	0.39	0.43	1.05	1.07	0.70	0.52	0.33	0.09	0.10	0.15		0.43
15	o-PO4-P (mg P/L)	0.032	0.670	0.350	0.268	0.025	0.020	0.039	0.065	0.039	0.065		0.052
16	SiO2 (mg/L)	50.5	33.7	22.7	21.4	26.4	26.8	21.5	14.8	15.0	18.6		17.4
17	SO4 (mg/L)	13.3	9.1	16.7	18.1	10.1	62.0	13.4	15.0	9.4	6.5		6.5
	BIOLOGICAL/BACTERIOLOGICAL												
1	BOD3-27 (mg/L)	1.1	1.7	0.9	1.4	0.4	2.9	4.1	0.5	1.2	1.3		1.8
2	COD (mg/L)	20.0	34.0	20.0	19.0	19.0	22.0	22.0	7.0	25.0	15.0		36.0
3	DO (mg/L)	4.9	2.4	5.2	5.8	5.9	4.0	10.8	6.8	5.9	6.7		7.2
4	DO_SAT% (%)	61	30	64	71	73	49	131	75	65	76		90
	TRACE & TOXIC												
	CHEMICAL INDICES												
1	HAR_Ca (mgCaCO3/L)	71	76	80	64	71	77	81	77	96	86		73
2	HAR_Total (mgCaCO3/L)	122	127	121	100	95	119	127	126	124	126		114
3	Na% (%)	17	20	14	14	12	14	15	15	14	23		52
4	RSC (-)	0.3	0.4	0.2	0.1	0.1		0.2	0.2	0.0	0.6		0.3
5	SAR (-)	0.5	0.6	0.4	0.3	0.3	0.4	0.4	0.4	0.4	0.7		2.4

Nationwide Lockdown

Water Quality Summary for the period : 2019-2020

Station Name : Narmada at Mandleshwar (CW1NAM000189 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)	364	21150	0.000	1063
2	EC_GEN (µmho/cm)	11	336	222	287
3	pH_GEN (pH units)	11	7.9	7.1	7.6
4	TDS (mg/L)	11	209	147	184
5	Temp (deg C)	11	27.0	20.0	24.6
6	Turb (NTU)	10	167.0	0.0	30.3
	CHEMICAL				
1	Alk-Phen (mgCaCO3/L)	10	0.0	0.0	0
2	ALK-TOT (mgCaCO3/L)	10	156	72	124
3	Ca (mg/L)	11	38	26	31
4	Cl (mg/L)	11	14.0	4.0	8.3
5	CO3 (mg/L)	10	0.0	0.0	0
6	F (mg/L)	7	0.12	0.05	0.09
7	HCO3 (mg/L)	11	190	88	151
8	K (mg/L)	11	5.4	1.4	2.8
9	Mg (mg/L)	11	12.4	5.8	9.8
10	Na (mg/L)	11	57.9	6.0	15
11	NH3-N (mg N/L)	11	1.04	0.03	0.17
12	NO2+NO3 (mg N/L)	11	1.16	0.12	0.57
13	NO2-N (mgN/L)	11	0.69	0.00	0.09
14	NO3-N (mgN/L)	11	1.07	0.09	0.48
15	o-PO4-P (mg P/L)	11	0.670	0.020	0.148
16	SiO2 (mg/L)	11	50.5	14.8	24.4
17	SO4 (mg/L)	11	62.0	6.5	16.4
	BIOLOGICAL/BACTERIOLOGICAL				
1	BOD3-27 (mg/L)	11	4.1	0.4	1.6
2	COD (mg/L)	11	36.0	7.0	21.7
3	DO (mg/L)	11	10.8	2.4	6
4	DO_SAT% (%)	11	131	30	71
	TRACE & TOXIC				
	CHEMICAL INDICES				
1	HAR_Ca (mgCaCO3/L)	11	96	64	77
2	HAR_Total (mgCaCO3/L)	11	127	95	118
3	Na% (%)	11	52	12	19
4	RSC (-)	10	0.6	0.0	0.2
5	SAR (-)	11	2.4	0.3	0.6

Water Quality Seasonal Average for the period : 2015-2020

Station Name : Narmada at Mandleshwar (CW1NAM000189) 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				
		2015	2016	2017	2018	2019	2015-2016	2016-2017	2017-2018	2018-2019	2019-2020	2016	2017	2018	2019	2020
	PHYSICAL															
1	Q (cumec)	725.6		468.2	449.3	1915	359.5		233.9	519.7	384.1	500.2		141.9	773.5	113.1
2	EC_FLD (µmho/cm)														278	
3	EC_GEN (µmho/cm)	213	231	357	361	284	209	261	334	242	294	286	239	313	276	282
4	pH_FLD (pH units)														7.5	
5	pH_GEN (pH units)	8.1	7.8	7.9	7.9	7.4	8.2	7.9	7.8	7.4	7.6	8.2	7.7	8.0	7.5	7.7
6	TDS (mg/L)	135	147	228	216	176	133	172	220	162	191	181	155	204	164	191
7	Temp (deg C)	22.4	24.8	26.8	28.0	26.2	18.3	21.5	19.5	22.8	22.8	20.3	21.3	23.7	23.7	24.5
8	Turb (NTU)	9.2	33.8	26.8	34.4	58.8	0.0	0.0	0.0	0.0	17.0	0.0	0.0	0.0	0.0	0.2
	CHEMICAL															
1	Alk-Phen (mgCaCO3/L)	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	0.0
2	ALK-TOT (mgCaCO3/L)	149	109	151	148	124	122	121	144	118	114	129	119	138	140	141
3	Ca (mg/L)	26	24	33	32	29	27	28	30	27	33	27	29	27	29	32
4	Cl (mg/L)	8.3	6.2	14.8	16.4	9.2	8.3	7.8	10.0	7.0	7.5	8.0	8.0	12.0	7.3	7.9
5	CO3 (mg/L)	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	0.0
6	F (mg/L)	0.40	0.26	0.32	0.40	0.09	0.36	0.18	0.32	0.22	0.11	0.26	0.30	0.27	0.11	
7	HCO3 (mg/L)	181	133	184	180	151	146	148	176	144	141	158	145	164	171	173
8	K (mg/L)	2.3	1.8	2.2	2.5	3.6	2.0	1.4	2.9	1.9	1.7	2.0	1.5	2.3	2.0	3.1
9	Mg (mg/L)	11.9	8.7	14.0	14.0	9.8	10.3	9.5	14.0	10.4	9.8	11.6	10.4	13.1	11.2	9.9
10	Na (mg/L)	11.2	9.4	15.0	14.4	10.1	10.1	9.3	15.8	14.1	9.8	10.4	10.6	13.9	12.9	37.9
11	NH3-N (mg N/L)					0.28					0.08					0.10
12	NO2+NO3 (mg N/L)	1.35	1.52	1.46	1.55	0.91	0.51	0.45	2.98	0.38	0.28	0.33	0.30	1.51	0.72	0.30
13	NO2-N (mgN/L)	0.01	0.12	0.05	0.53	0.18	0.06	0.01	0.04	0.02	0.03	0.01	0.02	0.11	0.11	0.01
14	NO3-N (mgN/L)	1.34	1.40	1.41	1.02	0.73	0.45	0.43	2.94	0.35	0.26	0.32	0.28	1.40	0.61	0.29
15	o-PO4-P (mg P/L)	0.199	0.243	0.202	0.246	0.269	0.135	0.086	0.117	0.047	0.041	0.114	0.081	0.084	0.040	0.058
16	SiO2 (mg/L)	16.9	24.8	22.1	28.1	30.9	16.1	18.2	21.9	17.7	19.5	21.8	19.3	21.3	27.2	18.0
17	SO4 (mg/L)	15.2	16.9	16.0	14.9	13.5	4.0	9.3	22.6	8.9	24.9	5.0	7.2	17.0	7.3	6.5
	BIOLOGICAL/BACTERIOLOGICAL															
1	BOD3-27 (mg/L)	0.8	1.0	0.9	1.0	1.1	0.7	0.9	1.1	0.8	2.2	0.8	1.2	1.4	1.2	1.5
2	COD (mg/L)	36.0	39.6	35.6	39.2	22.4	26.0	44.8	32.3	35.0	19.0	33.0	35.0	37.3	34.7	25.5
3	DO (mg/L)	6.1	6.0	5.6	5.1	4.8	7.3	6.7	5.5	6.7	6.9	6.2	5.1	5.0	5.4	6.9
4	DO_SAT% (%)	71	73	71	65	60	77	75	60	78	80	68	57	59	63	83
	TRACE & TOXIC															
	CHEMICAL INDICES															
1	HAR_Ca (mgCaCO3/L)	66	60	83	80	72	67	71	76	67	83	67	71	67	73	79
2	HAR_Total (mgCaCO3/L)	115	97	141	138	113	110	111	134	111	124	115	115	122	120	120
3	Na% (%)	17	18	18	18	15	16	15	20	21	15	16	17	20	19	37
4	RSC (-)	0.7	0.3	0.2	0.2	0.2	0.3	0.2	0.2	0.2	0.1	0.3	0.1	0.3	0.4	0.4
5	SAR (-)	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	1.5

3.5 Kundi at Kogaon

HISTORY SHEET

			Water Year	**:**	**2019-2020**
Site	**:**	**Kundi at Kogaon**	**Code**	**:**	CW1NAM000442
State	:	Madhya Pradesh	District		Khargon
Basin	:	Narmada	Independent River	:	Narmada
Tributary	:	Kundi	Sub Tributary	:	
Sub-Sub Tributary	:		Local River	:	Kundi
Division	:	Narmada Div. Cwc Bhopal	Sub-Division	:	MNSD III CWC INDORE
Drainage Area	:	3919 Sq. Km.	Bank	:	Right
Latitude	:	22°06'18"	Longitude	:	75°40'42"
		Opening Date	Closing Date		
Gauge	:	03/02/1978			
Discharge	:	01/07/1978			
Sediment	:				
Water Quality	:	15/09/1986			

Water Quality Datasheet for the period : 2019-2020

Station Name : Kundi at Kogaon CW1NAM000442) Division : Narmada Division, Bhopal

Local River : Kundi Sub-Division : MNSD-III, Indore

River Water Analysis

S.No	Parameters	03/06/2019	01/07/2019	01/08/2019	03/09/2019	03/10/2019	01/11/2019	02/12/2019	01/01/2020	03/02/2020	02/03/2020	01/04/2020	05/05/2020
		A	A	A	A	A	A	A	A	A	A	A	A
	PHYSICAL												
1	Q (cumec)	11.26	107.0	40.36	167.9	78.31				17.71	24.97		
2	Colour_Cod (-)	Clear	Light Brown	Light Brown	Dark Brown	Clear	Clear	Clear	Clear	Clear	Clear		Clear
3	EC_GEN (µmho/cm)	303	289	302	477	516	567	8	324	325	340		203
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
5	pH_GEN (pH units)	7.4	7.2	7.9	7.7	8.1	8.0	8.0	8.1	7.5	7.9		7.7
6	TDS (mg/L)	179	177	186	305	336	283	298	231	226	211		156
7	Temp (deg C)	31.0	30.0	26.5	29.0	29.0	27.5	26.0	19.5	20.0	25.0		29.0
8	Turb (NTU)		14.0	69.0	275.0	40.0	49.0	29.0	2.0	1.9	0.7		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)	129	123	116	184	196	207	177	147	78	156		116
3	Ca (mg/L)	20	26	26	47	45	46	38	55	30	32		27
4	Cl (mg/L)	7.0	12.0	10.0	16.0	19.0	27.0	24.0	12.0	10.0	7.0		5.9
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)	0.02	0.04	0.12	0.11	0.12	0.11	0.12					
7	HCO3 (mg/L)	157	150	142	225	239	253	216	179	95	190		141
8	K (mg/L)	2.1	3.8	4.3	3.1	1.2	1.4	1.7	1.4	1.3	2.3		1.9
9	Mg (mg/L)	15.3	12.9	12.6	18.5	25.3	29.7	21.9	3.2	15.6	13.2		9.0
10	Na (mg/L)	16.3	13.3	7.6	12.5	18.5	19.1	19.6	13.5	12.1	19.3		10.9
11	NH3-N (mg N/L)	0.10	0.05	0.48	0.04	0.16	0.26	0.12	0.10	0.06	0.11		0.14
12	NO2+NO3 (mg N/L)	0.42	1.94	1.08	1.07	0.20	0.21	0.21	0.09	0.13	0.45		1.12
13	NO2-N (mgN/L)	0.04	1.35	0.09	0.09	0.02	0.02	0.02	0.00	0.03	0.04		1.01
14	NO3-N (mgN/L)	0.38	0.59	0.99	0.98	0.18	0.19	0.19	0.09	0.10	0.42		0.11
15	o-PO4-P (mg P/L)	0.008	0.425	0.688	0.374	0.005	0.035	0.036	0.078	0.048	0.078		0.046
16	SiO2 (mg/L)	55.3	32.6	24.3	24.3	52.6	48.1	25.5	15.9	15.5	18.2		17.6
17	SO4 (mg/L)	18.7	10.7	17.3	26.5	22.6	92.2	17.9	25.5	10.4	11.8		5.2
	BIOLOGICAL/BACTERIOLOGICAL												
1	BOD3-27 (mg/L)	1.4	1.2	0.9	0.9	0.6	0.8	0.7	0.5	1.1	1.6		1.6
2	COD (mg/L)	23.0	44.0	21.0	23.0	16.0	15.0	23.0	19.0	19.0	27.0		15.0
3	DO (mg/L)	5.1	5.3	5.9	5.3	6.0	5.9	6.2	7.0	6.7	6.8		7.8
4	DO_SAT% (%)	69	70	73	69	78	74	76	76	74	83		101
	TRACE & TOXIC												
	CHEMICAL INDICES												
1	HAR_Ca (mgCaCO3/L)	51	64	66	118	114	114	96	138	75	80		67
2	HAR_Total (mgCaCO3/L)	115	118	119	195	219	237	187	151	140	135		104
3	Na% (%)	23	19	12	12	16	15	18	16	16	23		18
4	RSC (-)	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4		0.2
5	SAR (-)	0.7	0.5	0.3	0.4	0.5	0.5	0.6	0.5	0.4	0.7		0.5

Nationwide Lockdown

Water Quality Summary for the period : 2019-2020

Station Name : Kundi at Kogaon (CW1NAM000442) 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_GEN (µmho/cm)	11	567	8	332
3	pH_GEN (pH units)	11	8.1	7.2	7.8
4	TDS (mg/L)	11	336	156	235
5	Temp (deg C)	11	31.0	19.5	26.6
6	Turb (NTU)	10	275.0	0.0	48.1
	CHEMICAL				
1	Alk-Phen (mgCaCO3/L)	11	0.0	0.0	0
2	ALK-TOT (mgCaCO3/L)	11	207	78	148
3	Ca (mg/L)	11	55	20	36
4	Cl (mg/L)	11	27.0	5.9	13.6
5	CO3 (mg/L)	11	0.0	0.0	0
6	F (mg/L)	7	0.12	0.02	0.09
7	HCO3 (mg/L)	11	253	95	181
8	K (mg/L)	11	4.3	1.2	2.2
9	Mg (mg/L)	11	29.7	3.2	16.1
10	Na (mg/L)	11	19.6	7.6	14.8
11	NH3-N (mg N/L)	11	0.48	0.04	0.15
12	NO2+NO3 (mg N/L)	11	1.94	0.09	0.63
13	NO2-N (mgN/L)	11	1.35	0.00	0.25
14	NO3-N (mgN/L)	11	0.99	0.09	0.38
15	o-PO4-P (mg P/L)	11	0.688	0.005	0.166
16	SiO2 (mg/L)	11	55.3	15.5	30
17	SO4 (mg/L)	11	92.2	5.2	23.5
	BIOLOGICAL/BACTERIOLOGICAL				
1	BOD3-27 (mg/L)	11	1.6	0.5	1
2	COD (mg/L)	11	44.0	15.0	22.3
3	DO (mg/L)	11	7.8	5.1	6.2
4	DO_SAT% (%)	11	101	69	77
	TRACE & TOXIC				
	CHEMICAL INDICES				
1	HAR_Ca (mgCaCO3/L)	11	138	51	89
2	HAR_Total (mgCaCO3/L)	11	237	104	156
3	Na% (%)	11	23	12	17
4	RSC (-)	11	0.4	0.0	0.1
5	SAR (-)	11	0.7	0.3	0.5

Water Quality Seasonal Average for the period : 2015-2020

Station Name : Kundi at Kogaon (CW1NAM000442) Division : Narmada Division, Bhopal
Local River : Kundi Sub-Division : MNSD-III, Indore

River Water

S.No	Parameters	Flood					Winter					Summer				
		Jun - Oct					Nov - Feb					Mar - May				
		2015	2016	2017	2018	2019	2015-2016	2016-2017	2017-2018	2018-2019	2019-2020	2016	2017	2018	2019	2020
	PHYSICAL															
1	Q (cumec)	11.13			33.65		7.067					River Dry	River Dry	River Dry		
2	EC_FLD (µmho/cm)														353	
3	EC_GEN (µmho/cm)	303	372	425	386	377	349	333	401	437	306				353	272
4	pH_FLD (pH units)														7.6	
5	pH_GEN (pH units)	8.3	7.8	8.3	8.2	7.7	8.3	7.9	8.0	7.8	7.9				7.6	7.8
6	TDS (mg/L)	193	237	274	241	237	210	216	265	263	260				202	184
7	Temp (deg C)	26.8	29.2	29.4	28.8	29.1	26.5	21.6	21.5	25.0	23.3				26.0	27.0
8	Turb (NTU)	16.0	91.3	23.3	56.3	99.5	0.0	0.0	0.0	0.0	20.5					0.3
	CHEMICAL															
1	Alk-Phen (mgCaCO3/L)	5.4	0.0	7.1	5.5	0.0	4.6	0.0	0.0	0.0	0.0				0.0	0.0
2	ALK-TOT (mgCaCO3/L)	170	151	168	168	150	190	156	162	161	152				147	136
3	Ca (mg/L)	32	32	35	33	33	28	33	31	33	42				26	29
4	Cl (mg/L)	14.1	9.3	16.8	17.8	12.8	25.0	13.0	16.0	20.0	18.3				15.0	6.4
5	CO3 (mg/L)	6.5	0.0	8.5	6.6	0.0	5.6	0.0	0.0	0.0	0.0				0.0	0.0
6	F (mg/L)	0.46	0.22	0.26	0.27	0.08	0.60	0.19	0.09	0.59	0.11				0.09	
7	HCO3 (mg/L)	194	184	187	192	183	221	191	198	197	186				179	166
8	K (mg/L)	2.2	2.2	1.4	2.1	2.9	1.8	1.3	1.8	2.0	1.5				2.0	2.1
9	Mg (mg/L)	20.9	15.2	20.3	13.2	16.9	24.1	15.6	18.7	2.0	17.6				17.0	11.1
10	Na (mg/L)	18.6	13.2	16.5	16.2	13.7	28.5	12.9	17.4	20.9	16.1				23.7	15.1
11	NH3-N (mg N/L)					0.17					0.14					0.13
12	NO2+NO3 (mg N/L)	2.52	1.83	1.95	1.39	0.94	3.63	0.59	3.49	2.22	0.16				1.91	0.79
13	NO2-N (mgN/L)	0.02	0.07	0.06	0.06	0.32	0.02	0.01	0.04	0.02	0.02				0.03	0.52
14	NO3-N (mgN/L)	2.49	1.76	1.89	1.34	0.62	3.61	0.58	3.45	2.19	0.14				1.88	0.26
15	o-PO4-P (mg P/L)	0.148	0.238	0.246	0.288	0.300	0.192	0.118	0.100	0.069	0.049				0.016	0.062
16	SiO2 (mg/L)	24.8	27.9	20.8	27.4	37.8	27.1	18.9	19.5	23.1	26.2				44.2	17.9
17	SO4 (mg/L)	23.5	30.8	17.1	18.1	19.2	13.2	11.6	20.9	18.7	36.5				8.0	8.5
	BIOLOGICAL/BACTERIOLOGICAL															
1	BOD3-27 (mg/L)	1.0	0.7	1.2	1.2	1.0	1.5	1.2	0.9	1.0	0.8				1.3	1.6
2	COD (mg/L)	32.3	40.7	36.0	37.5	25.4	35.0	48.3	46.5	28.0	19.0				25.0	21.0
3	DO (mg/L)	5.9	6.0	5.5	5.6	5.5	6.0	6.5	6.0	5.9	6.4				5.1	7.3
4	DO_SAT% (%)	74	78	72	73	72	74	74	68	71	75				63	92
	TRACE & TOXIC															
	CHEMICAL INDICES															
1	HAR_Ca (mgCaCO3/L)	81	79	87	82	83	69	82	77	82	106				64	73
2	HAR_Total (mgCaCO3/L)	168	143	172	137	153	169	147	155	91	179				135	120
3	Na% (%)	19	17	18	20	16	27	16	19	33	16				27	21
4	RSC (-)	0.1	0.2	0.0	0.6	0.1	0.5	0.2	0.2	1.4	0.0				0.2	0.3
5	SAR (-)	0.6	0.5	0.6	0.6	0.5	1.0	0.5	0.6	1.0	0.5				0.9	0.6

3.6 Narmada at Handia

History Sheet

HISTORY SHEET

			Water Year	**:**	**2019-2020**
Site	**:**	**Narmada at Handia**	**Code**	**:**	CW1NAM000392
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°29'26"	Longitude	:	76°58'33"
		Opening Date	Closing Date		
Gauge	:	09/02/1977			
Discharge	:	26/04/1977			
Sediment	:	11/12/1977			
Water Quality	:	01/08/1979			

Water Quality Datasheet for the period : 2019-2020

Station Name : Narmada at Handia (CW1NAM000392) Division : Narmada Division, Bhopal

Local River : Narmada Sub-Division : MNSD-II, Bhopal

River Water Analysis

S.No	Parameters	03/06/2019	01/07/2019	01/08/2019	03/09/2019	03/10/2019	01/11/2019	02/12/2019	01/01/2020	03/02/2020	02/03/2020	01/04/2020	05/05/2020
		A	A	A	A	A	A	A	A	A	A	A	A
	PHYSICAL												
1	Q (cumec)	33.30	121.9	31.82	45.80	42.48	631	530	120	224.7	162		
2	Colour_Cod (-)	Clear	Clear	Dark Brown	Dark Brown	Light Brown	Clear	Clear	Clear	Clear	Clear		Clear
3	EC_GEN (µmho/cm)	267	278	203	313	230	332	345	387	310	341		496
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
5	pH_GEN (pH units)	7.7	7.7	7.9	7.4	7.8	7.7	7.7	8.0	7.6	8.1		7.4
6	TDS (mg/L)	158	148	138	195	150	168	231	276	220	213		373
7	Temp (deg C)	26.0	23.0	23.0	22.5	24.0	23.0	25.0	16.0	20.0	22.0		27.5
8	Turb (NTU)		10.0	197.0	270.0	106.0	40.0	25.0	1.0	5.4	0.8		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)	111	102	89	128	106	143	167	194	76	160		154
3	Ca (mg/L)	18	20	22	31	29	37	36	42	38	33		45
4	Cl (mg/L)	13.0	9.0	7.0	7.0	3.0	8.0	8.0	12.0	14.0	8.0		11.7
5	CO3 (mg/L)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0
6	F (mg/L)	0.02	0.02	0.11	0.11	0.11	0.11	0.12					
7	HCO3 (mg/L)	135	125	108	156	129	175	204	237	93	195		188
8	K (mg/L)	1.7	2.9	4.4	3.8	1.2	1.4	1.4	1.7	1.3	2.2		2.1
9	Mg (mg/L)	13.6	10.9	7.3	9.2	7.1	10.5	14.1	17.3	10.5	9.6		23.4
10	Na (mg/L)	12.3	12.8	5.1	11.2	7.8	10.5	12.7	16.7	12.0	18.5		50.6
11	NH3-N (mg N/L)	0.09	0.05	0.04	0.02	0.14	0.17	0.07	0.09	0.06	0.05		0.20
12	NO2+NO3 (mg N/L)	0.37	1.65	1.24	1.24	0.09	0.11	0.11	0.12	0.13	0.09		0.99
13	NO2-N (mgN/L)	0.01	1.34	0.09	0.09	0.02	0.02	0.02	0.04	0.04	0.03		0.10
14	NO3-N (mgN/L)	0.36	0.31	1.16	1.16	0.08	0.09	0.09	0.09	0.10	0.06		0.89
15	o-PO4-P (mg P/L)	0.012	0.294	0.442	0.404	0.031	0.012	0.039	0.083	0.067	0.046		0.033
16	SiO2 (mg/L)	63.9	37.6	22.1	22.1	28.8	28.2	24.1	15.0	15.0	18.4		26.3
17	SO4 (mg/L)	7.7	11.2	14.6	22.8	11.7	42.6	18.3	23.0	9.8	5.3		17.3
	BIOLOGICAL/BACTERIOLOGICAL												
1	BOD3-27 (mg/L)	1.0	0.6	0.6	0.9	0.9	1.4	1.6	1.0	0.7	1.1		0.8
2	COD (mg/L)	17.0	27.0	33.0	20.0	18.0	22.0	25.0	15.0	26.0	20.0		31.0
3	DO (mg/L)	4.6	7.9	4.9	5.6	5.8	5.9	6.5	7.7	7.2	5.6		7.2
4	DO_SAT% (%)	57	92	57	64	69	69	79	78	79	64		90
	TRACE & TOXIC												
	CHEMICAL INDICES												
1	HAR_Ca (mgCaCO3/L)	45	49	54	78	73	92	89	106	94	84		113
2	HAR_Total (mgCaCO3/L)	102	95	84	116	102	135	148	178	138	124		211
3	Na% (%)	21	22	11	17	14	14	16	17	16	24		34
4	RSC (-)	0.2	0.2	0.1	0.2	0.1	0.2	0.4	0.4	0.0	0.7		0.0
5	SAR (-)	0.5	0.6	0.2	0.5	0.3	0.4	0.5	0.5	0.4	0.7		1.5

Nationwide Lockdown

Water Quality Summary for the period : 2019-2020

Station Name : Narmada at Handia (CW1NAM000392) 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)	151	17572	0.000	1696
2	EC_GEN (µmho/cm)	11	496	203	318
3	pH_GEN (pH units)	11	8.1	7.4	7.7
4	TDS (mg/L)	11	373	138	206
5	Temp (deg C)	11	27.5	16.0	22.9
6	Turb (NTU)	10	270.0	0.0	65.5
	CHEMICAL				
1	Alk-Phen (mgCaCO3/L)	11	0.0	0.0	0
2	ALK-TOT (mgCaCO3/L)	11	194	76	130
3	Ca (mg/L)	11	45	18	32
4	Cl (mg/L)	11	14.0	3.0	9.2
5	CO3 (mg/L)	11	0.0	0.0	0
6	F (mg/L)	7	0.12	0.02	0.08
7	HCO3 (mg/L)	11	237	93	159
8	K (mg/L)	11	4.4	1.2	2.2
9	Mg (mg/L)	11	23.4	7.1	12.1
10	Na (mg/L)	11	50.6	5.1	15.5
11	NH3-N (mg N/L)	11	0.20	0.02	0.09
12	NO2+NO3 (mg N/L)	11	1.65	0.09	0.56
13	NO2-N (mgN/L)	11	1.34	0.01	0.16
14	NO3-N (mgN/L)	11	1.16	0.06	0.4
15	o-PO4-P (mg P/L)	11	0.442	0.012	0.133
16	SiO2 (mg/L)	11	63.9	15.0	27.4
17	SO4 (mg/L)	11	42.6	5.3	16.8
	BIOLOGICAL/BACTERIOLOGICAL				
1	BOD3-27 (mg/L)	11	1.6	0.6	1
2	COD (mg/L)	11	33.0	15.0	23.1
3	DO (mg/L)	11	7.9	4.6	6.3
4	DO_SAT% (%)	11	92	57	73
	TRACE & TOXIC				
	CHEMICAL INDICES				
1	HAR_Ca (mgCaCO3/L)	11	113	45	80
2	HAR_Total (mgCaCO3/L)	11	211	84	130
3	Na% (%)	11	34	11	19
4	RSC (-)	11	0.7	0.0	0.2
5	SAR (-)	11	1.5	0.2	0.6

Water Quality Seasonal Average for the period : 2015-2020

Station Name : Narmada at Handia (CW1NAM000392) 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				
		2015	2016	2017	2018	2019	2015-2016	2016-2017	2017-2018	2018-2019	2019-2020	2016	2017	2018	2019	2020
	PHYSICAL															
1	Q (cumec)	319.3			877.5	3011	152.8			229.8		117.9			80.13	
2	EC_FLD (µmho/cm)														275	
3	EC_GEN (µmho/cm)	231	235	270	262	258	268	279	354	274	344	265	248	333	265	419
4	pH_FLD (pH units)														7.7	
5	pH_GEN (pH units)	8.3	7.9	7.9	7.9	7.7	8.4	7.9	7.9	7.6	7.8	8.3	7.8	8.2	7.7	7.7
6	TDS (mg/L)	146	151	174	164	158	172	180	235	183	224	172	161	218	163	293
7	Temp (deg C)	29.4	25.6	23.9	28.0	23.7	23.7	18.8	16.4	19.3	21.0	26.2	27.0	26.3	22.0	24.8
8	Turb (NTU)	31.4	85.8	77.0	90.5	145.8	0.0	0.0	0.0	0.0	17.9	0.0	0.0	0.0	0.0	0.4
	CHEMICAL															
1	Alk-Phen (mgCaCO3/L)	2.3	2.3	1.6	0.0	0.0	5.8	0.0	0.0	0.0	0.0	1.6	0.0	6.1	0.0	0.0
2	ALK-TOT (mgCaCO3/L)	143	112	121	139	107	161	149	157	136	145	129	131	155	122	157
3	Ca (mg/L)	29	22	28	28	24	33	33	32	29	38	26	31	24	27	39
4	Cl (mg/L)	7.3	5.3	7.2	6.2	7.8	7.8	7.3	10.0	8.8	10.5	7.7	6.7	13.3	7.0	9.9
5	CO3 (mg/L)	2.8	2.8	1.9	0.0	0.0	7.0	0.0	0.0	0.0	0.0	1.9	0.0	7.3	0.0	0.0
6	F (mg/L)	0.35	0.25	0.31	0.28	0.07	0.22	0.17	0.28	0.24	0.11	0.31	0.28	0.21	0.13	
7	HCO3 (mg/L)	169	131	144	170	131	182	181	192	166	177	154	160	175	148	192
8	K (mg/L)	2.8	1.7	1.4	1.6	2.8	1.7	1.3	1.9	1.5	1.4	1.5	1.2	1.6	1.7	2.1
9	Mg (mg/L)	11.8	10.2	9.7	13.1	9.6	13.6	11.8	14.2	12.1	13.1	11.3	9.7	15.7	11.1	16.5
10	Na (mg/L)	13.5	8.5	10.4	7.0	9.8	16.0	11.6	15.6	16.8	13.0	8.9	10.8	16.4	11.9	34.5
11	NH3-N (mg N/L)					0.07					0.10					0.13
12	NO2+NO3 (mg N/L)	1.18	1.20	0.91	0.90	0.92	1.42	0.46	1.21	0.34	0.12	1.14	0.32	0.49	0.69	0.54
13	NO2-N (mgN/L)	0.01	0.13	0.04	0.04	0.31	0.02	0.01	0.04	0.02	0.03	0.01	0.01	0.03	0.04	0.06
14	NO3-N (mgN/L)	1.17	1.07	0.87	0.86	0.61	1.40	0.45	1.17	0.32	0.09	1.14	0.31	0.46	0.64	0.47
15	o-PO4-P (mg P/L)	0.339	0.298	0.195	0.214	0.237	0.148	0.088	0.126	0.035	0.050	0.436	0.071	0.089	0.046	0.039
16	SiO2 (mg/L)	18.3	25.5	21.5	23.0	34.9	16.3	18.5	21.3	18.4	20.6	20.5	19.2	19.2	30.7	22.3
17	SO4 (mg/L)	14.7	19.4	15.2	11.7	13.6	6.2	8.8	19.7	9.2	23.4	11.9	6.5	12.0	6.7	11.3
	BIOLOGICAL/BACTERIOLOGICAL															
1	BOD3-27 (mg/L)	0.7	0.7	0.7	0.8	0.8	0.7	1.1	1.1	0.7	1.2	0.9	1.2	1.2	0.9	1.0
2	COD (mg/L)	36.2	38.0	38.8	38.7	23.0	38.5	41.5	37.3	31.3	22.0	35.0	37.0	29.0	27.0	25.5
3	DO (mg/L)	6.3	5.9	5.5	5.8	5.8	7.6	7.0	6.4	7.2	6.8	6.3	5.3	5.9	5.7	6.4
4	DO_SAT% (%)	82	72	65	74	68	89	75	65	78	76	78	67	73	65	77
	TRACE & TOXIC															
	CHEMICAL INDICES															
1	HAR_Ca (mgCaCO3/L)	73	55	70	71	60	82	83	81	72	95	64	78	61	67	98
2	HAR_Total (mgCaCO3/L)	122	97	111	126	100	138	133	140	122	150	112	119	127	113	167
3	Na% (%)	19	16	17	11	17	20	16	19	22	16	15	16	22	18	29
4	RSC (-)	0.4	0.3	0.2	0.7	0.2	0.5	0.3	0.4	0.3	0.2	0.4	0.3	0.6	0.2	0.4
5	SAR (-)	0.5	0.4	0.4	0.3	0.4	0.6	0.4	0.6	0.7	0.5	0.4	0.4	0.6	0.5	1.1

3.7 Ganjal at Chhidgaon

History sheet

			Water Year	**:**	**2019-2020**
Site	**:**	**Ganjal at Chhidgaon**	**Code**	**:**	CW1NAM000379
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°24'16"	Longitude	:	77°18'35"
		Opening Date	Closing Date		
Gauge	:	22/12/1976			
Discharge	:	22/12/1976			
Sediment	:				
Water Quality	:	16/09/1986			

Water Quality Datasheet for the period : 2019-2020

Station Name : Ganjal at Chhidgaon (CW1NAM000379) Division : Narmada Division, Bhopal

Local River : Ganjal Sub-Division : MNSD-II, Bhopal

River Water Analysis

S.No	Parameters	03/06/2019	01/07/2019	01/08/2019	03/09/2019	03/10/2019	01/11/2019	02/12/2019	01/01/2020	03/02/2020	02/03/2020	01/04/2020	05/05/2020
		A	A	A	A	A	A	A	A	A	A	A	A
	PHYSICAL												
1	Q (cumec)	0	0	549.61	249.61	89.37	0	2.39	1.1	0	0		0
2	Colour_Cod (-)	Clear	Clear	Brown	Dark Brown	Clear	Clear	Clear	Clear	Clear	Clear		Clear
3	EC_GEN (µmho/cm)	510	488	214	316	327	368	510	447	540	622		218
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
5	pH_GEN (pH units)	7.0	7.1	7.9	7.5	7.9	7.8	7.8	8.1	7.4	7.8		7.5
6	TDS (mg/L)	300	295	143	201	212	186	337	342	368	392		161
7	Temp (deg C)	29.0	27.5	25.5	26.5	27.0		22.5	17.0	17.0	21.0		27.0
8	Turb (NTU)		11.0	122.0	278.0	40.0	41.0	27.0	2.0	2.9	1.8		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)	242	227	86	145	163	167	244	230	117	260		104
3	Ca (mg/L)	34	38	23	34	40	39	51	54	49	47		26
4	Cl (mg/L)	21.0	17.0	6.0	5.0	5.0	8.0	11.0	13.0	9.0	16.0		7.8
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)	0.09	0.02	0.11	0.11	0.11	0.10	0.14					
7	HCO3 (mg/L)	295	277	105	177	199	204	298	281	143	317		127
8	K (mg/L)	1.9	4.6	3.7	4.7	0.7	0.8	1.1	0.9	1.0	2.1		1.7
9	Mg (mg/L)	20.9	17.3	7.8	12.2	13.4	14.1	21.9	17.0	22.1	18.5		8.9
10	Na (mg/L)	38.1	34.2	4.6	8.1	10.4	12.2	22.9	25.5	29.1	55.1		8.5
11	NH3-N (mg N/L)	0.13	0.05	0.05	0.12	0.12	0.20	0.14	0.12	0.13	0.21		0.10
12	NO2+NO3 (mg N/L)	0.23	1.59	1.21	1.20	0.76	0.57	0.34	0.12	0.21	0.82		0.11
13	NO2-N (mgN/L)	0.02	1.21	0.10	0.10	0.01	0.03	0.02	0.03	0.07	0.10		0.01
14	NO3-N (mgN/L)	0.21	0.38	1.11	1.10	0.75	0.54	0.32	0.09	0.14	0.71		0.10
15	o-PO4-P (mg P/L)	0.030	0.497	0.315	0.219	0.012	0.018	0.054	0.096	0.083	0.049		0.026
16	SiO2 (mg/L)	61.8	56.1	24.7	24.7	55.4	47.6	26.2	16.8	15.8	26.2		17.2
17	SO4 (mg/L)	17.9	17.2	13.3	21.1	17.3	44.3	28.2	30.4	12.2	5.6		5.2
	BIOLOGICAL/BACTERIOLOGICAL												
1	BOD3-27 (mg/L)	1.2	1.8	0.8	0.9	0.2	0.6	0.8	0.8	0.5	2.0		1.2
2	COD (mg/L)	23.0	38.0	22.0	17.0	17.0	12.0	10.0	18.0	23.0	14.0		20.0
3	DO (mg/L)	3.5	3.3	6.0	5.7	5.9		6.3	8.8	6.3	7.9		7.8
4	DO_SAT% (%)	46	41	73	70	74		72	91	65	89		98
	TRACE & TOXIC												
	CHEMICAL INDICES												
1	HAR_Ca (mgCaCO3/L)	86	94	58	84	101	98	127	134	122	118		65
2	HAR_Total (mgCaCO3/L)	173	166	90	135	157	157	218	205	214	195		102
3	Na% (%)	32	30	10	11	13	14	19	21	23	38		15
4	RSC (-)	1.4	1.2	0.0	0.2	0.1	0.2	0.6	0.5	0.0	1.3		0.1
5	SAR (-)	1.3	1.2	0.2	0.3	0.4	0.4	0.7	0.8	0.9	1.7		0.4

Nationwide Lockdown

Water Quality Summary for the period : 2019-2020

Station Name : Ganjal at Chhidgaon (CW1NAM000379) 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_GEN (µmho/cm)	11	622	214	415
3	pH_GEN (pH units)	11	8.1	7.0	7.6
4	TDS (mg/L)	11	392	143	267
5	Temp (deg C)	10	29.0	17.0	24
6	Turb (NTU)	10	278.0	0.0	52.6
	CHEMICAL				
1	Alk-Phen (mgCaCO3/L)	11	0.0	0.0	0
2	ALK-TOT (mgCaCO3/L)	11	260	86	181
3	Ca (mg/L)	11	54	23	39
4	Cl (mg/L)	11	21.0	5.0	10.8
5	CO3 (mg/L)	11	0.0	0.0	0
6	F (mg/L)	7	0.14	0.02	0.1
7	HCO3 (mg/L)	11	317	105	220
8	K (mg/L)	11	4.7	0.7	2.1
9	Mg (mg/L)	11	22.1	7.8	15.8
10	Na (mg/L)	11	55.1	4.6	22.6
11	NH3-N (mg N/L)	11	0.21	0.05	0.12
12	NO2+NO3 (mg N/L)	11	1.59	0.11	0.65
13	NO2-N (mgN/L)	11	1.21	0.01	0.15
14	NO3-N (mgN/L)	11	1.11	0.09	0.5
15	o-PO4-P (mg P/L)	11	0.497	0.012	0.127
16	SiO2 (mg/L)	11	61.8	15.8	33.9
17	SO4 (mg/L)	11	44.3	5.2	19.3
	BIOLOGICAL/BACTERIOLOGICAL				
1	BOD3-27 (mg/L)	11	2.0	0.2	1
2	COD (mg/L)	11	38.0	10.0	19.5
3	DO (mg/L)	10	8.8	3.3	6.2
4	DO_SAT% (%)	10	98	41	72
	TRACE & TOXIC				
	CHEMICAL INDICES				
1	HAR_Ca (mgCaCO3/L)	11	134	58	99
2	HAR_Total (mgCaCO3/L)	11	218	90	165
3	Na% (%)	11	38	10	21
4	RSC (-)	11	1.4	0.0	0.5
5	SAR (-)	11	1.7	0.2	0.7

Water Quality Seasonal Average for the period : 2015-2020

Station Name : Ganjal at Chhidgaon (CW1NAM000379) Division : Narmada Division, Bhopal

Local River : Ganjal Sub-Division : MNSD-II, Bhopal

River Water

S.No	Parameters	Flood					Winter					Summer				
		Jun - Oct					Nov - Feb					Mar - May				
		2015	2016	2017	2018	2019	2015-2016	2016-2017	2017-2018	2018-2019	2019-2020	2016	2017	2018	2019	2020
	PHYSICAL															
1	Q (cumec)	29.90			18.50		7.825			0.000		3.466				
2	EC_FLD (µmho/cm)														537	
3	EC_GEN (µmho/cm)	278	320	326	317	371	404	438	458	411	466	532	476	495	529	420
4	pH_FLD (pH units)														7.3	
5	pH_GEN (pH units)	8.0	7.7	8.0	7.9	7.5	8.1	7.6	7.8	7.7	7.7	8.1	7.6	8.1	7.5	7.6
6	TDS (mg/L)	172	207	207	200	230	258	309	302	292	308	346	308	320	313	277
7	Temp (deg C)	28.6	29.9	29.5	27.3	27.1	22.0	20.6	19.6	16.5	18.8	26.0	26.0	24.5	23.2	24.0
8	Turb (NTU)	35.2	129.6	51.6	98.6	112.8	0.0	0.0	0.0	0.0	18.2	0.0	0.0	0.0	0.0	0.9
	CHEMICAL															
1	Alk-Phen (mgCaCO3/L)	0.0	2.3	1.6	2.9	0.0	1.2	0.0	2.0	0.0	0.0	0.0	0.0	2.6	0.0	0.0
2	ALK-TOT (mgCaCO3/L)	173	155	151	146	173	249	243	210	219	190	265	248	226	252	182
3	Ca (mg/L)	30	26	30	28	34	39	42	35	42	48	37	31	30	34	37
4	Cl (mg/L)	8.5	7.7	7.8	8.8	10.8	10.3	11.0	9.5	12.0	10.3	13.0	13.0	17.3	12.0	11.9
5	CO3 (mg/L)	0.0	2.8	1.9	3.4	0.0	1.4	0.0	2.3	0.0	0.0	0.0	0.0	3.1	0.0	0.0
6	F (mg/L)	0.35	0.29	0.37	0.25	0.09	0.28	0.21	0.30	0.26	0.12	0.52	0.44	0.26	0.10	
7	HCO3 (mg/L)	212	183	180	171	211	301	296	252	268	232	323	302	269	308	222
8	K (mg/L)	2.1	1.7	1.1	2.0	3.1	1.3	1.1	1.6	1.3	1.0	1.5	1.3	1.5	1.5	1.9
9	Mg (mg/L)	15.8	14.0	12.5	12.1	14.3	22.2	21.3	19.0	20.4	18.8	22.9	22.9	21.0	22.8	13.7
10	Na (mg/L)	18.5	25.4	15.5	13.2	19.1	30.8	25.1	24.3	40.0	22.4	40.5	35.4	33.2	39.9	31.8
11	NH3-N (mg N/L)					0.09					0.15					0.15
12	NO2+NO3 (mg N/L)	0.65	1.75	0.86	1.53	1.00	1.22	0.58	0.35	0.47	0.31	0.91	0.53	0.28	0.44	0.46
13	NO2-N (mgN/L)	0.01	0.10	0.07	0.30	0.29	0.03	0.02	0.04	0.02	0.03	0.02	0.03	0.03	0.03	0.06
14	NO3-N (mgN/L)	0.64	1.65	0.79	1.23	0.71	1.19	0.56	0.31	0.45	0.28	0.90	0.50	0.25	0.41	0.41
15	o-PO4-P (mg P/L)	0.200	0.224	0.176	0.194	0.215	0.141	0.114	0.092	0.076	0.063	0.173	0.162	0.067	0.050	0.037
16	SiO2 (mg/L)	23.1	28.7	23.9	34.1	44.6	27.6	18.4	19.7	18.4	26.6	24.9	21.0	18.4	33.6	21.7
17	SO4 (mg/L)	15.3	21.3	13.8	13.0	17.4	13.9	9.9	11.1	9.1	28.8	15.8	9.9	14.0	7.2	5.4
	BIOLOGICAL/BACTERIOLOGICAL															
1	BOD3-27 (mg/L)	1.2	1.1	1.0	0.9	1.0	1.0	1.2	1.1	0.9	0.7	0.8	1.2	2.4	1.0	1.6
2	COD (mg/L)	35.0	29.0	23.6	30.6	23.4	23.5	30.0	34.3	37.5	15.8	31.3	35.3	37.3	26.7	17.0
3	DO (mg/L)	5.2	5.6	5.4	5.6	4.9	7.1	6.4	5.8	7.6	7.1	6.6	4.3	6.4	5.1	7.9
4	DO_SAT% (%)	66	73	71	70	61	81	71	63	77	76	80	53	76	59	93
	TRACE & TOXIC															
	CHEMICAL INDICES															
1	HAR_Ca (mgCaCO3/L)	74	66	76	71	85	97	106	87	104	120	91	78	75	86	91
2	HAR_Total (mgCaCO3/L)	140	125	128	121	144	190	195	166	189	198	187	173	162	181	148
3	Na% (%)	22	31	19	16	19	26	21	24	30	19	32	31	31	32	27
4	RSC (-)	0.7	0.7	0.5	0.5	0.6	1.2	1.0	0.9	0.6	0.3	1.6	1.5	1.3	1.5	0.7
5	SAR (-)	0.7	1.0	0.6	0.5	0.7	1.0	0.8	0.8	1.2	0.7	1.3	1.2	1.1	1.3	1.0

3.8 Narmada at Hoshangabad

History sheet

			Water Year	**:**	**2019-2020**
Site	**:**	**Narmada at Hoshangabad**	**Code**	**:**	CW1NAM000278
State	:	Madhya Pradesh	District		Hoshangabad
Basin	:	Narmada	Independent River	:	Narmada
Tributary	:		Sub Tributary	:	
Sub-Sub Tributary	:		Local River	:	Narmada
Division	:	Narmada division Bhopal	Sub-Division	:	MNSD-1 CWC Hoshangabad
Drainage Area	:	44548 Sq. Km.	Bank	:	Left
Latitude	:	22°45'22"	Longitude	:	77°43'58"
		Opening Date	Closing Date		
Gauge	:	21/05/1972			
Discharge	:	16/09/1972			
Sediment	:	29/12/1972			
Water Quality	:	15/07/1979			

Water Quality Datasheet for the period : 2019-2020

Station Name : Narmada at Hoshangabad (CW1NAM000278) Division : Narmada Division, Bhopal

Local River : Narmada Sub-Division : MNSD-1, Hoshangabad

River Water Analysis

S.No	Parameters	03/06/2019	01/07/2019	01/08/2019	03/09/2019	03/10/2019	01/11/2019	02/12/2019	01/01/2020	03/02/2020	02/03/2020	26/04/2020	05/05/2020
		A	A	A	A	A	A	A	A	A	A	A	A
	PHYSICAL												
1	Q (cumec)	40.10	72.20	17.50	31.44	2394.1	629.9	298.4	217	313.6	342.4	450	408
2	Colour_Cod (-)	Clear	Clear	Dark Brown	Dark Brown	Light Brown	Clear	Clear	Clear	Clear	Clear	Clear	Clear
3	EC_GEN (µmho/cm)	251	223	196	148	202	225	313	369	277	280	179	199
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_GEN (pH units)	7.4	7.4	7.8	7.3	7.7	7.8	7.8	8.1	7.6	7.8	7.6	7.4
6	TDS (mg/L)	147	138	123	90	130	141	207	263	191	172	125	150
7	Temp (deg C)	28.0	30.0	24.0	25.0	25.0	25.0	22.0	20.0	20.0	24.0	27.0	26.5
8	Turb (NTU)		10.0	183.0	242.0	88.0	37.0	24.0	6.0	3.2	1.0		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)	113	102	91	61	84	97	161	274	65	156	104	111
3	Ca (mg/L)	23	21	22	18	26	26	36	41	33	32	26	28
4	Cl (mg/L)	12.0	9.0	5.0	4.0	5.0	5.0	7.0	10.0	14.0	11.0	7.8	5.9
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)	0.04	0.03	0.11	0.10	0.11	0.11	0.09					
7	HCO3 (mg/L)	138	125	111	74	103	118	197	334	79	190	127	136
8	K (mg/L)	1.3	3.1	4.7	2.7	1.4	1.4	1.3	1.5	1.1	2.0	1.0	1.7
9	Mg (mg/L)	12.2	7.8	7.3	6.3	4.6	6.3	13.1	18.0	11.7	10.3	9.6	9.2
10	Na (mg/L)	9.1	10.2	6.1	4.4	6.2	6.7	10.4	12.5	8.2	12.9	5.0	8.8
11	NH3-N (mg N/L)	0.14	0.05	0.05	0.03	0.08	0.08	0.08	0.13	0.06	0.06	0.09	0.09
12	NO2+NO3 (mg N/L)	0.06	1.63	1.19	1.18	0.13	0.16	0.19	0.12	0.14	0.14	0.05	0.11
13	NO2-N (mgN/L)	0.01	1.27	0.12	0.11	0.00	0.02	0.00	0.03	0.04	0.02	0.01	0.02
14	NO3-N (mgN/L)	0.05	0.36	1.07	1.07	0.13	0.14	0.19	0.09	0.10	0.12	0.04	0.09
15	o-PO4-P (mg P/L)	0.019	0.424	0.522	0.273	0.009	0.022	0.037	0.092	0.045	0.075	0.010	0.041
16	SiO2 (mg/L)	57.5	37.5	25.8	25.8	19.1	19.9	23.8	15.4	14.7	20.1	17.2	18.2
17	SO4 (mg/L)	6.9	8.0	12.5	12.3	15.6	40.3	15.6	16.5	8.6	7.2	3.7	5.1
	BIOLOGICAL/BACTERIOLOGICAL												
1	BOD3-27 (mg/L)	0.5	0.8	1.3	1.2	0.5	0.9	0.9	0.7	0.9	1.4	1.0	0.8
2	COD (mg/L)	38.0	27.0	26.0	17.0	16.0	11.0	14.0	5.0	21.0	17.0		17.0
3	DO (mg/L)	4.7	5.9	4.7	5.7	5.7	6.3	6.3	7.4	6.8	6.5	7.6	6.4
4	DO_SAT% (%)	60	78	56	69	69	76	72	81	75	77	95	79
	TRACE & TOXIC												
	CHEMICAL INDICES												
1	HAR_Ca (mgCaCO3/L)	58	54	56	44	66	66	91	103	83	79	64	69
2	HAR_Total (mgCaCO3/L)	108	86	86	70	85	92	145	178	132	122	104	108
3	Na% (%)	15	20	13	12	13	14	13	13	12	18	9	15
4	RSC (-)	0.1	0.3	0.1	0.0	0.0	0.1	0.3	1.9	0.0	0.7	0.0	0.1
5	SAR (-)	0.4	0.5	0.3	0.2	0.3	0.3	0.4	0.4	0.3	0.5	0.2	0.4

Water Quality Summary for the period : 2019-2020

Station Name : Narmada at Hoshangabad (CW1NAM000278) 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)	152	13060	0.000	924.7
2	EC_GEN (µmho/cm)	12	369	148	239
3	pH_GEN (pH units)	12	8.1	7.3	7.6
4	TDS (mg/L)	12	263	90	156
5	Temp (deg C)	12	30.0	20.0	24.7
6	Turb (NTU)	10	242.0	0.0	59.4
	CHEMICAL				
1	Alk-Phen (mgCaCO3/L)	12	0.0	0.0	0
2	ALK-TOT (mgCaCO3/L)	12	274	61	118
3	Ca (mg/L)	12	41	18	28
4	Cl (mg/L)	12	14.0	4.0	8
5	CO3 (mg/L)	12	0.0	0.0	0
6	F (mg/L)	7	0.11	0.03	0.08
7	HCO3 (mg/L)	12	334	74	144
8	K (mg/L)	12	4.7	1.0	1.9
9	Mg (mg/L)	12	18.0	4.6	9.7
10	Na (mg/L)	12	12.9	4.4	8.4
11	NH3-N (mg N/L)	12	0.14	0.03	0.08
12	NO2+NO3 (mg N/L)	12	1.63	0.05	0.42
13	NO2-N (mgN/L)	12	1.27	0.00	0.14
14	NO3-N (mgN/L)	12	1.07	0.04	0.29
15	o-PO4-P (mg P/L)	12	0.522	0.009	0.131
16	SiO2 (mg/L)	12	57.5	14.7	24.6
17	SO4 (mg/L)	12	40.3	3.7	12.7
	BIOLOGICAL/BACTERIOLOGICAL				
1	BOD3-27 (mg/L)	12	1.4	0.5	0.9
2	COD (mg/L)	11	38.0	5.0	19
3	DO (mg/L)	12	7.6	4.7	6.2
4	DO_SAT% (%)	12	95	56	74
	TRACE & TOXIC				
	CHEMICAL INDICES				
1	HAR_Ca (mgCaCO3/L)	12	103	44	69
2	HAR_Total (mgCaCO3/L)	12	178	70	110
3	Na% (%)	12	20	9	14
4	RSC (-)	12	1.9	0.0	0.3
5	SAR (-)	12	0.5	0.2	0.3

Water Quality Seasonal Average for the period : 2015-2020

Station Name : Narmada at Hoshangabad (CW1NAM000278) Division : Narmada Division, Bhopal

Local River : Narmada Sub-Division : MNSD-1, Hoshangabad

River Water

S.No	Parameters	Flood					Winter					Summer				
		Jun - Oct					Nov - Feb					Mar - May				
		2015	2016	2017	2018	2019	2015-2016	2016-2017	2017-2018	2018-2019	2019-2020	2016	2017	2018	2019	2020
	PHYSICAL															
1	Q (cumec)	487.2			526.9	814.0	146.0			165.9	0.000	157.1			86.96	
2	EC_FLD (µmho/cm)														289	
3	EC_GEN (µmho/cm)	236	174	259	242	204	260	286	326	249	296	306	243	332	272	219
4	pH_FLD (pH units)														7.6	
5	pH_GEN (pH units)	8.1	7.6	8.0	7.8	7.5	8.2	7.9	8.0	7.6	7.8	7.7	7.9	7.9	7.8	7.6
6	TDS (mg/L)	149	113	168	154	126	166	185	215	165	201	199	157	216	161	149
7	Temp (deg C)	23.3	19.0	23.2	26.0	26.4	14.9	16.9	18.0	20.0	21.8	16.3	20.0	22.7	23.7	25.8
8	Turb (NTU)	23.0	82.6	130.0	92.6	130.8	0.0	0.0	0.0	0.0	17.6	0.0	0.0	0.0	0.0	0.5
	CHEMICAL															
1	Alk-Phen (mgCaCO3/L)	0.0	0.0	1.0	0.0	0.0	2.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.5	0.0
2	ALK-TOT (mgCaCO3/L)	145	95	127	112	90	164	147	154	129	149	150	126	156	125	124
3	Ca (mg/L)	27	20	30	27	22	35	33	31	29	34	30	32	29	29	28
4	Cl (mg/L)	8.1	5.8	6.2	6.2	7.0	8.0	7.5	7.8	6.3	9.0	9.3	6.3	11.7	7.0	8.2
5	CO3 (mg/L)	0.0	0.0	1.2	0.0	0.0	3.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8	0.0
6	F (mg/L)	0.31	0.29	0.28	0.21	0.08	0.22	0.20	0.27	0.14	0.10	0.27	0.15	0.23	0.09	
7	HCO3 (mg/L)	177	116	152	136	110	193	179	188	158	182	183	153	190	149	151
8	K (mg/L)	2.5	1.6	1.5	1.8	2.6	1.6	1.3	1.7	1.3	1.3	1.3	1.1	1.6	1.5	1.6
9	Mg (mg/L)	14.7	7.5	8.5	9.1	7.6	12.2	12.0	14.2	10.8	12.3	11.8	8.7	16.0	11.9	9.7
10	Na (mg/L)	13.8	6.6	200.8	5.8	7.2	14.9	9.8	13.8	11.4	9.4	15.3	9.7	9.7	10.7	8.9
11	NH3-N (mg N/L)					0.07					0.09					0.08
12	NO2+NO3 (mg N/L)	1.25	1.22	0.77	0.84	0.84	0.44	0.37	1.11	0.28	0.15	0.22	0.25	0.50	0.55	0.10
13	NO2-N (mgN/L)	0.02	0.07	0.05	0.05	0.30	0.01	0.01	0.03	0.02	0.02	0.01	0.01	0.09	0.05	0.02
14	NO3-N (mgN/L)	1.23	1.15	0.72	0.79	0.53	0.42	0.36	1.08	0.27	0.13	0.21	0.24	0.42	0.50	0.08
15	o-PO4-P (mg P/L)	0.226	0.221	0.140	0.223	0.249	0.123	0.097	0.073	0.038	0.049	0.099	0.089	0.063	0.023	0.042
16	SiO2 (mg/L)	16.2	17.2	20.3	23.0	33.2	14.5	14.5	20.9	17.6	18.5	13.0	15.8	19.5	26.1	18.5
17	SO4 (mg/L)	11.6	14.6	14.9	10.9	11.0	4.0	8.7	20.7	8.5	20.2	4.1	5.6	13.6	7.7	5.3
	BIOLOGICAL/BACTERIOLOGICAL															
1	BOD3-27 (mg/L)	0.8	0.9	1.1	0.8	0.9	0.6	1.1	0.9	0.9	0.8	1.1	0.8	1.3	1.0	1.1
2	COD (mg/L)	25.2	37.2	35.0	37.4	24.8	32.5	46.8	34.8	30.3	12.8	28.7	42.3	44.3	28.0	17.0
3	DO (mg/L)	5.6	5.9	5.6	5.3	5.3	6.6	6.8	7.0	6.6	6.7	5.5	5.4	6.0	5.8	6.8
4	DO_SAT% (%)	66	64	65	65	66	65	70	74	73	76	56	59	70	68	84
	TRACE & TOXIC															
	CHEMICAL INDICES															
1	HAR_Ca (mgCaCO3/L)	67	50	76	66	55	88	81	77	72	85	74	81	71	73	71
2	HAR_Total (mgCaCO3/L)	128	81	111	104	87	139	132	136	117	137	123	117	138	123	111
3	Na% (%)	18	15	31	11	15	19	14	18	17	13	20	15	13	16	14
4	RSC (-)	0.3	0.3	0.3	0.2	0.1	0.5	0.3	0.4	0.3	0.6	0.6	0.2	0.4	0.1	0.3
5	SAR (-)	0.5	0.3	8.2	0.3	0.3	0.6	0.4	0.5	0.5	0.4	0.6	0.4	0.4	0.4	0.4

3.9 Narmada at Sandia

History sheet

			Water Year	**:**	**2019-2020**
Site	**:**	**Narmada at Sandia**	**Code**	**:**	CW1NAU000450
State	:	Madhya Pradesh	District		Hoshangabad
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	:	33953.5 Sq. Km.	Bank	:	Left
Latitude	:	22°54'57"	Longitude	:	78°20'51"
		Opening Date	Closing Date		
Gauge	:	01/03/1978			
Discharge	:	18/04/1978			
Sediment	:	09/08/1978			
Water Quality	:	15/09/1979			

Water Quality Datasheet for the period : 2019-2020

Station Name : Narmada at Sandia (CW1NAU000450) Division : Narmada Division, Bhopal

Local River : Narmada Sub-Division : MNSD-1, Hoshangabad

River Water Analysis

S.No	Parameters	03/06/2019	01/07/2019	01/08/2019	03/09/2019	03/10/2019	01/11/2019	02/12/2019	01/01/2020	03/02/2020	02/03/2020	01/04/2020	05/05/2020
		A	A	A	A	A	A	A	A	A	A	A	A
	PHYSICAL												
1	Q (cumec)	38.10	47.20	1850	2399	2931.9	667.3	131	144.6	118.1	143.6		102.8
2	Colour_Cod (-)	Clear	Clear	Brown	Dark Brown	Light Brown	Clear	Clear	Clear	Clear	Clear		Clear
3	EC_GEN (µmho/cm)	219	215	141	247	249	325	403	547	278	262		332
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
5	pH_GEN (pH units)	7.3	7.2	7.9	7.3	7.9	8.0	7.8	8.3	7.4	7.8		7.4
6	TDS (mg/L)	131	131	89	157	162	204	266	391	193	162		251
7	Temp (deg C)	29.0	27.5	28.5	29.5	30.0	27.0	23.5	20.0	24.0	24.5		21.0
8	Turb (NTU)		14.0	100.0	272.0	105.0	40.0	31.0	21.0	5.8	0.8		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)	102	98	67	104	118	151	207	304	80	128		184
3	Ca (mg/L)	21	23	18	27	33	37	49	70	38	30		47
4	Cl (mg/L)	9.0	8.0	1.0	5.0	4.0	8.0	8.0	11.0	9.0	10.0		11.7
5	CO3 (mg/L)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0
6	F (mg/L)	0.04	0.04	0.10	0.09	0.10	0.10	0.12					
7	HCO3 (mg/L)	124	119	82	127	144	184	252	371	98	156		225
8	K (mg/L)	1.2	3.0	5.6	2.9	1.3	1.4	1.5	1.2	1.2	1.8		2.0
9	Mg (mg/L)	36.2	6.1	6.8	12.6	9.0	11.4	17.7	20.6	9.5	6.1		16.9
10	Na (mg/L)	6.6	7.6	3.4	5.8	6.0	8.5	9.3	12.6	6.6	10.4		21.2
11	NH3-N (mg N/L)	0.08	0.05	0.05	0.03	0.21	0.19	0.09	0.12	0.05	0.07		0.23
12	NO2+NO3 (mg N/L)	0.09	1.64	0.91	0.96	0.13	0.14	0.40	0.11	0.13	0.13		0.09
13	NO2-N (mgN/L)	0.01	1.55	0.09	0.09	0.01	0.01	0.01	0.03	0.03	0.03		0.02
14	NO3-N (mgN/L)	0.08	0.09	0.82	0.87	0.13	0.13	0.38	0.09	0.10	0.10		0.07
15	o-PO4-P (mg P/L)	0.017	0.413	0.439	0.327	0.023	0.025	0.048	0.151	0.058	0.057		0.034
16	SiO2 (mg/L)	58.9	31.3	30.5	31.5	24.6	23.5	24.6	19.2	18.8	17.6		21.5
17	SO4 (mg/L)	8.2	6.9	8.0	13.3	9.5	34.5	17.0	19.6	8.3	5.1		6.5
	BIOLOGICAL/BACTERIOLOGICAL												
1	BOD3-27 (mg/L)	0.7	0.7	0.6	0.8	0.4	0.9	0.6	0.7	0.9	0.9		1.4
2	COD (mg/L)	18.0	33.0	26.0	20.0	13.0	16.0	14.0	7.0	26.0	14.0		13.0
3	DO (mg/L)	5.2	5.8	5.6	5.1	5.7	6.5	4.7	6.8	6.3	5.6		5.8
4	DO_SAT% (%)	68	73	72	66	75	82	55	75	75	66		65
	TRACE & TOXIC												
	CHEMICAL INDICES												
1	HAR_Ca (mgCaCO3/L)	52	57	46	68	82	92	123	176	96	76		118
2	HAR_Total (mgCaCO3/L)	203	82	74	121	120	140	197	262	136	102		189
3	Na% (%)	7	16	8	9	10	12	9	9	10	18		20
4	RSC (-)	0.0	0.3	0.0	0.0	0.0	0.2	0.2	0.9	0.0	0.5		0.0
5	SAR (-)	0.2	0.4	0.2	0.2	0.2	0.3	0.3	0.3	0.2	0.5		0.7

Nationwide Lockdown

Water Quality Summary for the period : 2019-2020

Station Name : Narmada at Sandia (CW1NAU000450) 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)	244	72593	0.000	1000
2	EC_GEN (µmho/cm)	11	547	141	293
3	pH_GEN (pH units)	11	8.3	7.2	7.7
4	TDS (mg/L)	11	391	89	194
5	Temp (deg C)	11	30.0	20.0	25.9
6	Turb (NTU)	10	272.0	0.0	59
	CHEMICAL				
1	Alk-Phen (mgCaCO3/L)	11	0.0	0.0	0
2	ALK-TOT (mgCaCO3/L)	11	304	67	140
3	Ca (mg/L)	11	70	18	36
4	Cl (mg/L)	11	11.7	1.0	7.7
5	CO3 (mg/L)	11	0.0	0.0	0
6	F (mg/L)	7	0.12	0.04	0.08
7	HCO3 (mg/L)	11	371	82	171
8	K (mg/L)	11	5.6	1.2	2.1
9	Mg (mg/L)	11	36.2	6.1	13.9
10	Na (mg/L)	11	21.2	3.4	8.9
11	NH3-N (mg N/L)	11	0.23	0.03	0.11
12	NO2+NO3 (mg N/L)	11	1.64	0.09	0.43
13	NO2-N (mgN/L)	11	1.55	0.01	0.17
14	NO3-N (mgN/L)	11	0.87	0.07	0.26
15	o-PO4-P (mg P/L)	11	0.439	0.017	0.145
16	SiO2 (mg/L)	11	58.9	17.6	27.4
17	SO4 (mg/L)	11	34.5	5.1	12.4
	BIOLOGICAL/BACTERIOLOGICAL				
1	BOD3-27 (mg/L)	11	1.4	0.4	0.8
2	COD (mg/L)	11	33.0	7.0	18.2
3	DO (mg/L)	11	6.8	4.7	5.7
4	DO_SAT% (%)	11	82	55	70
	TRACE & TOXIC				
	CHEMICAL INDICES				
1	HAR_Ca (mgCaCO3/L)	11	176	46	90
2	HAR_Total (mgCaCO3/L)	11	262	74	148
3	Na% (%)	11	20	7	12
4	RSC (-)	11	0.9	0.0	0.2
5	SAR (-)	11	0.7	0.2	0.3

Water Quality Seasonal Average for the period : 2015-2020

Station Name : Narmada at Sandia (CW1NAU000450) Division : Narmada Division, Bhopal

Local River : Narmada Sub-Division : MNSD-1, Hoshangabad

River Water

S.No	Parameters	Flood					Winter					Summer				
		Jun - Oct					Nov - Feb					Mar - May				
		2015	2016	2017	2018	2019	2015-2016	2016-2017	2017-2018	2018-2019	2019-2020	2016	2017	2018	2019	2020
	PHYSICAL															
1	Q (cumec)	274.5			646.1	866.8	103.4			129.2	59.05	90.18			45.03	299.7
2	EC_FLD (µmho/cm)														269	
3	EC_GEN (µmho/cm)	227	193	248	220	214	235	258	287	239	388	258	231	305	255	297
4	pH_FLD (pH units)														7.8	
5	pH_GEN (pH units)	8.2	7.6	7.8	7.8	7.5	8.3	7.8	7.8	7.6	7.9	8.1	7.7	7.7	7.8	7.6
6	TDS (mg/L)	144	125	160	139	134	150	167	191	161	264	167	150	197	151	207
7	Temp (deg C)	28.6	27.3	26.5	28.8	28.9	20.8	18.1	19.1	19.0	23.6	23.8	25.8	25.5	24.2	22.8
8	Turb (NTU)	38.6	145.8	124.4	98.0	122.8	0.0	0.0	0.0	0.0	24.5	0.0	0.0	0.0	0.0	0.4
	CHEMICAL															
1	Alk-Phen (mgCaCO3/L)	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	0.0
2	ALK-TOT (mgCaCO3/L)	144	92	120	97	98	144	130	133	120	185	130	121	134	119	156
3	Ca (mg/L)	28	23	29	25	24	32	32	30	29	49	27	33	29	29	39
4	Cl (mg/L)	7.4	4.9	5.4	5.8	5.4	7.5	6.5	8.3	5.8	9.0	6.3	5.7	14.3	7.7	10.9
5	CO3 (mg/L)	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	0.0
6	F (mg/L)	0.32	0.35	0.33	0.27	0.07	0.24	0.19	0.29	0.23	0.11	0.23	0.19	0.21	0.06	
7	HCO3 (mg/L)	175	110	147	119	119	170	158	162	147	226	158	147	163	146	191
8	K (mg/L)	2.7	1.5	1.4	1.8	2.8	1.5	1.2	1.5	1.4	1.3	1.3	1.0	1.8	1.4	1.9
9	Mg (mg/L)	14.3	7.3	8.5	7.9	14.1	12.7	9.7	12.8	11.3	14.8	12.1	7.7	13.0	11.6	11.5
10	Na (mg/L)	10.1	4.9	7.5	4.5	5.9	10.5	7.2	9.2	8.6	9.2	7.9	7.8	9.2	8.2	15.8
11	NH3-N (mg N/L)					0.08					0.11					0.15
12	NO2+NO3 (mg N/L)	1.21	1.85	0.71	1.36	0.75	0.26	0.38	0.73	0.53	0.19	0.07	0.22	0.34	0.35	0.11
13	NO2-N (mgN/L)	0.01	0.10	0.04	0.38	0.35	0.01	0.01	0.03	0.02	0.02	0.01	0.01	0.03	0.02	0.02
14	NO3-N (mgN/L)	1.20	1.75	0.67	0.98	0.40	0.25	0.37	0.70	0.52	0.17	0.06	0.21	0.31	0.33	0.09
15	o-PO4-P (mg P/L)	0.323	0.230	0.179	0.233	0.244	0.103	0.077	0.081	0.042	0.070	0.106	0.075	0.094	0.124	0.046
16	SiO2 (mg/L)	14.7	21.5	22.0	22.1	35.4	14.5	14.8	20.2	18.1	21.5	13.4	15.6	18.2	23.9	19.5
17	SO4 (mg/L)	12.1	12.6	16.1	11.9	9.2	2.1	9.2	22.5	8.3	19.9	2.7	5.1	16.8	7.2	5.8
	BIOLOGICAL/BACTERIOLOGICAL															
1	BOD3-27 (mg/L)	0.7	0.9	1.0	0.7	0.6	0.7	1.2	1.0	0.8	0.8	0.4	1.0	1.0	1.0	1.1
2	COD (mg/L)	29.4	94.8	48.4	31.2	22.0	29.0	49.5	29.5	30.3	15.8	30.7	38.3	45.3	25.7	13.5
3	DO (mg/L)	6.0	5.4	5.4	4.9	5.5	7.5	6.7	6.3	6.6	6.1	6.5	5.3	5.3	6.1	5.7
4	DO_SAT% (%)	77	69	67	63	71	84	71	68	71	72	76	65	64	72	66
	TRACE & TOXIC															
	CHEMICAL INDICES															
1	HAR_Ca (mgCaCO3/L)	70	59	73	62	61	79	80	75	72	122	68	82	73	71	97
2	HAR_Total (mgCaCO3/L)	130	89	108	94	120	132	121	128	119	184	119	114	127	120	145
3	Na% (%)	14	11	13	9	10	14	11	14	13	10	12	13	13	13	19
4	RSC (-)	0.3	0.1	0.2	0.1	0.1	0.2	0.2	0.1	0.1	0.3	0.2	0.2	0.2	0.0	0.3
5	SAR (-)	0.4	0.2	0.3	0.2	0.2	0.4	0.3	0.4	0.3	0.3	0.3	0.3	0.4	0.3	0.6

3.10 Shakkar at Gadarwara

History sheet

			Water Year	**:**	**2019-2020**
Site	**:**	**Shakkar at Gadarwara**	**Code**	**:**	CW1NAU000391
State	:	Madhya Pradesh	District		Narsinghpur
Basin	:	Narmada	Independent River	:	Narmada
Tributary	:	Shakkar	Sub Tributary	:	
Sub-Sub Tributary	:		Local River	:	Shakkar
Division	:	NARMADA DIVISION BHOPAL	Sub-Division	:	MNSD-1 HOSHANGABAD
Drainage Area	:	2270 Sq. Km.	Bank	:	Left
Latitude	:	22°55'23"	Longitude	:	78°47'23"
		Opening Date	Closing Date		
Gauge	:	01/02/1977			
Discharge	:	01/02/1977			
Sediment	:	15/06/1978			
Water Quality	:	16/08/1979			

Water Quality Datasheet for the period : 2019-2020

Station Name : Shakkar at Gadarwara (CW1NAU000391) Division : Narmada Division, Bhopal

Local River : Shakkar Sub-Division : MNSD-1, Hoshangabad

River Water Analysis

S.No	Parameters	03/06/2019	01/07/2019	01/08/2019	03/09/2019	03/10/2019	01/11/2019	02/12/2019	01/01/2020	03/02/2020	02/03/2020	01/04/2020	05/05/2020
		A	A	A	A	A	A	A	A	A	A	A	A
	PHYSICAL												
1	Q (cumec)	No Flow	7.5	378.8	159.4	80.67	5.50	3.06	3.00	1.60	0.79	Nationwide Lockdown	0.18
2	Colour_Cod (-)		Dark Brown	Dark Brown	Brown	Light Brown	Clear	Clear	Clear	Clear	Clear		Clear
3	EC_GEN (µmho/cm)		164	160	224	279	417	484	516	440	463		193
4	Odour_Code (-)		odour free	odour free	odour free	odour free	odour free	odour free	odour free	odour free	odour free		odour free
5	pH_GEN (pH units)		7.3	7.8	7.3	7.9	7.9	7.7	7.8	7.3	7.8		7.4
6	TDS (mg/L)		100	106	142	187	257	322	364	302	276		146
7	Temp (deg C)		22.0	24.0	23.0	23.0	23.0	28.0	19.0	21.0	21.0		27.0
8	Turb (NTU)		187.0	149.0	152.0	85.0	46.0	29.0	22.0	1.1	0.3		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
2	ALK-TOT (mgCaCO3/L)		75	63	92	135	198	207	225	90	164		111
3	Ca (mg/L)		25	15	29	36	47	44	55	45	36		27
4	Cl (mg/L)		2.0	7.0	15.0	12.0	10.0	21.0	24.0	10.0	10.0		5.8
5	CO3 (mg/L)		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0
6	F (mg/L)		0.04	0.09	0.10	0.10	0.10	0.12					
7	HCO3 (mg/L)		92	77	112	165	242	252	275	110	200		136
8	K (mg/L)		3.9	5.2	2.7	0.6	0.8	1.8	1.3	0.8	2.1		5.4
9	Mg (mg/L)		7.3	7.3	4.9	11.7	16.8	22.6	20.9	20.9	24.8		7.0
10	Na (mg/L)		3.1	4.5	4.6	6.2	8.3	13.3	15.9	10.4	21.7		20.1
11	NH3-N (mg N/L)		0.06	0.04	0.02	0.25	0.19	0.10	0.15	0.14	0.19		0.09
12	NO2+NO3 (mg N/L)		1.03	1.13	1.14	0.15	0.24	0.42	0.12	0.18	0.69		0.18
13	NO2-N (mgN/L)		0.02	0.09	0.08	0.00	0.01	0.02	0.03	0.06	0.05		0.02
14	NO3-N (mgN/L)		1.01	1.04	1.05	0.14	0.23	0.41	0.08	0.12	0.63		0.16
15	o-PO4-P (mg P/L)		0.345	0.435	0.353	0.005	0.016	0.052	0.145	0.094	0.144		0.048
16	SiO2 (mg/L)		10.8	27.4	28.7	44.1	43.6	26.1	18.4	17.4	17.6		17.2
17	SO4 (mg/L)		11.7	9.0	14.5	21.1	45.9	21.4	20.1	9.6	5.8		4.1
	BIOLOGICAL/BACTERIOLOGICAL												
1	BOD3-27 (mg/L)		1.8	1.0	1.3	0.4	0.8	1.9	2.0	1.6	2.0		1.2
2	COD (mg/L)		51.0	31.0	13.0	17.0	21.0	15.0	11.0	15.0	10.0		23.0
3	DO (mg/L)		2.2	4.7	4.2	5.9	6.1	7.6	7.1	7.4	7.4		7.6
4	DO_SAT% (%)		25	56	49	69	71	97	77	83	83		95
	TRACE & TOXIC												
	CHEMICAL INDICES												
1	HAR_Ca (mgCaCO3/L)		62	38	72	91	117	109	138	112	90		67
2	HAR_Total (mgCaCO3/L)		92	68	92	140	187	203	225	199	193		96
3	Na% (%)		7	12	9	9	9	12	13	10	20		30
4	RSC (-)		0.0	0.0	0.0	0.0	0.3	0.1	0.0	0.0	0.0		0.3
5	SAR (-)		0.1	0.2	0.2	0.2	0.3	0.4	0.5	0.3	0.7		0.9

Water Quality Summary for the period : 2019-2020

Station Name : Shakkar at Gadarwara (CW1NAU000391) 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)	123	592.9	0.000	133.0
2	EC_GEN (µmho/cm)	10	516	160	334
3	pH_GEN (pH units)	10	7.9	7.3	7.6
4	TDS (mg/L)	10	364	100	220
5	Temp (deg C)	10	28.0	19.0	23.1
6	Turb (NTU)	10	187.0	0.0	67.1
	CHEMICAL				
1	Alk-Phen (mgCaCO3/L)	10	0.0	0.0	0
2	ALK-TOT (mgCaCO3/L)	10	225	63	136
3	Ca (mg/L)	10	55	15	36
4	Cl (mg/L)	10	24.0	2.0	11.7
5	CO3 (mg/L)	10	0.0	0.0	0
6	F (mg/L)	6	0.12	0.04	0.09
7	HCO3 (mg/L)	10	275	77	166
8	K (mg/L)	10	5.4	0.6	2.5
9	Mg (mg/L)	10	24.8	4.9	14.4
10	Na (mg/L)	10	21.7	3.1	10.8
11	NH3-N (mg N/L)	10	0.25	0.02	0.12
12	NO2+NO3 (mg N/L)	10	1.14	0.12	0.53
13	NO2-N (mgN/L)	10	0.09	0.00	0.04
14	NO3-N (mgN/L)	10	1.05	0.08	0.49
15	o-PO4-P (mg P/L)	10	0.435	0.005	0.164
16	SiO2 (mg/L)	10	44.1	10.8	25.1
17	SO4 (mg/L)	10	45.9	4.1	16.3
	BIOLOGICAL/BACTERIOLOGICAL				
1	BOD3-27 (mg/L)	10	2.0	0.4	1.4
2	COD (mg/L)	10	51.0	10.0	20.7
3	DO (mg/L)	10	7.6	2.2	6
4	DO_SAT% (%)	10	97	25	70
	TRACE & TOXIC				
	CHEMICAL INDICES				
1	HAR_Ca (mgCaCO3/L)	10	138	38	89
2	HAR_Total (mgCaCO3/L)	10	225	68	149
3	Na% (%)	10	30	7	13
4	RSC (-)	10	0.3	0.0	0.1
5	SAR (-)	10	0.9	0.1	0.4

Water Quality Seasonal Average for the period : 2015-2020

Station Name : Shakkar at Gadarwara (CW1NAU000391) Division : Narmada Division, Bhopal

Local River : Shakkar Sub-Division : MNSD-1, Hoshangabad

River Water

S.No	Parameters	Flood					Winter					Summer				
		Jun - Oct					Nov - Feb					Mar - May				
		2015	2016	2017	2018	2019	2015-2016	2016-2017	2017-2018	2018-2019	2019-2020	2016	2017	2018	2019	2020
	PHYSICAL															
1	Q (cumec)	47.91			89.07	154.7	1.540			0.918		0.006			River Dry	
2	EC_GEN (µmho/cm)	247	228	285	297	207	290	420	529	508	464	370	545	843		328
3	pH_GEN (pH units)	8.2	7.5	8.0	7.8	7.6	8.3	7.8	7.7	7.8	7.7	8.0	7.6	7.7		7.6
4	TDS (mg/L)	155	147	183	184	134	184	272	349	368	311	242	354	535		211
5	Temp (deg C)	23.8	24.0	23.8	21.4	23.0	20.3	19.8	21.0	20.0	22.8	21.0	21.8	21.0		24.0
6	Turb (NTU)	8.2	155.0	93.0	112.7	143.3	0.0	0.0	0.0	0.0	24.5	0.0	0.0	0.0		0.2
	CHEMICAL															
1	Alk-Phen (mgCaCO3/L)	2.0	0.0	1.3	0.0	0.0	5.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0
2	ALK-TOT (mgCaCO3/L)	156	103	127	119	91	167	204	234	244	180	170	250	293		138
3	Ca (mg/L)	30	26	31	31	26	34	44	49	41	48	23	46	59		31
4	Cl (mg/L)	8.1	4.8	7.0	9.0	9.0	7.8	9.0	19.8	42.7	16.3	15.0	27.0	86.0		7.9
5	CO3 (mg/L)	2.4	0.0	1.6	0.0	0.0	6.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0
6	F (mg/L)	0.26	0.37	0.34	0.28	0.08	0.20	0.15	0.36	0.28	0.11	0.25	0.24	0.30		
7	HCO3 (mg/L)	185	126	151	150	112	192	249	285	297	220	207	305	358		168
8	K (mg/L)	1.7	1.8	1.2	2.5	3.1	0.8	1.0	3.6	7.1	1.2	3.1	2.6	2.4		3.7
9	Mg (mg/L)	16.2	9.2	12.1	10.6	7.8	19.6	20.0	25.0	28.6	20.3	20.9	27.2	42.0		15.9
10	Na (mg/L)	9.4	6.0	7.3	7.5	4.6	10.9	11.2	20.0	33.7	12.0	15.6	29.6	12.4		20.9
11	NH3-N (mg N/L)					0.09					0.15					0.14
12	NO2+NO3 (mg N/L)	1.31	1.80	1.30	0.89	0.86	0.27	0.53	2.32	1.12	0.24	0.06	0.79	2.12		0.43
13	NO2-N (mgN/L)	0.03	0.19	0.08	0.07	0.05	0.01	0.02	0.06	0.02	0.03	0.01	0.04	0.08		0.04
14	NO3-N (mgN/L)	1.28	1.61	1.23	0.82	0.81	0.26	0.51	2.27	1.09	0.21	0.05	0.75	2.04		0.40
15	o-PO4-P (mg P/L)	0.219	0.345	0.260	0.333	0.284	0.104	0.092	0.175	0.081	0.077	0.182	0.146	0.134		0.096
16	P-Tot (mgP/L)				0.308											
17	SiO2 (mg/L)	19.0	25.1	22.4	27.7	27.8	20.6	17.3	21.2	19.7	26.4	21.6	19.2	21.7		17.4
18	SO4 (mg/L)	9.4	20.6	15.1	13.0	14.1	2.5	10.8	18.0	9.0	24.2	2.2	9.9	24.3		4.9
	BIOLOGICAL/BACTERIOLOGICAL															
1	BOD3-27 (mg/L)	0.8	0.9	1.0	1.2	1.1	0.6	1.0	1.1	1.9	1.6	3.0	0.8	1.7		1.6
2	COD (mg/L)	28.4	41.5	48.0	33.8	28.0	25.8	36.8	34.3	29.7	15.5	44.0	40.0	21.0		16.5
3	DO (mg/L)	6.2	4.9	5.2	4.8	4.2	7.6	6.6	4.6	6.2	7.0	3.0	4.3	4.8		7.5
4	DO_SAT% (%)	74	59	62	54	50	83	72	52	67	82	34	48	54		89
	TRACE & TOXIC															
	CHEMICAL INDICES															
1	HAR_Ca (mgCaCO3/L)	76	64	78	78	66	84	109	122	101	119	57	114	148		78
2	HAR_Total (mgCaCO3/L)	143	103	128	122	98	166	193	226	220	203	144	227	324		144
3	Na% (%)	13	11	11	11	9	13	11	15	22	11	19	21	8		25
4	RSC (-)	0.3	0.1	0.0	0.1	0.0	0.3	0.2	0.2	0.5	0.1	0.5	0.5	0.0		0.2
5	SAR (-)	0.3	0.3	0.3	0.3	0.2	0.4	0.4	0.6	1.0	0.4	0.6	0.8	0.3		0.8

3.11 Narmada at Barman

History Sheet

			Water Year	**:**	**2019-2020**
Site	**:**	**Narmada at Barman**	**Code**	**:**	CW1NAU000188
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 CWC Hoshangabad
Drainage Area	:	26453 Sq. Km.	Bank	:	Right
Latitude	:	23°01'46"	Longitude	:	79°00'34"
		Opening Date	Closing Date		
Gauge	:	09/12/1970			
Discharge	:	20/11/1971			
Sediment	:	27/08/1972			
Water Quality	:	01/06/1979			

Water Quality Datasheet for the period : 2019-2020

Station Name : Narmada at Barman (CW1NAU000188) Division : Narmada Division, Bhopal

Local River : Narmada Sub-Division : MNSD-1, Hoshangabad

River Water Analysis

S.No	Parameters	03/06/2019	01/07/2019	01/08/2019	03/09/2019	03/10/2019	01/11/2019	02/12/2019	01/01/2020	03/02/2020	02/03/2020	01/04/2020	05/05/2020
	PHYSICAL	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**
1	Q (cumec)	32.70	24.10	454.0	1300	1800	280.0	88.30	101	108.0	115.0	Nationwide Lockdown	120
2	Colour_Cod (-)	Clear	Dark Brown	Dark Brown	Dark Brown	Light Brown	Clear	Clear	Clear	Clear	Clear		Clear
3	EC_GEN (µmho/cm)	245	170	190	202	185	276	292	281	255	240		452
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
5	pH_GEN (pH units)	7.3	7.2	7.9	7.3	7.8	7.9	7.7	7.9	7.3	7.8		7.4
6	TDS (mg/L)	142	104	120	124	124	168	193	190	169	160		343
7	Temp (deg C)	31.0	26.0	27.0	27.0	27.0	26.0	28.0	18.0	20.0	23.0		28.0
8	Turb (NTU)		75.0	178.0	282.0	110.0	41.0	28.0	10.0	2.6	0.5		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)	107	73	84	79	89	123	143	141	65	132		277
3	Ca (mg/L)	24	19	22	24	24	31	34	33	28	25		51
4	Cl (mg/L)	9.0	4.0	7.0	4.0	6.0	8.0	7.0	8.0	9.0	6.0		9.8
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)	0.10	0.03	0.10	0.11	0.10	0.09	0.11					
7	HCO3 (mg/L)	130	89	102	96	108	150	175	172	79	161		338
8	K (mg/L)	1.3	3.5	4.4	2.7	1.0	0.7	1.3	1.2	1.1	1.7		1.6
9	Mg (mg/L)	10.5	5.1	7.8	5.8	6.6	18.8	12.4	13.9	11.7	8.4		27.4
10	Na (mg/L)	6.5	10.1	4.8	4.5	4.4	6.6	7.9	7.8	5.8	8.9		22.0
11	NH3-N (mg N/L)	0.11	0.05	0.05	0.01	0.12	0.13	0.06	0.06	0.07	0.08		0.25
12	NO2+NO3 (mg N/L)	0.34	0.86	1.20	1.20	0.39	0.38	0.37	0.11	0.13	0.15		0.79
13	NO2-N (mgN/L)	0.01	0.04	0.08	0.08	0.01	0.02	0.02	0.03	0.03	0.04		0.05
14	NO3-N (mgN/L)	0.33	0.82	1.12	1.12	0.38	0.36	0.36	0.09	0.10	0.11		0.74
15	o-PO4-P (mg P/L)	0.013	0.239	0.346	0.299	0.012	0.022	0.036	0.087	0.074	0.053		0.027
16	SiO2 (mg/L)	62.0	21.1	9.5	15.3	25.6	25.8	22.1	14.5	13.9	18.3		26.3
17	SO4 (mg/L)	6.2	8.3	11.3	14.2	15.6	30.1	19.4	14.1	8.7	9.7		5.2
	BIOLOGICAL/BACTERIOLOGICAL												
1	BOD3-27 (mg/L)	0.7	1.3	0.8	0.9	0.4	1.0	0.9	1.4	1.4	0.7		1.4
2	COD (mg/L)	10.0	35.0	23.0	12.0	43.0	150.0	14.0	16.0	22.0	17.0		24.0
3	DO (mg/L)	5.2	5.7	5.3	6.1	5.8	6.2	6.5	6.9	6.8	6.3		7.0
4	DO_SAT% (%)	70	70	67	77	73	76	83	73	75	73		89
	TRACE & TOXIC												
	CHEMICAL INDICES												
1	HAR_Ca (mgCaCO3/L)	60	47	56	60	60	77	85	83	71	62		128
2	HAR_Total (mgCaCO3/L)	103	68	88	84	88	155	137	141	120	96		242
3	Na% (%)	12	23	10	10	10	8	11	11	10	17		16
4	RSC (-)	0.1	0.1	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.7		0.7
5	SAR (-)	0.3	0.5	0.2	0.2	0.2	0.2	0.3	0.3	0.2	0.4		0.6

Water Quality Summary for the period : 2019-2020

Station Name : Narmada at Barman (CW1NAU000188) 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)	365	11700	0.000	418.4
2	EC_GEN (µmho/cm)	11	452	170	253
3	pH_GEN (pH units)	11	7.9	7.2	7.6
4	TDS (mg/L)	11	343	104	167
5	Temp (deg C)	11	31.0	18.0	25.5
6	Turb (NTU)	10	282.0	0.0	72.7
	CHEMICAL				
1	Alk-Phen (mgCaCO3/L)	11	0.0	0.0	0
2	ALK-TOT (mgCaCO3/L)	11	277	65	119
3	Ca (mg/L)	11	51	19	29
4	Cl (mg/L)	11	9.8	4.0	7.1
5	CO3 (mg/L)	11	0.0	0.0	0
6	F (mg/L)	7	0.11	0.03	0.09
7	HCO3 (mg/L)	11	338	79	145
8	K (mg/L)	11	4.4	0.7	1.9
9	Mg (mg/L)	11	27.4	5.1	11.7
10	Na (mg/L)	11	22.0	4.4	8.1
11	NH3-N (mg N/L)	11	0.25	0.01	0.09
12	NO2+NO3 (mg N/L)	11	1.20	0.11	0.54
13	NO2-N (mgN/L)	11	0.08	0.01	0.04
14	NO3-N (mgN/L)	11	1.12	0.09	0.5
15	o-PO4-P (mg P/L)	11	0.346	0.012	0.11
16	SiO2 (mg/L)	11	62.0	9.5	23.1
17	SO4 (mg/L)	11	30.1	5.2	13
	BIOLOGICAL/BACTERIOLOGICAL				
1	BOD3-27 (mg/L)	11	1.4	0.4	1
2	COD (mg/L)	11	150.0	10.0	33.3
3	DO (mg/L)	11	7.0	5.2	6.2
4	DO_SAT% (%)	11	89	67	75
	TRACE & TOXIC				
	CHEMICAL INDICES				
1	HAR_Ca (mgCaCO3/L)	11	128	47	72
2	HAR_Total (mgCaCO3/L)	11	242	68	120
3	Na% (%)	11	23	8	13
4	RSC (-)	11	0.7	0.0	0.2
5	SAR (-)	11	0.6	0.2	0.3

Water Quality Seasonal Average for the period : 2015-2020

Station Name : Narmada at Barman (CW1NAU000188) Division : Narmada Division, Bhopal

Local River : Narmada Sub-Division : MNSD-1, Hoshangabad

River Water

S.No	Parameters	Flood					Winter					Summer				
		Jun - Oct					Nov - Feb					Mar - May				
	PHYSICAL	**2015**	**2016**	**2017**	**2018**	**2019**	**2015-2016**	**2016-2017**	**2017-2018**	**2018-2019**	**2019-2020**	**2016**	**2017**	**2018**	**2019**	**2020**
1	Q (cumec)	191.3			177.9	677.5	85.17			84.75	151.3	93.33			39.03	57.50
2	EC_FLD (µmho/cm)														252	
3	EC_GEN (µmho/cm)	193	198	250	202	198	201	224	266	242	276	224	221	250	243	346
4	pH_FLD (pH units)														7.7	
5	pH_GEN (pH units)	8.2	7.7	7.9	7.7	7.5	8.2	7.9	7.8	7.5	7.7	8.1	7.8	7.6	7.9	7.6
6	TDS (mg/L)	121	130	160	150	123	127	145	175	163	180	146	144	165	143	252
7	Temp (deg C)	28.4	28.2	28.6	28.8	27.6	21.8	21.5	20.3	19.9	23.0	25.3	25.0	25.7	25.0	25.5
8	Turb (NTU)	25.4	82.0	84.6	82.8	161.3	0.0	0.0	0.0	0.0	20.4	0.0	0.0	0.0	0.0	0.3
	CHEMICAL															
1	Alk-Phen (mgCaCO3/L)	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	0.0
2	ALK-TOT (mgCaCO3/L)	117	91	115	111	86	119	106	116	116	118	107	110	109	105	205
3	Ca (mg/L)	27	23	29	27	23	29	25	28	29	32	25	31	25	27	38
4	Cl (mg/L)	7.8	4.7	7.0	5.2	6.0	7.8	6.3	10.3	6.3	8.0	6.7	9.3	11.3	7.7	7.9
5	CO3 (mg/L)	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	0.0
6	F (mg/L)	0.33	0.32	0.29	0.30	0.09	0.23	0.15	0.29	0.18	0.10	0.32	0.20	0.20	0.12	
7	HCO3 (mg/L)	143	111	141	135	105	138	130	142	142	144	130	135	133	123	250
8	K (mg/L)	2.3	1.5	1.4	1.9	2.6	1.5	1.1	1.5	1.4	1.1	1.4	1.0	1.5	1.5	1.7
9	Mg (mg/L)	11.2	7.6	9.1	9.6	7.1	9.5	10.4	12.4	10.9	14.2	10.0	7.8	11.3	11.0	17.9
10	Na (mg/L)	8.2	5.1	7.5	5.3	6.1	9.6	5.2	8.5	8.9	7.0	6.2	6.5	6.5	6.9	15.5
11	NH3-N (mg N/L)					0.07					0.08					0.16
12	NO2+NO3 (mg N/L)	0.89	1.05	0.68	1.30	0.80	0.30	0.26	0.42	0.41	0.25	0.05	0.18	0.16	0.48	0.47
13	NO2-N (mgN/L)	0.01	0.08	0.05	0.41	0.04	0.01	0.01	0.03	0.02	0.02	0.01	0.01	0.03	0.02	0.04
14	NO3-N (mgN/L)	0.87	0.98	0.63	0.89	0.75	0.29	0.25	0.39	0.39	0.23	0.05	0.17	0.12	0.46	0.43
15	o-PO4-P (mg P/L)	0.396	0.230	0.162	0.211	0.182	0.107	0.073	0.137	0.046	0.055	0.103	0.072	0.097	0.026	0.040
16	SiO2 (mg/L)	16.7	19.3	19.3	24.1	26.7	15.8	14.3	18.7	18.1	19.1	15.0	16.5	17.4	21.3	22.3
17	SO4 (mg/L)	9.2	14.5	13.2	11.9	11.1	4.9	9.6	11.2	8.5	18.1	3.0	6.0	10.2	7.0	7.5
	BIOLOGICAL/BACTERIOLOGICAL															
1	BOD3-27 (mg/L)	0.8	0.9	0.5	0.8	0.8	1.7	1.2	1.1	1.0	1.2	0.4	1.0	1.2	0.9	1.0
2	COD (mg/L)	31.0	35.4	29.8	65.4	24.6	36.8	33.5	32.5	37.5	50.5	23.7	29.0	42.3	30.0	20.5
3	DO (mg/L)	5.9	6.0	5.4	5.3	5.6	6.4	6.2	6.4	6.5	6.6	5.6	5.4	5.7	5.5	6.7
4	DO_SAT% (%)	76	76	69	69	71	72	70	71	71	77	67	65	69	66	81
	TRACE & TOXIC															
	CHEMICAL INDICES															
1	HAR_Ca (mgCaCO3/L)	67	57	72	67	57	73	63	69	72	79	62	78	61	67	95
2	HAR_Total (mgCaCO3/L)	114	89	110	107	86	113	106	121	117	138	104	111	108	113	169
3	Na% (%)	13	11	13	10	13	15	10	13	14	10	11	11	11	12	17
4	RSC (-)	0.1	0.1	0.1	0.1	0.0	0.1	0.1	0.0	0.1	0.0	0.1	0.1	0.1	0.0	0.7
5	SAR (-)	0.3	0.2	0.3	0.2	0.3	0.4	0.2	0.3	0.4	0.3	0.3	0.3	0.3	0.3	0.5

3.12 Sher at Belkheri

History sheet

			Water Year	**:**	**2019-2020**
Site	**:**	**Sher at Belkheri**	**Code**	**:**	CW1NAU000395
State	:	Madhya Pradesh	District		Narsinghpur
Basin	:	Narmada	Independent River	:	Narmada
Tributary	:	Sher	Sub Tributary	:	
Sub-Sub Tributary	:		Local River	:	Sher
Division	:	NARMADA DIVISION BHOPAL	Sub-Division	:	MNSD-1 HOSHANGABAD
Drainage Area	:	1508 Sq. Km.	Bank	:	Right
Latitude	:	22°55'01"	Longitude	:	79°20'32"
		Opening Date	Closing Date		
Gauge	:	16/03/1977			
Discharge	:	16/03/1977			
Sediment	:				
Water Quality	:	01/09/1986			

Water Quality Datasheet for the period : 2019-2020

Station Name : Sher at Belkheri (CW1NAU000395) Division : Narmada Division, Bhopal

Local River : Sher Sub-Division : MNSD-1, Hoshangabad

River Water Analysis

S.No	Parameters	03/06/2019	01/07/2019	01/08/2019	03/09/2019	03/10/2019	01/11/2019	02/12/2019	01/01/2020	03/02/2020	02/03/2020	01/04/2020	05/05/2020
	PHYSICAL	A	A	A	A	A	A	A	A	A	A	A	A
1	Q (cumec)		6.65	34.11	102.2	99.51	11.47	3.75	2.25	1.75			
2	Colour_Cod (-)	Clear	Clear	Dark Brown	Light Brown	Clear	Clear	Clear	Clear	Clear			Clear
3	EC_GEN (µmho/cm)	497	398	187	450	315	432	536	503	515			399
4	Odour_Code (-)	odour free	odour free	odour free	odour free	odour free	odour free	odour free	odour free	odour free			odour free
5	pH_GEN (pH units)	7.1	7.1	7.8	7.4	8.0	7.9	7.7	7.8	7.3			7.2
6	TDS (mg/L)	296	248	117	294	206	351	354	340	354			285
7	Temp (deg C)	31.0	28.0	26.0	25.0	27.0	27.0	22.0	19.0	19.0			23.0
8	Turb (NTU)		10.0	142.0	277.0	35.0	425.0	35.0	44.0	2.6			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
2	ALK-TOT (mgCaCO3/L)	269	205	84	231	159	210	282	275	143			196
3	Ca (mg/L)	42	42	22	43	40	36	54	50	52			46
4	Cl (mg/L)	12.0	9.0	9.0	7.0	10.0	7.0	9.0	9.0	11.0			15.7
5	CO3 (mg/L)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0
6	F (mg/L)	0.12	0.03	0.09	0.09	0.10	0.11	0.13					
7	HCO3 (mg/L)	328	250	102	282	194	256	344	335	174			239
8	K (mg/L)	1.1	4.0	4.2	2.2	0.6	0.7	0.8	0.8	0.6			10.2
9	Mg (mg/L)	29.2	17.3	7.3	21.9	12.7	18.7	29.2	30.9	29.4			13.4
10	Na (mg/L)	16.7	13.4	4.5	12.6	7.3	9.3	14.0	13.8	14.3			25.6
11	NH3-N (mg N/L)	0.17	0.06	0.04	0.03	0.10	0.13	0.13	0.11	0.15			0.30
12	NO2+NO3 (mg N/L)	0.23	2.33	0.99	0.99	0.46	0.46	0.42	0.14	0.23			1.64
13	NO2-N (mgN/L)	0.01	1.83	0.08	0.09	0.00	0.02	0.02	0.03	0.07			0.18
14	NO3-N (mgN/L)	0.23	0.49	0.91	0.91	0.46	0.44	0.40	0.11	0.16			1.45
15	o-PO4-P (mg P/L)	0.006	0.434	0.224	0.187	0.003	0.058	0.070	0.131	0.118			1.007
16	SiO2 (mg/L)	65.2	52.8	19.9	21.1	46.8	43.0	28.5	18.7	17.7			18.3
17	SO4 (mg/L)	6.5	8.9	12.8	14.1	9.7	44.0	16.7	14.6	12.5			8.6
	BIOLOGICAL/BACTERIOLOGICAL												
1	BOD3-27 (mg/L)	0.9	1.3	0.6	0.6	0.3	0.8	0.8	1.0	0.8			3.8
2	COD (mg/L)	17.0	34.0	20.0	11.0	21.0	18.0	14.0	15.0	24.0			28.0
3	DO (mg/L)	4.7	3.0	5.0	5.7	5.9	6.0	6.5	7.6	6.4			4.4
4	DO_SAT% (%)	63	38	62	69	74	75	74	82	69			51
	TRACE & TOXIC												
	CHEMICAL INDICES												
1	HAR_Ca (mgCaCO3/L)	104	104	56	108	100	91	134	125	131			116
2	HAR_Total (mgCaCO3/L)	225	176	86	199	153	169	256	254	254			171
3	Na% (%)	14	14	10	12	9	11	11	11	11			23
4	RSC (-)	0.9	0.6	0.0	0.7	0.1	0.8	0.6	0.4	0.0			0.5
5	SAR (-)	0.5	0.4	0.2	0.4	0.3	0.3	0.4	0.4	0.4			0.9

Manpower Shortage

Nationwide Lockdown

Water Quality Summary for the period : 2019-2020

Station Name : Sher at Belkheri (CW1NAU000395) 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_GEN (µmho/cm)	10	536	187	423
3	pH_GEN (pH units)	10	8.0	7.1	7.5
4	TDS (mg/L)	10	354	117	285
5	Temp (deg C)	10	31.0	19.0	24.7
6	Turb (NTU)	9	425.0	0.0	107.8
	CHEMICAL				
1	Alk-Phen (mgCaCO3/L)	10	0.0	0.0	0
2	ALK-TOT (mgCaCO3/L)	10	282	84	205
3	Ca (mg/L)	10	54	22	43
4	Cl (mg/L)	10	15.7	7.0	9.9
5	CO3 (mg/L)	10	0.0	0.0	0
6	F (mg/L)	7	0.13	0.03	0.1
7	HCO3 (mg/L)	10	344	102	250
8	K (mg/L)	10	10.2	0.6	2.5
9	Mg (mg/L)	10	30.9	7.3	21
10	Na (mg/L)	10	25.6	4.5	13.1
11	NH3-N (mg N/L)	10	0.30	0.03	0.12
12	NO2+NO3 (mg N/L)	10	2.33	0.14	0.79
13	NO2-N (mgN/L)	10	1.83	0.00	0.23
14	NO3-N (mgN/L)	10	1.45	0.11	0.56
15	o-PO4-P (mg P/L)	10	1.007	0.003	0.224
16	SiO2 (mg/L)	10	65.2	17.7	33.2
17	SO4 (mg/L)	10	44.0	6.5	14.8
	BIOLOGICAL/BACTERIOLOGICAL				
1	BOD3-27 (mg/L)	10	3.8	0.3	1.1
2	COD (mg/L)	10	34.0	11.0	20.2
3	DO (mg/L)	10	7.6	3.0	5.5
4	DO_SAT% (%)	10	82	38	66
	TRACE & TOXIC				
	CHEMICAL INDICES				
1	HAR_Ca (mgCaCO3/L)	10	134	56	107
2	HAR_Total (mgCaCO3/L)	10	256	86	194
3	Na% (%)	10	23	9	13
4	RSC (-)	10	0.9	0.0	0.5
5	SAR (-)	10	0.9	0.2	0.4

Water Quality Seasonal Average for the period : 2015-2020

Station Name : Sher at Belkheri (CW1NAU000395) Division : Narmada Division, Bhopal

Local River : Sher Sub-Division : MNSD-1, Hoshangabad

River Water

S.No	Parameters	Flood					Winter					Summer				
		Jun - Oct					Nov - Feb					Mar - May				
	PHYSICAL	**2015**	**2016**	**2017**	**2018**	**2019**	**2015-2016**	**2016-2017**	**2017-2018**	**2018-2019**	**2019-2020**	**2016**	**2017**	**2018**	**2019**	**2020**
1	Q (cumec)	11.46					0.646					0.359				
2	EC_FLD (µmho/cm)														537	
3	EC_GEN (µmho/cm)	286	296	287	340	369	404	521	474	512	497	523	451	504	525	399
4	pH_FLD (pH units)														7.3	
5	pH_GEN (pH units)	8.0	7.6	7.8	7.8	7.5	8.0	7.8	7.8	7.3	7.7	7.8	7.7	8.0	7.4	7.2
6	TDS (mg/L)	178	191	181	220	232	258	339	311	335	350	341	290	327	313	285
7	Temp (deg C)	29.0	27.4	27.0	28.1	27.4	23.5	21.5	22.0	20.0	21.8	25.0	25.7	26.0	24.0	23.0
8	Turb (NTU)	17.6	96.2	62.4	67.6	116.0	0.0	0.0	0.0	0.0	126.6	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	ALK-TOT (mgCaCO3/L)	187	99	148	170	190	269	274	250	299	227	284	259	270	281	196
3	Ca (mg/L)	33	28	30	38	38	38	49	42	47	48	42	39	34	49	46
4	Cl (mg/L)	8.5	5.2	6.4	8.8	9.4	8.0	8.5	6.3	9.0	9.0	7.3	9.7	7.0	7.3	15.7
5	CO3 (mg/L)	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	0.0
6	F (mg/L)	0.34	0.33	0.31	0.41	0.09	0.23	0.20	0.26	0.28	0.12	0.47	0.51	0.24	0.15	
7	HCO3 (mg/L)	226	121	180	207	231	329	335	305	365	277	346	316	330	342	239
8	K (mg/L)	1.6	1.1	0.8	2.1	2.4	0.9	0.8	1.1	3.5	0.7	1.1	0.9	1.3	1.1	10.2
9	Mg (mg/L)	21.3	15.8	15.3	15.3	17.6	33.3	27.2	26.9	34.4	27.0	31.8	27.8	30.7	30.4	13.4
10	Na (mg/L)	11.0	7.4	8.5	9.6	10.9	16.3	14.5	15.5	26.7	12.8	16.1	17.5	19.4	20.8	25.6
11	NH3-N (mg N/L)					0.08					0.13					0.30
12	NO2+NO3 (mg N/L)	1.25	1.09	0.68	1.61	1.00	0.78	0.75	0.22	0.59	0.31	0.07	0.76	1.02	0.79	1.64
13	NO2-N (mgN/L)	0.03	0.13	0.05	0.25	0.40	0.01	0.05	0.03	0.03	0.03	0.01	0.05	0.06	0.02	0.18
14	NO3-N (mgN/L)	1.22	0.96	0.64	1.36	0.60	0.77	0.69	0.20	0.56	0.28	0.07	0.72	0.96	0.77	1.45
15	o-PO4-P (mg P/L)	0.627	0.262	0.165	0.241	0.171	0.103	0.204	0.075	0.118	0.094	0.291	0.213	0.073	0.021	1.007
16	SiO2 (mg/L)	23.7	23.0	22.3	27.0	41.2	37.3	22.4	20.2	19.5	27.0	30.9	27.3	19.3	38.2	18.3
17	SO4 (mg/L)	10.4	17.3	13.1	13.2	10.4	5.6	13.3	12.1	10.0	21.9	12.5	11.3	9.3	6.8	8.6
	BIOLOGICAL/BACTERIOLOGICAL															
1	BOD3-27 (mg/L)	0.5	0.9	0.9	1.1	0.7	0.8	1.4	0.9	1.1	0.9	1.1	1.3	2.2	0.9	3.8
2	COD (mg/L)	22.2	41.2	41.6	36.0	20.6	25.3	40.0	46.3	36.3	17.8	27.3	35.7	40.7	20.0	28.0
3	DO (mg/L)	5.7	5.1	5.4	5.1	4.9	6.7	7.6	6.8	6.8	6.6	5.3	5.3	5.7	5.3	4.4
4	DO_SAT% (%)	74	64	68	66	61	78	85	78	74	75	64	65	70	62	51
	TRACE & TOXIC															
	CHEMICAL INDICES															
1	HAR_Ca (mgCaCO3/L)	83	71	74	95	94	95	122	106	118	120	105	98	85	123	116
2	HAR_Total (mgCaCO3/L)	172	136	138	158	168	234	236	218	262	233	237	214	213	249	171
3	Na% (%)	13	11	11	11	12	13	11	13	18	11	13	15	17	15	23
4	RSC (-)	0.3	0.2	0.2	0.3	0.5	0.7	0.8	0.7	0.8	0.5	1.0	0.9	1.2	0.7	0.5
5	SAR (-)	0.4	0.3	0.3	0.3	0.4	0.5	0.4	0.5	0.7	0.4	0.5	0.5	0.6	0.6	0.9

3.13 Hiran at Patan

History sheet

Water Year : 2019-2020

			Water Year	**:**	**2019-2020**
Site	**:**	**Hiran at Patan**	**Code**	**:**	CW1NAU000530
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"
		Opening Date	Closing Date		
Gauge	:	30/08/1979			
Discharge	:	30/08/1979			
Sediment	:				
Water Quality	:	01/09/1986			

Water Quality Datasheet for the period : 2019-2020

Station Name : Hiran at Patan (CW1NAU000530) Division : Narmada Division, Bhopal

Local River : Hiran Sub-Division : UNSD, Jabalpur

River Water Analysis

S.No	Parameters	03/06/2019	01/07/2019	01/08/2019	03/09/2019	03/10/2019	01/11/2019	02/12/2019	01/01/2020	03/02/2020	02/03/2020	01/04/2020	05/05/2020
	PHYSICAL	A	A	A	A	A	A	A	A	A	A	A	A
1	Q (cumec)			24.48	101.2	210.6	38.34	9.8	7.25	6.19	2.42		3.5
2	Colour_Cod (-)	Clear	Light Brown	Dark Brown	Dark Brown	Light Brown	Clear	Clear	Clear	Clear	Clear		Clear
3	EC_GEN (µmho/cm)	641	284	241	335	252	510	594	474	499	564		213
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
5	pH_GEN (pH units)	7.9	7.6	7.6	7.9	7.4	7.5	7.8	7.6	7.1	7.7		7.2
6	TDS (mg/L)	376	172	171	196	162	307	382	329	327	342		160
7	Temp (deg C)	29.5	29.0	27.5	29.0	27.5	25.5	22.0	14.5	18.5	22.5		27.5
8	Turb (NTU)		44.0	266.0	265.0	142.0	48.0	39.0	21.0	7.1	2.4		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)	206	102	91	135	120	230	272	224	119	232		111
3	Ca (mg/L)	26	17	25	98	34	60	67	55	65	56		26
4	Cl (mg/L)	68.0	29.0	6.0	11.0	3.0	17.0	23.0	23.0	26.0	12.0		9.8
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)	0.20	0.03	0.12	0.12	0.11	0.12	0.14					
7	HCO3 (mg/L)	251	125	111	165	146	280	332	273	145	283		136
8	K (mg/L)	8.8	8.6	8.2	4.5	1.5	3.0	4.9	5.6	5.5	11.1		3.2
9	Mg (mg/L)	21.4	11.9	7.8	9.2	7.8	17.5	23.3	19.0	9.7	16.3		8.8
10	Na (mg/L)	61.3	22.6	9.2	9.3	7.2	13.6	19.4	18.2	19.2	37.7		12.7
11	NH3-N (mg N/L)	0.22	0.04	0.05	0.08	0.06	0.09	0.14	0.12	0.14	0.26		0.08
12	NO2+NO3 (mg N/L)	0.61	3.09	1.11	1.12	0.49	0.51	0.43	0.12	0.17	0.88		0.16
13	NO2-N (mgN/L)	0.08	2.58	0.09	0.09	0.00	0.02	0.02	0.03	0.05	0.04		0.05
14	NO3-N (mgN/L)	0.53	0.51	1.02	1.03	0.49	0.50	0.41	0.09	0.12	0.84		0.11
15	o-PO4-P (mg P/L)	0.215	0.406	0.426	0.189	0.068	0.053	0.076	0.125	0.114	0.131		0.012
16	SiO2 (mg/L)	27.1	13.8	27.6	28.6	19.7	21.9	29.3	19.0	20.3	18.9		16.4
17	SO4 (mg/L)	16.2	9.4	12.9	21.7	7.5	50.4	19.6	19.0	11.6	5.8		5.2
	BIOLOGICAL/BACTERIOLOGICAL												
1	BOD3-27 (mg/L)	1.2	4.3	0.8	0.8	0.9	0.9	2.3	2.6	2.8	3.4		2.0
2	COD (mg/L)	40.0	34.0	29.0	19.0	27.0	14.0	32.0	26.0	26.0	3.0		16.0
3	DO (mg/L)	1.4	5.8	3.9	3.7	5.0	3.9	5.6	5.5	4.1	5.6		7.8
4	DO_SAT% (%)	18	75	49	48	63	47	64	53	43	64		98
	TRACE & TOXIC												
	CHEMICAL INDICES												
1	HAR_Ca (mgCaCO3/L)	66	43	62	246	86	150	167	138	162	141		66
2	HAR_Total (mgCaCO3/L)	155	93	94	284	118	223	264	217	203	209		102
3	Na% (%)	45	32	16	7	12	12	14	15	17	27		21
4	RSC (-)	1.0	0.2	0.0	0.0	0.0	0.1	0.2	0.2	0.0	0.5		0.2
5	SAR (-)	2.1	1.0	0.4	0.2	0.3	0.4	0.5	0.5	0.6	1.1		0.5

Nationwide Lockdown

Water Quality Summary for the period : 2019-2020

Station Name : Hiran at Patan (CW1NAU000530) 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_GEN (µmho/cm)	11	641	213	419
3	pH_GEN (pH units)	11	7.9	7.1	7.6
4	TDS (mg/L)	11	382	160	266
5	Temp (deg C)	11	29.5	14.5	24.8
6	Turb (NTU)	10	266.0	0.0	83.5
	CHEMICAL				
1	Alk-Phen (mgCaCO3/L)	11	0.0	0.0	0
2	ALK-TOT (mgCaCO3/L)	11	272	91	167
3	Ca (mg/L)	11	98	17	48
4	Cl (mg/L)	11	68.0	3.0	20.7
5	CO3 (mg/L)	11	0.0	0.0	0
6	F (mg/L)	7	0.20	0.03	0.12
7	HCO3 (mg/L)	11	332	111	204
8	K (mg/L)	11	11.1	1.5	5.9
9	Mg (mg/L)	11	23.3	7.8	13.9
10	Na (mg/L)	11	61.3	7.2	20.9
11	NH3-N (mg N/L)	11	0.26	0.04	0.12
12	NO2+NO3 (mg N/L)	11	3.09	0.12	0.79
13	NO2-N (mgN/L)	11	2.58	0.00	0.28
14	NO3-N (mgN/L)	11	1.03	0.09	0.51
15	o-PO4-P (mg P/L)	11	0.426	0.012	0.165
16	SiO2 (mg/L)	11	29.3	13.8	22.1
17	SO4 (mg/L)	11	50.4	5.2	16.3
	BIOLOGICAL/BACTERIOLOGICAL				
1	BOD3-27 (mg/L)	11	4.3	0.8	2
2	COD (mg/L)	11	40.0	3.0	24.2
3	DO (mg/L)	11	7.8	1.4	4.8
4	DO_SAT% (%)	11	98	18	57
	TRACE & TOXIC				
	CHEMICAL INDICES				
1	HAR_Ca (mgCaCO3/L)	11	246	43	121
2	HAR_Total (mgCaCO3/L)	11	284	93	178
3	Na% (%)	11	45	7	20
4	RSC (-)	11	1.0	0.0	0.2
5	SAR (-)	11	2.1	0.2	0.7

Water Quality Seasonal Average for the period : 2015-2020

Station Name : Hiran at Patan (CW1NAU000530) Division : Narmada Division, Bhopal

Local River : Hiran Sub-Division : UNSD, Jabalpur

River Water Analysis

S.No	Parameters	Flood					Winter					Summer				
		Jun - Oct					Nov - Feb					Mar - May				
	PHYSICAL	2015	2016	2017	2018	2019	2015-2016	2016-2017	2017-2018	2018-2019	2019-2020	2016	2017	2018	2019	2020
1	Q (cumec)	56.63			174.0		10.41					2.302				
2	EC_FLD (µmho/cm)														571	
3	EC_GEN (µmho/cm)	273	269	254	390	351	402	483	480	498	519	448	314		557	389
4	pH_FLD (pH units)														8.0	
5	pH_GEN (pH units)	8.0	7.5	7.8	7.5	7.7	8.1	7.6	7.6	7.3	7.5	8.3	7.6		7.8	7.5
6	TDS (mg/L)	166	172	163	248	215	258	311	315	333	336	294	204		333	251
7	Temp (deg C)	28.8	29.4	29.8	26.9	28.5	22.8	21.1	26.0	19.9	20.1	22.8	24.0		24.7	25.0
8	Turb (NTU)	303.6	130.0	98.8	106.8	179.3	0.0	0.0	0.0	0.0	28.8	0.0	0.0		0.0	1.2
	CHEMICAL															
1	Alk-Phen (mgCaCO3/L)	1.5	0.0	0.0	0.0	0.0	3.5	0.0	0.0	0.0	0.0	6.9	0.0		0.0	0.0
2	ALK-TOT (mgCaCO3/L)	159	115	114	124	131	221	211	202	247	211	188	149		217	172
3	Ca (mg/L)	33	28	30	35	40	50	52	45	54	62	39	36		51	41
4	Cl (mg/L)	17.0	5.4	7.3	29.3	23.4	16.5	18.3	12.0	27.3	22.3	20.5	14.0		31.7	10.9
5	CO3 (mg/L)	1.8	0.0	0.0	0.0	0.0	4.2	0.0	0.0	0.0	0.0	8.4	0.0		0.0	0.0
6	F (mg/L)	0.37	0.35	0.33	0.30	0.12	0.32	0.20	0.29	0.33	0.13	0.53	0.43		0.21	
7	HCO3 (mg/L)	190	140	140	151	160	261	258	246	301	258	213	182		265	210
8	K (mg/L)	4.9	2.8	2.3	8.2	6.3	5.9	4.1	3.4	8.4	4.7	5.5	3.2		11.8	7.1
9	Mg (mg/L)	15.3	8.7	7.8	9.3	11.6	18.3	17.1	15.3	23.1	17.4	14.5	13.2		16.6	12.5
10	Na (mg/L)	16.6	14.1	9.0	7.4	21.9	20.4	15.5	12.3	33.0	17.6	18.8	13.8		33.2	25.2
11	NH3-N (mg N/L)					0.09					0.12					0.17
12	NO2+NO3 (mg N/L)	1.34	1.65	1.21	2.04	1.28	2.43	0.72	1.20	1.01	0.31	2.17	0.76		2.72	0.52
13	NO2-N (mgN/L)	0.12	0.28	0.06	0.15	0.57	0.09	0.04	0.05	0.03	0.03	0.08	0.04		0.77	0.05
14	NO3-N (mgN/L)	1.21	1.36	1.15	1.89	0.71	2.34	0.68	1.15	0.98	0.28	2.09	0.73		1.94	0.47
15	o-PO4-P (mg P/L)	0.537	0.346	0.246	0.475	0.261	0.632	0.247	0.222	0.304	0.092	0.281	0.192		0.818	0.071
16	SiO2 (mg/L)	15.4	18.4	20.9	24.7	23.4	13.0	15.9	18.7	19.5	22.6	24.6	20.2		30.4	17.7
17	SO4 (mg/L)	13.2	17.5	10.5	13.4	13.5	5.1	10.8	3.1	9.6	25.1	8.9	5.5		9.1	5.5
	BIOLOGICAL/BACTERIOLOGICAL															
1	BOD3-27 (mg/L)	0.8	0.7	1.0	1.3	1.6	1.7	2.5	1.0	1.5	2.1	1.4	1.6		1.6	2.7
2	COD (mg/L)	26.0	40.0	35.5	28.5	29.8	40.3	38.3	38.0	46.0	24.5	36.5	46.0		35.7	9.5
3	DO (mg/L)	5.2	4.7	4.2	4.6	4.0	5.9	6.1	5.8	5.2	4.8	5.3	4.6		2.5	6.7
4	DO_SAT% (%)	67	62	55	57	51	68	67	71	57	52	62	54		29	81
	TRACE & TOXIC															
	CHEMICAL INDICES															
1	HAR_Ca (mgCaCO3/L)	83	70	75	88	101	125	129	112	136	154	97	90		126	103
2	HAR_Total (mgCaCO3/L)	146	107	108	127	149	202	200	176	232	227	157	145		196	156
3	Na% (%)	18	23	16	11	22	18	14	13	22	14	20	17		26	24
4	RSC (-)	0.3	0.2	0.1	0.2	0.3	0.4	0.3	0.5	0.6	0.1	0.6	0.1		0.5	0.3
5	SAR (-)	0.6	0.6	0.4	0.3	0.8	0.6	0.5	0.4	0.9	0.5	0.7	0.5		1.0	0.8

3.14 Banjar at Bamni

History sheet

			Water Year	**:**	**2019-2020**
Site	**:**	**Banjar at Bamni**	**Code**	**:**	CW1NAU000781
State	:	Madhya Pradesh	District		Mandla
Basin	:	Narmada	Independent River	:	Narmada
Tributary	:	Banjar	Sub Tributary	:	
Sub-Sub Tributary	:		Local River	:	Banjar
Division	:	Narmada Divn Bhopal	Sub-Division	:	UNSD Jabalpur
Drainage Area	:	1864 Sq. Km.	Bank	:	Left
Latitude	:	22°29'03"	Longitude	:	80°22'41"
		Opening Date	Closing Date		
Gauge	:	20/06/1999			
Discharge	:	30/11/1999			
Sediment	:	01/07/2002			
Water Quality	:	01/07/2002			

Water Quality Datasheet for the period : 2019-2020

Station Name : Banjar at Bamni (CW1NAU000781) Division : Narmada Division, Bhopal

Local River : Banjar Sub-Division : UNSD, Jabalpur

River Water Analysis

S.No	Parameters	03/06/2019	01/07/2019	01/08/2019	03/09/2019	03/10/2019	01/11/2019	02/12/2019	01/01/2020	03/02/2020	02/03/2020	01/04/2020	05/05/2020
	PHYSICAL	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**
1	Q (cumec)	No Flow / Stagnant Water	No Flow / Stagnant Water	32.58	129.0	192.7	Manpower shortage	Manpower shortage	Manpower shortage	Manpower shortage	Manpower shortage	Nationwide Lockdown	0.00
2	Colour_Cod (-)			Brown	Light Brown	Light Brown							Clear
3	EC_GEN (µmho/cm)			124	165	185							246
4	Odour_Code (-)			odour free	odour free	odour free							odour free
5	pH_GEN (pH units)			7.8	7.2	7.7							7.4
6	TDS (mg/L)			80	103	120							185
7	Temp (deg C)			23.0	28.0	23.5							28.5
8	Turb (NTU)			121.0	130.0	130.0							0.0
	CHEMICAL												
1	Alk-Phen (mgCaCO3/L)			0.0	0.0	0.0							0.0
2	ALK-TOT (mgCaCO3/L)			61	73	82							150
3	Ca (mg/L)			16	19	22							32
4	Cl (mg/L)			4.0	5.0	5.0							5.9
5	CO3 (mg/L)			0.0	0.0	0.0							0.0
6	F (mg/L)			0.10	0.11	0.11							
7	HCO3 (mg/L)			74	89	100							183
8	K (mg/L)			5.3	2.6	1.2							2.1
9	Mg (mg/L)			5.3	4.9	6.1							10.1
10	Na (mg/L)			3.9	4.5	5.7							11.3
11	NH3-N (mg N/L)			0.04	0.02	0.08							0.07
12	NO2+NO3 (mg N/L)			1.31	1.32	0.28							0.06
13	NO2-N (mgN/L)			0.13	0.12	0.01							0.01
14	NO3-N (mgN/L)			1.18	1.20	0.27							0.05
15	o-PO4-P (mg P/L)			0.419	0.317	0.012							0.026
16	SiO2 (mg/L)			12.9	14.2	28.0							18.7
17	SO4 (mg/L)			11.2	12.1	8.7							5.8
	BIOLOGICAL/BACTERIOLOGICAL												
1	BOD3-27 (mg/L)			1.1	0.5	0.5							1.0
2	COD (mg/L)			39.0	28.0	10.0							19.0
3	DO (mg/L)			5.6	5.2	5.7							6.2
4	DO_SAT% (%)			65	66	67							79
	TRACE & TOXIC												
	CHEMICAL INDICES												
1	HAR_Ca (mgCaCO3/L)			40	48	55							79
2	HAR_Total (mgCaCO3/L)			62	68	81							121
3	Na% (%)			11	12	13							17
4	RSC (-)			0.0	0.1	0.0							0.6
5	SAR (-)			0.2	0.2	0.3							0.4

Water Quality Summary for the period : 2019-2020

Station Name : Banjar at Bamni (CW1NAU000781) 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)	123	1120	0.000	117.2
2	EC_GEN (µmho/cm)	4	246	124	180
3	pH_GEN (pH units)	4	7.8	7.2	7.5
4	TDS (mg/L)	4	185	80	122
5	Temp (deg C)	4	28.5	23.0	25.8
6	Turb (NTU)	4	130.0	0.0	95.3
	CHEMICAL				
1	Alk-Phen (mgCaCO3/L)	4	0.0	0.0	0
2	ALK-TOT (mgCaCO3/L)	4	150	61	91
3	Ca (mg/L)	4	32	16	22
4	Cl (mg/L)	4	5.9	4.0	5
5	CO3 (mg/L)	4	0.0	0.0	0
6	F (mg/L)	3	0.11	0.10	0.11
7	HCO3 (mg/L)	4	183	74	112
8	K (mg/L)	4	5.3	1.2	2.8
9	Mg (mg/L)	4	10.1	4.9	6.6
10	Na (mg/L)	4	11.3	3.9	6.4
11	NH3-N (mg N/L)	4	0.08	0.02	0.05
12	NO2+NO3 (mg N/L)	4	1.32	0.06	0.74
13	NO2-N (mgN/L)	4	0.13	0.01	0.07
14	NO3-N (mgN/L)	4	1.20	0.05	0.68
15	o-PO4-P (mg P/L)	4	0.419	0.012	0.194
16	SiO2 (mg/L)	4	28.0	12.9	18.5
17	SO4 (mg/L)	4	12.1	5.8	9.4
	BIOLOGICAL/BACTERIOLOGICAL				
1	BOD3-27 (mg/L)	4	1.1	0.5	0.8
2	COD (mg/L)	4	39.0	10.0	24
3	DO (mg/L)	4	6.2	5.2	5.7
4	DO_SAT% (%)	4	79	65	69
	TRACE & TOXIC				
	CHEMICAL INDICES				
1	HAR_Ca (mgCaCO3/L)	4	79	40	56
2	HAR_Total (mgCaCO3/L)	4	121	62	83
3	Na% (%)	4	17	11	13
4	RSC (-)	4	0.6	0.0	0.2
5	SAR (-)	4	0.4	0.2	0.3

Water Quality Seasonal Average for the period : 2015-2020

Station Name : Banjar at Bamni (CW1NAU000781) Division : Narmada Division, Bhopal

Local River : Banjar Sub-Division : UNSD, Jabalpur

River Water

S.No	Parameters	Flood					Winter					Summer				
		Jun - Oct					Nov - Feb					Mar - May				
		2015	2016	2017	2018	2019	2015-2016	2016-2017	2017-2018	2018-2019	2019-2020	2016	2017	2018	2019	2020
	PHYSICAL															
1	Q (cumec)	30.64			15.87	88.57	3.859					0.166			0.000	
2	EC_GEN (µmho/cm)	134	127	131	192	158	174	220	276			372	268	315		246
3	pH_GEN (pH units)	7.9	7.3	7.9	7.6	7.6	8.0	7.5	7.6			8.1	7.6	7.9		7.4
4	TDS (mg/L)	84	80	85	130	101	111	143	182			241	174	205		185
5	Temp (deg C)	26.8	26.4	25.9	25.3	24.8	18.6	15.4	18.1			23.8	19.7	18.0		28.5
6	Turb (NTU)	47.8	138.5	113.3	140.8	127.0	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			1.6	0.0	0.0		0.0
2	ALK-TOT (mgCaCO3/L)	76	54	56	75	72	98	98	130			153	137	144		150
3	Ca (mg/L)	19	14	13	20	19	22	24	29			23	29	30		32
4	Cl (mg/L)	6.2	4.1	4.0	7.0	4.7	4.5	6.5	4.8			21.7	11.3	7.0		5.9
5	CO3 (mg/L)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			1.9	0.0	0.0		0.0
6	F (mg/L)	0.27	0.28	0.27	0.29	0.11	0.22	0.15	0.25			0.28	0.32	0.26		
7	HCO3 (mg/L)	93	66	69	91	88	120	120	158			183	168	176		183
8	K (mg/L)	4.0	3.1	1.6	2.8	3.0	2.0	1.5	1.7			5.4	2.1	2.1		2.1
9	Mg (mg/L)	7.6	5.3	5.0	6.3	5.4	9.8	7.4	11.1			14.9	11.3	12.9		10.1
10	Na (mg/L)	8.2	4.2	4.5	6.1	4.7	8.0	7.1	8.2			30.0	13.3	9.3		11.3
11	NH3-N (mg N/L)					0.04										0.07
12	NO2+NO3 (mg N/L)	0.74	0.93	0.69	1.47	0.97	0.10	0.15	0.16			0.07	0.14	0.11		0.06
13	NO2-N (mgN/L)	0.03	0.13	0.04	0.48	0.09	0.01	0.01	0.03			0.01	0.01	0.02		0.01
14	NO3-N (mgN/L)	0.71	0.79	0.65	0.98	0.88	0.09	0.14	0.13			0.05	0.13	0.08		0.05
15	o-PO4-P (mg P/L)	0.346	0.344	0.261	0.274	0.249	0.081	0.070	0.068			0.099	0.051	0.052		0.026
16	SiO2 (mg/L)	12.3	17.9	18.9	24.2	18.4	12.5	15.0	17.0			19.1	17.0	15.9		18.7
17	SO4 (mg/L)	16.6	15.2	12.4	12.6	10.7	5.9	8.5	12.3			4.1	3.2	10.8		5.8
	BIOLOGICAL/BACTERIOLOGICAL															
1	BOD3-27 (mg/L)	0.8	0.8	0.6	0.7	0.7	0.6	1.0	1.1			1.9	1.8	1.5		1.0
2	COD (mg/L)	26.5	36.0	47.5	41.8	25.7	26.0	39.8	30.8			35.3	36.0	33.0		19.0
3	DO (mg/L)	6.3	4.6	5.1	5.2	5.5	6.8	6.5	6.4			5.3	4.5	4.2		6.2
4	DO_SAT% (%)	78	58	63	63	66	72	66	67			61	47	44		79
	TRACE & TOXIC															
	CHEMICAL INDICES															
1	HAR_Ca (mgCaCO3/L)	47	35	31	50	48	55	60	72			57	73	74		79
2	HAR_Total (mgCaCO3/L)	79	57	52	76	70	96	91	118			119	120	128		121
3	Na% (%)	18	13	15	14	12	15	14	13			35	19	14		17
4	RSC (-)	0.0	0.0	0.1	0.1	0.0	0.1	0.2	0.2			0.7	0.4	0.3		0.6
5	SAR (-)	0.4	0.2	0.3	0.3	0.2	0.4	0.3	0.3			1.3	0.5	0.4		0.4

3.15 Burhner at Mohgaon

History Sheet

			Water Year	**:**	**2019-2020**
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 Divn. Bhopal	Sub-Division	:	UNSD Jabalpur
Drainage Area	:	3919 Sq. Km.	Bank	:	Right
Latitude	:	22°45'42"	Longitude	:	80°37'26"
		Opening Date	Closing Date		
Gauge	:	13/01/1977			
Discharge	:	13/01/1977			
Sediment	:	27/08/1992			
Water Quality	:	16/09/1986			

Water Quality Datasheet for the period : 2019-2020

Station Name : Burhner at Mohgaon (010215004) Division : Narmada Division, Bhopal

Local River : Burhner Sub-Division : UNSD, Jabalpur

River Water Analysis

S.No	Parameters	03/06/2019	01/07/2019	01/08/2019	03/09/2019	03/10/2019	01/11/2019	02/12/2019	01/01/2020	03/02/2020	02/03/2020	01/04/2020	05/05/2020
	PHYSICAL	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**
1	Q (cumec)	0.000	18.08	263.1	184.8	221	57.5	14.8	9.9	9.5	8.85	Lockdown	
2	Colour_Cod (-)	Clear	Light Brown	Brown	Light Brown	Light Brown	Clear	Clear	Clear	Clear	Clear		Clear
3	EC_GEN (µmho/cm)	326	211	125	176	187	206	235	221	231	224		229
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
5	pH_GEN (pH units)	7.4	7.1	7.5	7.5	7.7	7.9	7.7	8.0	7.3	7.4		7.4
6	TDS (mg/L)	194	142	79	114	122	128	155	161	161	137		178
7	Temp (deg C)	28.0	30.0	24.5	26.0	26.0	26.0	22.5	19.0	22.0	25.0		29.5
8	Turb (NTU)		17.0	90.0	167.0	92.0	42.0	24.0	10.0	5.5	10.0		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)	146	98	49	80	90	101	124	125	66	136		131
3	Ca (mg/L)	21	22	15	19	23	24	30	29	30	26		30
4	Cl (mg/L)	18.0	6.0	3.0	3.0	3.0	6.0	5.0	4.0	7.0	7.0		9.8
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)	0.05	0.02	0.10	0.10	0.10	6.00	0.10					
7	HCO3 (mg/L)	178	119	60	98	110	123	151	153	81	166		160
8	K (mg/L)	3.7	4.2	2.9	2.8	0.7	1.0	0.9	0.7	0.9	2.2		2.5
9	Mg (mg/L)	16.5	5.6	3.9	6.8	8.0	7.3	9.2	9.7	9.7	10.1		11.7
10	Na (mg/L)	18.9	6.8	3.1	4.4	4.5	4.7	5.6	6.0	5.9	8.1		11.4
11	NH3-N (mg N/L)	0.11	0.05	0.04	0.03	0.07	0.09	0.08	0.06	0.06	0.08		0.09
12	NO2+NO3 (mg N/L)	0.15	0.73	1.00	1.01	0.26	0.26	0.29	0.12	0.12	0.23		0.19
13	NO2-N (mgN/L)	0.04	0.02	0.09	0.10	0.01	0.01	0.01	0.04	0.03	0.05		0.02
14	NO3-N (mgN/L)	0.10	0.71	0.91	0.91	0.25	0.25	0.28	0.09	0.09	0.18		0.17
15	o-PO4-P (mg P/L)	0.013	0.099	0.107	0.121	0.025	0.029	0.034	0.063	0.041	0.061		0.022
16	SiO2 (mg/L)	9.9	26.9	24.3	25.8	37.0	37.2	25.4	14.2	14.7	20.5		20.3
17	SO4 (mg/L)	7.6	11.8	11.8	12.4	9.8	28.9	9.8	11.1	8.6	6.2		5.6
	BIOLOGICAL/BACTERIOLOGICAL												
1	BOD3-27 (mg/L)	1.7	1.1	1.0	0.7	0.5	0.5	0.7	0.4	1.1	0.7		1.4
2	COD (mg/L)	43.0	39.0	21.0	17.0	16.0	9.0	23.0	16.0	18.0	18.0		8.0
3	DO (mg/L)	3.6	4.4	5.5	5.8	6.0	6.1	6.1	7.2	6.3	5.6		6.0
4	DO_SAT% (%)	46	58	65	71	74	75	70	78	72	68		78
	TRACE & TOXIC												
	CHEMICAL INDICES												
1	HAR_Ca (mgCaCO3/L)	54	54	38	48	58	61	76	74	76	64		74
2	HAR_Total (mgCaCO3/L)	123	77	54	76	91	91	115	114	117	106		123
3	Na% (%)	25	15	10	11	10	10	10	10	10	14		17
4	RSC (-)	0.5	0.4	0.0	0.1	0.0	0.2	0.2	0.2	0.0	0.6		0.2
5	SAR (-)	0.7	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3		0.4

Water Quality Summary for the period : 2019-2020

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)	122	2143	0.000	196.8
2	EC_GEN (µmho/cm)	11	326	125	216
3	pH_GEN (pH units)	11	8.0	7.1	7.5
4	TDS (mg/L)	11	194	79	143
5	Temp (deg C)	11	30.0	19.0	25.3
6	Turb (NTU)	10	167.0	0.0	45.8
	CHEMICAL				
1	Alk-Phen (mgCaCO3/L)	11	0.0	0.0	0
2	ALK-TOT (mgCaCO3/L)	11	146	49	104
3	Ca (mg/L)	11	30	15	25
4	Cl (mg/L)	11	18.0	3.0	6.5
5	CO3 (mg/L)	11	0.0	0.0	0
6	F (mg/L)	7	6.00	0.02	0.92
7	HCO3 (mg/L)	11	178	60	127
8	K (mg/L)	11	4.2	0.7	2
9	Mg (mg/L)	11	16.5	3.9	9
10	Na (mg/L)	11	18.9	3.1	7.2
11	NH3-N (mg N/L)	11	0.11	0.03	0.07
12	NO2+NO3 (mg N/L)	11	1.01	0.12	0.39
13	NO2-N (mgN/L)	11	0.10	0.01	0.04
14	NO3-N (mgN/L)	11	0.91	0.09	0.36
15	o-PO4-P (mg P/L)	11	0.121	0.013	0.056
16	SiO2 (mg/L)	11	37.2	9.9	23.3
17	SO4 (mg/L)	11	28.9	5.6	11.2
	BIOLOGICAL/BACTERIOLOGICAL				
1	BOD3-27 (mg/L)	11	1.7	0.4	0.9
2	COD (mg/L)	11	43.0	8.0	20.7
3	DO (mg/L)	11	7.2	3.6	5.7
4	DO_SAT% (%)	11	78	46	69
	TRACE & TOXIC				
	CHEMICAL INDICES				
1	HAR_Ca (mgCaCO3/L)	11	76	38	61
2	HAR_Total (mgCaCO3/L)	11	123	54	99
3	Na% (%)	11	25	10	13
4	RSC (-)	11	0.6	0.0	0.2
5	SAR (-)	11	0.7	0.2	0.3

Water Quality Seasonal Average for the period : 2015-2020

Station Name : Burhner at Mohgaon (010215004) Division : Narmada Division, Bhopal

Local River : Burhner Sub-Division : UNSD, Jabalpur

River Water

S.No	Parameters	Flood					Winter					Summer				
		Jun - Oct					Nov - Feb					Mar - May				
	PHYSICAL	**2015**	**2016**	**2017**	**2018**	**2019**	**2015-2016**	**2016-2017**	**2017-2018**	**2018-2019**	**2019-2020**	**2016**	**2017**	**2018**	**2019**	**2020**
1	Q (cumec)	60.38			69.32	116.5	9.371			6.093		1.499			1.484	
2	EC_FLD (µmho/cm)														280	
3	EC_GEN (µmho/cm)	157	176	205	216	205	192	214	256	237	223	279	253	286	264	227
4	pH_FLD (pH units)														7.6	
5	pH_GEN (pH units)	8.1	7.6	7.9	7.7	7.4	8.2	7.8	7.7	7.4	7.7	8.0	7.8	7.9	7.6	7.4
6	TDS (mg/L)	97	114	135	134	130	121	138	169	158	151	181	164	187	157	158
7	Temp (deg C)	27.9	28.6	28.5	26.9	26.9	20.5	19.1	19.3	18.0	22.4	25.8	24.3	24.7	24.3	27.3
8	Turb (NTU)	131.4	168.4	76.6	104.0	91.5	0.0	0.0	0.0	0.0	20.4	0.0	0.0	0.0	0.0	5.0
	CHEMICAL															
1	Alk-Phen (mgCaCO3/L)	1.9	1.4	1.0	0.0	0.0	2.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	ALK-TOT (mgCaCO3/L)	101	82	101	100	93	126	123	129	130	104	139	141	140	125	134
3	Ca (mg/L)	22	17	23	23	20	29	29	30	27	29	26	30	27	24	28
4	Cl (mg/L)	7.2	6.1	6.2	6.8	6.6	6.0	5.3	4.8	11.4	5.5	6.3	7.3	13.7	7.7	8.4
5	CO3 (mg/L)	2.3	1.7	1.3	0.0	0.0	2.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	F (mg/L)	0.36	0.26	0.30	0.16	0.07	0.15	0.13	0.41	0.16	3.05	0.22	0.22	0.18	0.10	
7	HCO3 (mg/L)	119	96	121	122	113	148	150	157	158	127	169	172	171	153	163
8	K (mg/L)	2.2	1.8	1.3	2.2	2.8	1.1	0.8	1.1	1.0	0.9	1.8	1.6	2.0	1.9	2.3
9	Mg (mg/L)	9.4	8.7	8.6	7.5	8.2	12.8	10.8	10.6	11.4	9.0	14.5	12.1	12.7	12.3	10.9
10	Na (mg/L)	6.6	5.3	6.8	6.9	7.5	6.4	5.5	6.5	7.0	5.5	8.7	10.6	11.5	10.9	9.8
11	NH3-N (mg N/L)					0.06					0.07					0.09
12	NO2+NO3 (mg N/L)	0.88	0.72	0.39	1.43	0.63	0.06	0.19	0.10	0.20	0.20	0.04	0.18	0.08	0.29	0.21
13	NO2-N (mgN/L)	0.01	0.08	0.04	0.42	0.05	0.01	0.01	0.01	0.02	0.02	0.01	0.01	0.01	0.05	0.03
14	NO3-N (mgN/L)	0.87	0.64	0.35	1.01	0.58	0.06	0.18	0.08	0.18	0.17	0.03	0.18	0.07	0.24	0.18
15	o-PO4-P (mg P/L)	0.203	0.300	0.200	0.217	0.073	0.075	0.079	0.070	0.045	0.042	0.070	0.048	0.235	0.015	0.042
16	SiO2 (mg/L)	20.9	21.6	17.2	28.1	24.8	19.5	15.5	16.3	18.2	22.9	19.6	17.7	15.9	23.2	20.4
17	SO4 (mg/L)	8.1	13.8	9.5	8.8	10.7	1.5	8.8	8.2	8.6	14.6	2.6	3.8	4.7	7.2	5.9
	BIOLOGICAL/BACTERIOLOGICAL															
1	BOD3-27 (mg/L)	0.6	0.6	0.7	0.7	1.0	0.4	1.0	0.7	0.7	0.7	1.1	1.4	1.4	1.1	1.0
2	COD (mg/L)	28.0	27.8	22.4	42.6	27.2	27.5	25.3	31.0	30.5	16.5	26.3	38.0	40.7	30.7	13.0
3	DO (mg/L)	5.9	5.3	5.1	5.0	5.1	6.9	6.4	6.2	6.3	6.4	5.3	4.5	5.0	4.9	5.8
4	DO_SAT% (%)	76	67	65	62	63	76	69	67	66	74	64	54	60	59	73
	TRACE & TOXIC															
	CHEMICAL INDICES															
1	HAR_Ca (mgCaCO3/L)	56	43	58	58	50	72	72	74	68	72	65	74	67	61	69
2	HAR_Total (mgCaCO3/L)	95	80	94	90	84	125	117	118	115	109	126	124	120	112	114
3	Na% (%)	13	12	12	13	14	10	9	11	12	10	13	15	17	17	15
4	RSC (-)	0.1	0.1	0.2	0.2	0.2	0.1	0.1	0.2	0.3	0.2	0.3	0.3	0.4	0.3	0.4
5	SAR (-)	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.3	0.3	0.2	0.3	0.4	0.5	0.4	0.4

3.16 Narmada at Manot

History Sheet

			Water Year	**:**	**2019-2020**
Site	**:**	**Narmada at Manot**	**Code**	**:**	**010215002**
State	:	Madhya Pradesh	District		Mandla
Basin	:	Narmada	Independent River	:	Narmada
Tributary	:		Sub Tributary	:	
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"
		Opening Date	Closing Date		
Gauge	:	16/12/1976			
Discharge	:	16/12/1976			
Sediment	:	09/11/1979			
Water Quality	:	01/01/1980			

Water Quality Datasheet for the period : 2019-2020

Station Name : Narmada at Manot (010215002) Division : Narmada Division, Bhopal

Local River : Narmada Sub-Division : UNSD, Jabalpur

River Water Analysis

S.No	Parameters	03/06/2019	01/07/2019	01/08/2019	03/09/2019	03/10/2019	01/11/2019	02/12/2019	01/01/2020	03/02/2020	02/03/2020	01/04/2020	05/05/2020
	PHYSICAL	A	A	A	A	A	A	A	A	A	A	A	A
1	Q (cumec)		17.37	236.3	369.6	313.0	67	48	14.08	8.96	8.75	Lockdown	7.59
2	Colour_Cod (-)	Clear	Light Brown	Brown	Brown	Light Brown	Clear	Clear	Clear	Clear	Clear		Clear
3	EC_GEN (µmho/cm)	329	287	133	120	197	276	261	239	254	284		222
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
5	pH_GEN (pH units)	7.0	7.3	7.4	7.1	7.6	7.8	7.6	7.9	7.3	7.4		7.5
6	TDS (mg/L)	195	191	88	80	95	171	172	174	175	181		169
7	Temp (deg C)	29.0	29.5	28.5	25.5	25.5	25.5	22.0	14.0	29.0	21.0		25.0
8	Turb (NTU)		8.0	99.0	217.0	98.0	42.0	25.0	4.3	1.5	0.7		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)	156	145	56	51	94	137	136	131	84	144		134
3	Ca (mg/L)	25	21	19	14	28	32	31	28	33	32		27
4	Cl (mg/L)	9.0	14.0	4.0	4.0	5.0	6.0	5.0	4.0	4.0	11.0		5.9
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)	0.01	0.03	0.11	0.10	0.11	0.11	0.10					
7	HCO3 (mg/L)	190	177	68	62	115	167	166	160	102	176		164
8	K (mg/L)	1.4	3.6	3.1	2.3	0.7	0.7	0.5	0.5	0.4	1.0		1.3
9	Mg (mg/L)	21.1	17.7	2.4	7.3	6.1	10.0	12.4	13.4	6.4	10.8		16.4
10	Na (mg/L)	12.9	20.2	3.7	2.8	4.4	5.9	6.5	6.4	6.7	12.6		12.2
11	NH3-N (mg N/L)	0.17	0.09	0.08	0.15	0.06	0.05	0.05	0.04	0.04	0.09		0.09
12	NO2+NO3 (mg N/L)	0.17	2.03	1.16	1.17	0.32	0.30	0.32	0.11	0.11	0.17		0.19
13	NO2-N (mgN/L)	0.05	1.60	0.09	0.09	0.02	0.01	0.02	0.03	0.02	0.03		0.02
14	NO3-N (mgN/L)	0.12	0.44	1.07	1.08	0.30	0.29	0.31	0.09	0.09	0.14		0.17
15	o-PO4-P (mg P/L)	0.019	0.343	0.350	0.205	0.012	0.022	0.039	0.098	0.089	0.030		0.005
16	SiO2 (mg/L)	38.1	38.2	28.6	30.3	36.9	36.2	26.6	14.7	13.9	20.3		19.3
17	SO4 (mg/L)	4.4	9.5	9.8	11.3	6.8	25.0	10.5	13.6	7.7	7.0		6.4
	BIOLOGICAL/BACTERIOLOGICAL												
1	BOD3-27 (mg/L)	2.0	1.0	1.6	0.5	0.6	0.7	0.8	0.7	1.0	1.4		1.8
2	COD (mg/L)	29.0	39.0	26.0	22.0	20.0	25.0	9.0	19.0	31.0	31.0		33.0
3	DO (mg/L)	2.8	4.2	5.5	5.2	5.6	5.9	6.5	7.2	6.8	5.9		9.2
4	DO_SAT% (%)	36	55	70	63	68	71	74	70	88	67		111
	TRACE & TOXIC												
	CHEMICAL INDICES												
1	HAR_Ca (mgCaCO3/L)	61	52	48	34	70	80	78	70	83	81		67
2	HAR_Total (mgCaCO3/L)	149	126	58	64	96	122	130	126	110	126		135
3	Na% (%)	16	25	12	8	9	10	10	10	12	18		16
4	RSC (-)	0.1	0.4	0.0	0.0	0.0	0.3	0.1	0.1	0.0	0.4		0.0
5	SAR (-)	0.5	0.8	0.2	0.2	0.2	0.2	0.3	0.2	0.3	0.5		0.5

Water Quality Summary for the period : 2019-2020

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)	215	1914	0.000	144.2
2	EC_GEN (µmho/cm)	11	329	120	237
3	pH_GEN (pH units)	11	7.9	7.0	7.5
4	TDS (mg/L)	11	195	80	154
5	Temp (deg C)	11	29.5	14.0	25
6	Turb (NTU)	10	217.0	0.0	49.6
	CHEMICAL				
1	Alk-Phen (mgCaCO3/L)	11	0.0	0.0	0
2	ALK-TOT (mgCaCO3/L)	11	156	51	115
3	Ca (mg/L)	11	33	14	26
4	Cl (mg/L)	11	14.0	4.0	6.5
5	CO3 (mg/L)	11	0.0	0.0	0
6	F (mg/L)	7	0.11	0.01	0.08
7	HCO3 (mg/L)	11	190	62	141
8	K (mg/L)	11	3.6	0.4	1.4
9	Mg (mg/L)	11	21.1	2.4	11.3
10	Na (mg/L)	11	20.2	2.8	8.6
11	NH3-N (mg N/L)	11	0.17	0.04	0.08
12	NO2+NO3 (mg N/L)	11	2.03	0.11	0.55
13	NO2-N (mgN/L)	11	1.60	0.01	0.18
14	NO3-N (mgN/L)	11	1.08	0.09	0.37
15	o-PO4-P (mg P/L)	11	0.350	0.005	0.11
16	SiO2 (mg/L)	11	38.2	13.9	27.5
17	SO4 (mg/L)	11	25.0	4.4	10.2
	BIOLOGICAL/BACTERIOLOGICAL				
1	BOD3-27 (mg/L)	11	2.0	0.5	1.1
2	COD (mg/L)	11	39.0	9.0	25.8
3	DO (mg/L)	11	9.2	2.8	5.9
4	DO_SAT% (%)	11	111	36	70
	TRACE & TOXIC				
	CHEMICAL INDICES				
1	HAR_Ca (mgCaCO3/L)	11	83	34	66
2	HAR_Total (mgCaCO3/L)	11	149	58	113
3	Na% (%)	11	25	8	13
4	RSC (-)	11	0.4	0.0	0.1
5	SAR (-)	11	0.8	0.2	0.3

Water Quality Seasonal Average for the period : 2015-2020

Station Name : Narmada at Manot (010215002) 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				
	PHYSICAL	**2015**	**2016**	**2017**	**2018**	**2019**	**2015-2016**	**2016-2017**	**2017-2018**	**2018-2019**	**2019-2020**	**2016**	**2017**	**2018**	**2019**	**2020**
1	Q (cumec)	59.96			95.90	234.1	11.70			10.40	7.040	2.726			5.983	0.000
2	EC_FLD (µmho/cm)														301	
3	EC_GEN (µmho/cm)	151	207	236	222	213	208	277	262	264	258	304	260	285	289	253
4	pH_FLD (pH units)														7.6	
5	pH_GEN (pH units)	8.0	7.7	7.8	7.6	7.3	8.3	7.7	7.8	7.4	7.7	8.0	7.9	7.9	7.5	7.5
6	TDS (mg/L)	94	134	147	139	130	133	181	174	175	173	197	169	186	174	175
7	Temp (deg C)	27.7	26.6	25.3	25.4	27.6	19.5	19.3	19.0	21.3	22.6	20.3	22.2	20.7	24.3	23.0
8	Turb (NTU)	273.8	121.0	77.2	105.6	105.5	0.0	0.0	0.0	0.0	18.2	0.0	0.0	0.0	0.0	0.3
	CHEMICAL															
1	Alk-Phen (mgCaCO3/L)	1.0	0.0	0.0	0.0	0.0	4.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	ALK-TOT (mgCaCO3/L)	100	114	112	101	100	142	143	135	142	122	156	148	143	145	139
3	Ca (mg/L)	23	22	25	26	21	28	32	28	29	31	27	32	26	28	29
4	Cl (mg/L)	6.3	5.4	5.6	6.6	7.2	7.8	6.3	4.3	6.0	4.8	7.3	6.3	8.7	7.0	8.4
5	CO3 (mg/L)	1.2	0.0	0.0	0.0	0.0	5.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	F (mg/L)	0.17	0.26	0.27	0.17	0.07	0.15	0.16	0.40	0.18	0.10	0.26	0.19	0.18	0.07	
7	HCO3 (mg/L)	119	139	137	124	122	163	175	165	173	149	190	181	174	177	170
8	K (mg/L)	2.5	1.7	1.0	1.7	2.2	0.7	0.5	0.6	0.7	0.5	1.0	0.8	0.8	1.0	1.1
9	Mg (mg/L)	9.3	11.5	9.6	8.9	10.9	16.0	12.9	13.5	16.3	10.5	16.5	11.8	14.3	14.5	13.6
10	Na (mg/L)	6.2	7.4	7.4	4.8	8.8	8.2	7.0	7.6	10.9	6.4	9.8	11.0	10.8	12.1	12.4
11	NH3-N (mg N/L)					0.11					0.04					0.09
12	NO2+NO3 (mg N/L)	0.82	1.05	0.49	1.16	0.97	0.07	0.17	0.27	0.21	0.21	0.05	0.15	0.14	0.43	0.18
13	NO2-N (mgN/L)	0.02	0.05	0.05	0.10	0.37	0.01	0.01	0.04	0.01	0.02	0.01	0.01	0.02	0.01	0.03
14	NO3-N (mgN/L)	0.80	1.00	0.44	1.05	0.60	0.07	0.16	0.24	0.20	0.19	0.04	0.14	0.12	0.42	0.16
15	o-PO4-P (mg P/L)	0.324	0.307	0.181	0.194	0.186	0.102	0.093	0.075	0.267	0.062	0.082	0.066	0.051	0.015	0.017
16	SiO2 (mg/L)	19.7	23.2	19.3	25.3	34.4	21.3	20.3	17.7	18.4	22.8	20.8	24.8	17.0	29.7	19.8
17	SO4 (mg/L)	8.8	16.0	10.1	11.1	8.3	1.8	10.3	7.9	8.3	14.2	3.0	6.1	4.1	7.5	6.7
	BIOLOGICAL/BACTERIOLOGICAL															
1	BOD3-27 (mg/L)	0.5	1.0	0.6	0.9	1.1	0.6	0.9	0.9	2.7	0.8	1.0	1.3	1.0	0.8	1.6
2	COD (mg/L)	33.0	46.2	38.4	43.2	27.2	28.8	40.8	37.0	35.0	21.0	35.7	40.0	35.0	29.3	32.0
3	DO (mg/L)	6.1	5.3	5.2	5.0	4.7	7.3	6.6	6.5	6.4	6.6	5.9	5.5	5.2	5.2	7.6
4	DO_SAT% (%)	78	66	64	61	58	80	72	69	72	76	65	63	58	62	89
	TRACE & TOXIC															
	CHEMICAL INDICES															
1	HAR_Ca (mgCaCO3/L)	58	55	64	64	53	70	79	70	73	78	68	81	64	71	74
2	HAR_Total (mgCaCO3/L)	97	103	103	101	99	136	133	126	140	122	136	130	124	131	130
3	Na% (%)	12	13	13	9	14	12	10	12	14	10	14	15	16	17	17
4	RSC (-)	0.1	0.2	0.2	0.1	0.1	0.2	0.2	0.2	0.2	0.1	0.4	0.4	0.4	0.3	0.2
5	SAR (-)	0.3	0.3	0.3	0.2	0.4	0.3	0.3	0.3	0.4	0.3	0.4	0.4	0.4	0.5	0.5

3.17 Narmada at Dindori

History Sheet

			Water Year	**:**	**2019-2020**
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°56'51"	Longitude	:	81°04'40"
		Opening Date	Closing Date		
Gauge	:	26/06/1988			
Discharge	:	01/08/1988			
Sediment	:				
Water Quality	:	15/03/1990			

Water Quality Datasheet for the period : 2019-2020

Station Name : Narmada at Dindori (010215001) Division : Narmada Division, Bhopal

Local River : Narmada Sub-Division : UNSD, Jabalpur

River Water Analysis

S.No	Parameters	03/06/2019	01/07/2019	01/08/2019	03/09/2019	03/10/2019	01/11/2019	02/12/2019	01/01/2020	03/02/2020	02/03/2020	01/04/2020	05/05/2020
		A	A	A	A	A	A	A	A	A	A	A	A
	PHYSICAL												
1	Q (cumec)	0.92	19.98	37.5	110.28	137.08	29.63	4.42	15.44	9.61	8.71	Lockdown	7.85
2	Colour_Cod (-)	Clear	Clear	Dark Brown	Brown	Clear	Clear	Clear	Clear	Clear	Clear		Clear
3	EC_GEN (µmho/cm)	286	201	219	238	223	280	270	262	285	354		274
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
5	pH_GEN (pH units)	7.3	7.1	7.1	7.2	7.6	7.8	7.4	7.9	7.3	7.3		7.2
6	TDS (mg/L)	182	146	143	151	146	177	178	197	191	215		215
7	Temp (deg C)	32.0	29.0	26.0	28.5	27.0	26.0	19.0	9.0	30.0	20.0		16.5
8	Turb (NTU)	0.0	78.0	144.0	212.0	45.0	34.0	28.0	0.0	3.4	1.5		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)	154	75	95	102	110	139	138	149	70	164		146
3	Ca (mg/L)	31	23	33	28	29	32	33	36	33	35		34
4	Cl (mg/L)	9.0	9.0	6.0	8.0	9.0	5.0	6.0	5.0	7.0	7.0		5.9
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)	0.06	0.03	0.12	0.11	0.11	0.11	0.11					
7	HCO3 (mg/L)	188	92	116	124	134	170	168	182	86	200		178
8	K (mg/L)	1.5	3.5	3.2	2.2	0.8	0.7	0.9	0.7	0.8	2.7		2.2
9	Mg (mg/L)	11.4	13.9	4.4	8.8	11.2	12.2	15.1	12.9	14.3	16.5		18.8
10	Na (mg/L)	14.2	7.5	6.5	5.3	5.4	6.2	7.4	7.7	8.2	16.2		14.4
11	NH3-N (mg N/L)	0.18	0.03	0.03	0.02	0.04	0.06	0.06	0.06	0.05	0.13		0.14
12	NO2+NO3 (mg N/L)	0.20	2.69	1.16	1.13	0.39	0.39	0.33	0.12	0.13	0.27		1.41
13	NO2-N (mgN/L)	0.01	1.61	0.13	0.10	0.01	0.02	0.02	0.03	0.03	0.04		1.14
14	NO3-N (mgN/L)	0.19	1.08	1.03	1.03	0.38	0.37	0.32	0.09	0.10	0.22		0.27
15	o-PO4-P (mg P/L)	0.028	0.347	0.329	0.241	0.051	0.042	0.043	0.074	0.061	0.072		0.057
16	SiO2 (mg/L)	48.2	23.6	21.8	23.5	33.7	33.1	27.7	16.8	16.7	19.5		19.0
17	SO4 (mg/L)	6.4	16.5	13.5	11.1	8.4	25.4	11.9	8.7	8.4	7.9		7.4
	BIOLOGICAL/BACTERIOLOGICAL												
1	BOD3-27 (mg/L)	1.5	1.4	0.8	0.8	0.8	1.0	1.1	0.9	1.6	1.8		1.4
2	COD (mg/L)	39.0	34.0	24.0	23.0	18.0	27.0	29.0	20.0	18.0	1.0		15.0
3	DO (mg/L)	4.5	3.9	4.4	5.2	4.3		6.4	6.6	4.8	2.7		3.8
4	DO_SAT% (%)	62	51	54	66	54		69		64	30		39
	TRACE & TOXIC												
	CHEMICAL INDICES												
1	HAR_Ca (mgCaCO3/L)	78	58	82	70	72	81	82	89	83	88		85
2	HAR_Total (mgCaCO3/L)	126	116	100	106	118	131	145	143	143	157		163
3	Na% (%)	20	12	12	10	9	9	10	10	11	18		16
4	RSC (-)	0.6	0.0	0.0	0.0	0.0	0.2	0.0	0.1	0.0	0.2		0.0
5	SAR (-)	0.6	0.3	0.3	0.2	0.2	0.2	0.3	0.3	0.3	0.6		0.5

Water Quality Summary for the period : 2019-2020

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_GEN (µmho/cm)	11	354	201	263
3	pH_GEN (pH units)	11	7.9	7.1	7.4
4	TDS (mg/L)	11	215	143	176
5	Temp (deg C)	11	32.0	9.0	23.9
6	Turb (NTU)	11	212.0	0.0	49.6
	CHEMICAL				
1	Alk-Phen (mgCaCO3/L)	11	0.0	0.0	0
2	ALK-TOT (mgCaCO3/L)	11	164	70	122
3	Ca (mg/L)	11	36	23	32
4	Cl (mg/L)	11	9.0	5.0	7
5	CO3 (mg/L)	11	0.0	0.0	0
6	F (mg/L)	7	0.12	0.03	0.09
7	HCO3 (mg/L)	11	200	86	149
8	K (mg/L)	11	3.5	0.7	1.7
9	Mg (mg/L)	11	18.8	4.4	12.7
10	Na (mg/L)	11	16.2	5.3	9
11	NH3-N (mg N/L)	11	0.18	0.02	0.07
12	NO2+NO3 (mg N/L)	11	2.69	0.12	0.75
13	NO2-N (mgN/L)	11	1.61	0.01	0.29
14	NO3-N (mgN/L)	11	1.08	0.09	0.46
15	o-PO4-P (mg P/L)	11	0.347	0.028	0.122
16	SiO2 (mg/L)	11	48.2	16.7	25.8
17	SO4 (mg/L)	11	25.4	6.4	11.4
	BIOLOGICAL/BACTERIOLOGICAL				
1	BOD3-27 (mg/L)	11	1.8	0.8	1.2
2	COD (mg/L)	11	39.0	1.0	22.5
3	DO (mg/L)	10	6.6	2.7	4.7
4	DO_SAT% (%)	9	69	30	54
	TRACE & TOXIC				
	CHEMICAL INDICES				
1	HAR_Ca (mgCaCO3/L)	11	89	58	79
2	HAR_Total (mgCaCO3/L)	11	163	100	132
3	Na% (%)	11	20	9	12
4	RSC (-)	11	0.6	0.0	0.1
5	SAR (-)	11	0.6	0.2	0.3

Water Quality Seasonal Average for the period : 2015-2020

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				
	PHYSICAL	**2015**	**2016**	**2017**	**2018**	**2019**	**2015-2016**	**2016-2017**	**2017-2018**	**2018-2019**	**2019-2020**	**2016**	**2017**	**2018**	**2019**	**2020**
1	Q (cumec)	20.07			46.02		5.603			4.376		1.864			7.856	
2	EC_FLD (µmho/cm)														329	
3	EC_GEN (µmho/cm)	198	225	267	268	233	241	300	322	303	274	323	288	322	316	314
4	pH_FLD (pH units)														7.1	
5	pH_GEN (pH units)	7.9	7.5	7.6	7.4	7.3	8.1	7.4	7.7	7.3	7.6	7.9	7.5	7.6	7.3	7.2
6	TDS (mg/L)	124	147	175	170	154	152	197	214	201	186	210	192	210	192	215
7	Temp (deg C)	26.4	26.5	25.8	25.6	28.5	18.0	17.8	15.9	15.4	21.0	22.3	23.5	18.2	16.0	18.3
8	Turb (NTU)	57.0	162.6	91.2	122.2	95.8	0.0	0.0	0.0	0.0	16.4	0.0	0.0	0.0	0.0	0.8
	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	0.0	0.0	0.0
2	ALK-TOT (mgCaCO3/L)	122	108	124	123	107	154	150	151	158	124	157	155	147	156	155
3	Ca (mg/L)	26	25	31	29	29	34	33	34	37	33	31	31	28	43	35
4	Cl (mg/L)	7.0	6.9	8.8	7.6	8.2	8.0	7.0	8.3	9.5	5.8	9.0	9.3	12.0	6.7	6.4
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	0.0	0.0	0.0
6	F (mg/L)	0.17	0.22	0.19	0.07	0.09	0.15	0.15	0.10	0.13	0.11	0.27	0.25	0.08	0.11	
7	HCO3 (mg/L)	149	132	152	151	131	188	183	184	192	152	191	189	180	190	189
8	K (mg/L)	2.4	2.0	1.4	1.7	2.2	1.1	0.8	1.1	1.2	0.8	1.7	1.3	1.9	1.7	2.5
9	Mg (mg/L)	12.5	10.1	10.2	12.7	9.9	15.8	13.9	16.0	14.6	13.6	14.3	15.1	14.3	9.5	17.7
10	Na (mg/L)	9.0	6.0	8.9	8.2	7.8	8.8	7.7	9.4	9.8	7.4	12.1	13.6	13.1	14.6	15.3
11	NH3-N (mg N/L)					0.06					0.06					0.13
12	NO2+NO3 (mg N/L)	1.57	0.91	0.48	1.23	1.11	0.33	0.29	0.08	0.53	0.24	0.12	0.21	0.56	1.77	0.84
13	NO2-N (mgN/L)	0.11	0.04	0.03	0.19	0.37	0.14	0.06	0.02	0.02	0.02	0.02	0.02	0.01	0.74	0.59
14	NO3-N (mgN/L)	1.46	0.87	0.45	1.05	0.74	0.19	0.22	0.07	0.50	0.22	0.11	0.20	0.54	1.04	0.25
15	o-PO4-P (mg P/L)	0.283	0.232	0.151	0.175	0.199	0.087	0.105	0.074	0.118	0.055	0.132	0.082	0.139	0.156	0.064
16	SiO2 (mg/L)	17.9	24.8	19.4	28.4	30.2	16.6	18.2	17.3	19.3	23.6	20.3	18.5	16.5	30.3	19.2
17	SO4 (mg/L)	12.1	20.2	12.5	10.7	11.2	2.7	11.5	9.7	8.6	13.6	3.1	7.4	8.3	9.2	7.6
	BIOLOGICAL/BACTERIOLOGICAL															
1	BOD3-27 (mg/L)	1.0	0.9	1.2	1.0	1.1	1.3	1.3	1.2	2.0	1.2	1.9	2.2	1.6	1.5	1.6
2	COD (mg/L)	30.2	38.4	60.8	36.8	27.6	33.0	50.5	44.3	42.5	23.5	33.7	46.3	38.3	19.0	8.0
3	DO (mg/L)	5.0	4.3	4.7	4.4	4.5	5.3	5.7	5.4	5.1	5.9	6.0	4.2	4.3	3.9	3.3
4	DO_SAT% (%)	61	53	58	53	57	56	60	54	50	66	69	50	45	40	34
	TRACE & TOXIC															
	CHEMICAL INDICES															
1	HAR_Ca (mgCaCO3/L)	65	63	78	72	72	85	83	84	93	84	76	78	71	108	86
2	HAR_Total (mgCaCO3/L)	118	105	121	125	113	151	141	151	154	140	136	141	131	147	160
3	Na% (%)	14	11	14	12	12	11	10	12	12	10	16	17	18	18	17
4	RSC (-)	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	0.1
5	SAR (-)	0.4	0.3	0.4	0.3	0.3	0.3	0.3	0.3	0.4	0.3	0.4	0.5	0.5	0.5	0.5

3.18 Narmada at Mandla

History Sheet

			Water Year	**:**	**2019-2020**
Site	**:**	**Narmada at Mandla**	**Code**	**:**	**010215033**
State	:	Madhya Pradesh	District		Mandla
Basin	:	Narmada	Independent River	:	Narmada
Tributary	:	-	Sub Tributary	:	-
Sub-Sub Tributary	:	-	Local River	:	Narmada
Division	:	EE, ND, CWC, BHOPAL	Sub-Division	:	AE, UNSD, CWC, JABALPUR
Drainage Area	:	Sq. Km.	Bank	:	
Latitude	:	22°35'57"	Longitude	:	80°21'50"
		Opening Date	Closing Date		
Gauge	:				
Discharge	:				
Sediment	:				
Water Quality	:	03/09/2019			

Water Quality Datasheet for the period : 2019-2020

Station Name : Narmada at Mandla (010215033) Division : Narmada Division, Bhopal

Local River : Narmada Sub-Division : UNSD, Jabalpur

River Water Analysis

S.No	Parameters			03/09/2019	03/10/2019	01/11/2019	02/12/2019	01/01/2020	03/02/2020	02/03/2020	01/04/2020	05/05/2020
	PHYSICAL			B	A	A	A	A	A	A	A	A
1	Q (cumec)										Lockdown	
2	Colour_Cod (-)			Clear	Clear	Clear	Clear	Clear	Clear	Clear		Clear
3	EC_GEN (µmho/cm)			155	186	236	261	251	250	281		306
4	Odour_Code (-)			odour free	odour free	odour free	odour free	odour free	odour free	odour free		odour free
5	pH_GEN (pH units)			7.2	7.6	7.8	7.8	7.9	7.3	7.7		7.4
6	TDS (mg/L)			97	121	121	179	179	167	172		232
7	Temp (deg C)			30.0	29.0	25.0	21.5	19.0	13.0	22.0		21.0
8	Turb (NTU)			125.0	124.0	35.0	23.0	8.0	1.4	1.6		0.0
	CHEMICAL											
1	Alk-Phen (mgCaCO3/L)			0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0
2	ALK-TOT (mgCaCO3/L)			65	89	109	136	134	66	140		189
3	Ca (mg/L)			18	23	28	31	30	26	74		39
4	Cl (mg/L)			2.0	3.0	5.0	5.0	5.0	2.0	10.0		7.8
5	CO3 (mg/L)			0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0
6	F (mg/L)			0.10	0.11	0.10	0.09					
7	HCO3 (mg/L)			79	108	133	166	163	81	171		230
8	K (mg/L)			2.6	0.9	1.0	0.8	0.8	0.9	2.0		2.5
9	Mg (mg/L)			4.9	7.1	9.5	19.0	14.1	12.4	8.7		14.0
10	Na (mg/L)			3.5	4.2	5.5	6.8	6.7	6.7	10.8		12.0
11	NH3-N (mg N/L)			0.05	0.09	0.11	0.06	0.07	0.07	0.05		0.18
12	NO2+NO3 (mg N/L)			1.10	0.07	0.11	0.10	0.12	0.11	0.09		0.28
13	NO2-N (mgN/L)			0.10	0.01	0.02	0.01	0.03	0.03	0.02		0.13
14	NO3-N (mgN/L)			1.00	0.05	0.09	0.09	0.09	0.09	0.07		0.16
15	o-PO4-P (mg P/L)			0.250	0.018	0.090	0.030	0.070	0.032	0.030		0.110
16	SiO2 (mg/L)			24.5	41.7	40.8	21.1	15.4	14.1	18.3		23.4
17	SO4 (mg/L)			11.3	8.4	31.0	32.1	14.5	7.7	5.4		5.4
	BIOLOGICAL/BACTERIOLOGICAL											
1	BOD3-27 (mg/L)			0.7	0.6	1.4	1.0	0.5	0.5	1.6		1.6
2	COD (mg/L)			19.0	10.0	14.0	19.0	20.0	24.0	11.0		30.0
3	DO (mg/L)			6.0	6.0	6.2	6.4	7.1	6.1	6.1		5.4
4	DO_SAT% (%)			79	78	75	72	77	58	70		61
	TRACE & TOXIC											
	CHEMICAL INDICES											
1	HAR_Ca (mgCaCO3/L)			46	58	71	77	75	64	184		97
2	HAR_Total (mgCaCO3/L)			66	87	110	156	134	116	220		156
3	Na% (%)			10	9	10	9	10	11	10		14
4	RSC (-)			0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.7
5	SAR (-)			0.2	0.2	0.2	0.2	0.3	0.3	0.3		0.4
	PESTICIDES											

Water Quality Summary for the period : 2019-2020

Station Name : Narmada at Mandla (010215033) 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_GEN (µmho/cm)	8	306	155	241
3	pH_GEN (pH units)	8	7.9	7.2	7.6
4	TDS (mg/L)	8	232	97	159
5	Temp (deg C)	8	30.0	13.0	22.6
6	Turb (NTU)	8	125.0	0.0	39.8
	CHEMICAL				
1	Alk-Phen (mgCaCO3/L)	8	0.0	0.0	0
2	ALK-TOT (mgCaCO3/L)	8	189	65	116
3	Ca (mg/L)	8	74	18	34
4	Cl (mg/L)	8	10.0	2.0	5
5	CO3 (mg/L)	8	0.0	0.0	0
6	F (mg/L)	4	0.11	0.09	0.1
7	HCO3 (mg/L)	8	230	79	141
8	K (mg/L)	8	2.6	0.8	1.4
9	Mg (mg/L)	8	19.0	4.9	11.2
10	Na (mg/L)	8	12.0	3.5	7
11	NH3-N (mg N/L)	8	0.18	0.05	0.08
12	NO2+NO3 (mg N/L)	8	1.10	0.07	0.25
13	NO2-N (mgN/L)	8	0.13	0.01	0.04
14	NO3-N (mgN/L)	8	1.00	0.05	0.2
15	o-PO4-P (mg P/L)	8	0.250	0.018	0.079
16	SiO2 (mg/L)	8	41.7	14.1	24.9
17	SO4 (mg/L)	8	32.1	5.4	14.5
	BIOLOGICAL/BACTERIOLOGICAL				
1	BOD3-27 (mg/L)	8	1.6	0.5	1
2	COD (mg/L)	8	30.0	10.0	18.4
3	DO (mg/L)	8	7.1	5.4	6.2
4	DO_SAT% (%)	8	79	58	71
	TRACE & TOXIC				
	CHEMICAL INDICES				
1	HAR_Ca (mgCaCO3/L)	8	184	46	84
2	HAR_Total (mgCaCO3/L)	8	220	66	131
3	Na% (%)	8	14	9	10
4	RSC (-)	8	0.7	0.0	0.1
5	SAR (-)	8	0.4	0.2	0.3
	PESTICIDES				

Water Quality Seasonal Average for the period : 2015-2020

Station Name : Narmada at Mandla (010215033) 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
		2019	2019-2020	2020
	PHYSICAL			
1	Q (cumec)			
2	EC_GEN (µmho/cm)	171	250	294
3	pH_GEN (pH units)	7.4	7.7	7.5
4	TDS (mg/L)	109	162	202
5	Temp (deg C)	29.5	19.6	21.5
6	Turb (NTU)	124.5	16.8	0.8
	CHEMICAL			
1	ALK-TOT (mgCaCO3/L)	77	111	164
2	Ca (mg/L)	21	29	56
3	Cl (mg/L)	2.5	4.3	8.9
4	F (mg/L)	0.11	0.10	
5	HCO3 (mg/L)	94	136	201
6	K (mg/L)	1.7	0.9	2.3
7	Mg (mg/L)	6.0	13.7	11.4
8	Na (mg/L)	3.8	6.4	11.4
9	NH3-N (mg N/L)	0.07	0.08	0.11
10	NO2+NO3 (mg N/L)	0.58	0.11	0.19
11	NO2-N (mgN/L)	0.06	0.02	0.07
12	NO3-N (mgN/L)	0.53	0.09	0.11
13	o-PO4-P (mg P/L)	0.134	0.056	0.070
14	SiO2 (mg/L)	33.1	22.8	20.9
15	SO4 (mg/L)	9.8	21.3	5.4
	BIOLOGICAL/BACTERIOLOGICAL			
1	BOD3-27 (mg/L)	0.7	0.8	1.6
2	COD (mg/L)	14.5	19.3	20.5
3	DO (mg/L)	6.0	6.4	5.8
4	DO_SAT% (%)	79	70	65
	TRACE & TOXIC			
	CHEMICAL INDICES			
1	HAR_Ca (mgCaCO3/L)	52	72	141
2	HAR_Total (mgCaCO3/L)	77	129	188
3	Na% (%)	10	10	12
4	RSC (-)	0.0	0.0	0.3
5	SAR (-)	0.2	0.2	0.4
	PESTICIDES			

3.19 Gaur at Bhalwara

History Sheet

			Water Year	**:**	**2019-2020**
Site	**:**	**Gaur at Bhalwara**	**Code**	**:**	**010215027**
State	:	Madhya Pradesh	District		Jabalpur
Basin	:	Narmada	Independent River	:	Narmada
Tributary	:	-	Sub Tributary	:	-
Sub-Sub Tributary	:	-	Local River	:	Gaur
Division	:		Sub-Division	:	
Drainage Area	:	Sq. Km.	Bank	:	
Latitude	:	23°06'32"	Longitude	:	79°58'18"
		Opening Date	Closing Date		
Gauge	:				
Discharge	:				
Sediment	:				
Water Quality	:	01/06/2019			

Water Quality Datasheet for the period : 2019-2020

Station Name : Gaur at Bhalwara (010215027) Division : Narmada Division, Bhopal

Local River : Narmada Sub-Division : UNSD, Jabalpur

River Water Analysis

S.No	Parameters	03/06/2019	01/07/2019	01/08/2019	03/09/2019	03/10/2019	01/11/2019	02/12/2019	01/01/2020	03/02/2020	02/03/2020	01/04/2020	05/05/20200
	PHYSICAL	A	A	A	A	A	A	A	A	A	A	A	A
1	Q (cumec)											Lockdown	
2	Colour_Cod (-)	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear		Clear
3	EC_GEN (µmho/cm)	430	344	198	226	267	363	332	291	292	782		507
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
5	pH_GEN (pH units)	7.5	7.3	7.9	7.3	7.3	7.8	7.6	7.4	7.0	7.2		8.0
6	TDS (mg/L)	255	210	124	142	180	183	218	208	203	482		379
7	Temp (deg C)	29.0	28.0	29.0	24.0	26.0	27.0	21.0	14.0	19.0	21.5		28.0
8	Turb (NTU)		15.0	140.0	173.0	75.0	41.0	24.0	32.0	2.6	0.4		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)	197	166	75	98	116	159	170	137	80	312		200
3	Ca (mg/L)	38	31	25	25	21	39	41	35	36	87		27
4	Cl (mg/L)	17.0	21.0	8.0	5.0	22.0	6.0	5.0	11.0	7.0	27.0		27.4
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)	0.21	0.03	0.11	0.09	0.10	0.11	0.11					
7	HCO3 (mg/L)	240	202	91	120	141	194	207	167	98	381		244
8	K (mg/L)	5.5	4.2	3.2	2.7	0.8	1.0	0.9	0.9	1.4	4.6		2.0
9	Mg (mg/L)	22.6	15.3	6.8	9.2	7.8	12.9	13.4	11.4	11.4	29.0		25.1
10	Na (mg/L)	14.3	12.9	3.6	4.4	19.6	8.7	7.1	10.6	6.2	26.7		13.2
11	NH3-N (mg N/L)	0.27	0.07	0.04	0.04	0.39	0.15	0.08	0.09	0.09	0.13		0.17
12	NO2+NO3 (mg N/L)	1.18	2.03	1.17	1.18	0.20	0.13	0.13	0.12	0.15	0.49		1.36
13	NO2-N (mgN/L)	0.02	1.59	0.11	0.10	0.10	0.02	0.02	0.03	0.05	0.14		0.02
14	NO3-N (mgN/L)	1.17	0.44	1.06	1.08	0.10	0.11	0.11	0.09	0.10	0.35		1.34
15	o-PO4-P (mg P/L)	0.306	0.326	0.336	0.233	0.080	0.031	0.032	0.059	0.043	0.090		0.086
16	SiO2 (mg/L)	53.7	40.1	21.6	19.6	29.3	29.6	21.3	14.0	14.5	23.8		27.5
17	SO4 (mg/L)	33.1	13.3	13.5	15.7	14.7	41.8	10.7	19.4	8.1	8.2		20.6
	BIOLOGICAL/BACTERIOLOGICAL												
1	BOD3-27 (mg/L)	1.7	3.2	1.2	0.9	2.2	1.5	1.3	0.6	1.0	3.2		2.0
2	COD (mg/L)	41.0	26.0	23.0	20.0	29.0	23.0	33.0	17.0	19.0	20.0		14.0
3	DO (mg/L)	2.1	5.3	5.6	5.9	2.4	6.2	6.4	7.1	5.0	6.8		7.6
4	DO_SAT% (%)	27	68	73	70	30	78	72	69	54	77		97
	TRACE & TOXIC												
	CHEMICAL INDICES												
1	HAR_Ca (mgCaCO3/L)	96	77	62	62	53	98	102	88	91	217		68
2	HAR_Total (mgCaCO3/L)	190	141	90	100	85	152	157	135	139	337		173
3	Na% (%)	14	16	8	8	33	11	9	14	9	15		14
4	RSC (-)	0.2	0.5	0.0	0.0	0.6	0.2	0.3	0.1	0.0	0.0		0.6
5	SAR (-)	0.5	0.5	0.2	0.2	0.9	0.3	0.2	0.4	0.2	0.6		0.4
	PESTICIDES												

Water Quality Summary for the period : 2019-2020

Station Name : Gaur at Bhalwara (010215027) 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_GEN (µmho/cm)	11	782	198	367
3	pH_GEN (pH units)	11	8.0	7.0	7.5
4	TDS (mg/L)	11	482	124	235
5	Temp (deg C)	11	29.0	14.0	24.2
6	Turb (NTU)	10	173.0	0.0	50.3
	CHEMICAL				
1	Alk-Phen (mgCaCO3/L)	11	0.0	0.0	0
2	ALK-TOT (mgCaCO3/L)	11	312	75	155
3	Ca (mg/L)	11	87	21	37
4	Cl (mg/L)	11	27.4	5.0	14.2
5	CO3 (mg/L)	11	0.0	0.0	0
6	F (mg/L)	7	0.21	0.03	0.11
7	HCO3 (mg/L)	11	381	91	190
8	K (mg/L)	11	5.5	0.8	2.5
9	Mg (mg/L)	11	29.0	6.8	15
10	Na (mg/L)	11	26.7	3.6	11.6
11	NH3-N (mg N/L)	11	0.39	0.04	0.14
12	NO2+NO3 (mg N/L)	11	2.03	0.12	0.74
13	NO2-N (mgN/L)	11	1.59	0.02	0.2
14	NO3-N (mgN/L)	11	1.34	0.09	0.54
15	o-PO4-P (mg P/L)	11	0.336	0.031	0.147
16	SiO2 (mg/L)	11	53.7	14.0	26.8
17	SO4 (mg/L)	11	41.8	8.1	18.1
	BIOLOGICAL/BACTERIOLOGICAL				
1	BOD3-27 (mg/L)	11	3.2	0.6	1.7
2	COD (mg/L)	11	41.0	14.0	24.1
3	DO (mg/L)	11	7.6	2.1	5.5
4	DO_SAT% (%)	11	97	27	65
	TRACE & TOXIC				
	CHEMICAL INDICES				
1	HAR_Ca (mgCaCO3/L)	11	217	53	92
2	HAR_Total (mgCaCO3/L)	11	337	85	154
3	Na% (%)	11	33	8	14
4	RSC (-)	11	0.6	0.0	0.2
5	SAR (-)	11	0.9	0.2	0.4
	PESTICIDES				

Water Quality Seasonal Average for the period : 2015-2020

Station Name : Gaur at Bhalwara (010215027) Division : Narmada Division, Bhopal

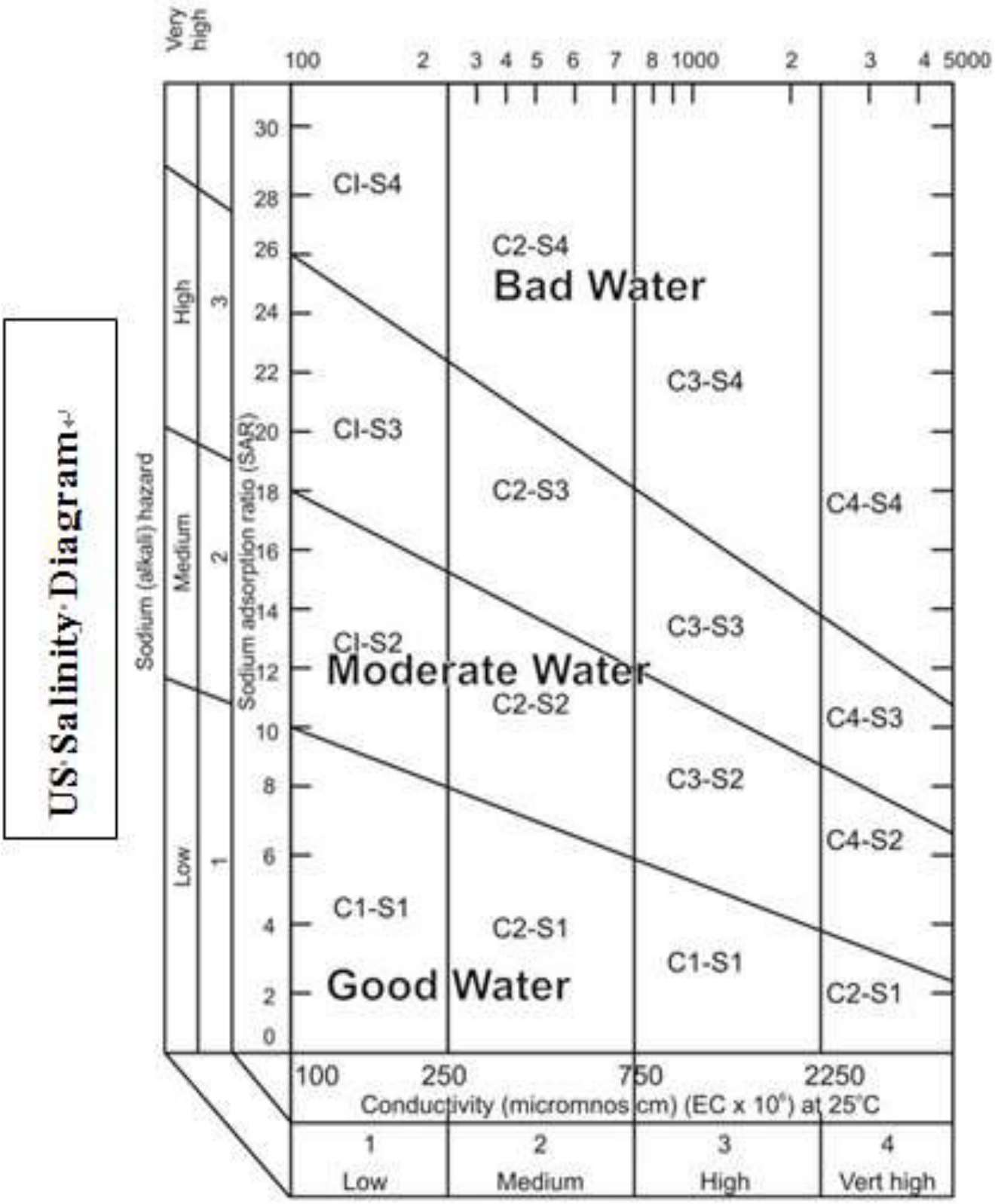
Local River : Narmada Sub-Division : UNSD, Jabalpur

River Water

S.No	Parameters	Flood	Winter	Summer
		Jun - Oct	Nov - Feb	Mar - May
		2019	2019-2020	2020
	PHYSICAL			
1	Q (cumec)			
2	EC_GEN (µmho/cm)	293	320	645
3	pH_GEN (pH units)	7.4	7.4	7.6
4	TDS (mg/L)	182	203	431
5	Temp (deg C)	27.2	20.3	24.8
6	Turb (NTU)	100.8	24.9	0.2
	CHEMICAL			
1	ALK-TOT (mgCaCO3/L)	130	136	256
2	Ca (mg/L)	28	38	57
3	Cl (mg/L)	14.6	7.3	27.2
4	F (mg/L)	0.11	0.11	
5	HCO3 (mg/L)	159	167	313
6	K (mg/L)	3.3	1.1	3.3
7	Mg (mg/L)	12.3	12.3	27.1
8	Na (mg/L)	11.0	8.1	19.9
9	NH3-N (mg N/L)	0.16	0.10	0.15
10	NO2+NO3 (mg N/L)	1.15	0.13	0.92
11	NO2-N (mgN/L)	0.38	0.03	0.08
12	NO3-N (mgN/L)	0.77	0.10	0.84
13	o-PO4-P (mg P/L)	0.256	0.041	0.088
14	SiO2 (mg/L)	32.9	19.8	25.7
15	SO4 (mg/L)	18.1	20.0	14.4
	BIOLOGICAL/BACTERIOLOGICAL			
1	BOD3-27 (mg/L)	1.8	1.1	2.6
2	COD (mg/L)	27.8	23.0	17.0
3	DO (mg/L)	4.3	6.2	7.2
4	DO_SAT% (%)	54	68	87
	TRACE & TOXIC			
	CHEMICAL INDICES			
1	HAR_Ca (mgCaCO3/L)	70	95	142
2	HAR_Total (mgCaCO3/L)	121	146	255
3	Na% (%)	16	11	14
4	RSC (-)	0.3	0.1	0.3
5	SAR (-)	0.4	0.3	0.5
	PESTICIDES			

Annexure 1 U. S. Salinity diagram

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



Annexure 2 Tolerance Limits as prescribed by the Bureau of Indian Standards (2296:1992)

Characteristics	Designated best use				
	A	B	C	D	E
Dissolved Oxygen (DO)mg/l, min	6	5	4	4	-
Biochemical Oxygen demand (BOD)mg/l, max	2	3	3	-	-
Total coliform organisms MPN/100ml, max	50	500	5,000	-	-
pH value	6.5-8.5	6.5-8.5	6.0-9.0	6.5-8.5	6.0-8.5
Colour, Hazen units, max.	10	300	300	-	-
Odour	Un-objectionable			-	-
Taste	Tasteless	-	-	-	-
Total dissolved solids, mg/l, max.	500	-	1,500	-	2,100
Total hardness (as CaCO3), mg/l, max.	200	-	-	-	-
Calcium hardness (as CaCO3), mg/l, max.	200	-	-	-	-
Magnesium hardness (as CaCO3), mg/l, max.	200	-	-	-	-
Copper (as Cu), mg/l, max.	1.5	-	1.5	-	-
Iron (as Fe), mg/l, max.	0.3	-	0.5	-	-
Manganese (as Mn), mg/l, max.	0.5	-	-	-	-
Cholorides (as Cu), mg/l, max.	250	-	600	-	600
Sulphates (as SO4), mg/l, max.	400	-	400	-	1,000
Nitrates (as NO3), mg/l, max.	20	-	50	-	-
Fluorides (as F), mg/l, max.	1.5	1.5	1.5	-	-
Phenolic compounds (as C2H5OH), mg/l, max.	0.002	0.005	0.005	-	-
Mercury (as Hg), mg/l, max.	0.001	-	-	-	-
Cadmium (as Cd), mg/l, max.	0.01	-	0.01	-	-
Salenium (as Se), mg/l, max.	0.01	-	0.05	-	-
Arsenic (as As), mg/l, max.	0.05	0.2	0.2	-	-
Cyanide (as Pb), mg/l, max.	0.05	0.05	0.05	-	-
Lead (as Pb), mg/l, max.	0.1	-	0.1	-	-
Zinc (as Zn), mg/l, max.	15	-	15	-	-
Chromium (as Cr6+), mg/l, max.	0.05	-	0.05	-	-
Anionic detergents (as MBAS), mg/l, max.	0.2	1	1	-	-
Barium (as Ba), mg/l, max.	1	-	-	-	-
Free Ammonia (as N), mg/l, max	-	-	-	1.2	-
Electrical conductivity, micromhos/cm, max	-	-	-	-	2,250
Sodium absorption ratio, max	-	-	-	-	26
Boron, mg/l, max	-	-	-	-	2