2015-16

जल गुणवत्ता आँकड़े पुस्तक

Water Quality Data Book

नर्मदा बेसिन संगठन

केन्द्रीय जल आयोग,भोपाल

अप्रैल 2017

NARMADA BASIN ORGANISATION

Central Water Commission, Bhopal

April **2017**

केवल सरकारी उपयोग के लिये

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जल गुणवत्ता आँकड़े पुस्तक

WATER QUALITY DATA BOOK

नर्मदा बेसिन

Narmada Basin

जून 2015 - मई 2016

June 2015 – May 2016

केन्द्रीय जल आयोग

नर्मदा बेसिन संगठन

अप्रैल 2017

CENTRALWATER COMMISSION

Narmada Basin Organisation

April 2017

प्रस्तावना

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

नदी घाटियों के समुचित नियोजन, संरक्षण और विकास में प्रभावी कार्यवाही के लिये केन्द्रीय 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 गुणवत्ता के प्रबोधन के लिये इन्ही कुछ महत्वपूर्ण स्थलों से जल नमूने एकत्रित किये जाते है । नर्मदा नदी के जल गुणवत्ता प्रबोधन से संबधित आँकड़ो का संकलन, नर्मदा मंडल, भोपाल तथा ताप्ती मंडल, सूरत स्थित प्रयोगशालाओं में किया जाता है । नर्मदा बेसिन के लिये इन आंकडों का संकलन वर्ष 1978-79 में सात स्थलों से शुरू किया गया था, वर्तमान में 18 स्थलों पर जल गुणवत्ता आंकडों का आकलन कार्य किया जा रहा है ।

नर्मदा नदी की जल गुणवत्ता के प्रभावी प्रबोधन हेतु जल गुणवत्ता आँकड़े पुस्तक का प्रकाशन किया जा रहा है । इस पुस्तक में वर्ष 2015-16 के दौरान नर्मदा बेसिन में 18 स्थलों के विश्लेषित आंकडे संकलित किए गए है । भारतीय मानक संस्थान द्वारा जल गुणवत्ता संबंधी मानक निर्धारित किए गए है । संकलित आँकड़ो के आधार पर ही जानकारी इस पुस्तक में समाहित है । इसके अलावा प्रेक्षण तकनीक, आंकलन पध्दति , स्थलवार वृतपत्र , रासायनिक घटक आदि भी इस पुस्तक में उल्लेखित हैं ।

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

इस पुस्तक के आँकड़ो के 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 हूं ।

(राकेश कुमार टोटेजा)
अधीक्षण अभियंता (समन्वय)

स्थान भोपाल
अप्रैल ' 2017

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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 2015-2016 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 12^{th} Five Year Plan. The sites and the codes of Water Quality Observation Stations in the Narmada basin are given in Table 1-1.

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

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

1.3 Availability of Water Quality Data

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

Table 1-2, Details of Sites on Narmada River

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

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

1.4 Common Characteristics of Water

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

Table 1-3, Parameters analysed at the Divisional Laboratory

Physical					
1	Colour	3	EC_GEN (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)
Trace and Toxic			1. Al (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 2015 to 31st May 2016.

- 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:

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

(***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:

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

(Residual Sodium Carbonate)

Residual Sodium Carbonate is calculated using the following formula

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

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 2015-16

Orsang at Chandwada

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

Narmada at Garudeshwar

The degree of Hardness Number at this Station showed the range of medium hard water. The BOD value was above the tolerance limit on 01.02.2016 (2.2) and on 01.04.2016 (2.8). The pH and fluoride values were within their respective tolerance limits. The ionic concentration varied in value below the prescribed limits, hence water stream qualified for all designated classes A, B, C, D, and E.

Goi at Pati

Most of the chemical constituents analyses were within their respective tolerance limits, attributed to water stream suitable for all user classes A, B, C, D and E.

Uri at Dhulsar

All the chemical constituents analyses including pH, Fluoride and BOD. were within their respective tolerance limits, attributed to water stream suitable for all user classes A, B, C, D and E.

Narmada at Mandleshwar

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

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 pH, fluoride, BOD and other parameters varied in values below the prescribed limits; hence the water stream at this station qualifies suitable for all usable classes A, B, C, D & E.

Ganjal at Chhidgaon

The degree of hardness number classified the water stream toward 'Hard Water' type. 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 01.06.2015 (3.4) .

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 value was above the tolerance limit only on 01.06.2015 (8.5). The BOD value was above the tolerance limit only on 01.03.2016 (3.0). The fluoride values were within the tolerance limit for all designated use classes.

Narmada at Barmanghat

The water at this station was alkaline and towards 'Medium Hard Water' range. The BOD value was above the tolerance limit on 01.06.2015(2.1) and on 02.11.2015 (4.2). The pH 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 pH values, BOD and fluoride concentrations were within the limit for all designated use classes. Ionic concentrations are non-interfering as pollutants due to their low concentrations from maximum prescribed limit of designated best user classes A, B, C, D and E.

Hiran at Patan

The hardness number values projected water channel as 'Medium Hard Water' range. Ionic concentrations were below the prescribed tolerance limit. The BOD value was above the tolerance limit of use class 'A' only on 01.02.2016 (2.8). 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 values were above the tolerance limit on 01.03.2016 (2.2) and on 02.05.2016 (2.7) .

Burhner at Mohgaon

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

Narmada at Manot

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

Narmada at Dindori

The water exhibited 'Medium Hard' water as per hardness number. The BOD values were above the tolerance limit on 01.01.2016 (2.1) and on 02.05.2016 (3.5). The pH and fluoride values and all other parameters were within their tolerance limit for all designated user classes A,B,C,D and E.

3 Analysis Results

3.1 General

Based on discussion presented in Chapter 1 and 2, the results of chemical analysis carried out at each of 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.

3.2 Orsang at Chandwada

History Sheet

			Water Year	**:**	**2015-2016**
Site	**:**	**Orsang at Chandwada**	**Code**	**:**	**01 02 15 032**
State	:	Gujarat	District		Vadodara
Basin	:	Narmada	Independent River	:	Narmada
Tributary	:	Orsang	Sub Tributary	:	
Sub-Sub Tributary	:		Local River	:	Orsang
Division	:	Tapi Division, Surat	Sub-Division	:	LNSD Bharuch
Drainage Area	:	3846 Sq. Km.	Bank	:	Right
Latitude	:	22°01'48"	Longitude	:	73°25'30"
		Opening Date	Closing Date		
Gauge	:	11/01/1979			
Discharge	:	01/11/1979			
Sediment	:	01/08/1988			
Water Quality	:	15/03/1980			

Water Quality Datasheet for the period : 2015-2016

Station Name : Orsang at Chandwada (01 02 15 032) Division : Tapi Division, Surat

Local River : Orsang Sub-Division: LNSD Bharuch

River Water Analysis

S.No	Parameters	01/06/15	01/07/15	01/08/15	01/09/15	01/10/15	02/11/15	01/12/15	01/01/16	01/02/16	01/03/16	01/04/16	02/05/16
		A	A	A	A	A	A	A	A	A	A	A	A
	PHYSICAL												
1	Q (cumec)		3.308	156.6	3.198	5.870							
2	Colour_Cod (-)			Brown		Clear		7					
3	EC_FLD (µmho/cm)					600		600					
4	EC_GEN (µmho/cm)			350		498		370					
5	Odour_Code (-)			odour free		odour free		odour free					
6	pH_FLD (pH units)					7.0		7.0					
7	pH_GEN (pH units)			8.2		8.3		8.2					
8	SS (mg/L)			110		165		110					
9	TDS (mg/L)			225		322		240					
10	Temp (deg C)			25.0		23.0		20.0					
11	TS (mg/L)			335		1242							
12	Turb (NTU)			4.0		2.0		1.0					
	CHEMICAL												
1	Alk-Phen (mgCaCO3/L)			0.0		0.0		0.0					
2	ALK-TOT (mgCaCO3/L)			87		107		103					
3	Ca (mg/L)			34		28		34					
4	Cl (mg/L)			80.0		65.0		58.0					
5	CO3 (mg/L)			0.0		0.0		0.0					
6	F (mg/L)			0.13		0.14							
7	HCO3 (mg/L)			106		130		126					
8	K (mg/L)			4.2		4.0		3.6					
9	Mg (mg/L)			10.9		12.2		7.3					
10	Na (mg/L)			42.0		46.0		40.4					
11	NH3-N (mg N/L)			0.11		0.13		0.12					
12	NO2+NO3 (mg N/L)			0.19		0.24		0.19					
13	NO2-N (mgN/L)			0.08		0.10		0.06					
14	NO3-N (mgN/L)			0.11		0.14		0.13					
15	P-Tot (mgP/L)			0.120		0.130		0.150					
16	SiO2 (mg/L)			10.0		8.0		8.0					
17	SO4 (mg/L)			6.0		9.0		6.0					
	BIOLOGICAL/BACTERIOLOGICAL												
1	BOD3-27 (mg/L)			0.5		0.5		0.8					
2	COD (mg/L)			52.0		112.0		24.0					
3	DO (mg/L)					6.8		7.0					
4	DO_SAT% (%)					79		77					
5	FCol-MPN (MPN/100mL)			200		300		600					
6	Tcol-MPN (MPN/100mL)			400		500		1100					
	TRACE & TOXIC												
1	Al (mg/L)			0.06		0.08		0.05					
	CHEMICAL INDICES												
1	HAR_Ca (mgCaCO3/L)			85		70		85					
2	HAR_Total (mgCaCO3/L)			130		121		116					
3	Na% (%)			40		44		42					
4	RSC (-)			0.0		0.0		0.0					
5	SAR (-)			1.6		1.8		1.6					

Water Quality Summary for the period : 15-2016

Station Name : Orsang at Chandwada (01 02 15 032) Division : Tapi Division, Surat

Local River : Orsang Sub-Division : LNSD Bharuch

River Water Summary

S.No	Parameters	Number of Observations	Maximum	Minimum	Mean
	PHYSICAL				
1	Q (cumec)	71	470.6	2.022	44.31
2	EC_FLD (µmho/cm)	2	600	600	600
3	EC_GEN (µmho/cm)	3	498	350	406
4	pH_FLD (pH units)	2	7.0	7.0	7
5	pH_GEN (pH units)	3	8.3	8.2	8.2
6	SS (mg/L)	3	165	110	128
7	TDS (mg/L)	3	322	225	262
8	Temp (deg C)	3	25.0	20.0	22.7
9	TS (mg/L)	2	1242	335	789
10	Turb (NTU)	3	4.0	1.0	2.3
	CHEMICAL				
1	Alk-Phen (mgCaCO3/L)	3	0.0	0.0	0
2	ALK-TOT (mgCaCO3/L)	3	107	87	99
3	Ca (mg/L)	3	34	28	32
4	Cl (mg/L)	3	80.0	58.0	67.7
5	CO3 (mg/L)	3	0.0	0.0	0
6	F (mg/L)	2	0.14	0.13	0.13
7	HCO3 (mg/L)	3	130	106	121
8	K (mg/L)	3	4.2	3.6	3.9
9	Mg (mg/L)	3	12.2	7.3	10.1
10	Na (mg/L)	3	46.0	40.4	42.8
11	NH3-N (mg N/L)	3	0.13	0.11	0.12
12	NO2+NO3 (mg N/L)	3	0.24	0.19	0.21
13	NO2-N (mgN/L)	3	0.10	0.06	0.08
14	NO3-N (mgN/L)	3	0.14	0.11	0.13
15	P-Tot (mgP/L)	3	0.150	0.120	0.133
16	SiO2 (mg/L)	3	10.0	8.0	8.7
17	SO4 (mg/L)	3	9.0	6.0	7
	BIOLOGICAL/BACTERIOLOGICAL				
1	BOD3-27 (mg/L)	3	0.8	0.5	0.6
2	COD (mg/L)	3	112.0	24.0	62.7
3	DO (mg/L)	2	7.0	6.8	6.9
4	DO_SAT% (%)	2	79	77	78
5	FCol-MPN (MPN/100mL)	3	600	200	367
6	Tcol-MPN (MPN/100mL)	3	1100	400	667
	TRACE & TOXIC				
1	Al (mg/L)	3	0.08	0.05	0.06
	CHEMICAL INDICES				
1	HAR_Ca (mgCaCO3/L)	3	85	70	80
2	HAR_Total (mgCaCO3/L)	3	130	116	122
3	Na% (%)	3	44	40	42
4	RSC (-)	3	0.0	0.0	0
5	SAR (-)	3	1.8	1.6	1.7

Water Quality Seasonal Average for the period: 2011-2016

Station Name : Orsang at Chandwada (01 02 15 032) 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				
		2011	2012	2013	2014	2015	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016	2012	2013	2014	2015	2016
	PHYSICAL															
1	Q (cumec)	74.45	54.75	166.1	48.93	42.26	1.415	4.063	11.94	1.121		0.471	0.000	2.284	0.747	
2	EC_FLD (µmho/cm)	430			300	600				600	600				600	
3	EC_GEN (µmho/cm)	425	471	386	456	424	664	260	651	480	370	687		703	728	
4	pH_FLD (pH units)	7.5			7.0	7.0				7.0	7.0				7.0	
5	pH_GEN (pH units)	7.6	7.8	8.1	8.2	8.2	7.5	7.2	7.8	8.3	8.2	6.8		8.4	8.0	
6	SS (mg/L)	149	150	130	163	138	230	92	223	140	110	230		233	220	
7	TDS (mg/L)	297	305	251	286	274	457	180	440	317	240	600		466	480	
8	Temp (deg C)	27.5	29.0	26.5	28.3	24.0	26.0	29.0	19.5	19.0	20.0	19.0		24.0	25.0	
9	TS (mg/L)	445	455	381	450	789	687	272	662	467		676		699	700	
10	Turb (NTU)	31.0	4.0	13.0	5.7	3.0	1.0	1.0	2.0	1.0	1.0	1.0		1.0	1.0	
	CHEMICAL															
1	Alk-Phen (mgCaCO3/L)	0.0	0.0	0.0	8.6	0.0	0.0	0.0	0.0	7.5	0.0	0.0		5.8	14.1	
2	ALK-TOT (mgCaCO3/L)	100	72	107	104	97	120	75	111	95	103	131		122	176	
3	Ca (mg/L)	34	34	33	35	31	32	30	32	28	34	32		38	47	
4	Cl (mg/L)	98.5	85.0	85.5	75.3	72.5	93.7	100.0	100.0	66.5	58.0	293.0		100.0	65.0	
5	CO3 (mg/L)	0.0	0.0	0.0	10.3	0.0	0.0	0.0	0.0	9.0	0.0	0.0		7.0	17.0	
6	F (mg/L)	0.06	0.13	0.15	0.13	0.13	0.07	0.20	0.15	0.20		0.10		0.20	0.14	
7	HCO3 (mg/L)	122	88	130	106	118	146	92	136	98	126	160		134	180	
8	K (mg/L)	11.9	2.3	6.9	3.9	4.1	15.9	3.8	5.3	4.0	3.6	20.4		3.4	3.6	
9	Mg (mg/L)	8.2	6.9	6.4	7.7	11.5	9.2	7.5	7.3	10.0	7.3	10.7		8.0	19.0	
10	Na (mg/L)	58.4	50.1	63.0	48.7	44.0	61.6	58.4	75.4	45.4	40.4	191.8		72.0	42.6	
11	NH3-N (mg N/L)	0.07	0.15	0.13	0.15	0.12	0.08	0.10	0.14	0.12	0.12	0.06		0.20	0.13	
12	NO2+NO3 (mg N/L)	0.15	0.18			0.22	0.13	0.18			0.19	0.08				
13	NO2-N (mgN/L)	0.04	0.06			0.09	0.03	0.03			0.06	0.02				
14	NO3-N (mgN/L)	0.11	0.12	0.13	0.13	0.13	0.10	0.15	0.13	0.13	0.13	0.05		0.12	0.14	
15	o-PO4-P (mg P/L)	0.065	0.060				0.060	0.050				0.140				
16	P-Tot (mgP/L)	0.390	0.180	0.220	0.177	0.125	0.460	0.440	0.200	0.120	0.150	0.480		0.180	0.100	
17	SiO2 (mg/L)	10.0	21.0	7.9	8.4	9.0	10.0	8.0	8.5	7.3	8.0	8.0		7.5	8.6	
18	SO4 (mg/L)	9.3	11.8	10.3	8.6	7.5	8.8	12.0	12.6	9.3	6.0	10.6		16.0	2.0	
	BIOLOGICAL/BACTERIOLOGICAL															
1	BOD3-27 (mg/L)	1.3	0.8	1.8	1.0	0.5	3.0	1.4	1.4	1.7	0.8	0.6		3.2	4.8	
2	COD (mg/L)					82.0				16.0	24.0				37.0	
3	DO (mg/L)			7.8	7.0	6.8				8.0	7.0				8.0	
4	DO_SAT% (%)			98	89	79				86	77				97	
5	FCol-MPN (MPN/100mL)				483	250			400	290	600			800	300	
6	Tcol-MPN (MPN/100mL)				1000	450			1000	500	1100			1800	500	
	TRACE & TOXIC															
1	Al (mg/L)	0.13	0.10	0.12	0.11	0.07	0.10	0.08	0.11	0.07	0.05	0.16		0.10	0.14	
	CHEMICAL INDICES															
1	HAR_Ca (mgCaCO3/L)	84	85	83	88	78	80	75	80	71	85	80		95	118	
2	HAR_Total (mgCaCO3/L)	118	114	109	121	126	118	106	110	112	116	125		129	197	
3	Na% (%)	49	48	52	46	42	49	53	58	46	42	74		54	32	
4	RSC (-)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1		0.0	0.0	
5	SAR (-)	2.3	2.0	2.6	1.9	1.7	2.5	2.5	3.1	1.9	1.6	7.5		2.8	1.3	

3.3 Narmada at Garudeshwar

History Sheet

			Water Year	**:**	**2015-2016**
Site	**:**	**Narmada at Garudeshwar**	**Code**	**:**	**01 02 15 030**
State	:	Gujarat	District		Bharuch
Basin	:	Narmada	Independent River	:	Narmada
Tributary	:		S ub Tributary	:	
Sub-Sub Tributary	:		Local River	:	Narmada
Division	:	Tapi Division, Surat	Sub-Division	:	LNSD Bharuch
Drainage Area	:	87892 Sq. Km.	Bank	:	Right
Latitude	:	21°53'00"	Longitude	:	73°39'00"
Zero of Gauge (m)	:	10 .000 (M.S.L.)	22/12/1971		
		Opening Date	Closing Date		
Gauge	:	22/12/1971			
Discharge	:	23/03/1972			
Sediment	:	21/03/1973			
Water Quality	:	15/06/1977			

Water Quality Datasheet for the period : 2015-2016

Station Name : Narmada at Garudeshwar (01 02 15 030) Division : Tapi Division, Surat

Local River : Narmada Sub-Division : LNSD Bharuch

River Water Analysis

S.No	Parameters	01/06/2015	01/07/2015	01/08/2015	01/09/2015	01/10/2015	02/11/2015	01/12/2015	01/01/2016	01/02/2016	01/03/2016	01/04/2016	02/05/2016
		A	A	A	A	A	A	A	A	A	A	A	A
	PHYSICAL												
1	Q (cumec)	25.92	18.72	1523	24.25	200.1	27.35	27.86	23.67	25.12	42.58	40.10	25.67
2	Colour_Cod (-)	Clear		Light Brown		Brown		7		Clear		Clear	
3	EC_FLD (µmho/cm)									356		345	
4	EC_GEN (µmho/cm)	425		325		321		285		356		351	
5	Odour_Code (-)	odour free		odour free		odour free		odour free		odour free		odour free	
6	pH_FLD (pH units)									8.1		7.1	
7	pH_GEN (pH units)	8.3		8.1		8.1		8.2		7.9		8.1	
8	SS (mg/L)	150		100		110		90		120		119	
9	TDS (mg/L)	276		211		206		183		232		238	
10	Temp (deg C)	26.0		25.0		22.0		20.0		16.0		22.0	
11	TS (mg/L)	150		311		926				352		357	
12	Turb (NTU)	1.0		2.0		2.0		1.0		1.0		1.0	
	CHEMICAL												
1	Alk-Phen (mgCaCO3/L)	0.0		0.0		0.0		0.0		0.0		0.0	
2	ALK-TOT (mgCaCO3/L)	100		95		90		90		93		120	
3	Ca (mg/L)	32		34		28		32		36		34	
4	Cl (mg/L)	59.0		70.0		60.0		63.0		60.0		50.0	
5	CO3 (mg/L)	0.0		0.0		0.0		0.0		0.0		0.0	
6	F (mg/L)	0.13		0.14		0.15		0.14		0.13		0.12	
7	HCO3 (mg/L)	122		116		110		110		114		146	
8	K (mg/L)	3.6		3.6		3.8		3.0		4.6		4.0	
9	Mg (mg/L)	12.2		8.5		7.3		9.7		4.9		10.9	
10	Na (mg/L)	36.0		42.0		38.0		38.3		42.0		38.0	
11	NH3-N (mg N/L)	0.10		0.13		0.13		0.13		0.13		0.13	
12	NO2+NO3 (mg N/L)	0.19		0.21		0.21		0.20		0.17		0.18	
13	NO2-N (mgN/L)	0.05		0.08		0.08		0.07		0.04		0.06	
14	NO3-N (mgN/L)	0.14		0.13		0.13		0.13		0.13		0.12	
15	P-Tot (mgP/L)	0.120		0.130		0.140		0.140		0.140		0.120	
16	SiO2 (mg/L)	6.0		8.0		10.0		10.0		12.0		6.0	
17	SO4 (mg/L)	9.5		10.0		6.0		10.0		11.0		11.0	
	BIOLOGICAL/BACTERIOLOGICAL												
1	BOD3-27 (mg/L)	0.6		0.8		0.5		0.6		2.2		2.8	
2	COD (mg/L)	80.0		32.0		88.0		76.0		160.0		80.0	
3	DO (mg/L)									7.6		7.5	
4	DO_SAT% (%)									76		86	
5	FCol-MPN (MPN/100mL)	400		500		300		600		600		500	
6	Tcol-MPN (MPN/100mL)	1000		800		700		1300		1000		1400	
	TRACE & TOXIC												
1	Al (mg/L)	0.10		0.10		0.06		0.08		0.10		0.09	
	CHEMICAL INDICES												
1	HAR_Ca (mgCaCO3/L)	80		85		70		80		90		85	
2	HAR_Total (mgCaCO3/L)	131		121		101		121		110		131	
3	Na% (%)	37		42		44		40		44		38	
4	RSC (-)	0.0		0.0		0.0		0.0		0.0		0.0	
5	SAR (-)	1.4		1.7		1.7		1.5		1.7		1.4	

Water Quality Summary for the period : 2015-2016

S.No	Parameters	Number of Observations	Maximum	Minimum	Mean
	PHYSICAL				
1	Q (cumec)	297	4805	17.93	209.1
2	EC_FLD (µmho/cm)	2	356	345	351
3	EC_GEN (µmho/cm)	6	425	285	344
4	pH_FLD (pH units)	2	8.1	7.1	7.6
5	pH_GEN (pH units)	6	8.3	7.9	8.1
6	SS (mg/L)	6	150	90	115
7	TDS (mg/L)	6	276	183	224
8	Temp (deg C)	6	26.0	16.0	21.8
9	TS (mg/L)	5	926	150	419
10	Turb (NTU)	6	2.0	1.0	1.3
	CHEMICAL				
1	Alk-Phen (mgCaCO3/L)	6	0.0	0.0	0
2	ALK-TOT (mgCaCO3/L)	6	120	90	98
3	Ca (mg/L)	6	36	28	33
4	Cl (mg/L)	6	70.0	50.0	60.3
5	CO3 (mg/L)	6	0.0	0.0	0
6	F (mg/L)	6	0.15	0.12	0.13
7	HCO3 (mg/L)	6	146	110	120
8	K (mg/L)	6	4.6	3.0	3.8
9	Mg (mg/L)	6	12.2	4.9	8.9
10	Na (mg/L)	6	42.0	36.0	39
11	NH3-N (mg N/L)	6	0.13	0.10	0.12
12	NO2+NO3 (mg N/L)	6	0.21	0.17	0.19
13	NO2-N (mgN/L)	6	0.08	0.04	0.06
14	NO3-N (mgN/L)	6	0.14	0.12	0.13
15	P-Tot (mgP/L)	6	0.140	0.120	0.132
16	SiO2 (mg/L)	6	12.0	6.0	8.7
17	SO4 (mg/L)	6	11.0	6.0	9.6
	BIOLOGICAL/BACTERIOLOGICAL				
1	BOD3-27 (mg/L)	6	2.8	0.5	1.2
2	COD (mg/L)	6	160.0	32.0	86
3	DO (mg/L)	2	7.6	7.5	7.5
4	DO_SAT% (%)	2	86	76	81
5	FCol-MPN (MPN/100mL)	6	600	300	483
6	Tcol-MPN (MPN/100mL)	6	1400	700	1033
	TRACE & TOXIC				
1	Al (mg/L)	6	0.10	0.06	0.09
	CHEMICAL INDICES				
1	HAR_Ca (mgCaCO3/L)	6	90	70	82
2	HAR_Total (mgCaCO3/L)	6	131	101	119
3	Na% (%)	6	44	37	41
4	RSC (-)	6	0.0	0.0	0
5	SAR (-)	6	1.7	1.4	1.6

Water Quality Seasonal Average for the period: 2011-2016

Station Name : Narmada at Garudeshwar (01 02 15 030) 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				
		2011	2012	2013	2014	2015	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016	2012	2013	2014	2015	2016
	PHYSICAL															
1	Q (cumec)	1471	568.7	1891	590.6	358.3	67.95	112.3	48.81	83.65	26.00	51.80	87.71	111.3	24.09	36.12
2	EC_FLD (µmho/cm)	356								340	356				340	345
3	EC_GEN (µmho/cm)	323	373	306	310	357	305	386	405	390	321	240	306	382	330	351
4	pH_FLD (pH units)	7.4		8.2						7.8	8.1				7.8	7.1
5	pH_GEN (pH units)	7.6	7.5	7.8	8.2	8.2	7.5	7.9	8.2	8.2	8.0	7.5	8.2	8.0	8.2	8.1
6	SS (mg/L)	113	123	103	115	120	99	131	125	138	105	50	102	100	100	119
7	TDS (mg/L)	228	247	204	203	231	198	235	258	253	208	200	235	237	213	238
8	Temp (deg C)	26.0	25.3	24.3	24.3	24.3	19.5	21.0	20.5	15.5	18.0	25.0	25.0	22.0	22.0	22.0
9	TS (mg/L)	332	370	307	318	462	297	366	383	390	352	151	337	337	313	357
10	Turb (NTU)	1.0	3.3	3.3	1.0	1.7	1.0	1.0	1.0	1.0	1.0	2.0	1.0	1.0	1.0	1.0
	CHEMICAL															
1	Alk-Phen (mgCaCO3/L)	0.0	0.0	0.0	7.7	0.0	0.0	0.0	5.0	10.0	0.0	0.0	0.0	6.6	5.8	0.0
2	ALK-TOT (mgCaCO3/L)	87	80	90	97	95	92	85	103	78	92	92	100	103	184	120
3	Ca (mg/L)	33	31	31	33	31	34	33	31	28	34	32	32	32	33	34
4	Cl (mg/L)	86.6	136.3	67.3	66.7	63.0	48.1	52.3	75.5	61.0	61.5	56.7	74.5	50.0	90.0	50.0
5	CO3 (mg/L)	0.0	0.0	0.0	9.3	0.0	0.0	0.0	6.0	12.0	0.0	0.0	0.0	8.0	7.0	0.0
6	F (mg/L)	0.07	0.23	0.17	0.15	0.14	0.05	0.18	0.15	0.14	0.13	0.08	0.14	0.18	0.15	0.12
7	HCO3 (mg/L)	106	98	110	100	116	112	104	113	71	112	112	122	110	210	146
8	K (mg/L)	13.7	5.5	6.8	4.0	3.7	9.8	3.8	7.4	3.9	3.8	10.0	3.6	4.8	4.6	4.0
9	Mg (mg/L)	7.4	7.5	8.8	6.9	9.3	6.9	6.7	8.0	6.5	7.3	7.4	6.8	7.8	14.4	10.9
10	Na (mg/L)	46.5	83.2	42.0	44.8	38.7	29.2	30.6	51.6	41.3	40.1	31.5	53.1	38.0	44.8	38.0
11	NH3-N (mg N/L)	0.05	0.11	0.11	0.13	0.12	0.08	0.06	0.14	0.16	0.13	0.08	0.10	0.12	0.13	0.13
12	NO2+NO3 (mg N/L)	0.13	0.15			0.20	0.11	0.24			0.18	0.12				0.18
13	NO2-N (mgN/L)	0.03	0.03			0.07	0.02	0.05			0.05	0.02				0.06
14	NO3-N (mgN/L)	0.10	0.12	0.13	0.12	0.13	0.08	0.17	0.11	0.16	0.13	0.10	0.23	0.16	0.13	0.12
15	o-PO4-P (mg P/L)	0.043	0.060				0.050	0.060				0.120				
16	P-Tot (mgP/L)	0.224	0.320	0.213	0.157	0.130	0.300	0.250	0.200	0.180	0.140	0.300	0.260	0.120	0.150	0.120
17	SiO2 (mg/L)	17.7	9.5	6.5	8.4	8.0	20.4	9.0	8.9	10.4	11.0	10.0	10.0	8.4	5.0	6.0
18	SO4 (mg/L)	6.7	9.6	10.0	10.2	8.5	11.4	13.0	11.2	11.2	10.5	10.0	10.2	16.0	5.0	11.0
	BIOLOGICAL/BACTERIOLOGICAL															
1	BOD3-27 (mg/L)	1.7	0.6	1.0	0.7	0.6	1.6	0.9	1.6	1.1	1.4	0.5	2.7	3.1	4.9	2.8
2	COD (mg/L)					66.7				8.0	118.0				26.0	80.0
3	DO (mg/L)			7.0						6.9	7.6				6.9	7.5
4	DO_SAT% (%)			82						65	76				79	86
5	FCol-MPN (MPN/100mL)				400	400			600	400	600			500	600	500
6	Tcol-MPN (MPN/100mL)				900	833			1200	800	1150			1000	1200	1400
	TRACE & TOXIC															
1	Al (mg/L)	0.08	0.08	0.11	0.11	0.09	0.07	0.11	0.07	0.08	0.09	0.06	0.12	0.08	0.12	0.09
	CHEMICAL INDICES															
1	HAR_Ca (mgCaCO3/L)	81	77	77	83	78	85	81	78	70	85	80	80	80	82	85
2	HAR_Total (mgCaCO3/L)	112	108	114	112	117	114	109	111	97	116	111	108	113	142	131
3	Na% (%)	43	50	42	45	41	34	37	48	48	42	36	51	41	40	38
4	RSC (-)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.9	0.0
5	SAR (-)	1.9	3.4	1.7	1.8	1.6	1.2	1.3	2.1	1.9	1.6	1.3	2.2	1.6	1.6	1.4

3.4 Goi at Pati

History sheet

			Water Year	**:**	**2015-2016**
Site	**:**	**Goi at Pati**	**Code**	**:**	**N.C.A. PATI**
State	:	Madhya Pradesh	District		Barwani
Basin	:	Narmada	Independent River	:	Narmada
Tributary	:	Goi			
Sub Tributary	:		Local River	:	Goi
Division	:	Narmada Division, Bhopal	Sub-Division	:	MNSD-III, Indore
Drainage Area	:	2151 Sq. km.	Bank	:	Right
Latitude	:	21°56'37"	Longitude	:	74°44'42"
Zero of Gauge (m)	:	187 .000 (M.S.L.)	15/06/2008		
		Opening Date	Closing Date		
Gauge	:	15/06/2008			
Discharge	:	15/06/2008			
Sediment	:				
Water Quality	:	01/07/2008			

Water Quality Datasheet for the period : 2015-2016

Station Name : Goi at Pati (N.C.A. PATI) Division : Narmada Division, Bhopal

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

River Water Analysis

S.No	Parameters	01/06/2015	01/07/2015	03/08/2015	01/09/2015	05/10/2015	02/11/2015	01/12/2015	01/01/2016	01/02/2016	01/03/2016	01/04/2016	02/05/2016
		A	A	A	A	A	A	A	A	B	A	A	A
	PHYSICAL												
1	Q (cumec)		1.454	31.36	11.98	12.65	4.682	3.000	2.592	2.149	1.843	1.820	1.915
2	Colour_Cod (-)		Clear	Light Brown	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear
3	EC_GEN (µmho/cm)		339	316	310	292	324	389	322	328	427	398	401
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)		8.1	8.3	8.4	8.4	8.3	8.4	8.3	8.1	8.2	8.2	8.2
6	TDS (mg/L)		215	219	192	190	198	243	214	214	276	265	257
7	Temp (deg C)		25.0	25.0	26.0	28.0	22.0	20.0	16.0	16.0	22.0	24.0	25.0
8	Turb (NTU)		0.0	140.0	20.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	CHEMICAL												
1	Alk-Phen (mgCaCO3/L)		0.0	4.7	7.0	6.9	4.6	6.9	2.3	0.0	0.0	0.0	0.0
2	ALK-TOT (mgCaCO3/L)		165	189	159	167	170	170	168	163	167	170	158
3	Ca (mg/L)		38	23	42	29	40	36	33	35	29	30	30
4	Cl (mg/L)		7.8	10.4	10.0	10.3	15.0	10.0	9.0	19.0	20.0	18.0	21.0
5	CO3 (mg/L)		0.0	5.6	8.4	8.4	5.6	8.4	2.8	0.0	0.0	0.0	0.0
6	F (mg/L)		0.48	0.23	0.76	0.28	0.65	0.06	0.23	0.24	0.35	0.33	0.32
7	HCO3 (mg/L)		201	219	177	187	196	190	199	199	204	207	193
8	K (mg/L)		3.9	2.2	2.3	0.9	0.8	0.9	0.8	0.9	0.9	1.0	1.2
9	Mg (mg/L)		16.8	29.7	16.8	23.6	18.7	20.7	21.4	18.7	19.9	21.9	18.2
10	Na (mg/L)		22.4	15.3	15.8	17.7	17.4	17.7	18.2	18.2	18.8	19.1	18.1
11	NO2+NO3 (mg N/L)		12.70	2.06	5.23	4.08	4.47	4.08	3.38	3.13	3.04	2.25	0.24
12	NO2-N (mgN/L)		0.05	0.02	0.02	0.01	0.02	0.06	0.08	0.02	0.03	0.02	0.01
13	NO3-N (mgN/L)		12.65	2.04	5.20	4.07	4.45	4.02	3.30	3.10	3.01	2.23	0.23
14	o-PO4-P (mg P/L)		0.572	0.307	0.321	0.122	0.107	0.204	0.004	0.184	0.206	0.157	0.060
15	SiO2 (mg/L)		30.9	29.1	29.0	33.2	29.7	31.2	29.3	27.9	25.8	23.9	23.5
16	SO4 (mg/L)		27.2	25.2	26.4	12.7	12.7	14.7	16.5	16.3	16.8	15.6	14.4
	BIOLOGICAL/BACTERIOLOGICAL												
1	BOD3-27 (mg/L)		0.4	0.2	0.4	0.2	0.1	0.7	0.7	0.4	0.2	0.8	1.0
2	COD (mg/L)		26.0	27.0	31.0	29.0	32.0	34.0	37.0	21.0	54.0	43.0	29.0
3	DO (mg/L)		6.2	6.8	6.8	6.4	7.1	6.8	7.2	6.6	5.1	5.4	5.5
4	DO_SAT% (%)		75	82	84	82	81	75	73	67	58	64	67
	TRACE & TOXIC												
	CHEMICAL INDICES												
1	HAR_Ca (mgCaCO3/L)		95	58	105	72	101	89	83	87	73	76	74
2	HAR_Total (mgCaCO3/L)		164	182	175	170	179	175	172	165	156	167	150
3	Na% (%)		22	15	16	18	18	18	19	19	21	20	21
4	RSC (-)		0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.1	0.2
5	SAR (-)		0.8	0.5	0.5	0.6	0.6	0.6	0.6	0.6	0.7	0.6	0.6

Water Quality Summary for the period : 2015-2016

Station Name : Goi at Pati (N.C.A. PATI) Division : Narmada Division, Bhopal

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

River Water Summary

S.No	Parameters	Number of Observations	Maximum	Minimum	Mean
	PHYSICAL				
1	Q (cumec)	260	98.99	0.764	8.580
2	EC_GEN (µmho/cm)	11	427	292	350
3	pH_GEN (pH units)	11	8.4	8.1	8.3
4	TDS (mg/L)	11	276	190	226
5	Temp (deg C)	11	28.0	16.0	22.6
6	Turb (NTU)	11	140.0	0.0	14.5
	CHEMICAL				
1	Alk-Phen (mgCaCO3/L)	11	7.0	0.0	3
2	ALK-TOT (mgCaCO3/L)	11	189	158	168
3	Ca (mg/L)	11	42	23	33
4	Cl (mg/L)	11	21.0	7.8	13.7
5	CO3 (mg/L)	11	8.4	0.0	3.6
6	F (mg/L)	11	0.76	0.06	0.36
7	HCO3 (mg/L)	11	219	177	197
8	K (mg/L)	11	3.9	0.8	1.4
9	Mg (mg/L)	11	29.7	16.8	20.6
10	Na (mg/L)	11	22.4	15.3	18.1
11	NO2+NO3 (mg N/L)	11	12.70	0.24	4.06
12	NO2-N (mgN/L)	11	0.08	0.01	0.03
13	NO3-N (mgN/L)	11	12.65	0.23	4.03
14	o-PO4-P (mg P/L)	11	0.572	0.004	0.204
15	SiO2 (mg/L)	11	33.2	23.5	28.5
16	SO4 (mg/L)	11	27.2	12.7	18
	BIOLOGICAL/BACTERIOLOGICAL				
1	BOD3-27 (mg/L)	11	1.0	0.1	0.5
2	COD (mg/L)	11	54.0	21.0	33
3	DO (mg/L)	11	7.2	5.1	6.4
4	DO_SAT% (%)	11	84	58	73
	TRACE & TOXIC				
	CHEMICAL INDICES				
1	HAR_Ca (mgCaCO3/L)	11	105	58	83
2	HAR_Total (mgCaCO3/L)	11	182	150	169
3	Na% (%)	11	22	15	19
4	RSC (-)	11	0.2	0.0	0.1
5	SAR (-)	11	0.8	0.5	0.6

Water Quality Seasonal Average for the period : 2011-2016

Station Name : Goi at Pati (N.C.A. PATI) Division : Narmada Division, Bhopal

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

River Water

S.No	Parameters	Flood					Winter					Summer				
		Jun - Oct					Nov - Feb					Mar - May				
		2011	2012	2013	2014	2015	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016	2012	2013	2014	2015	2016
	PHYSICAL															
1	Q (cumec)	37.61	35.19	33.11		14.36	1.071	0.763	2.131		2.914	0.000	0.000	0.000	0.000	1.860
2	EC_GEN (µmho/cm)	345	289	376	317	314	442	463	483	384	341					409
3	pH_GEN (pH units)	8.3	8.1	8.3	8.1	8.3	8.2	8.2	8.1	8.2	8.3					8.2
4	TDS (mg/L)	221	179	237	202	204	282	291	297	255	217					266
5	Temp (deg C)	27.0	27.0	27.6	27.3	26.0		23.5	23.0	21.0	18.5					23.7
6	Turb (NTU)	108.0	130.0	27.0	212.0	40.0	0.1	0.0	1.5	0.0	0.0					0.0
	CHEMICAL															
1	Alk-Phen (mgCaCO3/L)	4.2	0.0	5.7	1.7	4.6	2.5	0.0	1.9	2.5	3.5					0.0
2	ALK-TOT (mgCaCO3/L)	132	118	171	150	170	181	199	191	179	168					165
3	Ca (mg/L)	29	27	25	33	33	34	40	42	36	36					30
4	Cl (mg/L)	12.4	11.5	15.3	9.3	9.6	25.5	18.8	16.9	23.9	13.3					19.7
5	CO3 (mg/L)	5.1	0.0	6.9	2.1	5.6	3.0	0.0	2.3	3.0	4.2					0.0
6	F (mg/L)	0.22	0.36	0.34	0.49	0.44	0.18	0.29	0.20	0.15	0.30					0.33
7	HCO3 (mg/L)	151	144	195	179	196	215	243	228	212	196					201
8	K (mg/L)	1.9	1.4	3.0	2.4	2.3	1.1	1.1	0.8	0.8	0.8					1.0
9	Mg (mg/L)	17.2	12.5	25.7	19.8	21.7	23.0	23.4	22.5	25.6	19.9					20.0
10	Na (mg/L)	17.0	14.5	17.2	14.1	17.8	21.4	22.5	26.6	23.7	17.9					18.6
11	NO2+NO3 (mg N/L)	3.03	5.09	5.77	5.35	6.01	14.62	4.65	8.63	10.69	3.76					1.84
12	NO2-N (mgN/L)	0.02	0.07	0.03	0.07	0.03	0.11	0.03	0.04	0.02	0.04					0.02
13	NO3-N (mgN/L)	3.01	5.03	5.74	5.28	5.99	14.51	4.62	8.59	10.67	3.72					1.82
14	o-PO4-P (mg P/L)	0.193	0.046	0.216	0.545	0.331	0.089	0.042	0.181	0.152	0.125					0.141
15	SiO2 (mg/L)	29.9	26.3	31.4	30.5	30.6	34.0	34.1	39.0	30.8	29.5					24.4
16	SO4 (mg/L)	10.2	18.7	21.5	30.5	22.9	8.6	15.4	23.5	19.2	15.0					15.6
	BIOLOGICAL/BACTERIOLOGICAL															
1	BOD3-27 (mg/L)	0.9	1.1	0.8	0.7	0.3	0.8	0.6	0.6	0.8	0.5					0.7
2	COD (mg/L)	22.7	29.7	24.8	36.3	28.3	34.5	37.0	27.0	41.5	31.0					42.0
3	DO (mg/L)	5.4	5.8	6.6	6.4	6.6	5.5	5.8	6.8	7.1	6.9					5.3
4	DO_SAT% (%)	75	73	84	80	81		68	79	80	74					63
	TRACE & TOXIC															
	CHEMICAL INDICES															
1	HAR_Ca (mgCaCO3/L)	72	68	64	83	83	86	99	104	89	90					74
2	HAR_Total (mgCaCO3/L)	144	120	171	166	173	181	197	198	196	173					158
3	Na% (%)	20	21	18	15	18	20	19	23	21	18					20
4	RSC (-)	0.1	0.1	0.1	0.0	0.1	0.0	0.1	0.3	0.0	0.0					0.2
5	SAR (-)	0.6	0.6	0.6	0.5	0.6	0.7	0.7	0.8	0.7	0.6					0.6

3.5 Uri at Dhulsar

History sheet

			Water Year	**:**	**2015-2016**
Site	**:**	**Uri at Dhulsar**	**Code**	**:**	**NCA DHULSAR**
State	:	Madhya Pradesh	District		Dhar
			Independent		
Basin	:	Narmada	River	:	Narmada
Tributary	:	Uri	Local River	:	Uri
Division	:	Narmada Division, Bhopal	Sub-Division	:	MNSD-III, Indore
Drainage Area	:	787 Sq. Km.	Bank	:	Right
Latitude	:	22°12'20"	Longitude	:	74°51'06"
Zero of		151 .000			
Gauge (m)	:	(M.S.L.)	15/06/2008		
		Opening Date	Closing Date		
Gauge	:	15/06/2008			
Discharge	:	15/06/2008			
Sediment	:				
Water Quality	:	01/08/2008			

Water Quality Datasheet for the period : 2015-2016

Station Name : Uri at Dhulsar (NCA Dhulsar) Division : Narmada Division, Bhopal

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

River Water Analysis

S.No	Parameters	01/06/2015	01/07/2015	03/08/2015	01/09/2015	05/10/2015	02/11/2015	01/12/2015	01/01/2016	01/02/2016	01/03/2016	01/04/2016	02/05/2016
		A	A	A	A	A	A	A	A	A	A	A	A
	PHYSICAL												
1	Q (cumec)		0.497	19.93	4.771	0.971							
2	Colour_Cod (-)		Clear	Clear	Clear	Clear							
3	EC_GEN (µmho/cm)		252	308	340	383							
4	Odour_Code (-)		odour free	odour free	odour free	odour free							
5	pH_GEN (pH units)		8.3	8.4	8.3	8.1							
6	TDS (mg/L)		160	216	205	249							
7	Temp (deg C)		28.0	27.0	27.0	26.0							
8	Turb (NTU)		0.0	9.0	15.0	0.0							
	CHEMICAL												
1	Alk-Phen (mgCaCO3/L)		4.6	7.0	4.7	0.0							
2	ALK-TOT (mgCaCO3/L)		107	182	172	172							
3	Ca (mg/L)		21	38	46	34							
4	Cl (mg/L)		7.8	12.8	13.6	13.0							
5	CO3 (mg/L)		5.6	8.4	5.6	0.0							
6	F (mg/L)		0.58	0.36	0.74	0.35							
7	HCO3 (mg/L)		119	205	199	210							
8	K (mg/L)		5.0	2.4	2.7	3.3							
9	Mg (mg/L)		10.2	20.4	16.0	26.5							
10	Na (mg/L)		21.1	15.6	16.2	34.3							
11	NO2+NO3 (mg N/L)		4.74	2.04	3.58	3.96							
12	NO2-N (mgN/L)		0.10	0.01	0.01	0.07							
13	NO3-N (mgN/L)		4.65	2.03	3.57	3.89							
14	o-PO4-P (mg P/L)		0.764	0.286	0.305	0.124							
15	SiO2 (mg/L)		30.5	33.4	33.5	39.9							
16	SO4 (mg/L)		22.3	29.2	29.0	28.5							
	BIOLOGICAL/BACTERIOLOGICAL												
1	BOD3-27 (mg/L)		0.9	0.6	0.3	0.2							
2	COD (mg/L)		58.0	48.0	51.0	36.0							
3	DO (mg/L)		4.5	6.9	6.0	5.0							
4	DO_SAT% (%)		57	87	75	62							
	TRACE & TOXIC												
	CHEMICAL INDICES												
1	HAR_Ca (mgCaCO3/L)		52	96	116	85							
2	HAR_Total (mgCaCO3/L)		95	181	183	196							
3	Na% (%)		31	16	16	27							
4	RSC (-)		0.3	0.0	0.0	0.0							
5	SAR (-)		0.9	0.5	0.5	1.1							

Water Quality Summary for the period : 2015-2016

Station Name : Uri at Dhulsar (NCA Dhulsar) Division : Narmada Division, Bhopal

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

River Water Summary

S.No	Parameters	Number of Observations	Maximum	Minimum	Mean
	PHYSICAL				
1	Q (cumec)	77	184.4	0.459	15.12
2	EC_GEN (µmho/cm)	4	383	252	321
3	pH_GEN (pH units)	4	8.4	8.1	8.3
4	TDS (mg/L)	4	249	160	208
5	Temp (deg C)	4	28.0	26.0	27
6	Turb (NTU)	4	15.0	0.0	6
	CHEMICAL				
1	Alk-Phen (mgCaCO3/L)	4	7.0	0.0	4.1
2	ALK-TOT (mgCaCO3/L)	4	182	107	158
3	Ca (mg/L)	4	46	21	35
4	Cl (mg/L)	4	13.6	7.8	11.8
5	CO3 (mg/L)	4	8.4	0.0	4.9
6	F (mg/L)	4	0.74	0.35	0.51
7	HCO3 (mg/L)	4	210	119	183
8	K (mg/L)	4	5.0	2.4	3.3
9	Mg (mg/L)	4	26.5	10.2	18.3
10	Na (mg/L)	4	34.3	15.6	21.8
11	NO2+NO3 (mg N/L)	4	4.74	2.04	3.58
12	NO2-N (mgN/L)	4	0.10	0.01	0.05
13	NO3-N (mgN/L)	4	4.65	2.03	3.53
14	o-PO4-P (mg P/L)	4	0.764	0.124	0.37
15	SiO2 (mg/L)	4	39.9	30.5	34.3
16	SO4 (mg/L)	4	29.2	22.3	27.2
	BIOLOGICAL/BACTERIOLOGICAL				
1	BOD3-27 (mg/L)	4	0.9	0.2	0.5
2	COD (mg/L)	4	58.0	36.0	48.3
3	DO (mg/L)	4	6.9	4.5	5.6
4	DO_SAT% (%)	4	87	57	70
	TRACE & TOXIC				
	CHEMICAL INDICES				
1	HAR_Ca (mgCaCO3/L)	4	116	52	87
2	HAR_Total (mgCaCO3/L)	4	196	95	163
3	Na% (%)	4	31	16	23
4	RSC (-)	4	0.3	0.0	0.1
5	SAR (-)	4	1.1	0.5	0.8

Water Quality Seasonal Average for the period : 2011-2016

Station Name : Uri at Dhulsar (NCA DHULSAR) Division : Narmada Division, Bhopal

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

River Water

S.No	Parameters	Flood					Winter					Summer				
		Jun - Oct					Nov - Feb					Mar - May				
		2011	2012	2013	2014	2015	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016	2012	2013	2014	2015	2016
	PHYSICAL															
1	Q (cumec)	5.594	4.175	18.89		6.542	0.000	0.000	0.872			0.000	0.000	0.000		
2	EC_GEN (µmho/cm)	428	445	415	382	321		418	474	340						
3	pH_GEN (pH units)	8.5	8.3	8.5	7.9	8.3		8.3	8.2	7.9						
4	TDS (mg/L)	272	278	262	243	208		269	292	218						
5	Temp (deg C)	27.0	27.8	27.4	28.0	27.0		24.0	22.8	26.0						
6	Turb (NTU)	27.4	15.0	25.5	81.7	6.0		0.0	2.6	0.0						
	CHEMICAL															
1	Alk-Phen (mgCaCO3/L)	7.6	3.3	8.2	0.0	4.1		5.0	0.0	0.0						
2	ALK-TOT (mgCaCO3/L)	185	177	181	164	158		148	173	148						
3	Ca (mg/L)	35	35	33	30	35		28	36	17						
4	Cl (mg/L)	18.5	25.8	21.5	19.6	11.8		19.8	17.7	26.2						
5	CO3 (mg/L)	9.1	4.0	9.9	0.0	4.9		6.0	0.0	0.0						
6	F (mg/L)	0.23	0.35	0.35	0.44	0.51		0.37	0.10	0.36						
7	HCO3 (mg/L)	207	207	201	200	183		168	211	181						
8	K (mg/L)	2.8	3.6	4.0	3.2	3.3		2.8	2.1	2.3						
9	Mg (mg/L)	20.6	19.6	23.9	23.1	18.3		19.9	26.0	28.9						
10	Na (mg/L)	28.2	26.7	23.0	19.8	21.8		26.5	30.4	27.6						
11	NO2+NO3 (mg N/L)	4.48	7.02	1.68	5.02	3.58		2.57	4.60	2.93						
12	NO2-N (mgN/L)	0.09	0.07	0.04	0.07	0.05		0.13	0.11	0.01						
13	NO3-N (mgN/L)	4.39	6.94	1.64	4.95	3.53		2.43	4.50	2.92						
14	o-PO4-P (mg P/L)	0.145	0.006	0.146	0.438	0.370		0.008	0.044	0.085						
15	SiO2 (mg/L)	33.3	28.9	28.4	37.1	34.3		44.5	49.3	24.9						
16	SO4 (mg/L)	14.0	25.7	30.2	30.0	27.2		19.9	32.6	22.9						
	BIOLOGICAL/BACTERIOLOGICAL															
1	BOD3-27 (mg/L)	0.7	0.8	1.0	0.8	0.5		0.4	1.1	1.4						
2	COD (mg/L)	20.3	15.0	24.8	27.7	48.3		44.0	20.0	27.0						
3	DO (mg/L)	5.7	6.2	6.5	5.8	5.6		4.8	6.2	5.5						
4	DO_SAT% (%)	75	79	83	74	70		57	71	68						
	TRACE & TOXIC															
	CHEMICAL INDICES															
1	HAR_Ca (mgCaCO3/L)	86	89	81	75	87		71	89	44						
2	HAR_Total (mgCaCO3/L)	172	170	181	171	163		154	198	164						
3	Na% (%)	27	26	23	20	23		27	25	27						
4	RSC (-)	0.3	0.2	0.1	0.0	0.1		0.0	0.0	0.0						
5	SAR (-)	1.0	0.9	0.8	0.7	0.8		0.9	0.9	0.9						

3.6 Narmada at Mandleshwar

History Sheet

			Water Year	**:**	**2015-2016**
Site	**:**	**Narmada at Mandleshwar**	**Code**	**:**	**010215026**
State	:	Madhya Pradesh	District		Khargone
			Independent		
Basin	:	Narmada	River	:	Narmada
Tributary	:		Local River	:	Narmada
Division	:	Narmada Division, Bhopal	Sub-Division	:	MNSD-III, Indore
Drainage Area	:	72809 Sq. Km.	Bank	:	Right
Latitude	:	22°10'18"	Longitude	:	75°39'39"
Zero of					
Gauge (m)	:	138 .000 (M.S.L.)	16/12/1970		
		Opening Date	Closing Date		
Gauge	:	16/12/1970			
Discharge	:	28/08/1971			
Sediment	:	14/04/1972			
Water Quality	:	18/06/1979			

Water Quality Datasheet for the period : 2015-2016

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

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

River Water Analysis

S.No	Parameters	01/06/2015	01/07/2015	03/08/2015	01/09/2015	05/10/2015	02/11/2015	01/12/2015	01/01/2016	01/02/2016	01/03/2016	01/04/2016	02/05/2016
		A	A	A	A	A	A	A	A	B	A	A	A
	PHYSICAL												
1	Q (cumec)	215.8	685.6	1107	920.2	699.4	405.3	281.1	530.1	290.5	400.6	545.2	554.8
2	Colour_Cod (-)	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear
3	EC_GEN (µmho/cm)	235	229	210	218	175	174	235	198	229	295	285	277
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)	8.2	8.1	8.1	8.2	8.1	8.2	8.3	8.2	8.1	8.2	8.2	8.1
6	TDS (mg/L)	135	146	143	135	114	105	147	130	149	192	172	178
7	Temp (deg C)	24.0	22.0	20.0	22.0	24.0	22.0	20.0	15.0	16.0	18.0	20.0	23.0
8	Turb (NTU)	0.0	0.0	23.0	23.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	CHEMICAL												
1	Alk-Phen (mgCaCO3/L)	0.0	0.0	0.0	0.0	0.0	0.0	4.6	0.0	0.0	0.0	0.0	0.0
2	ALK-TOT (mgCaCO3/L)	139	135	135	225	109	109	121	128	130	125	130	132
3	Ca (mg/L)	27	28	27	27	23	26	25	27	29	26	27	27
4	Cl (mg/L)	10.5	4.5	9.6	8.2	8.6	7.0	9.0	8.0	9.0	8.0	9.0	7.0
5	CO3 (mg/L)	0.0	0.0	0.0	0.0	0.0	0.0	5.6	0.0	0.0	0.0	0.0	0.0
6	F (mg/L)	0.35	0.53	0.27	0.70	0.16	0.56	0.44	0.23	0.22	0.26	0.29	0.24
7	HCO3 (mg/L)	169	165	165	274	133	133	136	156	159	153	159	161
8	K (mg/L)	1.7	3.0	2.6	2.8	1.7	1.6	1.7	1.7	2.9	2.0	1.8	2.1
9	Mg (mg/L)	11.2	11.2	13.1	13.9	10.0	10.7	10.5	9.0	11.2	11.4	13.1	10.2
10	Na (mg/L)	8.7	13.5	11.7	11.9	10.3	8.2	10.2	10.4	11.7	11.2	10.9	9.0
11	NO2+NO3 (mg N/L)	0.39	2.22	0.74	2.63	0.78	0.61	0.82	0.30	0.31	0.32	0.48	0.20
12	NO2-N (mgN/L)	0.02	0.01	0.02	0.02	0.00	0.01	0.16	0.03	0.02	0.02	0.01	0.01
13	NO3-N (mgN/L)	0.37	2.22	0.73	2.61	0.78	0.60	0.65	0.27	0.29	0.30	0.46	0.19
14	o-PO4-P (mg P/L)	0.087	0.343	0.226	0.237	0.100	0.173	0.193	0.003	0.171	0.197	0.096	0.049
15	SiO2 (mg/L)	18.0	18.5	15.2	16.2	16.6	11.5	15.8	15.2	21.8	22.0	21.8	21.5
16	SO4 (mg/L)	4.3	11.7	26.9	28.8	4.2	4.5	3.8	3.0	4.6	4.9	4.8	5.2
	BIOLOGICAL/BACTERIOLOGICAL												
1	BOD3-27 (mg/L)	0.9	0.8	0.8	0.8	0.8	0.7	0.4	0.6	1.0	0.9	0.6	0.9
2	COD (mg/L)	45.0	38.0	32.0	34.0	31.0	26.0	27.0	28.0	23.0	32.0	31.0	36.0
3	DO (mg/L)	5.6	5.4	6.8	6.2	6.7	7.5	6.8	7.6	7.3	6.7	6.1	5.8
4	DO_SAT% (%)	67	62	75	71	80	86	75	75	74	71	67	68
	TRACE & TOXIC												
	CHEMICAL INDICES												
1	HAR_Ca (mgCaCO3/L)	68	70	68	68	57	64	63	68	72	66	68	68
2	HAR_Total (mgCaCO3/L)	114	116	123	125	99	109	106	105	119	113	122	111
3	Na% (%)	14	20	17	17	18	14	17	17	17	18	16	15
4	RSC (-)	0.5	0.4	0.3	2.0	0.2	0.0	0.3	0.5	0.2	0.3	0.2	0.4
5	SAR (-)	0.4	0.5	0.5	0.5	0.5	0.3	0.4	0.4	0.5	0.5	0.4	0.4

Water Quality Summary for the period : 2015-2016

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

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

River Water Summary

S.No	Parameters	Number of Observations	Maximum	Minimum	Mean
	PHYSICAL				
1	Q (cumec)	293	2311	138.9	603.1
2	EC_GEN (µmho/cm)	12	295	174	230
3	pH_GEN (pH units)	12	8.3	8.1	8.2
4	TDS (mg/L)	12	192	105	146
5	Temp (deg C)	12	24.0	15.0	20.5
6	Turb (NTU)	12	23.0	0.0	3.8
	CHEMICAL				
1	Alk-Phen (mgCaCO3/L)	12	4.6	0.0	0.4
2	ALK-TOT (mgCaCO3/L)	12	225	109	135
3	Ca (mg/L)	12	29	23	27
4	Cl (mg/L)	12	10.5	4.5	8.2
5	CO3 (mg/L)	12	5.6	0.0	0.5
6	F (mg/L)	12	0.70	0.16	0.35
7	HCO3 (mg/L)	12	274	133	164
8	K (mg/L)	12	3.0	1.6	2.1
9	Mg (mg/L)	12	13.9	9.0	11.3
10	Na (mg/L)	12	13.5	8.2	10.6
11	NO2+NO3 (mg N/L)	12	2.63	0.20	0.81
12	NO2-N (mgN/L)	12	0.16	0.00	0.03
13	NO3-N (mgN/L)	12	2.61	0.19	0.79
14	o-PO4-P (mg P/L)	12	0.343	0.003	0.156
15	SiO2 (mg/L)	12	22.0	11.5	17.9
16	SO4 (mg/L)	12	28.8	3.0	8.9
	BIOLOGICAL/BACTERIOLOGICAL				
1	BOD3-27 (mg/L)	12	1.0	0.4	0.8
2	COD (mg/L)	12	45.0	23.0	31.9
3	DO (mg/L)	12	7.6	5.4	6.5
4	DO_SAT% (%)	12	86	62	72
	TRACE & TOXIC				
	CHEMICAL INDICES				
1	HAR_Ca (mgCaCO3/L)	12	72	57	67
2	HAR_Total (mgCaCO3/L)	12	125	99	114
3	Na% (%)	12	20	14	17
4	RSC (-)	12	2.0	0.0	0.4
5	SAR (-)	12	0.5	0.3	0.4

Water Quality Seasonal Average for the period : 2011-2016

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

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

River Water

S.No	Parameters	Flood					Winter					Summer				
		Jun - Oct					Nov - Feb					Mar - May				
		2011	2012	2013	2014	2015	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016	2012	2013	2014	2015	2016
	PHYSICAL															
1	Q (cumec)	1986	857.0	2416	524.0	725.6	558.2	621.0	633.3	632.6	359.5	603.8	689.5	1271	853.9	500.2
2	EC_GEN (µmho/cm)	247	267	241	240	213	237	240	243	201	209	277	268	218	201	286
3	pH_GEN (pH units)	8.2	8.1	8.0	7.9	8.1	8.2	8.1	8.2	8.1	8.2	8.2	8.2	8.1	8.1	8.2
4	TDS (mg/L)	156	166	152	153	135	154	158	145	132	133	171	170	138	127	181
5	Temp (deg C)	27.4	27.8	26.4	26.0	22.4	23.8	21.4	23.5	16.3	18.3	23.3	22.3	24.0	20.0	20.3
6	Turb (NTU)	23.6	18.0	96.4	15.8	9.2	0.1	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	CHEMICAL															
1	Alk-Phen (mgCaCO3/L)	1.0	2.0	0.5	0.9	0.0	0.0	0.0	1.3	0.0	1.2	0.0	0.0	0.0	0.0	0.0
2	ALK-TOT (mgCaCO3/L)	155	127	119	140	149	142	138	134	122	122	147	135	143	128	129
3	Ca (mg/L)	26	27	25	28	26	29	27	29	27	27	28	27	29	26	27
4	Cl (mg/L)	8.2	8.7	10.1	19.5	8.3	7.8	7.2	8.3	6.5	8.3	10.9	7.9	30.2	8.6	8.0
5	CO3 (mg/L)	1.2	2.4	0.6	1.0	0.0	0.0	0.0	1.5	0.0	1.4	0.0	0.0	0.0	0.0	0.0
6	F (mg/L)	0.21	0.23	0.24	0.25	0.40	0.24	0.28	0.15	0.35	0.36	0.21	0.23	0.14	0.48	0.26
7	HCO3 (mg/L)	186	150	143	169	181	173	168	161	149	146	179	165	174	156	158
8	K (mg/L)	2.3	2.7	4.5	3.1	2.3	1.7	1.8	1.6	2.0	2.0	1.6	1.7	1.3	1.4	2.0
9	Mg (mg/L)	9.9	9.5	11.0	12.1	11.9	10.3	10.8	12.0	10.1	10.3	10.2	10.9	12.4	11.4	11.6
10	Na (mg/L)	9.4	13.5	11.0	16.7	11.2	8.3	11.9	12.5	10.6	10.1	9.8	10.9	12.1	9.0	10.4
11	NO2+NO3 (mg N/L)	1.44	1.13	1.66	1.53	1.35	1.07	0.74	0.75	1.31	0.51	0.54	0.43	0.44	0.59	0.33
12	NO2-N (mgN/L)	0.03	0.02	0.04	0.03	0.01	0.03	0.08	0.04	0.04	0.06	0.02	0.02	0.01	0.05	0.01
13	NO3-N (mgN/L)	1.42	1.11	1.63	1.50	1.34	1.04	0.66	0.71	1.27	0.45	0.52	0.41	0.43	0.54	0.32
14	o-PO4-P (mg P/L)	0.098	0.030	0.161	0.345	0.199	0.092	0.036	0.048	0.177	0.135	0.039	0.202	0.054	0.112	0.114
15	SiO2 (mg/L)	19.9	24.7	20.5	18.7	16.9	26.0	22.6	22.3	17.5	16.1	24.6	25.9	18.4	16.5	21.8
16	SO4 (mg/L)	4.6	21.1	11.7	18.9	15.2	9.4	5.4	5.8	11.1	4.0	3.5	5.2	7.7	25.5	5.0
	BIOLOGICAL/BACTERIOLOGICAL															
1	BOD3-27 (mg/L)	1.4	0.7	1.0	1.5	0.8	1.7	0.8	0.9	0.9	0.7	1.0	0.7	0.8	0.8	0.8
2	COD (mg/L)	29.2	18.4	28.0	25.6	36.0	30.5	38.5	24.3	42.3	26.0	31.0	23.3	28.3	48.3	33.0
3	DO (mg/L)	5.6	5.6	5.9	6.2	6.1	7.0	6.0	7.3	7.1	7.3	6.2	5.1	6.5	6.6	6.2
4	DO_SAT% (%)	71	71	73	77	71	83	68	85	72	77	73	58	77	72	68
	TRACE & TOXIC															
	CHEMICAL INDICES															
1	HAR_Ca (mgCaCO3/L)	64	67	63	71	66	72	68	72	68	67	71	66	73	66	67
2	HAR_Total (mgCaCO3/L)	105	107	109	121	115	115	113	122	110	110	113	112	125	113	115
3	Na% (%)	16	21	17	21	17	13	18	18	17	16	16	17	17	15	16
4	RSC (-)	1.0	0.4	0.2	0.4	0.7	0.6	0.5	0.3	0.3	0.3	0.7	0.5	0.4	0.3	0.3
5	SAR (-)	0.4	0.6	0.5	0.6	0.5	0.3	0.5	0.5	0.4	0.4	0.4	0.4	0.5	0.4	0.4

3.7 Kundi at Kogaon

History sheet

			Water Year	**:**	**2015-2016**
Site	**:**	**Kundi at Kogaon**	**Code**	**:**	**010215025**
State	:	Madhya Pradesh	District		Khargone
			Independent		
Basin	:	Narmada	River	:	Narmada
Tributary	:	Kundi	Local River	:	Kundi
Division	:	Narmada Division, Bhopal	Sub-Division	:	MNSD-III, Indore
Drainage Area	:	3919 Sq. Km.	Bank	:	Right
Latitude	:	22°06'06"	Longitude	:	75°41'02"
Zero of		151 .000			
Gauge (m)	:	(M.S.L.)	03/02/1978		
		Opening Date	Closing Date		
Gauge	:	03/02/1978			
Discharge	:	01/07/1978			
Sediment	:				
Water Quality	:	15/09/1986			

Water Quality Datasheet for the period : 2015-2016

Station Name : Kundi at Kogaon (010215025) Division : Narmada Division, Bhopal

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

River Water Analysis

S.No	Parameters	01/06/2015	01/07/2015	03/08/2015	01/09/2015	05/10/2015	02/11/2015	01/12/2015	01/01/2016	01/02/2016	01/03/2016	01/04/2016	02/05/2016
		A	A	A	A	A	A	A	A	B	A	A	A
	PHYSICAL												
1	Q (cumec)			4.586	22.82	5.988	7.067						
2	Colour_Cod (-)			Clear	Clear	Clear	Clear						
3	EC_GEN (µmho/cm)			266	348	294	349						
4	Odour_Code (-)			odour free	odour free	odour free	odour free						
5	pH_GEN (pH units)			8.3	8.4	8.3	8.3						
6	TDS (mg/L)			173	215	191	210						
7	Temp (deg C)			26.0	24.0	30.5	26.5						
8	Turb (NTU)			39.0	25.0	0.0	0.0						
	CHEMICAL												
1	Alk-Phen (mgCaCO3/L)			4.7	7.0	4.6	4.6						
2	ALK-TOT (mgCaCO3/L)			166	185	160	190						
3	Ca (mg/L)			30	40	27	28						
4	Cl (mg/L)			16.5	15.8	10.1	25.0						
5	CO3 (mg/L)			5.6	8.4	5.6	5.6						
6	F (mg/L)			0.41	0.74	0.22	0.60						
7	HCO3 (mg/L)			191	208	184	221						
8	K (mg/L)			2.6	2.5	1.5	1.8						
9	Mg (mg/L)			19.0	20.7	23.1	24.1						
10	Na (mg/L)			18.6	17.1	20.0	28.5						
11	NO2+NO3 (mg N/L)			1.36	4.67	3.66	3.63						
12	NO2-N (mgN/L)			0.03	0.03	0.03	0.02						
13	NO3-N (mgN/L)			1.33	4.64	3.63	3.61						
14	o-PO4-P (mg P/L)			0.193	0.210	0.102	0.192						
15	SiO2 (mg/L)			22.7	22.3	29.6	27.1						
16	SO4 (mg/L)			29.8	27.4	13.2	13.2						
	BIOLOGICAL/BACTERIOLOGICAL												
1	BOD3-27 (mg/L)			1.2	1.0	0.7	1.5						
2	COD (mg/L)			29.0	34.0	34.0	35.0						
3	DO (mg/L)			5.8	5.9	6.0	6.0						
4	DO_SAT% (%)			71	70	79	74						
	TRACE & TOXIC												
	CHEMICAL INDICES												
1	HAR_Ca (mgCaCO3/L)			76	99	67	69						
2	HAR_Total (mgCaCO3/L)			155	185	163	169						
3	Na% (%)			20	17	21	27						
4	RSC (-)			0.2	0.0	0.0	0.5						
5	SAR (-)			0.7	0.5	0.7	1.0						

Water Quality Summary for the period : 2015-2016

Station Name : Kundi at Kogaon (010215025) Division : Narmada Division, Bhopal

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

River Water Summary

S.No	Parameters	Number of Observations	Maximum	Minimum	Mean
	PHYSICAL				
1	Q (cumec)	85	1274	1.774	55.57
2	EC_GEN (µmho/cm)	4	349	266	314
3	pH_GEN (pH units)	4	8.4	8.3	8.3
4	TDS (mg/L)	4	215	173	197
5	Temp (deg C)	4	30.5	24.0	26.8
6	Turb (NTU)	4	39.0	0.0	12.8
	CHEMICAL				
1	Alk-Phen (mgCaCO3/L)	4	7.0	4.6	5.2
2	ALK-TOT (mgCaCO3/L)	4	190	160	175
3	Ca (mg/L)	4	40	27	31
4	Cl (mg/L)	4	25.0	10.1	16.9
5	CO3 (mg/L)	4	8.4	5.6	6.3
6	F (mg/L)	4	0.74	0.22	0.49
7	HCO3 (mg/L)	4	221	184	201
8	K (mg/L)	4	2.6	1.5	2.1
9	Mg (mg/L)	4	24.1	19.0	21.7
10	Na (mg/L)	4	28.5	17.1	21.1
11	NO2+NO3 (mg N/L)	4	4.67	0.39	2.74
12	NO2-N (mgN/L)	4	0.03	0.02	0.02
13	NO3-N (mgN/L)	4	4.64	0.37	2.72
14	o-PO4-P (mg P/L)	4	0.210	0.087	0.157
15	SiO2 (mg/L)	4	29.6	22.3	25.4
16	SO4 (mg/L)	4	29.8	13.2	20.9
	BIOLOGICAL/BACTERIOLOGICAL				
1	BOD3-27 (mg/L)	4	1.5	0.7	1.1
2	COD (mg/L)	4	35.0	29.0	33
3	DO (mg/L)	4	6.0	5.8	5.9
4	DO_SAT% (%)	4	79	70	74
	TRACE & TOXIC				
	CHEMICAL INDICES				
1	HAR_Ca (mgCaCO3/L)	4	99	67	78
2	HAR_Total (mgCaCO3/L)	4	185	155	168
3	Na% (%)	4	27	17	21
4	RSC (-)	4	0.5	0.0	0.2
5	SAR (-)	4	1.0	0.5	0.7

Water Quality Seasonal Average for the period : 2011-2016

Station Name : Kundi at Kogaon (010215025) 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				
		2011	2012	2013	2014	2015	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016	2012	2013	2014	2015	2016
	PHYSICAL															
1	Q (cumec)	58.41	30.09	63.87		11.13	0.295	0.996	3.907		7.067	0.000	0.000	0.015		
2	EC_GEN (µmho/cm)	406	422	399	312	303	508	436	533	343	349		493		305	
3	pH_GEN (pH units)	8.5	8.0	8.4	8.0	8.3	8.5	8.3	8.4	8.3	8.3		8.3		8.3	
4	TDS (mg/L)	257	262	253	199	193	325	284	336	226	210		315		195	
5	Temp (deg C)	29.2	29.0	27.9	27.7	26.8	24.0	21.1	25.0	22.8	26.5		22.3		24.3	
6	Turb (NTU)	92.7	26.7	39.3	123.7	16.0	0.1	0.0	2.6	0.0	0.0		0.0		0.0	
	CHEMICAL															
1	Alk-Phen (mgCaCO3/L)	8.4	0.0	7.6	1.7	5.4	10.1	3.1	10.2	4.2	4.6		2.6		2.5	
2	ALK-TOT (mgCaCO3/L)	186	186	186	150	170	215	198	232	177	190		199		169	
3	Ca (mg/L)	33	35	28	26	32	34	31	37	32	28		27		29	
4	Cl (mg/L)	16.1	19.2	18.6	13.2	14.1	31.8	26.9	12.3	23.0	25.0		19.2		19.5	
5	CO3 (mg/L)	10.1	0.0	9.2	2.1	6.5	12.1	3.7	12.3	5.1	5.6		3.1		3.0	
6	F (mg/L)	0.22	0.16	0.27	0.43	0.46	0.25	0.35	0.06	0.37	0.60		0.20		0.74	
7	HCO3 (mg/L)	207	227	208	179	194	238	234	258	206	221		237		200	
8	K (mg/L)	2.6	2.1	3.4	3.1	2.2	2.0	1.8	1.4	1.4	1.8		1.9		1.6	
9	Mg (mg/L)	21.0	20.7	26.8	20.2	20.9	34.3	25.0	33.4	24.0	24.1		25.5		17.9	
10	Na (mg/L)	14.1	26.3	19.3	15.2	18.6	29.2	33.5	32.0	25.4	28.5		28.5		19.9	
11	NO2+NO3 (mg N/L)	3.38	6.16	6.47	3.07	2.52	11.18	3.01	6.10	5.88	3.63		4.86		1.58	
12	NO2-N (mgN/L)	0.04	0.21	0.03	0.04	0.02	0.08	0.04	0.03	0.03	0.02		0.02		0.09	
13	NO3-N (mgN/L)	3.34	5.95	6.44	3.03	2.49	11.10	2.98	6.08	5.85	3.61		4.84		1.48	
14	o-PO4-P (mg P/L)	0.120	0.021	0.173	0.438	0.148	0.079	0.063	0.053	0.125	0.192		0.058		0.087	
15	SiO2 (mg/L)	33.0	32.5	28.5	21.1	24.8	60.9	38.9	47.3	31.9	27.1		35.4		25.8	
16	SO4 (mg/L)	10.7	19.8	27.6	27.8	23.5	19.4	16.3	30.2	17.5	13.2		13.8		27.0	
	BIOLOGICAL/BACTERIOLOGICAL															
1	BOD3-27 (mg/L)	1.2	0.8	0.9	0.9	1.0	0.9	0.9	1.5	0.9	1.5		0.8		1.9	
2	COD (mg/L)	27.7	21.3	35.0	28.3	32.3	32.0	31.0	35.0	34.7	35.0		25.5		34.0	
3	DO (mg/L)	5.2	5.7	6.3	5.9	5.9	4.5	5.3	6.7	7.0	6.0		5.8		5.4	
4	DO_SAT% (%)	67	74	79	75	74	53	59	80	81	74		66		62	
	TRACE & TOXIC															
	CHEMICAL INDICES															
1	HAR_Ca (mgCaCO3/L)	82	89	70	66	81	85	76	93	79	69		68		74	
2	HAR_Total (mgCaCO3/L)	169	175	182	150	168	227	181	233	179	169		174		148	
3	Na% (%)	15	23	19	17	19	22	29	23	23	27		26		22	
4	RSC (-)	0.4	0.3	0.2	0.1	0.1	0.0	0.4	0.1	0.1	0.5		0.5		0.4	
5	SAR (-)	0.5	0.9	0.6	0.5	0.6	0.8	1.1	0.9	0.8	1.0		0.9		0.7	

3.8 Narmada at Handia

History Sheet

			Water Year	**:**	**2015-2016**
Site	**:**	**Narmada at Handia**	**Code**	**:**	**010215022**
State	:	Madhya Pradesh	District		Harda
Basin	:	Narmada	Independent River	:	Narmada
Tributary	:	-	Sub Tributary	:	-
Sub-Sub Tributary	:	-	Local River	:	Narmada
Division	:	Narmada Division,Bhopal	Sub-Division	:	MNSD-II Bhopal
Drainage Area	:	54027 Sq. Km.	Bank	:	Left
Latitude	:	22°29'25"	Longitude	:	76°59'37"
Zero of Gauge (m)	:	258 .000 (M.S.L.)	09/02/1977		
		Opening Date	Closing Date		
Gauge	:	09/02/1977			
Discharge	:	26/04/1977			
Sediment	:	11/12/1977			
Water Quality	:	01/08/1979			

Water Quality Datasheet for the period : 2015-2016

Station Name : Narmada at Handia (010215022) Division : Narmada Division, Bhopal

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

River Water Analysis

S.No	Parameters	01/06/2015	01/07/2015	03/08/2015	01/09/2015	05/10/2015	02/11/2015	01/12/2015	01/01/2016	01/02/2016	01/03/2016	01/04/2016	02/05/2016
		A	A	A	A	A	A	A	A	B	A	A	A
	PHYSICAL												
1	Q (cumec)	162.0	98.10	279.0	750.0	284.0	127.0	205.0	122.0	155.0	139.0	110.0	135.0
2	Colour_Cod (-)	Clear	Clear	Light Brown	Light Brown	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear
3	EC_GEN (µmho/cm)	216	249	224	214	252	283	300	259	231	284	280	230
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)	8.2	8.4	8.2	8.2	8.3	8.4	8.4	8.4	8.2	8.2	8.2	8.3
6	TDS (mg/L)	125	158	152	133	164	176	189	170	151	184	184	149
7	Temp (deg C)	31.0	29.0	27.5	31.0	28.5	30.6	20.9	22.0	21.3	24.0	28.0	26.5
8	Turb (NTU)	0.0	4.0	97.0	56.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	CHEMICAL												
1	Alk-Phen (mgCaCO3/L)	0.0	6.9	0.0	0.0	4.6	6.9	9.3	6.9	0.0	0.0	0.0	4.7
2	ALK-TOT (mgCaCO3/L)	125	151	145	126	167	184	158	158	144	125	144	118
3	Ca (mg/L)	28	30	30	30	28	37	31	33	30	24	28	25
4	Cl (mg/L)	10.7	4.0	5.6	5.1	11.3	9.0	7.0	7.0	8.0	8.0	8.0	7.0
5	CO3 (mg/L)	0.0	8.4	0.0	0.0	5.6	8.4	11.2	8.4	0.0	0.0	0.0	5.7
6	F (mg/L)	0.21	0.43	0.18	0.72	0.21	0.50	0.02	0.19	0.19	0.29	0.32	0.32
7	HCO3 (mg/L)	153	167	177	154	193	207	170	176	176	153	176	132
8	K (mg/L)	1.3	3.3	3.9	3.7	1.9	1.8	1.8	1.4	1.6	1.4	1.5	1.5
9	Mg (mg/L)	9.7	10.9	10.7	10.9	16.8	16.3	14.6	12.2	11.4	10.7	12.6	10.7
10	Na (mg/L)	7.2	14.7	14.6	13.4	17.4	18.3	18.4	15.5	11.8	10.0	10.2	6.5
11	NO2+NO3 (mg N/L)	0.50	3.07	0.74	1.01	0.59	0.90	0.98	2.00	1.81	1.77	1.50	0.16
12	NO2-N (mgN/L)	0.00	0.00	0.01	0.01	0.00	0.00	0.03	0.04	0.01	0.01	0.01	0.01
13	NO3-N (mgN/L)	0.50	3.06	0.73	1.00	0.59	0.89	0.95	1.96	1.80	1.76	1.49	0.15
14	o-PO4-P (mg P/L)	0.147	0.408	0.502	0.522	0.117	0.212	0.188	0.000	0.193	0.185	1.109	0.014
15	SiO2 (mg/L)	20.3	26.7	11.9	11.4	21.4	16.1	16.5	11.5	21.3	21.1	20.4	20.0
16	SO4 (mg/L)	5.7	8.4	26.9	28.6	3.8	4.2	4.9	7.4	8.4	7.6	14.0	14.1
	BIOLOGICAL/BACTERIOLOGICAL												
1	BOD3-27 (mg/L)	1.2	0.5	0.3	0.5	1.0	0.4	0.6	0.6	1.2	1.6	0.4	0.8
2	COD (mg/L)	45.0	40.0	35.0	33.0	28.0	40.0	33.0	35.0	46.0	30.0	34.0	41.0
3	DO (mg/L)	4.9	6.8	6.6	6.2	7.1	7.7	7.6	7.5	7.7	6.8	6.2	5.9
4	DO_SAT% (%)	66	88	83	83	91	102	84	86	86	81	79	73
	TRACE & TOXIC												
	CHEMICAL INDICES												
1	HAR_Ca (mgCaCO3/L)	69	75	76	76	69	92	77	83	74	61	69	63
2	HAR_Total (mgCaCO3/L)	110	121	121	121	139	160	138	134	122	105	121	108
3	Na% (%)	12	20	20	19	21	20	22	20	17	17	15	11
4	RSC (-)	0.3	0.6	0.5	0.1	0.6	0.5	0.4	0.5	0.5	0.4	0.5	0.2
5	SAR (-)	0.3	0.6	0.6	0.5	0.6	0.6	0.7	0.6	0.5	0.4	0.4	0.3

Water Quality Summary for the period : 2015-2016

Station Name : Narmada at Handia (010215022) Division : Narmada Division, Bhopal

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

River Water Summary

S.No	Parameters	Number of Observations	Maximum	Minimum	Mean
	PHYSICAL				
1	Q (cumec)	348	5371	72.80	401.4
2	EC_GEN (µmho/cm)	12	300	214	252
3	pH_GEN (pH units)	12	8.4	8.2	8.3
4	TDS (mg/L)	12	189	125	161
5	Temp (deg C)	12	31.0	20.9	26.7
6	Turb (NTU)	12	97.0	0.0	13.1
	CHEMICAL				
1	Alk-Phen (mgCaCO3/L)	12	9.3	0.0	3.3
2	ALK-TOT (mgCaCO3/L)	12	184	118	146
3	Ca (mg/L)	12	37	24	29
4	Cl (mg/L)	12	11.3	4.0	7.6
5	CO3 (mg/L)	12	11.2	0.0	4
6	F (mg/L)	12	0.72	0.02	0.3
7	HCO3 (mg/L)	12	207	132	170
8	K (mg/L)	12	3.9	1.3	2.1
9	Mg (mg/L)	12	16.8	9.7	12.3
10	Na (mg/L)	12	18.4	6.5	13.2
11	NO2+NO3 (mg N/L)	12	3.07	0.16	1.25
12	NO2-N (mgN/L)	12	0.04	0.00	0.01
13	NO3-N (mgN/L)	12	3.06	0.15	1.24
14	o-PO4-P (mg P/L)	12	1.109	0.000	0.3
15	SiO2 (mg/L)	12	26.7	11.4	18.2
16	SO4 (mg/L)	12	28.6	3.8	11.1
	BIOLOGICAL/BACTERIOLOGICAL				
1	BOD3-27 (mg/L)	12	1.6	0.3	0.8
2	COD (mg/L)	12	46.0	28.0	36.7
3	DO (mg/L)	12	7.7	4.9	6.7
4	DO_SAT% (%)	12	102	66	84
	TRACE & TOXIC				
	CHEMICAL INDICES				
1	HAR_Ca (mgCaCO3/L)	12	92	61	74
2	HAR_Total (mgCaCO3/L)	12	160	105	125
3	Na% (%)	12	22	11	18
4	RSC (-)	12	0.6	0.1	0.4
5	SAR (-)	12	0.7	0.3	0.5

Water Quality Seasonal Average for the period : 2011-2016

Station Name : Narmada at Handia (010215022) Division : Narmada Division, Bhopal

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

River Water

S.No	Parameters	Flood					Winter					Summer				
		Jun - Oct					Nov - Feb					Mar - May				
		2011	2012	2013	2014	2015	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016	2012	2013	2014	2015	2016
	PHYSICAL															
1	Q (cumec)	1330	1151	4110	373.6	314.6	257.4	227.6	291.2	272.0	152.8	261.4	129.0	260.6	252.9	128.0
2	EC_GEN (µmho/cm)	227	267	219	231	231	344	281	308	236	268	257	293	214	197	265
3	pH_GEN (pH units)	8.3	8.2	8.1	8.1	8.3	8.4	8.2	8.3	8.2	8.4	8.4	8.3	8.3	8.3	8.3
4	TDS (mg/L)	143	167	139	148	146	223	184	182	155	172	162	185	134	128	172
5	Temp (deg C)	29.5	28.2	26.7	27.9	29.4	21.9	19.9	24.5	21.4	23.7	25.8	25.7	22.2	26.0	26.2
6	Turb (NTU)	130.6	37.0	256.8	83.2	31.4	2.6	0.0	11.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	CHEMICAL															
1	Alk-Phen (mgCaCO3/L)	4.8	6.0	1.5	4.5	2.3	5.7	1.9	5.3	1.3	5.8	9.2	6.0	6.6	4.2	1.6
2	ALK-TOT (mgCaCO3/L)	128	131	113	140	143	172	164	180	147	161	140	161	145	129	129
3	Ca (mg/L)	25	26	23	27	29	31	32	35	32	33	26	27	27	25	26
4	Cl (mg/L)	6.5	7.9	5.9	7.2	7.3	9.7	8.4	9.2	7.4	7.8	8.7	8.2	12.4	7.9	7.7
5	CO3 (mg/L)	5.8	7.2	1.9	5.4	2.8	6.8	2.3	6.4	1.5	7.0	11.1	7.2	7.9	5.0	1.9
6	F (mg/L)	0.11	0.11	0.26	0.28	0.35	0.29	0.32	0.19	0.40	0.22	0.18	0.27	0.16	0.15	0.31
7	HCO3 (mg/L)	144	145	134	160	169	196	196	207	177	182	148	182	161	147	154
8	K (mg/L)	2.0	2.2	3.9	2.0	2.8	1.8	1.5	1.5	1.5	1.7	1.9	1.7	1.5	1.4	1.5
9	Mg (mg/L)	8.0	10.6	10.9	13.1	11.8	13.5	12.2	15.6	12.5	13.6	10.5	13.2	13.2	11.6	11.3
10	Na (mg/L)	6.7	12.0	8.0	12.7	13.5	12.3	15.0	18.7	13.4	16.0	9.3	13.6	15.1	8.9	8.9
11	NO2+NO3 (mg N/L)	1.50	2.62	0.86	1.54	1.18	1.76	0.73	1.51	2.01	1.42	0.59	0.36	0.41	0.62	1.14
12	NO2-N (mgN/L)	0.01	0.05	0.02	0.02	0.01	0.15	0.01	0.06	0.04	0.02	0.07	0.01	0.02	0.05	0.01
13	NO3-N (mgN/L)	1.49	2.57	0.84	1.53	1.17	1.62	0.72	1.45	1.97	1.40	0.52	0.35	0.39	0.57	1.14
14	o-PO4-P (mg P/L)	0.151	0.030	0.185	0.353	0.339	0.094	0.063	0.051	0.206	0.148	0.042	0.626	0.035	0.120	0.436
15	SiO2 (mg/L)	24.8	25.5	23.4	21.6	18.3	22.4	22.6	24.6	17.9	16.3	27.7	25.1	19.0	17.3	20.5
16	SO4 (mg/L)	4.6	11.6	9.5	13.4	14.7	5.3	5.2	9.5	13.8	6.2	3.2	12.6	4.4	26.9	11.9
	BIOLOGICAL/BACTERIOLOGICAL															
1	BOD3-27 (mg/L)	1.2	0.6	0.7	1.2	0.7	1.4	0.8	1.3	1.0	0.7	1.8	0.7	1.1	0.6	0.9
2	COD (mg/L)	26.2	22.2	26.2	33.2	36.2	29.8	25.3	28.0	35.0	38.5	17.3	23.7	26.3	34.7	35.0
3	DO (mg/L)	6.0	5.8	6.2	6.1	6.3	6.7	6.6	7.5	6.9	7.6	6.3	5.8	6.8	6.8	6.3
4	DO_SAT% (%)	78	74	78	77	82	76	72	89	77	89	77	71	77	84	78
	TRACE & TOXIC															
	CHEMICAL INDICES															
1	HAR_Ca (mgCaCO3/L)	63	64	58	68	73	78	79	88	80	82	64	67	68	63	64
2	HAR_Total (mgCaCO3/L)	97	108	103	122	122	134	130	153	132	138	108	122	123	112	112
3	Na% (%)	13	19	15	18	19	17	20	21	18	20	15	19	21	15	15
4	RSC (-)	0.6	0.5	0.2	0.4	0.4	0.8	0.7	0.6	0.3	0.5	0.6	0.8	0.5	0.4	0.4
5	SAR (-)	0.3	0.5	0.4	0.5	0.5	0.5	0.6	0.7	0.5	0.6	0.4	0.5	0.6	0.4	0.4

3.9 Ganjal at Chhidgaon

History sheet

			Water Year	**:**	**2015-2016**
Site	**:**	**Ganjal at Chhidgaon**	**Code**	**:**	**010215020**
State	:	Madhya Pradesh	District		Harda
Basin	:	Narmada	Independent River	:	Narmada
Tributary	:	Ganjal	Sub Tributary	:	-
Sub-Sub Tributary	:	-	Local River	:	Ganjal
Division	:	Narmada Division,Bhopal	Sub-Division	:	MNSD-II,Bhopal
Drainage Area	:	1729 Sq. Km.	Bank	:	Left
Latitude	:	22°24'21"	Longitude	:	77°18'28"
Zero of Gauge (m)	:	287 .000 (M.S.L.)	02/12/1976		
		Opening Date	Closing Date		
Gauge	:	22/12/1976			
Discharge	:	22/12/1976			
Sediment	:				
Water Quality	:	16/09/1986			

Water Quality Datasheet for the period : 2015-2016

Station Name : Ganjal at Chhidgaon (010215020) Division : Narmada Division, Bhopal

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

River Water Analysis

S.No	Parameters	01/06/2015	01/07/2015	03/08/2015	01/09/2015	05/10/2015	02/11/2015	01/12/2015	01/01/2016	01/02/2016	01/03/2016	01/04/2016	02/05/2016
		A	A	A	A	A	A	A	A	B	A	A	A
	PHYSICAL												
1	Q (cumec)	0.230	0.300	48.10	73.72	10.23	9.500	7.770	9.680	9.500	0.000	0.000	0.000
2	Colour_Cod (-)	Clear	Clear	Light Brown	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear
3	EC_GEN (µmho/cm)	441	326	179	157	285	345	467	415	389	567	476	552
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)	8.2	7.8	7.9	8.0	8.2	8.3	8.1	8.0	7.9	8.2	8.1	8.0
6	TDS (mg/L)	254	206	121	95	185	208	295	275	254	368	315	355
7	Temp (deg C)	29.0	29.5	27.0	27.5	30.0	26.0	23.5	19.0	19.5	23.0	27.5	27.5
8	Turb (NTU)	0.0	26.0	132.0	18.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	CHEMICAL												
1	Alk-Phen (mgCaCO3/L)	0.0	0.0	0.0	0.0	0.0	4.6	0.0	0.0	0.0	0.0	0.0	0.0
2	ALK-TOT (mgCaCO3/L)	257	191	121	101	198	235	251	267	242	266	266	264
3	Ca (mg/L)	38	33	26	20	30	37	37	46	36	35	41	34
4	Cl (mg/L)	20.7	4.3	4.7	5.2	7.8	10.0	10.0	10.0	11.0	14.0	11.0	14.0
5	CO3 (mg/L)	0.0	0.0	0.0	0.0	0.0	5.6	0.0	0.0	0.0	0.0	0.0	0.0
6	F (mg/L)	0.41	0.37	0.21	0.57	0.21	0.57	0.03	0.25	0.25	0.71	0.44	0.41
7	HCO3 (mg/L)	313	233	148	123	241	275	306	326	295	324	324	322
8	K (mg/L)	1.9	3.5	2.0	2.2	1.0	1.2	1.5	1.2	1.2	1.3	1.2	1.9
9	Mg (mg/L)	20.7	15.3	11.2	7.8	24.1	22.8	21.9	21.9	22.1	22.8	19.9	26.0
10	Na (mg/L)	31.6	23.9	9.6	11.4	16.1	23.6	23.9	37.3	38.3	44.8	41.7	34.9
11	NO2+NO3 (mg N/L)	0.65	0.42	0.55	0.95	0.67	1.20	1.03	1.39	1.26	1.31	1.25	0.18
12	NO2-N (mgN/L)	0.01	0.02	0.02	0.02	0.00	0.00	0.05	0.06	0.02	0.03	0.01	0.01
13	NO3-N (mgN/L)	0.64	0.41	0.53	0.93	0.67	1.20	0.98	1.33	1.25	1.28	1.24	0.17
14	o-PO4-P (mg P/L)	0.154	0.404	0.164	0.160	0.120	0.192	0.184	0.006	0.183	0.387	0.092	0.041
15	SiO2 (mg/L)	33.4	23.4	10.9	10.5	37.3	28.4	30.0	25.4	26.5	28.0	24.6	22.0
16	SO4 (mg/L)	9.0	17.2	18.0	27.6	4.8	5.1	11.5	20.9	18.3	18.2	17.2	12.0
	BIOLOGICAL/BACTERIOLOGICAL												
1	BOD3-27 (mg/L)	3.4	0.9	0.6	0.2	0.7	1.3	0.9	1.1	0.6	1.1	1.1	0.3
2	COD (mg/L)	52.0	32.0	25.0	32.0	34.0	23.0	22.0	31.0	18.0	35.0	36.0	23.0
3	DO (mg/L)	3.4	4.9	6.1	5.6	5.8	7.0	7.3	7.7	6.5	8.0	8.2	3.5
4	DO_SAT% (%)	44	64	77	70	77	86	85	83	70	93	103	44
	TRACE & TOXIC												
	CHEMICAL INDICES												
1	HAR_Ca (mgCaCO3/L)	95	84	66	50	74	92	93	115	90	88	103	84
2	HAR_Total (mgCaCO3/L)	181	147	113	83	174	187	184	206	182	183	186	192
3	Na% (%)	27	26	15	23	17	22	22	28	31	35	33	28
4	RSC (-)	1.5	0.9	0.2	0.4	0.5	1.0	1.4	1.3	1.2	1.7	1.6	1.5
5	SAR (-)	1.0	0.9	0.4	0.5	0.5	0.8	0.8	1.1	1.2	1.4	1.3	1.1

Water Quality Summary for the period : 2015-2016

Station Name : Ganjal at Chhidgaon (010215020) Division : Narmada Division, Bhopal

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

River Water Summary

S.No	Parameters	Number of Observations	Maximum	Minimum	Mean
	PHYSICAL				
1	Q (cumec)	330	1004	0.000	24.07
2	EC_GEN (µmho/cm)	12	567	157	383
3	pH_GEN (pH units)	12	8.3	7.8	8.1
4	TDS (mg/L)	12	368	95	244
5	Temp (deg C)	12	30.0	19.0	25.8
6	Turb (NTU)	12	132.0	0.0	14.7
	CHEMICAL				
1	Alk-Phen (mgCaCO3/L)	12	4.6	0.0	0.4
2	ALK-TOT (mgCaCO3/L)	12	267	101	221
3	Ca (mg/L)	12	46	20	34
4	Cl (mg/L)	12	20.7	4.3	10.2
5	CO3 (mg/L)	12	5.6	0.0	0.5
6	F (mg/L)	12	0.71	0.03	0.37
7	HCO3 (mg/L)	12	326	123	269
8	K (mg/L)	12	3.5	1.0	1.7
9	Mg (mg/L)	12	26.0	7.8	19.7
10	Na (mg/L)	12	44.8	9.6	28.1
11	NO2+NO3 (mg N/L)	12	1.39	0.18	0.9
12	NO2-N (mgN/L)	12	0.06	0.00	0.02
13	NO3-N (mgN/L)	12	1.33	0.17	0.89
14	o-PO4-P (mg P/L)	12	0.404	0.006	0.174
15	SiO2 (mg/L)	12	37.3	10.5	25
16	SO4 (mg/L)	12	27.6	4.8	15
	BIOLOGICAL/BACTERIOLOGICAL				
1	BOD3-27 (mg/L)	12	3.4	0.2	1
2	COD (mg/L)	12	52.0	18.0	30.3
3	DO (mg/L)	12	8.2	3.4	6.2
4	DO_SAT% (%)	12	103	44	75
	TRACE & TOXIC				
	CHEMICAL INDICES				
1	HAR_Ca (mgCaCO3/L)	12	115	50	86
2	HAR_Total (mgCaCO3/L)	12	206	83	168
3	Na% (%)	12	35	15	26
4	RSC (-)	12	1.7	0.2	1.1
5	SAR (-)	12	1.4	0.4	0.9

Water Quality Seasonal Average for the period : 2011-2016

Station Name : Ganjal at Chhidgaon (010215020) 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				
		2011	2012	2013	2014	2015	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016	2012	2013	2014	2015	2016
	PHYSICAL															
1	Q (cumec)	141.2	91.77	1349		26.52	2.690	3.783	5.196		9.190	0.659	1.103	2.097		3.900
2	EC_GEN (µmho/cm)	269	377	306	299	278	388	471	446	365	404	547	525	398	482	532
3	pH_GEN (pH units)	8.2	8.1	7.9	8.0	8.0	8.1	8.1	8.2	8.1	8.1	8.1	8.4	8.2	8.2	8.1
4	TDS (mg/L)	168	232	194	192	172	250	304	276	242	258	345	331	253	307	346
5	Temp (deg C)	26.6	27.8	26.5	29.2	28.6	19.5	17.0	23.6	20.3	22.0	23.3	22.5	25.0	22.8	26.0
6	Turb (NTU)	133.2	36.0	178.8	100.4	35.2	0.1	0.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	CHEMICAL															
1	Alk-Phen (mgCaCO3/L)	4.9	1.5	0.0	2.6	0.0	1.9	0.0	0.0	1.3	1.2	0.0	9.4	1.5	3.3	0.0
2	ALK-TOT (mgCaCO3/L)	138	187	160	192	173	277	270	260	244	249	277	265	266	315	265
3	Ca (mg/L)	23	27	27	28	30	37	40	40	40	39	34	29	34	43	37
4	Cl (mg/L)	6.8	9.1	8.8	9.9	8.5	12.2	12.9	9.4	10.3	10.3	15.5	14.9	14.7	17.9	13.0
5	CO3 (mg/L)	5.9	1.8	0.0	3.1	0.0	2.3	0.0	0.0	1.5	1.4	0.0	11.3	1.8	4.0	0.0
6	F (mg/L)	0.14	0.26	0.25	0.24	0.35	0.27	0.44	0.21	0.37	0.28	0.25	0.33	0.19	0.38	0.52
7	HCO3 (mg/L)	156	225	195	228	212	333	330	317	295	301	338	301	321	376	323
8	K (mg/L)	2.1	1.5	3.0	2.1	2.1	1.6	1.4	1.0	1.1	1.3	2.1	1.7	1.3	0.8	1.5
9	Mg (mg/L)	11.4	14.9	14.8	16.6	15.8	24.1	23.8	23.6	21.7	22.2	21.2	22.0	24.9	30.1	22.9
10	Na (mg/L)	12.4	26.2	17.9	26.7	18.5	20.8	30.7	27.5	26.3	30.8	34.7	39.9	34.1	47.8	40.5
11	NO2+NO3 (mg N/L)	1.74	0.55	1.21	1.21	0.65	2.64	1.37	1.20	1.46	1.22	1.14	0.69	1.10	1.55	0.91
12	NO2-N (mgN/L)	0.02	0.04	0.03	0.02	0.01	0.06	0.01	0.05	0.04	0.03	0.04	0.01	0.01	0.09	0.02
13	NO3-N (mgN/L)	1.72	0.51	1.18	1.19	0.64	2.58	1.36	1.15	1.42	1.19	1.10	0.67	1.09	1.47	0.90
14	o-PO4-P (mg P/L)	0.155	0.040	0.173	0.338	0.200	0.102	0.038	0.095	0.219	0.141	0.022	0.203	0.059	0.137	0.173
15	SiO2 (mg/L)	34.4	29.2	22.7	29.8	23.1	36.8	35.5	39.9	27.0	27.6	33.3	32.1	28.2	31.5	24.9
16	SO4 (mg/L)	7.5	12.0	13.6	38.6	15.3	10.8	11.7	10.4	15.4	13.9	12.4	13.4	6.5	35.7	15.8
	BIOLOGICAL/BACTERIOLOGICAL															
1	BOD3-27 (mg/L)	1.1	1.2	1.0	1.1	1.2	0.7	0.9	1.3	0.7	1.0	0.6	1.2	0.9	0.8	0.8
2	COD (mg/L)	31.0	24.8	26.4	35.6	35.0	26.8	29.8	24.8	33.0	23.5	20.7	22.7	28.7	27.7	31.3
3	DO (mg/L)	5.4	5.3	5.9	6.0	5.2	5.7	6.8	7.6	6.8	7.1	6.0	6.6	6.9	6.5	6.6
4	DO_SAT% (%)	67	67	73	79	66	62	70	90	75	81	70	76	83	75	80
	TRACE & TOXIC															
	CHEMICAL INDICES															
1	HAR_Ca (mgCaCO3/L)	59	68	68	71	74	93	99	100	100	97	85	73	84	107	91
2	HAR_Total (mgCaCO3/L)	106	130	129	140	140	193	198	198	191	190	174	165	188	232	187
3	Na% (%)	18	27	20	25	22	19	25	23	23	26	29	34	28	31	32
4	RSC (-)	0.6	1.2	0.6	1.1	0.7	1.7	1.5	1.3	1.1	1.2	2.1	2.0	1.6	1.7	1.6
5	SAR (-)	0.5	1.0	0.6	0.9	0.7	0.7	1.0	0.9	0.8	1.0	1.1	1.4	1.1	1.4	1.3

3.10 Narmada at Hoshangabad

History sheet

			Water Year	**:**	**2015-2016**
Site	**:**	**Narmada at Hoshangabad**	**Code**	**:**	**010215019**
State	:	Madhya Pradesh	District		Hoshangabad
Basin	:	Narmada	Independent River	:	Narmada
Sub-Sub Tributary	:		Local River	:	Narmada
Division	:	Narmada Division, Bhopal	Sub-Division	:	MNSD-1, Hoshangabad
Drainage Area	:	44548 Sq. Km.	Bank	:	Left
Latitude	:	22°45'21"	Longitude	:	77°43'58"
Zero of Gauge (m)	:	282 .000 (M.S.L.)	21/05/1972		
		Opening Date	Closing Date		
Gauge	:	21/05/1972			
Discharge	:	16/09/1972			
Sediment	:	29/12/1972			
Water Quality	:	15/07/1979			

Water Quality Datasheet for the period : 2015-2016

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

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

River Water Analysis

S.No	Parameters	01/06/2015	01/07/2015	03/08/2015	01/09/2015	05/10/2015	02/11/2015	01/12/2015	01/01/2016	01/02/2016	01/03/2016	01/04/2016	02/05/2016
		A	A	A	A	A	A	A	A	B	A	A	A
	PHYSICAL												
1	Q (cumec)	202.1	132.4	210.1	533.3	166.9	125.7	145.0	121.9	168.6	158.5	134.6	178.3
2	Colour_Cod (-)	Clear	Clear	Light Brown	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear
3	EC_GEN (µmho/cm)	218	260	216	189	296	279	269	241	249	408	275	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	odour free
5	pH_GEN (pH units)	8.2	8.1	8.1	8.1	8.1	8.4	8.3	8.2	7.9	7.7	7.8	7.8
6	TDS (mg/L)	126	165	145	116	193	174	169	159	163	265	180	151
7	Temp (deg C)	28.5	24.0	20.0	21.0	23.0	17.0	18.5	12.0	12.0	12.0	19.0	18.0
8	Turb (NTU)	0.0	11.0	83.0	21.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	CHEMICAL												
1	Alk-Phen (mgCaCO3/L)	0.0	0.0	0.0	0.0	0.0	6.9	4.6	0.0	0.0	0.0	0.0	0.0
2	ALK-TOT (mgCaCO3/L)	123	151	140	112	198	193	146	163	153	191	142	118
3	Ca (mg/L)	26	28	24	27	29	40	32	36	33	36	29	24
4	Cl (mg/L)	10.2	5.8	6.6	5.6	12.4	9.0	8.0	7.0	8.0	14.0	8.0	6.0
5	CO3 (mg/L)	0.0	0.0	0.0	0.0	0.0	8.4	5.6	0.0	0.0	0.0	0.0	0.0
6	F (mg/L)	0.16	0.58	0.11	0.50	0.22	0.41	0.07	0.21	0.20	0.29	0.31	0.21
7	HCO3 (mg/L)	150	184	171	137	241	219	167	199	187	233	173	144
8	K (mg/L)	1.1	4.4	2.8	2.9	1.4	1.9	1.6	1.3	1.6	1.2	1.3	1.4
9	Mg (mg/L)	10.7	15.1	14.6	10.9	22.1	15.8	11.2	10.9	10.9	13.9	11.7	10.0
10	Na (mg/L)	6.7	14.3	11.8	12.1	24.1	17.2	17.1	12.0	13.4	21.0	18.7	6.2
11	NO2+NO3 (mg N/L)	0.83	3.23	0.53	0.88	0.80	0.71	0.33	0.36	0.35	0.33	0.29	0.04
12	NO2-N (mgN/L)	0.01	0.04	0.01	0.01	0.02	0.01	0.01	0.03	0.01	0.02	0.00	0.01
13	NO3-N (mgN/L)	0.82	3.19	0.52	0.86	0.78	0.70	0.32	0.33	0.34	0.32	0.28	0.04
14	o-PO4-P (mg P/L)	0.115	0.590	0.161	0.171	0.094	0.184	0.151	0.020	0.139	0.167	0.077	0.052
15	SiO2 (mg/L)	20.3	21.6	9.2	9.6	20.4	15.7	17.1	14.1	11.1	13.3	13.2	12.5
16	SO4 (mg/L)	5.2	9.7	20.1	17.8	5.4	6.2	2.8	2.9	4.0	4.9	3.9	3.7
	BIOLOGICAL/BACTERIOLOGICAL												
1	BOD3-27 (mg/L)	0.6	0.6	0.9	0.7	1.2	0.7	0.4	0.3	0.9	1.6	0.7	0.9
2	COD (mg/L)	16.0	30.0	27.0	27.0	26.0	44.0	32.0	30.0	24.0	34.0	32.0	20.0
3	DO (mg/L)	5.9	5.7	6.5	5.3	4.7	7.0	7.0	7.3	4.9	6.4	6.1	4.1
4	DO_SAT% (%)	75	68	71	59	55	72	74	68	45	59	66	43
	TRACE & TOXIC												
	CHEMICAL INDICES												
1	HAR_Ca (mgCaCO3/L)	65	71	60	68	73	100	79	89	83	90	72	59
2	HAR_Total (mgCaCO3/L)	109	133	121	114	165	165	126	135	129	148	120	101
3	Na% (%)	12	18	17	18	24	18	23	16	18	23	25	12
4	RSC (-)	0.3	0.4	0.4	0.0	0.7	0.6	0.4	0.6	0.5	0.9	0.4	0.4
5	SAR (-)	0.3	0.5	0.5	0.5	0.8	0.6	0.7	0.5	0.5	0.8	0.7	0.3

Water Quality Summary for the period : 2015-2016

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

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

River Water Summary

S.No	Parameters	Number of Observations	Maximum	Minimum	Mean
	PHYSICAL				
1	Q (cumec)	295	2797	86.01	276.5
2	EC_GEN (µmho/cm)	12	408	189	261
3	pH_GEN (pH units)	12	8.4	7.7	8.1
4	TDS (mg/L)	12	265	116	167
5	Temp (deg C)	12	28.5	12.0	18.8
6	Turb (NTU)	12	83.0	0.0	9.6
	CHEMICAL				
1	Alk-Phen (mgCaCO3/L)	12	6.9	0.0	1
2	ALK-TOT (mgCaCO3/L)	12	198	112	153
3	Ca (mg/L)	12	40	24	30
4	Cl (mg/L)	12	14.0	5.6	8.4
5	CO3 (mg/L)	12	8.4	0.0	1.2
6	F (mg/L)	12	0.58	0.07	0.27
7	HCO3 (mg/L)	12	241	137	184
8	K (mg/L)	12	4.4	1.1	1.9
9	Mg (mg/L)	12	22.1	10.0	13.1
10	Na (mg/L)	12	24.1	6.2	14.5
11	NO2+NO3 (mg N/L)	12	3.23	0.04	0.72
12	NO2-N (mgN/L)	12	0.04	0.00	0.02
13	NO3-N (mgN/L)	12	3.19	0.04	0.71
14	o-PO4-P (mg P/L)	12	0.590	0.020	0.16
15	SiO2 (mg/L)	12	21.6	9.2	14.9
16	SO4 (mg/L)	12	20.1	2.8	7.2
	BIOLOGICAL/BACTERIOLOGICAL				
1	BOD3-27 (mg/L)	12	1.6	0.3	0.8
2	COD (mg/L)	12	44.0	16.0	28.5
3	DO (mg/L)	12	7.3	4.1	5.9
4	DO_SAT% (%)	12	75	43	63
	TRACE & TOXIC				
	CHEMICAL INDICES				
1	HAR_Ca (mgCaCO3/L)	12	100	59	76
2	HAR_Total (mgCaCO3/L)	12	165	101	130
3	Na% (%)	12	25	12	19
4	RSC (-)	12	0.9	0.0	0.5
5	SAR (-)	12	0.8	0.3	0.5

Water Quality Seasonal Average for the period : 2011-2016

Station Name : Narmada at Hoshangabad (010215019) 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				
		2011	2012	2013	2014	2015	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016	2012	2013	2014	2015	2016
	PHYSICAL															
1	Q (cumec)	1188	819.6	3509	294.6	249.0	205.6	204.7	245.4	215.7	146.0	243.2	120.6	264.5	198.5	157.1
2	EC_GEN (µmho/cm)	245	316	204	221	236	297	249	287	208	260	256	283	208	194	306
3	pH_GEN (pH units)	8.3	8.2	8.0	8.0	8.1	8.2	8.2	8.2	8.1	8.2	8.2	8.2	8.1	8.2	7.7
4	TDS (mg/L)	155	196	128	140	149	191	163	175	138	166	163	177	133	124	199
5	Temp (deg C)	26.6	26.4	27.0	26.3	23.3	20.0	18.4	21.3	17.3	14.9	24.7	23.0	24.0	23.3	16.3
6	Turb (NTU)	142.6	46.0	177.8	122.8	23.0	7.6	0.0	6.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	CHEMICAL															
1	Alk-Phen (mgCaCO3/L)	3.0	3.5	0.0	3.0	0.0	1.3	1.3	2.6	0.0	2.9	2.5	1.7	0.0	1.7	0.0
2	ALK-TOT (mgCaCO3/L)	146	156	104	143	145	188	148	167	135	164	142	154	142	128	150
3	Ca (mg/L)	25	28	23	28	27	34	29	32	30	35	29	28	29	27	30
4	Cl (mg/L)	6.6	9.0	6.5	6.9	8.1	9.8	7.2	8.4	5.9	8.0	8.3	7.4	9.4	6.9	9.3
5	CO3 (mg/L)	3.6	4.2	0.0	3.7	0.0	1.5	1.5	3.1	0.0	3.5	3.0	2.1	0.0	2.0	0.0
6	F (mg/L)	0.15	0.34	0.27	0.31	0.31	0.27	0.30	0.16	0.26	0.22	0.22	0.22	0.14	0.29	0.27
7	HCO3 (mg/L)	171	182	127	167	177	226	177	198	165	193	167	184	173	152	183
8	K (mg/L)	2.3	2.1	4.1	2.8	2.5	1.4	1.4	1.3	1.3	1.6	1.2	1.6	1.4	1.2	1.3
9	Mg (mg/L)	10.7	12.9	9.4	12.8	14.7	13.2	12.0	16.2	11.3	12.2	8.6	13.1	11.9	12.3	11.8
10	Na (mg/L)	6.6	15.5	7.2	10.9	13.8	9.5	12.4	12.8	9.3	14.9	9.4	10.1	10.5	7.8	15.3
11	NO2+NO3 (mg N/L)	1.45	0.81	1.02	1.38	1.25	1.38	89.03	0.66	0.67	0.44	0.48	0.37	0.28	0.41	0.22
12	NO2-N (mgN/L)	0.01	0.02	0.03	0.02	0.02	0.04	0.01	0.07	0.03	0.01	0.13	0.02	0.01	0.06	0.01
13	NO3-N (mgN/L)	1.44	0.79	1.00	1.37	1.23	1.34	89.02	0.59	0.65	0.42	0.35	0.35	0.28	0.36	0.21
14	o-PO4-P (mg P/L)	0.174	0.043	0.276	0.478	0.226	0.104	0.050	0.033	0.198	0.123	0.019	0.196	0.046	0.055	0.099
15	SiO2 (mg/L)	29.9	23.4	17.4	18.3	16.2	22.8	21.6	25.8	18.7	14.5	24.0	22.1	20.4	18.9	13.0
16	SO4 (mg/L)	5.4	15.9	8.9	12.0	11.6	6.1	4.4	4.7	9.0	4.0	3.2	3.8	1.6	17.0	4.1
	BIOLOGICAL/BACTERIOLOGICAL															
1	BOD3-27 (mg/L)	1.1	0.7	0.7	0.9	0.8	1.2	0.7	0.8	0.8	0.6	1.5	0.7	0.7	0.7	1.1
2	COD (mg/L)	24.0	25.0	33.4	28.6	25.2	26.3	26.8	29.5	33.8	32.5	19.0	30.3	24.0	36.0	28.7
3	DO (mg/L)	5.7	6.1	6.1	5.9	5.6	7.3	7.0	7.5	7.1	6.6	6.3	6.0	6.8	6.7	5.5
4	DO_SAT% (%)	71	75	77	73	66	80	74	84	73	65	76	69	80	78	56
	TRACE & TOXIC															
	CHEMICAL INDICES															
1	HAR_Ca (mgCaCO3/L)	63	70	57	69	67	86	72	80	76	88	71	69	73	69	74
2	HAR_Total (mgCaCO3/L)	108	124	96	122	128	141	122	148	123	139	107	124	123	120	123
3	Na% (%)	12	21	14	16	18	13	18	16	14	19	16	15	16	12	20
4	RSC (-)	0.8	0.7	0.2	0.4	0.3	1.0	0.5	0.4	0.3	0.5	0.7	0.6	0.4	0.2	0.6
5	SAR (-)	0.3	0.6	0.3	0.4	0.5	0.4	0.5	0.5	0.4	0.6	0.4	0.4	0.4	0.3	0.6

3.11 Narmada at Sandia

History sheet

			Water Year	**:**	**2015-2016**
Site	**:**	**Narmada at Sandia**	**Code**	**:**	**010215013**
State	:	Madhya Pradesh	District		Hoshangabad
Basin	:	Narmada	Independent River	:	Narmada
Sub-Sub Tributary	:		Local River	:	Narmada
Division	:	Narmada Division, Bhopal	Sub-Division	:	MNSD-1,Hoshangabad
Drainage Area	:	33953.5 Sq. Km.	Bank	:	Left
Latitude	:	22°54'57"	Longitude	:	78°20'51"
Zero of Gauge (m)	:	297 .000 (M.S.L.)	01/03/1978		
		Opening Date	Closing Date		
Gauge	:	01/03/1978			
Discharge	:	18/04/1978			
Sediment	:	09/08/1978			
Water Quality	:	15/09/1979			

Water Quality Datasheet for the period : 2015-2016

Station Name : Narmada at Sandia (010215013) Division : Narmada Division, Bhopal

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

River Water Analysis

S.No	Parameters	01/06/2015	01/07/2015	03/08/2015	01/09/2015	05/10/2015	02/11/2015	01/12/2015	01/01/2016	01/02/2016	01/03/2016	01/04/2016	02/05/2016
		A	A	A	A	A	A	A	A	B	A	A	A
	PHYSICAL												
1	Q (cumec)	187.5	116.5	187.8	735.8	144.8	137.4	78.28	81.89	109.8	61.12	75.02	134.4
2	Colour_Cod (-)	Clear	Clear	Light Brown	Light Brown	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear
3	EC_GEN (µmho/cm)	189	244	225	231	245	254	268	229	190	313	256	205
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)	8.2	8.2	8.1	8.2	8.1	8.3	8.3	8.2	8.2	8.2	8.1	8.1
6	TDS (mg/L)	108	155	153	143	159	157	168	150	124	203	167	132
7	Temp (deg C)	29.0	29.0	28.0	29.0	28.0	25.0	25.0	17.0	16.0	18.0	26.0	27.5
8	Turb (NTU)	0.0	23.0	110.0	60.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	CHEMICAL												
1	Alk-Phen (mgCaCO3/L)	0.0	0.0	0.0	0.0	0.0	4.6	4.6	0.0	0.0	0.0	0.0	0.0
2	ALK-TOT (mgCaCO3/L)	111	142	154	148	165	172	145	142	116	156	128	106
3	Ca (mg/L)	28	30	24	29	30	40	30	32	25	30	30	22
4	Cl (mg/L)	8.2	5.0	6.9	7.4	9.4	10.0	8.0	6.0	6.0	7.0	6.0	6.0
5	CO3 (mg/L)	0.0	0.0	0.0	0.0	0.0	5.6	5.6	0.0	0.0	0.0	0.0	0.0
6	F (mg/L)	0.10	0.45	0.12	0.62	0.30	0.45	0.15	0.19	0.19	0.25	0.22	0.22
7	HCO3 (mg/L)	135	173	188	180	201	199	165	173	142	190	156	129
8	K (mg/L)	1.1	3.7	3.6	3.3	1.7	1.7	1.7	1.2	1.5	1.3	1.3	1.3
9	Mg (mg/L)	6.1	13.1	17.5	15.1	19.7	12.4	14.8	12.2	11.4	13.4	12.6	10.2
10	Na (mg/L)	4.8	11.6	10.9	10.2	13.1	12.2	12.4	10.0	7.3	9.2	10.1	4.4
11	NO2+NO3 (mg N/L)	0.12	3.55	0.75	1.00	0.65	0.53	0.33	0.11	0.09	0.07	0.09	0.04
12	NO2-N (mgN/L)	0.01	0.02	0.01	0.01	0.00	0.01	0.02	0.03	0.00	0.00	0.01	0.01
13	NO3-N (mgN/L)	0.11	3.53	0.73	0.99	0.65	0.52	0.31	0.08	0.09	0.07	0.08	0.03
14	o-PO4-P (mg P/L)	0.082	0.619	0.391	0.420	0.104	0.153	0.123	0.018	0.119	0.158	0.105	0.056
15	SiO2 (mg/L)	18.7	18.2	8.2	8.5	19.9	12.4	18.1	15.7	11.8	13.7	13.6	13.1
16	SO4 (mg/L)	2.3	13.6	19.9	21.4	3.2	3.5	1.9	0.8	2.0	2.0	3.1	3.1
	BIOLOGICAL/BACTERIOLOGICAL												
1	BOD3-27 (mg/L)	0.9	0.6	0.4	0.6	0.8	0.3	0.2	1.0	1.2	0.7	0.5	0.1
2	COD (mg/L)	35.0	32.0	29.0	27.0	24.0	32.0	25.0	33.0	26.0	36.0	34.0	22.0
3	DO (mg/L)	5.8	6.3	6.1	5.5	6.2	7.0	7.5	8.0	7.5	7.6	7.0	5.0
4	DO_SAT% (%)	75	82	78	72	79	85	91	83	76	80	86	63
	TRACE & TOXIC												
	CHEMICAL INDICES												
1	HAR_Ca (mgCaCO3/L)	71	75	60	72	75	99	76	79	63	75	75	55
2	HAR_Total (mgCaCO3/L)	96	129	133	134	157	150	138	129	111	131	127	98
3	Na% (%)	10	16	15	14	15	15	16	14	12	13	15	9
4	RSC (-)	0.3	0.3	0.4	0.3	0.2	0.5	0.2	0.3	0.1	0.5	0.0	0.2
5	SAR (-)	0.2	0.4	0.4	0.4	0.5	0.4	0.5	0.4	0.3	0.4	0.4	0.2

Water Quality Summary for the period : 2015-2016

Station Name : Narmada at Sandia (010215013) Division : Narmada Division, Bhopal

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

River Water Summary

S.No	Parameters	Number of Observations	Maximum	Minimum	Mean
	PHYSICAL				
1	Q (cumec)	296	2982	40.26	199.7
2	EC_GEN (µmho/cm)	12	313	189	237
3	pH_GEN (pH units)	12	8.3	8.1	8.2
4	TDS (mg/L)	12	203	108	152
5	Temp (deg C)	12	29.0	16.0	24.8
6	Turb (NTU)	12	110.0	0.0	16.1
	CHEMICAL				
1	Alk-Phen (mgCaCO3/L)	12	4.6	0.0	0.8
2	ALK-TOT (mgCaCO3/L)	12	172	106	140
3	Ca (mg/L)	12	40	22	29
4	Cl (mg/L)	12	10.0	5.0	7.2
5	CO3 (mg/L)	12	5.6	0.0	0.9
6	F (mg/L)	12	0.62	0.10	0.27
7	HCO3 (mg/L)	12	201	129	169
8	K (mg/L)	12	3.7	1.1	1.9
9	Mg (mg/L)	12	19.7	6.1	13.2
10	Na (mg/L)	12	13.1	4.4	9.7
11	NO2+NO3 (mg N/L)	12	3.55	0.04	0.61
12	NO2-N (mgN/L)	12	0.03	0.00	0.01
13	NO3-N (mgN/L)	12	3.53	0.03	0.6
14	o-PO4-P (mg P/L)	12	0.619	0.018	0.196
15	SiO2 (mg/L)	12	19.9	8.2	14.3
16	SO4 (mg/L)	12	21.4	0.8	6.4
	BIOLOGICAL/BACTERIOLOGICAL				
1	BOD3-27 (mg/L)	12	1.2	0.1	0.6
2	COD (mg/L)	12	36.0	22.0	29.6
3	DO (mg/L)	12	8.0	5.0	6.6
4	DO_SAT% (%)	12	91	63	79
	TRACE & TOXIC				
	CHEMICAL INDICES				
1	HAR_Ca (mgCaCO3/L)	12	99	55	73
2	HAR_Total (mgCaCO3/L)	12	157	96	128
3	Na% (%)	12	16	9	14
4	RSC (-)	12	0.5	0.0	0.3
5	SAR (-)	12	0.5	0.2	0.4

Water Quality Seasonal Average for the period : 2011-2016

Station Name : Narmada at Sandia (010215013) 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				
		2011	2012	2013	2014	2015	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016	2012	2013	2014	2015	2016
	PHYSICAL															
1	Q (cumec)	903.7	621.9	1714	309.4	274.5	186.1	183.3	217.0	203.4	103.4	210.7	123.7	238.7	138.6	90.18
2	EC_GEN (µmho/cm)	202	286	239	211	227	268	215	281	207	235	281	248	198	191	258
3	pH_GEN (pH units)	8.2	8.1	8.0	8.0	8.2	8.2	8.3	8.2	8.1	8.3	8.0	8.2	8.1	8.2	8.1
4	TDS (mg/L)	130	176	152	138	144	174	141	175	137	150	180	156	127	123	167
5	Temp (deg C)	27.6	28.0	26.6	29.0	28.6	20.1	20.8	20.5	21.0	20.8	24.3	25.3	25.8	25.0	23.8
6	Turb (NTU)	141.2	33.0	283.0	114.2	38.6	5.1	0.0	1.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	CHEMICAL															
1	Alk-Phen (mgCaCO3/L)	1.5	3.0	0.0	2.2	0.0	1.9	2.6	0.0	0.0	2.3	0.0	0.0	0.0	0.0	0.0
2	ALK-TOT (mgCaCO3/L)	118	141	123	142	144	161	130	167	135	144	157	127	139	125	130
3	Ca (mg/L)	25	29	27	29	28	34	27	32	29	32	28	26	27	29	27
4	Cl (mg/L)	5.1	9.2	7.0	6.8	7.4	13.1	6.7	8.8	5.9	7.5	8.4	6.7	9.9	7.3	6.3
5	CO3 (mg/L)	1.8	3.6	0.0	2.6	0.0	2.3	3.1	0.0	0.0	2.8	0.0	0.0	0.0	0.0	0.0
6	F (mg/L)	0.14	0.22	0.28	0.25	0.32	0.27	0.27	0.12	0.38	0.24	0.21	0.17	0.15	0.13	0.23
7	HCO3 (mg/L)	140	164	151	168	175	192	152	204	165	170	191	155	170	152	158
8	K (mg/L)	2.0	2.0	3.4	2.4	2.7	1.7	1.5	1.4	1.5	1.5	1.4	1.4	1.2	1.1	1.3
9	Mg (mg/L)	8.1	11.9	9.5	14.3	14.3	12.6	10.6	15.1	12.7	12.7	13.8	10.7	12.7	21.6	12.1
10	Na (mg/L)	6.0	10.0	7.9	10.0	10.1	10.1	9.6	13.3	10.5	10.5	9.7	8.6	9.1	7.1	7.9
11	NO2+NO3 (mg N/L)	1.82	1.03	1.42	1.27	1.21	1.39	0.26	0.76	0.79	0.26	0.79	0.27	0.28	0.41	0.07
12	NO2-N (mgN/L)	0.02	0.03	0.02	0.02	0.01	0.04	0.01	0.04	0.03	0.01	0.03	0.01	0.01	0.04	0.01
13	NO3-N (mgN/L)	1.80	1.00	1.40	1.25	1.20	1.36	0.26	0.72	0.76	0.25	0.76	0.26	0.26	0.37	0.06
14	o-PO4-P (mg P/L)	0.161	0.021	0.139	0.299	0.323	0.108	0.050	0.073	0.112	0.103	0.033	0.189	0.033	0.127	0.106
15	SiO2 (mg/L)	44.6	25.5	17.3	17.6	14.7	19.6	21.9	24.9	18.8	14.5	26.7	22.8	21.9	18.1	13.4
16	SO4 (mg/L)	11.6	8.3	10.7	12.6	12.1	4.5	3.2	5.2	11.6	2.1	2.4	3.5	2.1	23.0	2.7
	BIOLOGICAL/BACTERIOLOGICAL															
1	BOD3-27 (mg/L)	1.3	1.1	0.7	1.0	0.7	0.9	0.5	0.9	0.9	0.7	1.1	0.6	0.4	0.6	0.4
2	COD (mg/L)	30.0	21.0	38.8	29.0	29.4	43.5	29.8	31.0	31.5	29.0	24.7	21.0	30.7	33.7	30.7
3	DO (mg/L)	5.5	6.2	6.2	5.6	6.0	6.1	6.8	7.3	7.2	7.5	6.1	5.8	6.4	6.7	6.5
4	DO_SAT% (%)	70	79	77	73	77	67	76	81	80	84	73	70	78	80	76
	TRACE & TOXIC															
	CHEMICAL INDICES															
1	HAR_Ca (mgCaCO3/L)	62	71	69	74	70	85	66	80	73	79	70	64	68	72	68
2	HAR_Total (mgCaCO3/L)	95	121	108	133	130	138	110	143	126	132	127	109	121	162	119
3	Na% (%)	12	15	14	14	14	14	16	17	15	14	15	15	14	9	12
4	RSC (-)	0.5	0.4	0.4	0.2	0.3	0.5	0.4	0.5	0.2	0.2	0.6	0.4	0.4	0.1	0.2
5	SAR (-)	0.3	0.4	0.3	0.4	0.4	0.4	0.4	0.5	0.4	0.4	0.4	0.4	0.4	0.3	0.3

3.12 Shakkar at Gadarwara

History sheet

			Water Year	**:**	**2015-2016**
Site	**:**	**Shakkar at Gadarwara**	**Code**	**:**	**010215012**
State	:	Madhya Pradesh	District		Narsinghpur
Basin	:	Narmada	Independent River	:	Narmada
Tributary	:	Shakkar	Local River	:	Shakkar
Division	:	Narmada Division, Bhopal	Sub-Division	:	MNSD-1, Hoshangabad
Drainage Area	:	2270 Sq. Km.	Bank	:	Left
Latitude	:	22°55'26"	Longitude	:	78°47'20"
Zero of Gauge (m)	:	321 .000 (M.S.L.)	01/02/1977		
		Opening Date	Closing Date		
Gauge	:	01/02/1977			
Discharge	:	01/02/1977			
Sediment	:	15/06/1978			
Water Quality	:	16/08/1979			

Water Quality Datasheet for the period : 2015-2016

Station Name : Shakkar at Gadarwara (010215012) Division : Narmada Division, Bhopal

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

River Water Analysis

S.No	Parameters	01/06/2015	01/07/2015	03/08/2015	01/09/2015	05/10/2015	02/11/2015	01/12/2015	01/01/2016	01/02/2016	01/03/2016	01/04/2016	02/05/2016
		A	A	A	A	A	A	A	A	B	A	A	A
	PHYSICAL												
1	Q (cumec)	0.264	1.075	150.7	77.58	9.969	4.379	1.583	0.666	0.535	0.018		
2	Colour_Cod (-)	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear		
3	EC_GEN (µmho/cm)	272	260	211	230	264	229	379	265	285	370		
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)	8.5	8.1	8.1	8.1	8.1	8.3	8.3	8.4	8.3	8.0		
6	TDS (mg/L)	156	163	142	143	172	137	239	175	186	242		
7	Temp (deg C)	27.0	25.0	20.5	23.5	23.1	21.0	23.5	19.0	17.5	21.0		
8	Turb (NTU)	0.0	7.0	11.0	23.0	0.0	0.0	0.0	0.0	0.0	0.0		
	CHEMICAL												
1	Alk-Phen (mgCaCO3/L)	10.0	0.0	0.0	0.0	0.0	4.6	4.6	6.9	4.6	0.0		
2	ALK-TOT (mgCaCO3/L)	150	156	148	149	177	156	146	181	186	170		
3	Ca (mg/L)	22	36	31	29	33	39	37	32	26	23		
4	Cl (mg/L)	17.8	3.3	6.1	6.4	7.0	6.0	9.0	7.0	9.0	15.0		
5	CO3 (mg/L)	12.1	0.0	0.0	0.0	0.0	5.6	5.6	8.4	5.6	0.0		
6	F (mg/L)	0.17	0.44	0.18	0.46	0.06	0.38	0.06	0.20	0.18	0.26		
7	HCO3 (mg/L)	159	190	180	182	216	179	167	204	216	207		
8	K (mg/L)	0.9	2.7	1.9	2.1	1.0	0.8	1.0	0.7	0.8	3.1		
9	Mg (mg/L)	16.0	13.4	13.1	14.8	23.8	11.7	24.1	20.2	22.6	20.9		
10	Na (mg/L)	12.8	8.8	7.7	8.1	9.7	7.7	8.6	12.8	14.4	15.6		
11	NO2+NO3 (mg N/L)	0.36	4.18	0.11	1.13	0.78	0.50	0.47	0.04	0.07	0.06		
12	NO2-N (mgN/L)	0.01	0.09	0.02	0.02	0.00	0.01	0.02	0.02	0.01	0.01		
13	NO3-N (mgN/L)	0.35	4.09	0.09	1.11	0.78	0.50	0.45	0.02	0.06	0.05		
14	o-PO4-P (mg P/L)	0.078	0.357	0.271	0.284	0.104	0.102	0.175	0.001	0.138	0.182		
15	SiO2 (mg/L)	28.0	19.8	11.3	12.3	23.5	17.7	25.0	19.1	20.6	21.6		
16	SO4 (mg/L)	4.7	8.5	15.3	15.7	2.7	3.7	3.4	0.8	2.1	2.2		
	BIOLOGICAL/BACTERIOLOGICAL												
1	BOD3-27 (mg/L)	1.6	1.2	0.2	0.6	0.2	0.4	0.6	1.0	0.5	3.0		
2	COD (mg/L)	29.0	30.0	27.0	30.0	26.0	37.0	26.0	23.0	17.0	44.0		
3	DO (mg/L)	6.0	6.0	6.3	6.3	6.6	7.7	7.0	7.6	8.0	3.0		
4	DO_SAT% (%)	75	73	69	74	77	86	82	82	83	34		
	TRACE & TOXIC												
	CHEMICAL INDICES												
1	HAR_Ca (mgCaCO3/L)	56	89	78	73	82	98	93	79	66	57		
2	HAR_Total (mgCaCO3/L)	123	145	133	135	182	146	193	163	160	144		
3	Na% (%)	18	11	11	11	10	10	9	15	16	19		
4	RSC (-)	0.6	0.2	0.3	0.3	0.0	0.2	0.0	0.4	0.6	0.5		
5	SAR (-)	0.5	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.5	0.6		

Water Quality Summary for the period : 2015-2016

Station Name : Shakkar at Gadarwara (010215012) Division : Narmada Division, Bhopal

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

River Water Summary

S.No	Parameters	Number of Observations	Maximum	Minimum	Mean
	PHYSICAL				
1	Q (cumec)	226	493.8	0.015	43.93
2	EC_GEN (µmho/cm)	10	379	211	277
3	pH_GEN (pH units)	10	8.5	8.0	8.2
4	TDS (mg/L)	10	242	137	176
5	Temp (deg C)	10	27.0	17.5	22.1
6	Turb (NTU)	10	23.0	0.0	4.1
	CHEMICAL				
1	Alk-Phen (mgCaCO3/L)	10	10.0	0.0	3.1
2	ALK-TOT (mgCaCO3/L)	10	186	146	162
3	Ca (mg/L)	10	39	22	31
4	Cl (mg/L)	10	17.8	3.3	8.7
5	CO3 (mg/L)	10	12.1	0.0	3.7
6	F (mg/L)	10	0.46	0.06	0.24
7	HCO3 (mg/L)	10	216	159	190
8	K (mg/L)	10	3.1	0.7	1.5
9	Mg (mg/L)	10	24.1	11.7	18.1
10	Na (mg/L)	10	15.6	7.7	10.6
11	NO2+NO3 (mg N/L)	10	4.18	0.04	0.77
12	NO2-N (mgN/L)	10	0.09	0.00	0.02
13	NO3-N (mgN/L)	10	4.09	0.02	0.75
14	o-PO4-P (mg P/L)	10	0.357	0.001	0.169
15	SiO2 (mg/L)	10	28.0	11.3	19.9
16	SO4 (mg/L)	10	15.7	0.8	5.9
	BIOLOGICAL/BACTERIOLOGICAL				
1	BOD3-27 (mg/L)	10	3.0	0.2	0.9
2	COD (mg/L)	10	44.0	17.0	28.9
3	DO (mg/L)	10	8.0	3.0	6.5
4	DO_SAT% (%)	10	86	34	73
	TRACE & TOXIC				
	CHEMICAL INDICES				
1	HAR_Ca (mgCaCO3/L)	10	98	56	77
2	HAR_Total (mgCaCO3/L)	10	193	123	152
3	Na% (%)	10	19	9	13
4	RSC (-)	10	0.6	0.0	0.3
5	SAR (-)	10	0.6	0.3	0.4

Water Quality Seasonal Average for the period : 2011-2016

Station Name : Shakkar at Gadarwara (010215012) 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				
		2011	2012	2013	2014	2015	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016	2012	2013	2014	2015	2016
	PHYSICAL															
1	Q (cumec)	84.44	145.4	205.6	50.34	47.91	3.192	2.635	9.174	3.611	1.540	0.508	1.389	4.041	1.889	0.018
2	EC_GEN (µmho/cm)	213	236	233	233	247	330	325	378	311	290	338	297	283	279	370
3	pH_GEN (pH units)	8.3	8.0	7.9	7.9	8.2	8.4	8.3	8.2	8.1	8.3	8.0	8.7	8.2	8.2	8.0
4	TDS (mg/L)	135	141	146	150	155	217	212	237	206	184	220	188	180	176	242
5	Temp (deg C)	22.3	22.3	19.5	23.0	23.8	19.0	19.5	18.4	18.3	20.3	19.0	20.0	22.0	25.3	21.0
6	Turb (NTU)	164.0	68.8	224.3	96.6	8.2	2.6	0.0	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	CHEMICAL															
1	Alk-Phen (mgCaCO3/L)	3.2	1.9	0.0	3.9	2.0	8.2	2.5	0.0	1.3	5.2	0.0	13.6	1.4	2.5	0.0
2	ALK-TOT (mgCaCO3/L)	118	115	123	150	156	210	195	233	204	167	185	164	193	189	170
3	Ca (mg/L)	24	25	27	26	30	37	31	36	41	34	29	22	34	32	23
4	Cl (mg/L)	5.8	7.1	6.3	8.1	8.1	10.1	8.8	9.1	8.7	7.8	13.2	10.1	13.5	10.7	15.0
5	CO3 (mg/L)	3.8	2.2	0.0	4.7	2.4	9.9	3.0	0.0	1.5	6.3	0.0	16.4	1.7	3.0	0.0
6	F (mg/L)	0.16	0.28	0.43	0.26	0.26	0.26	0.32	0.09	0.40	0.20	0.08	0.15	0.11	0.11	0.25
7	HCO3 (mg/L)	136	136	150	173	185	237	232	284	246	192	226	167	232	225	207
8	K (mg/L)	2.2	1.6	3.7	2.2	1.7	1.6	1.2	0.9	1.6	0.8	1.6	1.5	1.1	1.1	3.1
9	Mg (mg/L)	10.4	11.5	11.5	14.5	16.2	18.6	18.6	26.3	20.4	19.6	18.0	18.1	17.7	19.5	20.9
10	Na (mg/L)	5.4	7.5	7.2	11.3	9.4	9.8	11.9	12.8	12.0	10.9	13.7	13.4	13.5	11.7	15.6
11	NO2+NO3 (mg N/L)	2.22	1.13	1.79	1.37	1.31	1.57	0.46	0.90	1.69	0.27	0.22	0.11	0.30	0.34	0.06
12	NO2-N (mgN/L)	0.02	0.02	0.04	0.04	0.03	0.20	0.02	0.05	0.06	0.01	0.01	0.01	0.01	0.05	0.01
13	NO3-N (mgN/L)	2.19	1.11	1.75	1.34	1.28	1.38	0.44	0.85	1.63	0.26	0.21	0.10	0.29	0.29	0.05
14	o-PO4-P (mg P/L)	0.083	0.016	0.216	0.319	0.219	0.093	0.016	0.026	0.187	0.104	0.028	0.188	0.040	0.120	0.182
15	SiO2 (mg/L)	33.3	26.3	18.7	23.4	19.0	23.5	26.5	28.9	22.4	20.6	26.8	20.5	18.9	19.9	21.6
16	SO4 (mg/L)	8.3	13.6	13.3	10.6	9.4	5.1	4.9	5.1	18.2	2.5	1.5	4.1	2.3	41.0	2.2
	BIOLOGICAL/BACTERIOLOGICAL															
1	BOD3-27 (mg/L)	0.7	1.1	0.9	1.0	0.8	1.2	1.1	0.9	1.0	0.6	2.7	1.6	0.9	1.0	3.0
2	COD (mg/L)	25.8	25.5	36.8	28.6	28.4	35.3	32.5	34.3	39.0	25.8	20.0	30.3	31.0	27.3	44.0
3	DO (mg/L)	5.3	5.9	5.7	5.8	6.2	7.1	7.3	7.3	6.8	7.6	4.6	5.5	6.5	7.1	3.0
4	DO_SAT% (%)	61	67	62	68	74	76	79	78	72	83	50	60	74	86	34
	TRACE & TOXIC															
	CHEMICAL INDICES															
1	HAR_Ca (mgCaCO3/L)	60	63	68	65	76	93	79	90	101	84	72	54	85	80	57
2	HAR_Total (mgCaCO3/L)	103	111	116	125	143	170	156	200	186	166	147	130	159	162	144
3	Na% (%)	10	13	12	16	13	11	15	12	12	13	17	18	16	14	19
4	RSC (-)	0.3	0.2	0.2	0.5	0.3	0.8	0.8	0.7	0.4	0.3	0.8	0.7	0.7	0.6	0.5
5	SAR (-)	0.2	0.3	0.3	0.4	0.3	0.3	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.4	0.6

3.13 Narmada at Barman

History Sheet

			Water Year	**:**	**2015-2016**
Site	**:**	**Narmada at Barman**	**Code**	**:**	**010215011**
State	:	Madhya Pradesh	District		Narsinghpur
Basin	:	Narmada	Independent River	:	Narmada
Tributary	:		Sub Tributary	:	
Sub-Sub Tributary	:		Local River	:	Narmada
Division	:	Narmada Division, Bhopal	Sub-Division	:	MNSD-1, Hoshangabad
Drainage Area	:	26453 Sq. Km.	Bank	:	Right
Latitude	:	23°01'52"	Longitude	:	79°00'56"
Zero of Gauge (m)	:	306 .000 (M.S.L.)	09/12/1970		
		Opening Date	Closing Date		
Gauge	:	09/12/1970			
Discharge	:	20/11/1971			
Sediment	:	27/08/1972			
Water Quality	:	01/06/1979			

Water Quality Datasheet for the period : 2015-2016

Station Name : Narmada at Barman (010215011) Division : Narmada Division, Bhopal

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

River Water Analysis

S.No	Parameters	01/06/2015	01/07/2015	03/08/2015	01/09/2015	05/10/2015	02/11/2015	01/12/2015	01/01/2016	01/02/2016	01/03/2016	01/04/2016	02/05/2016
		A	A	A	A	A	A	A	A	C	A	A	A
	PHYSICAL												
1	Q (cumec)	127.0	91.90	164.0	436.5	137.0	101.0	44.70	73.70	97.20	35.00	136.0	109.0
2	Colour_Cod (-)	Clear	Clear	Light Brown	Light Brown	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear
3	EC_GEN (µmho/cm)	188	211	171	188	205	227	224	186	167	263	211	197
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)	8.2	8.2	8.2	8.2	8.1	8.3	8.2	8.1	8.4	8.1	8.2	8.0
6	TDS (mg/L)	108	133	117	113	133	136	140	121	109	171	139	127
7	Temp (deg C)	29.0	29.0	28.0	28.0	28.0	25.0	23.0	19.0	20.0	23.0	26.0	27.0
8	Turb (NTU)	0.0	0.0	78.0	49.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	CHEMICAL												
1	Alk-Phen (mgCaCO3/L)	0.0	0.0	0.0	0.0	0.0	4.6	0.0	0.0	6.9	0.0	0.0	0.0
2	ALK-TOT (mgCaCO3/L)	113	123	110	110	130	137	125	105	107	119	102	99
3	Ca (mg/L)	25	27	25	27	29	35	27	31	24	26	25	24
4	Cl (mg/L)	9.0	5.5	7.6	7.4	9.5	12.0	6.0	6.0	7.0	8.0	7.0	5.0
5	CO3 (mg/L)	0.0	0.0	0.0	0.0	0.0	5.6	0.0	0.0	8.4	0.0	0.0	0.0
6	F (mg/L)	0.49	0.56	0.04	0.45	0.12	0.48	0.05	0.19	0.19	0.34	0.33	0.30
7	HCO3 (mg/L)	138	150	134	134	159	156	153	128	114	145	125	121
8	K (mg/L)	1.2	2.5	3.2	2.8	1.7	1.9	1.7	1.3	1.3	1.4	1.5	1.4
9	Mg (mg/L)	8.8	11.2	10.2	10.7	15.3	11.2	12.2	6.8	8.0	11.4	9.0	9.5
10	Na (mg/L)	4.8	9.2	8.0	8.8	10.0	12.8	12.7	7.0	5.8	7.0	7.2	4.4
11	NO2+NO3 (mg N/L)	0.23	2.11	0.52	0.99	0.59	0.67	0.41	0.06	0.06	0.05	0.06	0.05
12	NO2-N (mgN/L)	0.01	0.02	0.03	0.03	0.00	0.01	0.01	0.02	0.01	0.01	0.01	0.00
13	NO3-N (mgN/L)	0.23	2.09	0.50	0.97	0.59	0.67	0.41	0.04	0.05	0.04	0.05	0.05
14	o-PO4-P (mg P/L)	0.052	1.084	0.356	0.367	0.119	0.073	0.181	0.004	0.169	0.178	0.077	0.054
15	SiO2 (mg/L)	19.6	18.2	14.7	13.4	17.7	15.6	16.5	13.8	17.2	15.2	15.0	14.8
16	SO4 (mg/L)	2.1	8.5	15.6	17.0	2.8	3.2	1.8	13.0	1.7	2.2	2.6	4.4
	BIOLOGICAL/BACTERIOLOGICAL												
1	BOD3-27 (mg/L)	2.1	0.5	1.0	0.2	0.4	4.2	0.3	1.0	1.3	0.5	0.7	0.1
2	COD (mg/L)	35.0	20.0	40.0	31.0	29.0	41.0	40.0	49.0	17.0	16.0	19.0	36.0
3	DO (mg/L)	4.1	5.9	6.8	6.1	6.5	4.4	6.5	7.0	7.5	6.6	5.7	4.4
4	DO_SAT% (%)	53	77	87	78	83	53	76	75	82	77	70	55
	TRACE & TOXIC												
	CHEMICAL INDICES												
1	HAR_Ca (mgCaCO3/L)	63	68	62	68	72	88	68	78	60	65	62	61
2	HAR_Total (mgCaCO3/L)	100	115	105	113	136	134	118	106	93	112	99	100
3	Na% (%)	9	15	14	14	14	17	19	12	12	12	13	9
4	RSC (-)	0.3	0.2	0.1	0.0	0.0	0.1	0.2	0.0	0.3	0.1	0.1	0.0
5	SAR (-)	0.2	0.4	0.3	0.4	0.4	0.5	0.5	0.3	0.3	0.3	0.3	0.2

Water Quality Summary for the period : 2015-2016

Station Name : Narmada at Barman (010215011) Division : Narmada Division, Bhopal

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

River Water Summary

S.No	Parameters	Number of Observations	Maximum	Minimum	Mean
	PHYSICAL				
1	Q (cumec)	296	1881	24.80	131.5
2	EC_GEN (µmho/cm)	12	263	167	203
3	pH_GEN (pH units)	12	8.4	8.0	8.2
4	TDS (mg/L)	12	171	108	129
5	Temp (deg C)	12	29.0	19.0	25.4
6	Turb (NTU)	12	78.0	0.0	10.6
	CHEMICAL				
1	Alk-Phen (mgCaCO3/L)	12	6.9	0.0	1
2	ALK-TOT (mgCaCO3/L)	12	137	99	115
3	Ca (mg/L)	12	35	24	27
4	Cl (mg/L)	12	12.0	5.0	7.5
5	CO3 (mg/L)	12	8.4	0.0	1.2
6	F (mg/L)	12	0.56	0.04	0.29
7	HCO3 (mg/L)	12	159	114	138
8	K (mg/L)	12	3.2	1.2	1.8
9	Mg (mg/L)	12	15.3	6.8	10.3
10	Na (mg/L)	12	12.8	4.4	8.2
11	NO2+NO3 (mg N/L)	12	2.11	0.05	0.48
12	NO2-N (mgN/L)	12	0.03	0.00	0.01
13	NO3-N (mgN/L)	12	2.09	0.04	0.47
14	o-PO4-P (mg P/L)	12	1.084	0.004	0.226
15	SiO2 (mg/L)	12	19.6	13.4	16
16	SO4 (mg/L)	12	17.0	1.7	6.2
	BIOLOGICAL/BACTERIOLOGICAL				
1	BOD3-27 (mg/L)	12	4.2	0.1	1
2	COD (mg/L)	12	49.0	16.0	31.1
3	DO (mg/L)	12	7.5	4.1	6
4	DO_SAT% (%)	12	87	53	72
	TRACE & TOXIC				
	CHEMICAL INDICES				
1	HAR_Ca (mgCaCO3/L)	12	88	60	68
2	HAR_Total (mgCaCO3/L)	12	136	93	111
3	Na% (%)	12	19	9	13
4	RSC (-)	12	0.3	0.0	0.1
5	SAR (-)	12	0.5	0.2	0.3

Water Quality Seasonal Average for the period : 2011-2016

Station Name : Narmada at Barman (010215011) 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				
		2011	2012	2013	2014	2015	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016	2012	2013	2014	2015	2016
	PHYSICAL															
1	Q (cumec)	577.3	282.6	959.6	274.1	191.3	160.6	161.3	157.5	175.5	85.17	190.4	166.0	235.7	139.3	93.33
2	EC_GEN (µmho/cm)	209	272	208	185	193	226	199	237	167	201	222	212	175	168	224
3	pH_GEN (pH units)	8.2	8.0	8.0	7.8	8.2	8.2	8.2	8.1	8.1	8.2	8.1	8.1	8.1	8.1	8.1
4	TDS (mg/L)	134	168	131	118	121	147	131	145	111	127	139	135	114	108	146
5	Temp (deg C)	27.2	27.0	26.8	27.8	28.4	23.1	21.0	21.8	20.5	21.8	22.3	23.0	24.7	24.0	25.3
6	Turb (NTU)	130.0	26.0	121.8	54.4	25.4	7.6	0.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	CHEMICAL															
1	Alk-Phen (mgCaCO3/L)	1.0	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.9	0.0	0.0	0.0	0.0	0.0
2	ALK-TOT (mgCaCO3/L)	118	129	106	131	117	135	120	136	109	119	120	114	117	110	107
3	Ca (mg/L)	26	28	24	27	27	28	24	29	25	29	26	25	26	24	25
4	Cl (mg/L)	6.5	9.7	7.6	8.6	7.8	9.7	6.4	7.7	5.9	7.8	7.3	8.0	10.6	8.0	6.7
5	CO3 (mg/L)	1.2	1.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.5	0.0	0.0	0.0	0.0	0.0
6	F (mg/L)	0.13	0.27	0.29	0.26	0.33	0.25	0.25	0.15	0.20	0.23	0.16	0.14	0.18	0.14	0.32
7	HCO3 (mg/L)	142	153	129	160	143	165	147	167	133	138	146	139	143	134	130
8	K (mg/L)	2.3	1.8	2.7	2.3	2.3	1.6	1.4	1.2	1.2	1.5	1.5	1.3	1.2	1.2	1.4
9	Mg (mg/L)	7.3	10.0	10.4	13.8	11.2	10.9	11.2	13.5	9.7	9.5	6.6	9.3	9.9	10.7	10.0
10	Na (mg/L)	5.9	9.0	6.8	10.0	8.2	7.2	8.8	9.8	6.5	9.6	5.4	7.4	7.0	5.5	6.2
11	NO2+NO3 (mg N/L)	1.70	0.92	1.25	1.50	0.89	0.98	0.20	0.39	0.64	0.30	0.33	0.12	0.16	0.37	0.05
12	NO2-N (mgN/L)	0.04	0.08	0.04	0.03	0.01	0.01	0.01	0.05	0.03	0.01	0.02	0.01	0.01	0.06	0.01
13	NO3-N (mgN/L)	1.65	0.84	1.21	1.46	0.87	0.96	0.19	0.34	0.61	0.29	0.31	0.10	0.15	0.31	0.05
14	o-PO4-P (mg P/L)	0.108	0.010	0.158	0.167	0.396	0.110	0.019	0.046	0.120	0.107	0.031	0.812	0.045	0.118	0.103
15	SiO2 (mg/L)	30.6	26.3	18.6	23.6	16.7	23.6	23.1	23.0	21.7	15.8	26.8	22.6	21.2	14.3	15.0
16	SO4 (mg/L)	4.0	8.7	10.4	9.5	9.2	3.4	2.9	3.6	5.2	4.9	2.4	2.7	2.8	27.7	3.0
	BIOLOGICAL/BACTERIOLOGICAL															
1	BOD3-27 (mg/L)	1.1	0.9	0.6	1.2	0.8	1.2	0.7	0.9	0.8	1.7	1.7	0.9	0.7	0.5	0.4
2	COD (mg/L)	25.4	26.8	39.2	29.8	31.0	41.5	29.8	33.0	44.0	36.8	29.0	29.7	24.7	27.0	23.7
3	DO (mg/L)	4.9	5.8	6.2	5.1	5.9	6.9	6.7	7.2	7.1	6.4	5.8	5.6	6.5	6.5	5.6
4	DO_SAT% (%)	63	73	78	64	76	80	75	82	78	72	66	65	78	77	67
	TRACE & TOXIC															
	CHEMICAL INDICES															
1	HAR_Ca (mgCaCO3/L)	64	69	60	66	67	71	60	73	63	73	64	63	66	59	62
2	HAR_Total (mgCaCO3/L)	94	111	103	124	114	116	107	129	103	113	92	102	107	104	104
3	Na% (%)	12	15	13	14	13	12	15	14	12	15	11	13	12	10	11
4	RSC (-)	0.5	0.4	0.1	0.2	0.1	0.4	0.3	0.2	0.1	0.1	0.6	0.2	0.2	0.1	0.1
5	SAR (-)	0.3	0.4	0.3	0.4	0.3	0.3	0.4	0.4	0.3	0.4	0.2	0.3	0.3	0.2	0.3

3.14 Sher at Belkheri

History sheet

			Water Year	**:**	**2015-2016**
Site	**:**	**Sher at Belkheri**	**Code**	**:**	**010215010**
State	:	Madhya Pradesh	District		Narsinghpur
Basin	:	Narmada	Independent River	:	Narmada
Tributary	:	Sher	Local River	:	Sher
Division	:	Narmada Division, Bhopal	Sub-Division	:	MNSD-1, Hoshangabad
Drainage Area	:	1508 Sq. Km.	Bank	:	Right
Latitude	:	22°55'40"	Longitude	:	79°20'23"
Zero of Gauge (m)	:	340 .000 (M.S.L.)	01/02/1977		
		340 .000 (M.S.L.)	16/03/1977		
		Opening Date	Closing Date		
Gauge	:	16/03/1977			
Discharge	:	16/03/1977			
Sediment	:				
Water Quality	:	01/09/1986			

Water Quality Datasheet for the period : 2015-2016

Station Name : Sher at Belkheri (010215010) Division : Narmada Division, Bhopal

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

River Water Analysis

S.No	Parameters	01/06/2015	01/07/2015	03/08/2015	01/09/2015	05/10/2015	02/11/2015	01/12/2015	01/01/2016	01/02/2016	01/03/2016	01/04/2016	02/05/2016
		A	A	A	A	A	A	A	A	B	A	A	A
	PHYSICAL												
1	Q (cumec)	0.411	0.541	5.051	48.60	2.679	1.438	0.485	0.432	0.438	0.398	0.389	0.291
2	Colour_Cod (-)	Clear	Clear	Clear	Light Brown	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear
3	EC_GEN (µmho/cm)	432	302	222	191	281	349	451	405	412	550	493	525
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)	8.1	7.7	8.3	8.0	8.1	8.1	8.1	8.1	8.0	7.7	7.8	7.9
6	TDS (mg/L)	248	189	149	119	183	212	283	267	268	358	330	335
7	Temp (deg C)	32.0	28.0	28.0	28.0	29.0	28.0	24.0	21.0	21.0	23.0	24.0	28.0
8	Turb (NTU)	0.0	8.0	22.0	58.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	CHEMICAL												
1	Alk-Phen (mgCaCO3/L)	0.0	0.0	4.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	ALK-TOT (mgCaCO3/L)	279	181	157	121	198	258	266	293	261	291	275	285
3	Ca (mg/L)	42	35	30	28	30	40	31	41	41	41	46	38
4	Cl (mg/L)	15.8	5.2	6.5	7.3	7.9	6.0	10.0	10.0	6.0	8.0	6.0	8.0
5	CO3 (mg/L)	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)	0.36	0.62	0.03	0.57	0.12	0.43	0.01	0.19	0.32	0.70	0.39	0.32
7	HCO3 (mg/L)	340	221	180	148	241	315	324	358	318	355	335	348
8	K (mg/L)	1.2	2.5	2.0	1.8	0.8	0.7	1.0	0.9	0.9	0.9	1.1	1.4
9	Mg (mg/L)	32.6	19.9	15.1	10.7	28.4	31.8	30.9	34.8	35.7	31.6	32.1	31.6
10	Na (mg/L)	13.5	11.5	9.3	9.6	11.3	15.1	16.3	16.6	17.2	15.9	16.4	16.0
11	NO2+NO3 (mg N/L)	1.49	2.74	0.59	0.78	0.63	0.63	0.84	0.84	0.81	0.06	0.07	0.09
12	NO2-N (mgN/L)	0.02	0.06	0.02	0.02	0.00	0.01	0.01	0.02	0.00	0.01	0.01	0.01
13	NO3-N (mgN/L)	1.47	2.68	0.57	0.76	0.62	0.63	0.83	0.83	0.81	0.05	0.06	0.08
14	o-PO4-P (mg P/L)	0.077	2.312	0.341	0.303	0.104	0.059	0.167	0.003	0.185	0.666	0.157	0.051
15	SiO2 (mg/L)	35.8	20.6	14.9	14.2	33.1	31.7	36.8	38.4	42.2	39.7	32.3	20.7
16	SO4 (mg/L)	1.9	6.7	19.4	20.6	3.3	4.1	3.0	1.1	14.2	14.5	14.0	9.1
	BIOLOGICAL/BACTERIOLOGICAL												
1	BOD3-27 (mg/L)	1.4	0.4	0.4	0.3	0.1	0.6	0.6	1.2	0.6	1.5	1.0	0.7
2	COD (mg/L)	21.0	15.0	26.0	22.0	27.0	21.0	33.0	26.0	21.0	23.0	21.0	38.0
3	DO (mg/L)	5.2	5.1	6.3	5.7	6.1	5.8	6.9	7.0	7.0	6.3	5.3	4.3
4	DO_SAT% (%)	71	65	80	73	79	74	82	79	79	73	63	55
	TRACE & TOXIC												
	CHEMICAL INDICES												
1	HAR_Ca (mgCaCO3/L)	106	87	76	70	75	101	77	102	102	103	116	95
2	HAR_Total (mgCaCO3/L)	241	170	139	115	194	233	206	247	251	234	250	227
3	Na% (%)	11	13	13	15	11	12	15	13	13	13	13	13
4	RSC (-)	0.8	0.3	0.4	0.1	0.1	0.5	1.2	1.0	0.2	1.2	0.5	1.2
5	SAR (-)	0.4	0.4	0.3	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.5

Water Quality Summary for the period : 2015-2016

Station Name : Sher at Belkheri (010215010) Division : Narmada Division, Bhopal

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

River Water Summary

S.No	Parameters	Number of Observations	Maximum	Minimum	Mean
	PHYSICAL				
1	Q (cumec)	287	451.4	0.240	11.71
2	EC_GEN (µmho/cm)	12	550	191	384
3	pH_GEN (pH units)	12	8.3	7.7	8
4	TDS (mg/L)	12	358	119	245
5	Temp (deg C)	12	32.0	21.0	26.2
6	Turb (NTU)	12	58.0	0.0	7.3
	CHEMICAL				
1	Alk-Phen (mgCaCO3/L)	12	4.7	0.0	0.4
2	ALK-TOT (mgCaCO3/L)	12	293	121	239
3	Ca (mg/L)	12	46	28	37
4	Cl (mg/L)	12	15.8	5.2	8.1
5	CO3 (mg/L)	12	5.6	0.0	0.5
6	F (mg/L)	12	0.70	0.01	0.34
7	HCO3 (mg/L)	12	358	148	290
8	K (mg/L)	12	2.5	0.7	1.3
9	Mg (mg/L)	12	35.7	10.7	27.9
10	Na (mg/L)	12	17.2	9.3	14
11	NO2+NO3 (mg N/L)	12	2.74	0.06	0.8
12	NO2-N (mgN/L)	12	0.06	0.00	0.02
13	NO3-N (mgN/L)	12	2.68	0.05	0.78
14	o-PO4-P (mg P/L)	12	2.312	0.003	0.369
15	SiO2 (mg/L)	12	42.2	14.2	30
16	SO4 (mg/L)	12	20.6	1.1	9.3
	BIOLOGICAL/BACTERIOLOGICAL				
1	BOD3-27 (mg/L)	12	1.5	0.1	0.7
2	COD (mg/L)	12	38.0	15.0	24.5
3	DO (mg/L)	12	7.0	4.3	5.9
4	DO_SAT% (%)	12	82	55	73
	TRACE & TOXIC				
	CHEMICAL INDICES				
1	HAR_Ca (mgCaCO3/L)	12	116	70	92
2	HAR_Total (mgCaCO3/L)	12	251	115	209
3	Na% (%)	12	15	11	13
4	RSC (-)	12	1.2	0.1	0.6
5	SAR (-)	12	0.5	0.3	0.4

Water Quality Seasonal Average for the period : 2011-2016

Station Name : Sher at Belkheri (010215010) 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				
		2011	2012	2013	2014	2015	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016	2012	2013	2014	2015	2016
	PHYSICAL															
1	Q (cumec)	46.46	38.46	64.94		11.46	1.385	1.083	4.438		0.646	0.154	0.643	2.441		0.359
2	EC_GEN (µmho/cm)	288	372	321	282	286	426	446	453	373	404	507	504	396	305	523
3	pH_GEN (pH units)	8.1	8.0	8.1	7.9	8.0	8.1	8.0	8.1	8.1	8.0	8.0	7.9	8.0	8.0	7.8
4	TDS (mg/L)	183	230	205	181	178	275	290	286	248	258	311	308	256	199	341
5	Temp (deg C)	27.8	28.0	25.6	28.4	29.0	21.3	20.8	22.3	22.8	23.5	25.3	24.7	26.0	26.3	25.0
6	Turb (NTU)	108.2	16.0	115.2	60.8	17.6	0.1	0.0	1.3	0.0	0.0	0.0	0.3	0.0	0.0	0.0
	CHEMICAL															
1	Alk-Phen (mgCaCO3/L)	1.4	1.0	0.0	0.0	0.9	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)	153	186	172	188	187	263	274	289	258	269	269	290	287	214	284
3	Ca (mg/L)	26	30	33	29	33	42	42	48	46	38	37	38	45	33	42
4	Cl (mg/L)	7.2	8.5	7.2	8.9	8.5	13.9	11.1	9.5	8.6	8.0	12.5	9.6	13.0	21.0	7.3
5	CO3 (mg/L)	1.7	1.2	0.0	0.0	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	F (mg/L)	0.16	0.15	0.27	0.32	0.34	0.26	0.31	0.16	0.30	0.23	0.20	0.20	0.17	0.23	0.47
7	HCO3 (mg/L)	183	224	210	230	226	321	335	352	315	329	328	353	350	262	346
8	K (mg/L)	1.6	1.6	2.8	2.0	1.6	1.5	1.2	0.8	0.8	0.9	1.6	1.5	1.0	1.0	1.1
9	Mg (mg/L)	9.0	20.9	16.5	19.8	21.3	25.5	28.2	29.3	28.9	33.3	27.9	29.6	28.4	23.2	31.8
10	Na (mg/L)	7.2	12.9	11.2	11.0	11.0	8.3	15.6	16.7	14.2	16.3	16.1	18.2	19.0	9.3	16.1
11	NO2+NO3 (mg N/L)	1.80	0.99	0.93	1.37	1.25	1.45	0.72	1.18	0.90	0.78	0.45	0.39	0.92	0.67	0.07
12	NO2-N (mgN/L)	0.02	0.04	0.03	0.03	0.03	0.03	0.01	0.05	0.03	0.01	0.05	0.01	0.01	0.05	0.01
13	NO3-N (mgN/L)	1.78	0.95	0.90	1.34	1.22	1.42	0.72	1.13	0.86	0.77	0.40	0.38	0.91	0.62	0.07
14	o-PO4-P (mg P/L)	0.111	0.014	0.234	0.349	0.627	0.088	0.010	0.066	0.091	0.103	0.045	0.158	0.059	0.066	0.291
15	SiO2 (mg/L)	31.4	32.7	25.9	29.8	23.7	38.9	39.9	44.9	29.7	37.3	38.7	34.1	31.9	27.8	30.9
16	SO4 (mg/L)	3.9	9.7	13.1	11.0	10.4	4.6	6.1	5.6	4.2	5.6	3.0	4.4	3.6	9.0	12.5
	BIOLOGICAL/BACTERIOLOGICAL															
1	BOD3-27 (mg/L)	0.8	0.6	0.7	1.0	0.5	1.0	0.6	0.8	0.9	0.8	0.6	0.9	1.0	0.9	1.1
2	COD (mg/L)	27.0	24.0	25.2	34.8	22.2	39.5	27.8	29.0	44.8	25.3	20.0	28.3	24.0	27.7	27.3
3	DO (mg/L)	5.0	5.3	6.0	5.7	5.7	6.4	6.9	7.1	7.3	6.7	5.8	5.3	6.6	6.0	5.3
4	DO_SAT% (%)	64	68	74	73	74	72	77	81	84	78	71	64	81	74	64
	TRACE & TOXIC															
	CHEMICAL INDICES															
1	HAR_Ca (mgCaCO3/L)	66	75	82	73	83	105	105	119	115	95	93	96	114	83	105
2	HAR_Total (mgCaCO3/L)	103	162	151	155	172	211	222	241	235	234	209	219	232	179	237
3	Na% (%)	13	15	13	12	13	8	13	13	12	13	14	15	15	10	13
4	RSC (-)	1.0	0.5	0.5	0.7	0.3	1.1	1.1	1.0	0.5	0.7	1.2	1.4	1.1	0.7	1.0
5	SAR (-)	0.3	0.4	0.4	0.4	0.4	0.3	0.5	0.5	0.4	0.5	0.5	0.5	0.5	0.3	0.5

3.15 Hiran at Patan

History sheet

			Water Year	**:**	**2015-2016**
Site	**:**	**Hiran at Patan**	**Code**	**:**	**010215009**
State	:	Madhya Pradesh	District		Jabalpur
Basin	:	Narmada	Independent River	:	Narmada
Tributary	:	Hiran	Sub Tributary	:	
Sub-Sub Tributary	:		Local River	:	Hiran
Division	:	Narmada Division, Bhopal	Sub-Division	:	UNSD, Jabalpur
Drainage Area	:	3950 Sq. Km.	Bank	:	Left
Latitude	:	23°18'42"	Longitude	:	79°39'46"
Zero of Gauge (m)	:	341.5 .000 (M.S.L.)	30/08/1979		
		Opening Date	Closing Date		
Gauge	:	30/08/1979			
Discharge	:	30/08/1979			
Sediment	:				
Water Quality	:	01/09/1986			

Water Quality Datasheet for the period : 2015-2016

Station Name : Hiran at Patan (010215009) Division : Narmada Division, Bhopal

Local River : Hiran Sub-Division : UNSD, Jabalpur

River Water Analysis

S.No	Parameters	01/06/2015	01/07/2015	03/08/2015	01/09/2015	05/10/2015	02/11/2015	01/12/2015	01/01/2016	01/02/2016	01/03/2016	01/04/2016	02/05/2016
		A	A	A	A	A	A	A	A	B	A	A	A
	PHYSICAL												
1	Q (cumec)	1.001	41.79	22.46	78.80	25.80	34.35	2.987	5.119	4.792	5.334	1.571	
2	Colour_Cod (-)	Clear	Dark Brown	Light Brown	Light Brown	Clear	Clear	Clear	Clear	Clear	Clear	Clear	
3	EC_GEN (µmho/cm)	535	101	256	164	309	305	523	409	372	460	435	
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)	8.4	7.8	7.9	8.0	8.0	7.9	8.3	8.4	7.8	8.3	8.3	
6	TDS (mg/L)	308	64	154	102	200	190	327	270	243	299	288	
7	Temp (deg C)	31.5	28.5	27.5	28.5	28.0	28.0	25.0	18.0	20.0	21.0	24.5	
8	Turb (NTU)	0.0	1322.0	133.0	63.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	CHEMICAL												
1	Alk-Phen (mgCaCO3/L)	7.5	0.0	0.0	0.0	0.0	0.0	4.6	9.3	0.0	6.9	6.9	
2	ALK-TOT (mgCaCO3/L)	286	53	149	96	209	186	270	246	181	195	181	
3	Ca (mg/L)	52	23	36	21	33	44	59	54	44	41	36	
4	Cl (mg/L)	44.6	2.7	15.4	9.1	13.1	14.0	14.0	11.0	27.0	21.0	20.0	
5	CO3 (mg/L)	9.1	0.0	0.0	0.0	0.0	0.0	5.6	11.2	0.0	8.4	8.4	
6	F (mg/L)	0.61	0.44	0.17	0.44	0.18	0.51	0.13	0.33	0.30	0.64	0.43	
7	HCO3 (mg/L)	331	65	182	117	255	227	318	278	221	221	204	
8	K (mg/L)	6.5	6.6	4.5	3.8	3.1	4.2	4.6	6.8	8.0	5.4	5.6	
9	Mg (mg/L)	28.0	2.9	10.2	8.0	27.2	16.8	24.1	19.7	12.6	13.6	15.3	
10	Na (mg/L)	36.7	5.3	14.9	10.3	15.8	15.9	17.9	26.0	21.7	19.3	18.3	
11	NO2+NO3 (mg N/L)	1.39	1.38	1.26	1.30	1.35	1.97	2.40	2.87	2.49	2.16	2.17	
12	NO2-N (mgN/L)	0.01	0.26	0.16	0.16	0.04	0.13	0.03	0.09	0.09	0.09	0.06	
13	NO3-N (mgN/L)	1.38	1.12	1.10	1.14	1.32	1.84	2.37	2.77	2.40	2.07	2.11	
14	o-PO4-P (mg P/L)	0.618	0.780	0.515	0.530	0.240	0.297	0.681	0.900	0.652	0.386	0.176	
15	SiO2 (mg/L)	15.8	35.0	3.7	3.9	18.7	12.8	16.7	5.1	17.4	24.4	24.9	
16	SO4 (mg/L)	4.7	8.0	24.3	24.8	4.0	4.3	3.4	3.1	9.7	9.4	8.4	
	BIOLOGICAL/BACTERIOLOGICAL												
1	BOD3-27 (mg/L)	0.5	0.9	0.8	0.9	0.8	1.9	0.9	1.2	2.8	1.5	1.2	
2	COD (mg/L)	19.0	20.0	32.0	29.0	30.0	28.0	43.0	48.0	42.0	43.0	30.0	
3	DO (mg/L)	4.4	4.2	5.4	6.4	5.5	5.2	6.9	8.0	3.5	6.1	4.6	
4	DO_SAT% (%)	59	54	68	82	70	66	84	85	38	68	55	
	TRACE & TOXIC												
	CHEMICAL INDICES												
1	HAR_Ca (mgCaCO3/L)	131	57	90	53	81	110	147	135	110	103	90	
2	HAR_Total (mgCaCO3/L)	247	69	133	87	195	180	247	217	163	160	154	
3	Na% (%)	24	13	19	20	15	16	13	20	22	20	20	
4	RSC (-)	0.8	0.0	0.3	0.2	0.3	0.1	0.5	0.6	0.4	0.7	0.6	
5	SAR (-)	1.0	0.3	0.6	0.5	0.5	0.5	0.5	0.8	0.7	0.7	0.6	

Water Quality Summary for the period : 2015-2016

Station Name : Hiran at Patan (010215009) Division : Narmada Division, Bhopal

Local River : Hiran Sub-Division : UNSD, Jabalpur

River Water Summary

S.No	Parameters	Number of Observations	Maximum	Minimum	Mean
	PHYSICAL				
1	Q (cumec)	257	380.5	0.061	22.72
2	EC_GEN (µmho/cm)	11	535	101	352
3	pH_GEN (pH units)	11	8.4	7.8	8.1
4	TDS (mg/L)	11	327	64	222
5	Temp (deg C)	11	31.5	18.0	25.5
6	Turb (NTU)	11	1322.0	0.0	138
	CHEMICAL				
1	Alk-Phen (mgCaCO3/L)	11	9.3	0.0	3.2
2	ALK-TOT (mgCaCO3/L)	11	286	53	187
3	Ca (mg/L)	11	59	21	40
4	Cl (mg/L)	11	44.6	2.7	17.4
5	CO3 (mg/L)	11	11.2	0.0	3.9
6	F (mg/L)	11	0.64	0.13	0.38
7	HCO3 (mg/L)	11	331	65	220
8	K (mg/L)	11	8.0	3.1	5.4
9	Mg (mg/L)	11	28.0	2.9	16.2
10	Na (mg/L)	11	36.7	5.3	18.4
11	NO2+NO3 (mg N/L)	11	2.87	1.26	1.88
12	NO2-N (mgN/L)	11	0.26	0.01	0.1
13	NO3-N (mgN/L)	11	2.77	1.10	1.78
14	o-PO4-P (mg P/L)	11	0.900	0.176	0.525
15	SiO2 (mg/L)	11	35.0	3.7	16.2
16	SO4 (mg/L)	11	24.8	3.1	9.5
	BIOLOGICAL/BACTERIOLOGICAL				
1	BOD3-27 (mg/L)	11	2.8	0.5	1.2
2	COD (mg/L)	11	48.0	19.0	33.1
3	DO (mg/L)	11	8.0	3.5	5.5
4	DO_SAT% (%)	11	85	38	66
	TRACE & TOXIC				
	CHEMICAL INDICES				
1	HAR_Ca (mgCaCO3/L)	11	147	53	101
2	HAR_Total (mgCaCO3/L)	11	247	69	168
3	Na% (%)	11	24	13	18
4	RSC (-)	11	0.8	0.0	0.4
5	SAR (-)	11	1.0	0.3	0.6

Water Quality Seasonal Average for the period : 2011-2016

Station Name : Hiran at Patan (010215009) 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				
		2011	2012	2013	2014	2015	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016	2012	2013	2014	2015	2016
	PHYSICAL															
1	Q (cumec)	143.4	58.89	200.8		36.01	17.90	14.80	15.29		10.41	1.493	3.437	7.099		3.453
2	EC_GEN (µmho/cm)	347	487	350	395	273	501	359	476	376	402	550	430	421	411	448
3	pH_GEN (pH units)	8.1	8.2	7.9	7.9	8.0	8.3	8.1	8.1	8.1	8.1	8.2	7.8	7.9	8.2	8.3
4	TDS (mg/L)	219	301	222	257	166	329	233	295	249	258	338	268	269	263	294
5	Temp (deg C)	27.7	27.7	26.7	29.1	28.8	22.1	20.8	19.5	22.5	22.8	23.0	24.7	22.7	26.3	22.8
6	Turb (NTU)	116.2	23.0	194.0	31.0	303.6	5.1	0.0	1.5	0.0	0.0	0.0	0.7	0.0	0.0	0.0
	CHEMICAL															
1	Alk-Phen (mgCaCO3/L)	2.9	3.5	0.0	2.6	1.5	7.6	1.3	0.0	2.5	3.5	3.4	0.0	0.0	4.2	6.9
2	ALK-TOT (mgCaCO3/L)	157	218	166	235	159	297	211	280	226	221	276	196	272	233	188
3	Ca (mg/L)	27	42	36	47	33	59	45	59	49	50	44	39	52	48	39
4	Cl (mg/L)	9.3	24.0	16.9	28.7	17.0	17.6	11.0	16.1	21.6	16.5	23.4	21.7	24.6	32.4	20.5
5	CO3 (mg/L)	3.5	4.2	0.0	3.1	1.8	9.1	1.5	0.0	3.0	4.2	4.1	0.0	0.0	5.0	8.4
6	F (mg/L)	0.21	0.18	0.32	0.58	0.37	0.28	0.35	0.37	0.68	0.32	0.21	0.18	0.56	0.43	0.53
7	HCO3 (mg/L)	185	257	202	281	190	344	255	342	270	261	329	239	331	274	213
8	K (mg/L)	4.2	6.5	5.0	7.3	4.9	3.3	3.4	3.4	4.8	5.9	4.9	5.3	5.5	6.7	5.5
9	Mg (mg/L)	18.8	16.5	11.6	21.0	15.3	22.4	16.0	24.7	19.0	18.3	22.4	15.6	20.2	19.6	14.5
10	Na (mg/L)	15.3	28.6	17.2	24.9	16.6	18.0	16.5	21.8	19.5	20.4	21.4	17.7	22.6	24.0	18.8
11	NO2+NO3 (mg N/L)	1.81	1.77	1.02	3.00	1.34	4.53	1.03	2.08	4.35	2.43	1.13	1.14	2.02	2.13	2.17
12	NO2-N (mgN/L)	0.04	0.32	0.05	0.19	0.12	0.36	0.05	0.08	0.44	0.09	0.04	0.01	0.01	0.07	0.08
13	NO3-N (mgN/L)	1.77	1.45	0.97	2.82	1.21	4.17	0.97	2.00	3.91	2.34	1.09	1.13	2.00	2.06	2.09
14	o-PO4-P (mg P/L)	0.191	0.069	0.206	0.528	0.537	0.267	0.077	0.267	0.546	0.632	0.208	0.206	0.375	0.732	0.281
15	SiO2 (mg/L)	26.5	26.6	20.0	19.4	15.4	22.0	23.5	21.7	20.2	13.0	21.6	25.9	21.7	16.0	24.6
16	SO4 (mg/L)	5.1	15.5	12.7	18.0	13.2	6.2	3.8	11.7	10.2	5.1	3.5	16.4	4.3	13.8	8.9
	BIOLOGICAL/BACTERIOLOGICAL															
1	BOD3-27 (mg/L)	1.0	1.4	1.1	1.9	0.8	1.5	0.9	1.3	1.3	1.7	2.5	1.4	2.1	1.0	1.4
2	COD (mg/L)	33.8	29.0	33.4	39.0	26.0	30.8	34.3	26.8	36.3	40.3	25.0	31.3	30.7	31.7	36.5
3	DO (mg/L)	4.3	4.6	5.3	4.7	5.2	7.0	6.6	6.9	6.3	5.9	4.4	4.4	5.0	5.3	5.3
4	DO_SAT% (%)	55	58	66	61	67	80	74	74	72	68	51	53	58	65	62
	TRACE & TOXIC															
	CHEMICAL INDICES															
1	HAR_Ca (mgCaCO3/L)	68	104	91	119	83	147	112	147	124	125	110	97	131	121	97
2	HAR_Total (mgCaCO3/L)	146	173	140	206	146	240	179	250	202	202	204	162	215	203	157
3	Na% (%)	18	25	19	18	18	14	16	16	17	18	18	19	18	20	20
4	RSC (-)	0.5	0.9	0.5	0.6	0.3	1.2	0.7	0.6	0.5	0.4	1.5	0.7	1.2	0.6	0.6
5	SAR (-)	0.5	0.9	0.6	0.7	0.6	0.5	0.5	0.6	0.6	0.6	0.7	0.6	0.7	0.7	0.7

3.16 Banjar at Bamni

History sheet

			Water Year	**:**	**2015-2016**
Site	**:**	**Banjar at Bamni**	**Code**	**:**	CWC SITE
State	:	Madhya Pradesh	District		Mandla
Basin	:	Narmada	Independent River	:	Narmada
Tributary	:	Banjar	Sub Tributary	:	
Sub-Sub Tributary	:		Local River	:	Banjar
Division	:	Narmada Division, Bhopal	Sub-Division	:	UNSD, Jabalpur
Drainage Area	:	1864 Sq. Km.	Bank	:	Left
Latitude	:	22°29'06"	Longitude	:	80°22'58"
Zero of Gauge (m)	:	440 .000 (M.S.L.)	20/06/1999		
		Opening Date	Closing Date		
Gauge	:	20/06/1999			
Discharge	:	30/11/1999			
Sediment	:	01/07/2002			
Water Quality	:	01/07/2002			

Water Quality Datasheet for the period : 2015-2016

Station Name : Banjar at Bamni

Division : Narmada Division, Bhopal

Local River : Banjar

Sub-Division : UNSD, Jabalpur

River Water Analysis

S.No	Parameters	01/06/2015	01/07/2015	03/08/2015	01/09/2015	05/10/2015	02/11/2015	01/12/2015	01/01/2016	01/02/2016	01/03/2016	01/04/2016	02/05/2016
		A	A	A	A	A	A	A	A	B	A	A	A
	PHYSICAL												
1	Q (cumec)		0.000	47.21	77.10	28.91	11.01	5.639	1.281	0.682	0.332	0.000	0.000
2	Colour_Cod (-)		Clear	Light Brown	Light Brown	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear
3	EC_GEN (µmho/cm)		165	132	111	126	135	209	166	185	449	291	377
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)		7.8	7.8	7.9	7.9	8.0	8.1	8.1	7.9	8.0	8.0	8.3
6	TDS (mg/L)		104	80	70	82	82	131	110	121	289	192	242
7	Temp (deg C)		27.5	26.0	26.0	27.5	24.5	22.5	15.5	12.0	18.5	24.0	29.0
8	Turb (NTU)		24.0	121.0	46.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	CHEMICAL												
1	Alk-Phen (mgCaCO3/L)		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.7
2	ALK-TOT (mgCaCO3/L)		79	75	70	81	79	105	98	111	193	135	130
3	Ca (mg/L)		20	17	20	19	17	22	22	27	34	24	11
4	Cl (mg/L)		3.2	8.7	8.0	4.9	4.0	6.0	4.0	4.0	23.0	6.0	36.0
5	CO3 (mg/L)		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.7
6	F (mg/L)		0.67	0.01	0.30	0.10	0.36	0.06	0.24	0.23	0.30	0.30	0.25
7	HCO3 (mg/L)		96	91	85	99	96	128	119	136	236	165	147
8	K (mg/L)		6.2	4.3	3.9	1.4	2.1	2.4	1.9	1.8	4.5	4.4	7.2
9	Mg (mg/L)		8.8	6.3	4.9	10.5	9.7	11.2	9.2	9.2	17.5	13.4	13.9
10	Na (mg/L)		10.6	7.9	7.4	7.1	7.1	7.3	8.6	8.8	22.7	23.1	44.2
11	NO2+NO3 (mg N/L)		2.08	0.38	0.13	0.35	0.10	0.26	0.03	0.04	0.09	0.08	0.03
12	NO2-N (mgN/L)		0.06	0.03	0.03	0.00	0.00	0.02	0.01	0.02	0.02	0.01	0.01
13	NO3-N (mgN/L)		2.02	0.35	0.10	0.35	0.09	0.24	0.02	0.02	0.07	0.07	0.02
14	o-PO4-P (mg P/L)		0.548	0.362	0.377	0.099	0.071	0.122	0.001	0.129	0.169	0.083	0.046
15	SiO2 (mg/L)		24.3	4.1	4.4	16.2	9.9	14.5	12.5	12.9	16.3	22.5	18.5
16	SO4 (mg/L)		25.6	18.0	16.5	6.4	6.3	5.6	8.1	3.8	3.8	3.9	4.5
	BIOLOGICAL/BACTERIOLOGICAL												
1	BOD3-27 (mg/L)		0.8	1.4	0.5	0.6	0.4	0.2	0.7	1.3	2.2	0.9	2.7
2	COD (mg/L)		25.0	26.0	27.0	28.0	30.0	26.0	27.0	21.0	33.0	32.0	41.0
3	DO (mg/L)		6.1	6.5	5.9	6.5	6.5	6.9	7.2	6.4	6.1	6.1	3.6
4	DO_SAT% (%)		77	80	73	82	77	79	71	59	64	72	47
	TRACE & TOXIC												
	CHEMICAL INDICES												
1	HAR_Ca (mgCaCO3/L)		50	42	50	47	42	55	56	68	85	59	27
2	HAR_Total (mgCaCO3/L)		87	68	70	91	83	102	94	107	158	115	85
3	Na% (%)		20	19	18	14	15	13	16	15	23	30	51
4	RSC (-)		0.0	0.1	0.0	0.0	0.0	0.1	0.1	0.1	0.7	0.4	0.9
5	SAR (-)		0.5	0.4	0.4	0.3	0.3	0.3	0.4	0.4	0.8	0.9	2.1

Water Quality Summary for the period : 2015-2016

Station Name : Banjar at Bamni Division : Narmada Division, Bhopal

Local River : Banjar Sub-Division : UNSD, Jabalpur

River Water Summary

S.No	Parameters	Number of Observations	Maximum	Minimum	Mean
	PHYSICAL				
1	Q (cumec)	213	301.2	0.000	22.17
2	EC_GEN (µmho/cm)	11	449	111	213
3	pH_GEN (pH units)	11	8.3	7.8	8
4	TDS (mg/L)	11	289	70	137
5	Temp (deg C)	11	29.0	12.0	23
6	Turb (NTU)	11	121.0	0.0	17.4
	CHEMICAL				
1	Alk-Phen (mgCaCO3/L)	11	4.7	0.0	0.4
2	ALK-TOT (mgCaCO3/L)	11	193	70	105
3	Ca (mg/L)	11	34	11	21
4	Cl (mg/L)	11	36.0	3.2	9.8
5	CO3 (mg/L)	11	5.7	0.0	0.5
6	F (mg/L)	11	0.67	0.01	0.26
7	HCO3 (mg/L)	11	236	85	127
8	K (mg/L)	11	7.2	1.4	3.6
9	Mg (mg/L)	11	17.5	4.9	10.4
10	Na (mg/L)	11	44.2	7.1	14.1
11	NO2+NO3 (mg N/L)	11	2.08	0.03	0.32
12	NO2-N (mgN/L)	11	0.06	0.00	0.02
13	NO3-N (mgN/L)	11	2.02	0.02	0.3
14	o-PO4-P (mg P/L)	11	0.548	0.001	0.182
15	SiO2 (mg/L)	11	24.3	4.1	14.2
16	SO4 (mg/L)	11	25.6	3.8	9.3
	BIOLOGICAL/BACTERIOLOGICAL				
1	BOD3-27 (mg/L)	11	2.7	0.2	1.1
2	COD (mg/L)	11	41.0	21.0	28.7
3	DO (mg/L)	11	7.2	3.6	6.2
4	DO_SAT% (%)	11	82	47	71
	TRACE & TOXIC				
	CHEMICAL INDICES				
1	HAR_Ca (mgCaCO3/L)	11	85	27	53
2	HAR_Total (mgCaCO3/L)	11	158	68	96
3	Na% (%)	11	51	13	21
4	RSC (-)	11	0.9	0.0	0.2
5	SAR (-)	11	2.1	0.3	0.6

Water Quality Seasonal Average for the period : 2011-2016

Station Name : Banjar at Bamni

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				
		2011	2012	2013	2014	2015	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016	2012	2013	2014	2015	2016
	PHYSICAL															
1	Q (cumec)	32.53	40.30	84.35	32.27	51.07	9.457	5.414	16.37	17.33	3.859	0.336	1.182	0.000	0.796	0.332
2	EC_GEN (µmho/cm)	143	133	113	121	134	199	209	175	198	174	259	240		197	372
3	pH_GEN (pH units)	8.2	7.8	7.6	7.6	7.9	8.1	7.9	8.0	7.9	8.0	7.9	8.0		8.0	8.1
4	TDS (mg/L)	91	82	71	75	84	127	137	105	131	111	168	154		126	241
5	Temp (deg C)	26.1	26.3	23.1	26.3	26.8	19.6	18.3	17.8	18.0	18.6	18.0	17.5		22.3	23.8
6	Turb (NTU)	116.5	43.3	110.5	52.3	47.8	7.6	0.0	8.5	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	2.5	0.0	0.0	0.0	0.0	0.0	0.0		0.0	1.6
2	ALK-TOT (mgCaCO3/L)	80	65	55	66	76	113	116	94	122	98	137	124		117	153
3	Ca (mg/L)	16	14	14	15	19	24	24	21	26	22	28	24		26	23
4	Cl (mg/L)	5.8	5.6	6.0	6.2	6.2	11.2	8.1	9.8	7.1	4.5	8.9	8.8		10.1	21.7
5	CO3 (mg/L)	0.0	0.0	0.0	0.0	0.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	1.9
6	F (mg/L)	0.17	0.13	0.34	0.36	0.27	0.25	0.25	0.21	0.27	0.22	0.11	0.14		0.20	0.28
7	HCO3 (mg/L)	98	79	67	81	93	132	141	114	149	120	167	151		143	183
8	K (mg/L)	4.0	2.6	3.3	3.4	4.0	1.8	1.8	1.5	1.4	2.0	1.9	1.8		2.5	5.4
9	Mg (mg/L)	6.7	4.9	4.9	7.4	7.6	8.1	9.0	8.5	13.4	9.8	8.8	8.5		10.5	14.9
10	Na (mg/L)	8.0	9.6	6.4	6.6	8.2	8.5	10.7	9.2	12.1	8.0	9.8	11.4		8.7	30.0
11	NO2+NO3 (mg N/L)	1.97	0.95	0.69	1.09	0.74	0.57	0.12	0.21	0.45	0.10	0.28	0.05		0.78	0.07
12	NO2-N (mgN/L)	0.08	0.05	0.04	0.03	0.03	0.04	0.01	0.06	0.01	0.01	0.01	0.00		0.08	0.01
13	NO3-N (mgN/L)	1.89	0.89	0.65	1.05	0.71	0.53	0.11	0.16	0.44	0.09	0.27	0.05		0.70	0.05
14	o-PO4-P (mg P/L)	0.114	0.010	0.178	0.456	0.346	0.130	0.020	0.044	0.112	0.081	0.015	0.025		0.090	0.099
15	SiO2 (mg/L)	17.6	18.0	15.5	18.4	12.3	18.4	19.2	17.7	18.5	12.5	21.9	23.9		15.8	19.1
16	SO4 (mg/L)	7.3	17.4	10.4	10.1	16.6	9.1	6.2	7.4	12.0	5.9	4.1	3.7		26.6	4.1
	BIOLOGICAL/BACTERIOLOGICAL															
1	BOD3-27 (mg/L)	0.9	0.9	0.8	1.2	0.8	0.9	0.6	0.7	0.6	0.6	0.9	0.5		0.8	1.9
2	COD (mg/L)	23.5	26.3	29.3	36.8	26.5	27.5	27.0	27.0	30.0	26.0	16.0	15.0		35.0	35.3
3	DO (mg/L)	5.5	6.0	5.8	5.9	6.3	5.7	6.3	7.4	7.0	6.8	6.4	6.2		5.8	5.3
4	DO_SAT% (%)	67	74	68	72	78	61	67	78	74	72	68	64		65	61
	TRACE & TOXIC															
	CHEMICAL INDICES															
1	HAR_Ca (mgCaCO3/L)	40	35	34	38	47	59	59	51	64	55	70	61		64	57
2	HAR_Total (mgCaCO3/L)	68	56	55	68	79	93	97	87	120	96	107	96		108	119
3	Na% (%)	20	27	19	16	18	16	19	19	18	15	16	20		15	35
4	RSC (-)	0.3	0.2	0.1	0.0	0.0	0.4	0.4	0.2	0.2	0.1	0.6	0.6		0.2	0.7
5	SAR (-)	0.4	0.6	0.4	0.3	0.4	0.4	0.5	0.4	0.5	0.4	0.4	0.5		0.4	1.3

3.17 Burhner at Mohgaon

History Sheet

			Water Year	**:**	**2015-2016**
Site	**:**	**Burhner at Mohgaon**	**Code**	**:**	**010215004**
State	:	Madhya Pradesh	District		Mandla
Basin	:	Narmada	Independent River	:	Narmada
Tributary	:	Burhner	Sub Tributary	:	
Sub-Sub Tributary	:		Local River	:	Burhner
Division	:	Narmada Division, Bhopal	Sub-Division	:	UNSD, Jabalpur
Drainage Area	:	3919 Sq. Km.	Bank	:	Right
Latitude	:	22°45'57"	Longitude	:	80°37'22"
Zero of Gauge (m)	:	447 .000 (M.S.L.)	13/01/1977		
		Opening Date	Closing Date		
Gauge	:	13/01/1977			
Discharge	:	13/01/1977			
Sediment	:	27/08/1992			
Water Quality	:	16/09/1986			

Water Quality Datasheet for the period : 2015-2016

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

Local River : Burhner Sub-Division : UNSD, Jabalpur

River Water Analysis

S.No	Parameters	01/06/2015	01/07/2015	03/08/2015	01/09/2015	05/10/2015	02/11/2015	01/12/2015	01/01/2016	01/02/2016	01/03/2016	01/04/2016	02/05/2016
		A	A	A	A	A	A	A	A	B	A	A	A
	PHYSICAL												
1	Q (cumec)	0.526	22.03	24.87	221.1	33.38	24.57	7.973	4.652	4.829	2.460	1.708	0.331
2	Colour_Cod (-)	Clear	Brown	Light Brown	Light Brown	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear
3	EC_GEN (µmho/cm)	243	111	148	118	164	165	221	189	192	283	262	293
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)	8.3	7.7	8.3	8.0	8.1	8.3	8.3	8.2	8.1	8.0	8.1	8.0
6	TDS (mg/L)	140	70	96	74	107	101	135	124	125	184	170	188
7	Temp (deg C)	29.5	28.0	28.0	27.0	27.0	23.0	22.0	18.0	19.0	23.5	27.0	27.0
8	Turb (NTU)	0.0	513.0	90.0	54.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	CHEMICAL												
1	Alk-Phen (mgCaCO3/L)	5.0	0.0	4.7	0.0	0.0	4.6	4.6	0.0	0.0	0.0	0.0	0.0
2	ALK-TOT (mgCaCO3/L)	138	67	105	75	121	117	132	133	123	135	133	148
3	Ca (mg/L)	26	16	22	20	27	27	28	30	30	29	27	23
4	Cl (mg/L)	12.1	5.1	6.2	7.1	5.4	6.0	7.0	6.0	5.0	6.0	3.0	10.0
5	CO3 (mg/L)	6.0	0.0	5.6	0.0	0.0	5.6	5.6	0.0	0.0	0.0	0.0	0.0
6	F (mg/L)	0.31	0.32	0.04	0.20	0.95	0.11	0.12	0.19	0.17	0.20	0.23	0.23
7	HCO3 (mg/L)	156	82	117	91	148	131	150	162	150	165	162	181
8	K (mg/L)	2.0	4.1	1.8	2.1	1.0	1.1	1.2	1.0	1.1	1.4	1.2	2.8
9	Mg (mg/L)	14.6	6.6	8.3	5.4	12.4	12.9	13.4	13.9	11.2	13.4	13.1	17.0
10	Na (mg/L)	9.2	5.3	6.3	6.4	6.2	5.3	6.4	7.0	6.9	7.5	7.8	10.8
11	NO2+NO3 (mg N/L)	0.30	3.20	0.10	0.55	0.25	0.03	0.17	0.03	0.04	0.04	0.06	0.02
12	NO2-N (mgN/L)	0.01	0.02	0.02	0.02	0.00	0.00	0.00	0.01	0.01	0.01	0.00	0.00
13	NO3-N (mgN/L)	0.29	3.18	0.08	0.53	0.25	0.03	0.16	0.02	0.03	0.03	0.06	0.02
14	o-PO4-P (mg P/L)	0.052	0.491	0.185	0.181	0.105	0.091	0.106	0.003	0.101	0.119	0.052	0.039
15	SiO2 (mg/L)	31.1	28.7	11.1	11.0	22.5	15.6	19.9	18.5	24.0	20.8	20.8	17.3
16	SO4 (mg/L)	3.4	9.8	11.8	12.7	2.9	3.1	1.0	0.3	1.5	2.2	2.8	2.8
	BIOLOGICAL/BACTERIOLOGICAL												
1	BOD3-27 (mg/L)	1.2	0.6	0.7	0.3	0.1	0.4	0.2	0.5	0.6	1.1	1.2	1.0
2	COD (mg/L)	15.0	33.0	30.0	32.0	30.0	28.0	30.0	38.0	14.0	30.0	21.0	28.0
3	DO (mg/L)	4.7	6.0	6.5	6.5	6.0	6.8	6.3	7.5	6.8	6.5	4.9	4.4
4	DO_SAT% (%)	61	77	83	82	75	79	72	79	73	76	61	55
	TRACE & TOXIC												
	CHEMICAL INDICES												
1	HAR_Ca (mgCaCO3/L)	65	40	54	51	68	68	69	75	75	72	66	58
2	HAR_Total (mgCaCO3/L)	126	68	88	73	119	122	125	133	122	127	121	129
3	Na% (%)	14	14	13	15	10	9	10	10	11	11	12	15
4	RSC (-)	0.3	0.0	0.3	0.0	0.1	0.0	0.2	0.0	0.0	0.2	0.3	0.4
5	SAR (-)	0.4	0.3	0.3	0.3	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.4

Water Quality Summary for the period : 2015-2016

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)	292	1805	0.094	48.98
2	EC_GEN (µmho/cm)	12	293	111	199
3	pH_GEN (pH units)	12	8.3	7.7	8.1
4	TDS (mg/L)	12	188	70	126
5	Temp (deg C)	12	29.5	18.0	24.9
6	Turb (NTU)	12	513.0	0.0	54.8
	CHEMICAL				
1	Alk-Phen (mgCaCO3/L)	12	5.0	0.0	1.6
2	ALK-TOT (mgCaCO3/L)	12	148	67	119
3	Ca (mg/L)	12	30	16	25
4	Cl (mg/L)	12	12.1	3.0	6.6
5	CO3 (mg/L)	12	6.0	0.0	1.9
6	F (mg/L)	12	0.95	0.04	0.25
7	HCO3 (mg/L)	12	181	82	141
8	K (mg/L)	12	4.1	1.0	1.7
9	Mg (mg/L)	12	17.0	5.4	11.8
10	Na (mg/L)	12	10.8	5.3	7.1
11	NO2+NO3 (mg N/L)	12	3.20	0.02	0.4
12	NO2-N (mgN/L)	12	0.02	0.00	0.01
13	NO3-N (mgN/L)	12	3.18	0.02	0.39
14	o-PO4-P (mg P/L)	12	0.491	0.003	0.127
15	SiO2 (mg/L)	12	31.1	11.0	20.1
16	SO4 (mg/L)	12	12.7	0.3	4.5
	BIOLOGICAL/BACTERIOLOGICAL				
1	BOD3-27 (mg/L)	12	1.2	0.1	0.7
2	COD (mg/L)	12	38.0	14.0	27.4
3	DO (mg/L)	12	7.5	4.4	6.1
4	DO_SAT% (%)	12	83	55	73
	TRACE & TOXIC				
	CHEMICAL INDICES				
1	HAR_Ca (mgCaCO3/L)	12	75	40	64
2	HAR_Total (mgCaCO3/L)	12	133	68	113
3	Na% (%)	12	15	9	12
4	RSC (-)	12	0.4	0.0	0.1
5	SAR (-)	12	0.4	0.2	0.3

Water Quality Seasonal Average for the period : 2011-2016

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				
		2011	2012	2013	2014	2015	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016	2012	2013	2014	2015	2016
	PHYSICAL															
1	Q (cumec)	119.8	95.56	180.5	64.34	60.38	15.79	8.650	23.97	14.56	9.371	2.836	2.113	10.26	5.471	1.206
2	EC_GEN (µmho/cm)	204	224	175	150	157	202	221	205	174	192	283	255	194	189	279
3	pH_GEN (pH units)	8.3	8.1	7.9	7.8	8.1	8.3	8.1	8.3	8.1	8.2	8.2	8.1	8.1	8.2	8.0
4	TDS (mg/L)	130	139	111	95	97	129	145	124	115	121	171	159	127	121	181
5	Temp (deg C)	28.3	28.2	21.1	27.8	27.9	20.3	19.9	20.4	20.3	20.5	24.3	25.8	25.3	25.8	25.8
6	Turb (NTU)	108.8	30.0	189.8	134.4	131.4	2.6	0.0	6.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	CHEMICAL															
1	Alk-Phen (mgCaCO3/L)	4.8	2.5	0.0	0.0	1.9	5.0	0.0	3.6	1.3	2.3	4.2	1.7	1.5	0.0	0.0
2	ALK-TOT (mgCaCO3/L)	126	103	90	98	101	131	140	123	121	126	155	139	144	126	139
3	Ca (mg/L)	21	22	20	22	22	27	29	29	27	29	30	26	28	28	26
4	Cl (mg/L)	14.0	7.6	8.7	6.0	7.2	9.6	6.4	7.6	5.5	6.0	8.9	7.9	10.0	7.6	6.3
5	CO3 (mg/L)	5.8	3.0	0.0	0.0	2.3	6.1	0.0	4.4	1.5	2.8	5.1	2.0	1.8	0.0	0.0
6	F (mg/L)	0.14	0.08	0.28	0.21	0.36	0.28	0.21	0.10	0.21	0.15	0.25	0.18	0.14	0.14	0.22
7	HCO3 (mg/L)	141	119	110	120	119	148	171	141	144	148	178	166	172	154	169
8	K (mg/L)	1.8	2.1	2.8	2.5	2.2	1.3	1.0	0.8	0.9	1.1	1.6	1.5	1.3	1.6	1.8
9	Mg (mg/L)	11.5	10.4	7.5	10.2	9.4	11.0	10.9	9.2	13.0	12.8	10.9	11.8	12.0	12.1	14.5
10	Na (mg/L)	7.0	10.2	8.0	6.9	6.6	6.8	8.7	7.2	5.8	6.4	8.9	10.0	8.8	6.7	8.7
11	NO2+NO3 (mg N/L)	1.63	0.60	1.06	1.03	0.88	0.19	0.05	0.12	0.19	0.06	0.21	0.03	0.17	0.30	0.04
12	NO2-N (mgN/L)	0.02	0.03	0.05	0.03	0.01	0.03	0.01	0.05	0.02	0.01	0.03	0.01	0.03	0.05	0.01
13	NO3-N (mgN/L)	1.61	0.57	1.01	1.01	0.87	0.17	0.05	0.07	0.17	0.06	0.18	0.02	0.15	0.25	0.03
14	o-PO4-P (mg P/L)	0.118	0.005	0.203	0.332	0.203	0.099	0.033	0.045	0.089	0.075	0.035	0.179	0.046	0.108	0.070
15	SiO2 (mg/L)	32.2	24.0	21.6	21.1	20.9	21.5	21.6	26.2	19.6	19.5	29.2	23.3	20.4	19.6	19.6
16	SO4 (mg/L)	4.2	11.4	12.0	8.1	8.1	6.4	2.1	1.5	9.4	1.5	2.7	9.8	1.1	20.3	2.6
	BIOLOGICAL/BACTERIOLOGICAL															
1	BOD3-27 (mg/L)	0.6	1.0	0.9	0.6	0.6	0.8	0.6	0.6	0.5	0.4	2.2	1.1	0.8	0.7	1.1
2	COD (mg/L)	25.6	22.4	30.0	30.6	28.0	27.8	33.8	21.8	30.0	27.5	27.7	26.3	25.3	35.7	26.3
3	DO (mg/L)	5.1	5.7	6.0	5.5	5.9	6.4	6.5	7.2	6.7	6.9	6.0	5.3	6.1	6.0	5.3
4	DO_SAT% (%)	65	73	66	69	76	71	72	79	74	76	71	65	74	74	64
	TRACE & TOXIC															
	CHEMICAL INDICES															
1	HAR_Ca (mgCaCO3/L)	52	56	49	54	56	68	71	74	67	72	74	65	71	70	65
2	HAR_Total (mgCaCO3/L)	100	99	81	96	95	114	117	112	121	125	120	114	121	120	126
3	Na% (%)	14	18	17	13	13	11	14	12	10	10	13	16	14	11	13
4	RSC (-)	0.5	0.3	0.2	0.1	0.1	0.4	0.5	0.2	0.1	0.1	0.7	0.5	0.5	0.1	0.3
5	SAR (-)	0.3	0.5	0.4	0.3	0.3	0.3	0.4	0.3	0.2	0.2	0.3	0.4	0.3	0.3	0.3

3.18 Narmada at Manot

History Sheet

			Water Year	**:**	**2015-2016**
Site	**:**	**Narmada at Manot**	**Code**	**:**	**010215002**
State	:	Madhya Pradesh	District		Mandla
Basin	:	Narmada	Independent River	:	Narmada
Sub-Sub Tributary	:		Local River	:	Narmada
Division	:	Narmada Division, Bhopal	Sub-Division	:	UNSD, Jabalpur
Drainage Area	:	4667 Sq. Km.	Bank	:	Right
Latitude	:	22°44'08"	Longitude	:	80°30'44"
Zero of Gauge (m)	:	442 .000 (M.S.L.)	16/12/1976		
		Opening Date	Closing Date		
Gauge	:	16/12/1976			
Discharge	:	16/12/1976			
Sediment	:	09/11/1979			
Water Quality	:	01/01/1980			

Water Quality Datasheet for the period : 2015-2016

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

Local River : Narmada Sub-Division : UNSD, Jabalpur

River Water Analysis

S.No	Parameters	01/06/2015	01/07/2015	03/08/2015	01/09/2015	05/10/2015	02/11/2015	01/12/2015	01/01/2016	01/02/2016	01/03/2016	01/04/2016	02/05/2016
		A	A	A	A	A	A	A	A	B	A	A	A
	PHYSICAL												
1	Q (cumec)	1.793	50.31	45.25	156.5	45.93	20.34	11.15	7.764	7.465	4.018	3.511	0.800
2	Colour_Cod (-)	Clear	Dark Brown	Light Brown	Brown	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear
3	EC_GEN (µmho/cm)	207	108	162	108	169	177	231	207	215	311	281	319
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)	8.3	7.7	7.9	8.1	8.1	8.3	8.3	8.3	8.3	7.9	8.1	8.0
6	TDS (mg/L)	119	68	107	68	110	108	147	137	140	202	185	205
7	Temp (deg C)	29.0	28.0	28.0	27.5	26.0	21.0	19.0	19.0	19.0	18.0	21.0	22.0
8	Turb (NTU)	0.0	1138.0	99.0	132.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	CHEMICAL												
1	Alk-Phen (mgCaCO3/L)	5.0	0.0	0.0	0.0	0.0	4.6	2.3	4.6	6.9	0.0	0.0	0.0
2	ALK-TOT (mgCaCO3/L)	126	65	110	70	128	128	149	154	139	156	147	165
3	Ca (mg/L)	22	20	27	20	27	25	27	30	29	29	28	24
4	Cl (mg/L)	6.9	4.6	7.4	6.3	6.1	8.0	9.0	8.0	6.0	7.0	5.0	10.0
5	CO3 (mg/L)	6.0	0.0	0.0	0.0	0.0	5.6	2.8	5.6	8.4	0.0	0.0	0.0
6	F (mg/L)	0.21	0.37	0.09	0.13	0.06	0.05	0.10	0.23	0.21	0.26	0.28	0.24
7	HCO3 (mg/L)	141	79	134	85	156	145	176	176	153	190	179	201
8	K (mg/L)	1.2	4.3	3.0	3.1	0.8	0.7	0.9	0.6	0.5	0.7	0.8	1.5
9	Mg (mg/L)	14.8	4.6	9.2	4.6	13.4	18.2	14.8	14.3	16.5	15.1	15.6	19.0
10	Na (mg/L)	6.6	4.8	6.8	6.6	6.4	7.0	7.1	9.6	8.9	9.2	9.2	11.1
11	NO2+NO3 (mg N/L)	0.32	2.59	0.40	0.63	0.15	0.05	0.17	0.02	0.06	0.06	0.08	0.02
12	NO2-N (mgN/L)	0.02	0.06	0.02	0.02	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01
13	NO3-N (mgN/L)	0.30	2.54	0.37	0.62	0.15	0.04	0.17	0.01	0.05	0.05	0.07	0.01
14	o-PO4-P (mg P/L)	0.087	0.551	0.440	0.432	0.111	0.103	0.133	0.048	0.122	0.147	0.064	0.034
15	SiO2 (mg/L)	22.6	21.6	15.4	16.0	22.9	16.1	20.2	21.4	27.5	22.1	22.4	17.9
16	SO4 (mg/L)	1.4	7.4	15.6	16.2	3.7	3.8	1.8	0.3	1.6	2.3	3.5	3.3
	BIOLOGICAL/BACTERIOLOGICAL												
1	BOD3-27 (mg/L)	0.7	0.3	0.5	0.4	0.5	0.4	0.5	0.9	0.8	1.3	0.7	0.9
2	COD (mg/L)	19.0	41.0	34.0	38.0	33.0	22.0	34.0	38.0	21.0	28.0	28.0	51.0
3	DO (mg/L)	5.7	5.7	6.1	6.6	6.5	6.6	7.3	7.9	7.5	6.4	5.9	5.3
4	DO_SAT% (%)	74	73	78	83	80	74	79	85	81	68	66	61
	TRACE & TOXIC												
	CHEMICAL INDICES												
1	HAR_Ca (mgCaCO3/L)	55	51	68	50	69	63	67	75	74	73	69	61
2	HAR_Total (mgCaCO3/L)	116	70	106	69	124	139	129	135	142	136	134	140
3	Na% (%)	11	12	12	17	10	10	11	13	12	13	13	15
4	RSC (-)	0.2	0.0	0.1	0.0	0.1	0.0	0.4	0.4	0.0	0.4	0.3	0.5
5	SAR (-)	0.3	0.2	0.3	0.3	0.3	0.3	0.3	0.4	0.3	0.3	0.3	0.4

Water Quality Summary for the period : 2015-2016

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)	266	1178	0.010	50.24
2	EC_GEN (µmho/cm)	12	319	108	208
3	pH_GEN (pH units)	12	8.3	7.7	8.1
4	TDS (mg/L)	12	205	68	133
5	Temp (deg C)	12	29.0	18.0	23.1
6	Turb (NTU)	12	1138.0	0.0	114.1
	CHEMICAL				
1	Alk-Phen (mgCaCO3/L)	12	6.9	0.0	2
2	ALK-TOT (mgCaCO3/L)	12	165	65	128
3	Ca (mg/L)	12	30	20	26
4	Cl (mg/L)	12	10.0	4.6	7
5	CO3 (mg/L)	12	8.4	0.0	2.4
6	F (mg/L)	12	0.37	0.05	0.18
7	HCO3 (mg/L)	12	201	79	151
8	K (mg/L)	12	4.3	0.5	1.5
9	Mg (mg/L)	12	19.0	4.6	13.3
10	Na (mg/L)	12	11.1	4.8	7.8
11	NO2+NO3 (mg N/L)	12	2.59	0.02	0.38
12	NO2-N (mgN/L)	12	0.06	0.00	0.01
13	NO3-N (mgN/L)	12	2.54	0.01	0.36
14	o-PO4-P (mg P/L)	12	0.551	0.034	0.189
15	SiO2 (mg/L)	12	27.5	15.4	20.5
16	SO4 (mg/L)	12	16.2	0.3	5.1
	BIOLOGICAL/BACTERIOLOGICAL				
1	BOD3-27 (mg/L)	12	1.3	0.3	0.7
2	COD (mg/L)	12	51.0	19.0	32.3
3	DO (mg/L)	12	7.9	5.3	6.5
4	DO_SAT% (%)	12	85	61	75
	TRACE & TOXIC				
	CHEMICAL INDICES				
1	HAR_Ca (mgCaCO3/L)	12	75	50	64
2	HAR_Total (mgCaCO3/L)	12	142	69	120
3	Na% (%)	12	17	10	12
4	RSC (-)	12	0.5	0.0	0.2
5	SAR (-)	12	0.4	0.2	0.3

Water Quality Seasonal Average for the period : 2011-2016

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				
		2011	2012	2013	2014	2015	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016	2012	2013	2014	2015	2016
	PHYSICAL															
1	Q (cumec)	158.5	100.7	140.8	78.22	59.96	18.90	13.75	32.05	23.78	10.76	3.824	4.487	9.246	8.394	3.764
2	EC_GEN (µmho/cm)	199	254	202	176	151	241	240	219	213	208	301	255	198	193	304
3	pH_GEN (pH units)	8.1	8.2	8.0	7.8	8.0	8.3	8.0	8.2	7.7	8.3	8.2	8.2	8.2	8.2	8.0
4	TDS (mg/L)	128	156	128	113	94	153	159	136	141	133	187	159	127	124	197
5	Temp (deg C)	28.0	27.4	26.2	27.7	27.7	19.6	18.4	20.0	20.0	19.5	23.7	24.7	25.2	23.5	20.3
6	Turb (NTU)	122.0	24.0	139.4	97.2	273.8	0.1	0.0	7.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	CHEMICAL															
1	Alk-Phen (mgCaCO3/L)	2.0	3.5	1.5	0.0	1.0	4.4	0.0	2.2	0.0	4.6	3.4	2.6	1.5	3.3	0.0
2	ALK-TOT (mgCaCO3/L)	117	131	102	114	100	149	156	133	121	142	165	139	140	133	156
3	Ca (mg/L)	22	23	23	25	23	30	29	30	31	28	29	26	28	29	27
4	Cl (mg/L)	7.3	7.8	8.3	6.8	6.3	9.3	7.0	8.0	7.6	7.8	8.6	9.9	10.6	6.8	7.3
5	CO3 (mg/L)	2.4	4.2	1.9	0.0	1.2	5.3	0.0	2.6	0.0	5.6	4.1	3.1	1.8	4.0	0.0
6	F (mg/L)	0.16	0.22	0.23	0.21	0.17	0.30	0.21	0.18	0.18	0.15	0.24	0.13	0.13	0.11	0.26
7	HCO3 (mg/L)	138	151	121	139	119	171	191	157	148	163	193	163	167	154	190
8	K (mg/L)	1.5	1.4	2.8	2.7	2.5	1.1	0.7	0.7	0.6	0.7	1.4	1.0	0.7	1.0	1.0
9	Mg (mg/L)	10.7	12.3	8.6	10.7	9.3	11.7	13.3	14.6	12.0	16.0	13.4	11.1	12.3	12.1	16.5
10	Na (mg/L)	5.5	9.9	8.4	7.6	6.2	6.9	8.6	7.4	6.5	8.2	9.9	10.3	8.9	7.2	9.8
11	NO2+NO3 (mg N/L)	1.54	0.63	1.25	1.17	0.82	0.07	0.03	0.15	0.42	0.07	0.18	0.02	0.17	0.33	0.05
12	NO2-N (mgN/L)	0.02	0.01	0.06	0.02	0.02	0.01	0.00	0.06	0.02	0.01	0.03	0.01	0.02	0.05	0.01
13	NO3-N (mgN/L)	1.53	0.62	1.19	1.14	0.80	0.06	0.03	0.09	0.39	0.07	0.15	0.01	0.15	0.27	0.04
14	o-PO4-P (mg P/L)	0.105	0.009	0.191	0.404	0.324	0.081	0.037	0.044	0.147	0.102	0.044	0.119	0.051	0.141	0.082
15	SiO2 (mg/L)	26.7	28.3	22.8	23.1	19.7	23.2	27.4	28.2	31.8	21.3	27.6	23.5	21.9	23.8	20.8
16	SO4 (mg/L)	6.6	6.4	12.9	10.1	8.8	4.4	2.4	1.7	30.0	1.8	3.4	17.6	1.5	25.9	3.0
	BIOLOGICAL/BACTERIOLOGICAL															
1	BOD3-27 (mg/L)	1.3	0.9	0.8	1.3	0.5	1.3	0.5	0.7	0.8	0.6	0.7	1.3	1.4	1.1	1.0
2	COD (mg/L)	28.8	22.2	33.0	30.6	33.0	33.5	21.8	28.3	36.5	28.8	24.3	25.3	19.0	28.7	35.7
3	DO (mg/L)	5.5	6.0	6.1	5.7	6.1	6.5	6.6	7.2	7.2	7.3	6.1	5.8	6.6	6.6	5.9
4	DO_SAT% (%)	70	76	75	72	78	70	71	79	78	80	71	69	79	77	65
	TRACE & TOXIC															
	CHEMICAL INDICES															
1	HAR_Ca (mgCaCO3/L)	56	58	58	62	58	76	72	74	79	70	73	66	70	72	68
2	HAR_Total (mgCaCO3/L)	100	109	94	107	97	124	128	135	129	136	128	112	122	122	136
3	Na% (%)	11	16	16	12	12	11	13	11	10	12	14	17	14	11	14
4	RSC (-)	0.4	0.4	0.2	0.2	0.1	0.5	0.6	0.1	0.1	0.2	0.7	0.6	0.4	0.2	0.4
5	SAR (-)	0.2	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.3	0.4

3.19 Narmada at Dindori

History Sheet

			Water Year	**:**	**2015-2016**
Site	**:**	**Narmada at Dindori**	**Code**	**:**	**010215001**
State	:	Madhya Pradesh	District		Dindori
Basin	:	Narmada	Independent River	:	Narmada
Tributary	:		Sub Tributary	:	
Sub-Sub Tributary	:		Local River	:	Narmada
Division	:	Narmada Division, Bhopal	Sub-Division	:	UNSD, Jabalpur
Drainage Area	:	2292 Sq. Km.	Bank	:	Left
Latitude	:	22°56'53"	Longitude	:	81°04'34"
Zero of Gauge (m)	:	660 .000 (M.S.L.)	26/06/1988		
		Opening Date	Closing Date		
Gauge	:	26/06/1988			
Discharge	:	01/08/1988			
Sediment	:				
Water Quality	:	15/03/1990			

Water Quality Datasheet for the period : 2015-2016

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

Local River : Narmada Sub-Division : UNSD, Jabalpur

River Water Analysis

S.No	Parameters	01/06/2015	01/07/2015	03/08/2015	01/09/2015	05/10/2015	02/11/2015	01/12/2015	01/01/2016	01/02/2016	01/03/2016	01/04/2016	02/05/2016
		A	A	A	A	A	A	A	A	B	A	A	A
	PHYSICAL												
1	Q (cumec)	0.752	9.052	37.94	40.13	12.49	9.177	4.200	3.734	5.453	2.711	2.136	0.745
2	Colour_Cod (-)	Clear	Light Brown	Light Brown	Light Brown	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear
3	EC_GEN (µmho/cm)	255	223	151	171	191	231	269	239	224	308	272	388
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)	8.2	7.7	7.7	7.8	7.9	8.2	8.1	8.1	8.1	7.8	7.9	7.9
6	TDS (mg/L)	147	140	97	111	125	135	170	158	146	201	178	252
7	Temp (deg C)	27.0	26.5	26.5	26.0	26.0	21.0	19.0	15.0	17.0	20.0	22.0	25.0
8	Turb (NTU)	0.0	193.0	44.0	48.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	CHEMICAL												
1	Alk-Phen (mgCaCO3/L)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	ALK-TOT (mgCaCO3/L)	151	130	89	105	135	149	161	163	142	147	144	180
3	Ca (mg/L)	27	32	20	23	28	37	30	37	32	30	29	33
4	Cl (mg/L)	7.1	5.1	9.4	8.6	4.9	13.0	9.0	7.0	3.0	6.0	4.0	17.0
5	CO3 (mg/L)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	F (mg/L)	0.21	0.39	0.01	0.12	0.13	0.12	0.09	0.19	0.19	0.29	0.31	0.23
7	HCO3 (mg/L)	184	159	108	128	165	182	196	199	173	179	176	219
8	K (mg/L)	1.6	3.3	3.4	2.9	1.0	1.3	1.5	1.1	0.7	0.7	0.8	3.6
9	Mg (mg/L)	16.0	12.4	8.8	10.0	15.6	17.3	17.3	14.8	13.9	14.6	12.6	15.8
10	Na (mg/L)	9.8	8.5	9.0	9.2	8.3	7.8	8.3	10.1	8.9	9.1	9.5	17.8
11	NO2+NO3 (mg N/L)	0.79	5.32	0.46	0.85	0.44	0.27	0.82	0.09	0.15	0.16	0.15	0.07
12	NO2-N (mgN/L)	0.05	0.38	0.04	0.03	0.04	0.05	0.45	0.04	0.04	0.03	0.01	0.01
13	NO3-N (mgN/L)	0.75	4.94	0.42	0.81	0.40	0.22	0.37	0.05	0.11	0.13	0.13	0.06
14	o-PO4-P (mg P/L)	0.092	0.290	0.450	0.442	0.143	0.113	0.110	0.040	0.085	0.102	0.075	0.220
15	SiO2 (mg/L)	29.4	20.6	8.8	9.8	20.8	17.7	9.7	21.1	18.0	21.2	25.5	14.3
16	SO4 (mg/L)	2.7	13.0	21.3	20.1	3.3	4.7	3.6	0.7	1.9	2.5	3.3	3.5
	BIOLOGICAL/BACTERIOLOGICAL												
1	BOD3-27 (mg/L)	0.9	1.3	1.5	0.8	0.6	0.6	1.1	2.1	1.6	1.2	1.1	3.5
2	COD (mg/L)	21.0	35.0	31.0	32.0	32.0	33.0	32.0	34.0	33.0	27.0	32.0	42.0
3	DO (mg/L)	2.9	5.0	5.7	5.0	6.2	5.6	5.0	4.8	5.9	5.6	7.0	5.4
4	DO_SAT% (%)	36	62	70	62	76	63	54	48	61	62	80	65
	TRACE & TOXIC												
	CHEMICAL INDICES												
1	HAR_Ca (mgCaCO3/L)	69	81	50	57	70	92	75	92	79	76	71	82
2	HAR_Total (mgCaCO3/L)	135	133	86	99	135	164	147	154	137	137	124	148
3	Na% (%)	13	12	18	16	12	9	11	12	12	13	14	20
4	RSC (-)	0.3	0.0	0.1	0.1	0.0	0.0	0.3	0.2	0.1	0.2	0.4	0.7
5	SAR (-)	0.4	0.3	0.4	0.4	0.3	0.3	0.3	0.4	0.3	0.3	0.4	0.6

Water Quality Summary for the period : 2015-2016

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)	297	908.9	0.611	21.79
2	EC_GEN (µmho/cm)	12	388	151	244
3	pH_GEN (pH units)	12	8.2	7.7	8
4	TDS (mg/L)	12	252	97	155
5	Temp (deg C)	12	27.0	15.0	22.6
6	Turb (NTU)	12	193.0	0.0	23.8
	CHEMICAL				
1	Alk-Phen (mgCaCO3/L)	12	0.0	0.0	0
2	ALK-TOT (mgCaCO3/L)	12	180	89	141
3	Ca (mg/L)	12	37	20	30
4	Cl (mg/L)	12	17.0	3.0	7.8
5	CO3 (mg/L)	12	0.0	0.0	0
6	F (mg/L)	12	0.39	0.01	0.19
7	HCO3 (mg/L)	12	219	108	172
8	K (mg/L)	12	3.6	0.7	1.8
9	Mg (mg/L)	12	17.3	8.8	14.1
10	Na (mg/L)	12	17.8	7.8	9.7
11	NO2+NO3 (mg N/L)	12	5.32	0.07	0.8
12	NO2-N (mgN/L)	12	0.45	0.01	0.1
13	NO3-N (mgN/L)	12	4.94	0.05	0.7
14	o-PO4-P (mg P/L)	12	0.450	0.040	0.18
15	SiO2 (mg/L)	12	29.4	8.8	18.1
16	SO4 (mg/L)	12	21.3	0.7	6.7
	BIOLOGICAL/BACTERIOLOGICAL				
1	BOD3-27 (mg/L)	12	3.5	0.6	1.4
2	COD (mg/L)	12	42.0	21.0	32
3	DO (mg/L)	12	7.0	2.9	5.3
4	DO_SAT% (%)	12	80	36	62
	TRACE & TOXIC				
	CHEMICAL INDICES				
1	HAR_Ca (mgCaCO3/L)	12	92	50	75
2	HAR_Total (mgCaCO3/L)	12	164	86	133
3	Na% (%)	12	20	9	14
4	RSC (-)	12	0.7	0.0	0.2
5	SAR (-)	12	0.6	0.3	0.4

Water Quality Seasonal Average for the period : 2011-2016

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

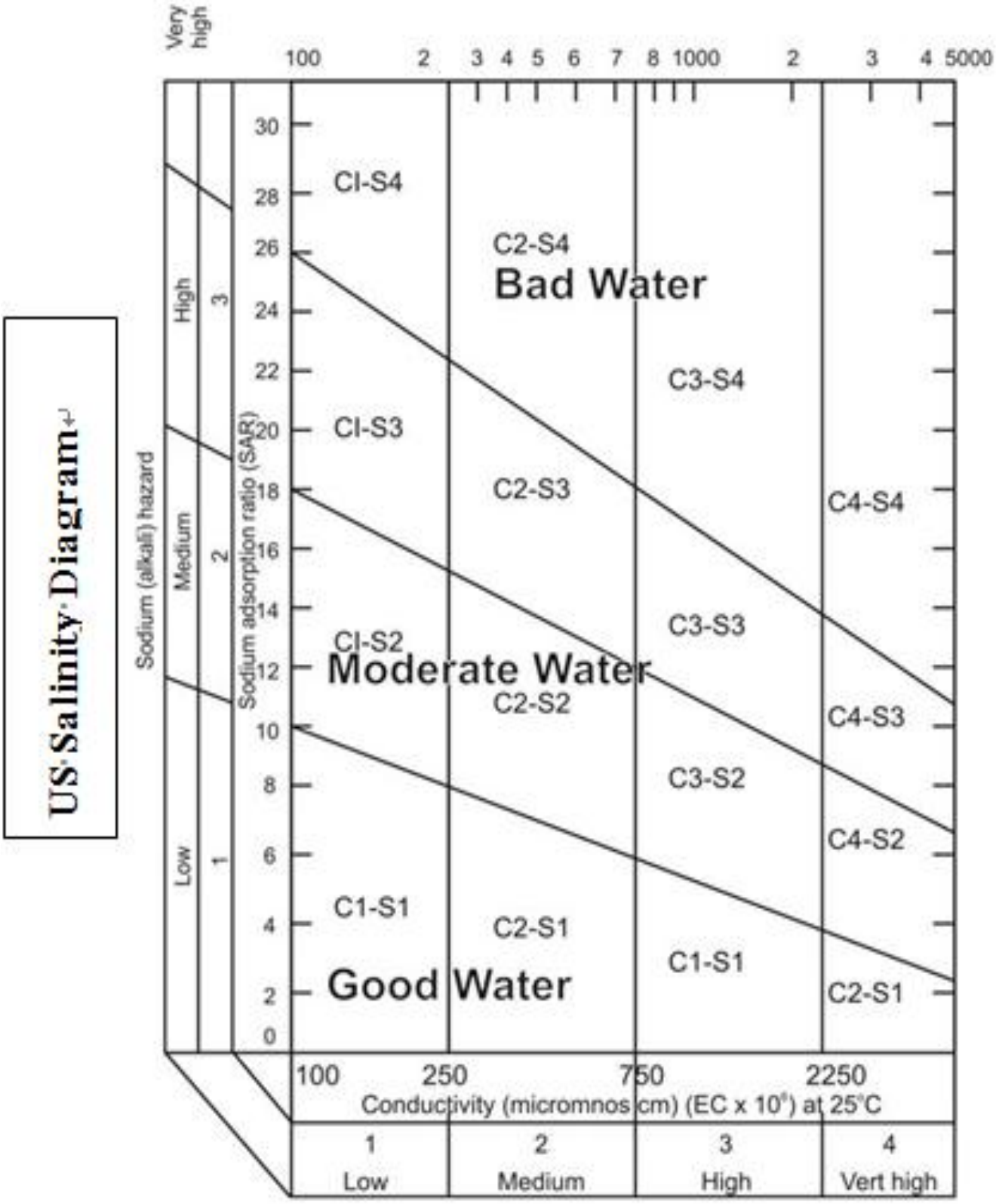
Local River : Narmada Sub-Division : UNSD, Jabalpur

River Water

S.No	Parameters	Flood					Winter					Summer				
		Jun - Oct					Nov - Feb					Mar - May				
		2011	2012	2013	2014	2015	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016	2012	2013	2014	2015	2016
	PHYSICAL															
1	Q (cumec)	51.52	36.42	145.7		20.07	17.17	4.811	16.50		5.603	2.242	1.533	5.466		1.864
2	EC_GEN (µmho/cm)	234	289	215	192	198	257	260	245	326	241	305	269	221	217	323
3	pH_GEN (pH units)	8.2	8.0	7.6	7.8	7.9	8.1	7.8	8.1	8.1	8.1	8.1	8.0	7.9	8.1	7.9
4	TDS (mg/L)	149	166	136	124	124	164	171	154	216	152	189	168	142	139	210
5	Temp (deg C)	26.2	26.2	25.7	28.9	26.4	16.5	20.4	18.4	17.3	18.0	23.0	22.9	23.0	22.0	22.3
6	Turb (NTU)	115.2	21.0	194.4	131.8	57.0	7.6	0.0	7.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	CHEMICAL															
1	Alk-Phen (mgCaCO3/L)	2.5	1.0	0.0	0.0	0.0	1.3	0.0	1.3	0.0	0.0	0.0	0.0	0.0	1.7	0.0
2	ALK-TOT (mgCaCO3/L)	135	133	105	125	122	158	157	141	177	154	168	146	153	144	157
3	Ca (mg/L)	26	26	24	26	26	35	33	34	44	34	28	27	29	31	31
4	Cl (mg/L)	9.1	9.2	9.3	8.3	7.0	10.7	7.0	8.1	16.1	8.0	9.4	9.5	11.8	7.7	9.0
5	CO3 (mg/L)	3.0	1.2	0.0	0.0	0.0	1.5	0.0	1.5	0.0	0.0	0.0	0.0	0.0	2.0	0.0
6	F (mg/L)	0.19	0.23	0.20	0.21	0.17	0.32	0.23	0.17	0.30	0.15	0.26	0.21	0.24	0.14	0.27
7	HCO3 (mg/L)	158	159	128	152	149	190	192	169	216	188	205	178	187	172	191
8	K (mg/L)	1.7	1.9	3.0	1.9	2.4	1.1	0.8	0.8	0.8	1.1	1.5	1.1	1.0	1.1	1.7
9	Mg (mg/L)	13.1	14.9	9.1	12.6	12.5	10.8	12.5	13.9	18.1	15.8	14.7	13.9	14.9	14.3	14.3
10	Na (mg/L)	7.4	10.8	9.4	8.1	9.0	7.8	10.9	9.7	19.6	8.8	10.6	10.9	9.8	7.8	12.1
11	NO2+NO3 (mg N/L)	1.71	1.02	1.26	1.37	1.57	0.25	0.11	0.33	3.78	0.33	0.30	0.18	0.32	0.34	0.12
12	NO2-N (mgN/L)	0.05	0.19	0.11	0.04	0.11	0.11	0.04	0.18	0.03	0.14	0.02	0.05	0.02	0.06	0.02
13	NO3-N (mgN/L)	1.66	0.84	1.15	1.33	1.46	0.14	0.07	0.15	3.74	0.19	0.28	0.12	0.30	0.28	0.11
14	o-PO4-P (mg P/L)	0.082	0.012	0.188	0.231	0.283	0.094	0.044	0.075	0.139	0.087	0.033	0.136	0.054	0.163	0.132
15	SiO2 (mg/L)	25.6	26.4	28.7	23.4	17.9	22.1	26.0	30.0	19.1	16.6	29.2	25.8	25.0	24.6	20.3
16	SO4 (mg/L)	4.2	10.5	21.3	10.2	12.1	5.5	1.8	3.1	29.9	2.7	5.2	4.5	1.8	20.0	3.1
	BIOLOGICAL/BACTERIOLOGICAL															
1	BOD3-27 (mg/L)	1.0	1.3	1.2	1.4	1.0	0.9	0.8	1.8	0.6	1.3	1.3	1.2	1.7	1.2	1.9
2	COD (mg/L)	33.6	23.4	32.4	34.6	30.2	34.5	27.8	26.8	36.0	33.0	22.0	21.3	27.7	34.3	33.7
3	DO (mg/L)	4.7	5.0	5.2	4.7	5.0	6.3	6.4	6.4	7.1	5.3	4.5	4.5	5.2	5.5	6.0
4	DO_SAT% (%)	58	61	63	61	61	64	71	67	74	56	53	51	60	62	69
	TRACE & TOXIC															
	CHEMICAL INDICES															
1	HAR_Ca (mgCaCO3/L)	64	65	61	66	65	88	83	85	111	85	71	67	73	78	76
2	HAR_Total (mgCaCO3/L)	119	127	99	118	118	133	135	143	186	151	132	125	135	138	136
3	Na% (%)	12	15	16	12	14	11	15	13	15	11	15	16	14	11	16
4	RSC (-)	0.3	0.2	0.2	0.2	0.1	0.5	0.5	0.1	0.1	0.2	0.7	0.4	0.4	0.1	0.4
5	SAR (-)	0.3	0.4	0.4	0.3	0.4	0.3	0.4	0.4	0.5	0.3	0.4	0.4	0.4	0.3	0.4

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

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

Sr.	Characteristics	Class A*	Class B*	Class C*	Class D*	Class E*
1.	pH value	6.5-8.5	6.5-8.5	6.5-8.5	6.5-8.5	6.5-8.5
2.	Conductivity at 25^0 C u mhos/cm (max)				1000	2250
3.	Color, Hazen units, Max	10	300	300		
4.	Dissolved Oxygen, mg/l, Min	6	5	4	4	
5.	Biochemical oxygen demand (5 days at 20^o C), mg/l, Max	2	3	3		
6.	Total dissolved solids, mg/l, Max	500		1500		2100
7.	Total Hardness as ($CaCO_3$) mg/l, max	300				--
8.	Calcium Hardness as ($CaCO_3$) mg/l, max	200				
9.	Magnesium as ($CaCO_3$) mg/l, max	100				
10.	Iron (as Fe), mg/l, Max	0.3		5		
11.	Copper (as Cu), mg/l, Max	1.5		1.5		
12.	Chlorides (as Cl), mg/l, Max	250		600		600
13.	Fluorides (as F), mg/l, Max	1.5	1.5	1.5		
14.	Sulphates (as SO_4), mg/l, Max	400		400		1000
15.	Nitrate (as NO_3), mg/l, max	20		50		
16.	Free Ammonia				1.2	
17.	Chromium (as Cr), mg/l, Max	0.05	0.05	0.05		
18.	Boron, mg/l, Max					2
19.	Percent Sodium, Max					60
20.	Sodium Adsorption Ratio, Max					26

* For use classes A to E refer table below

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

Plate 1: Line Diagram of Narmada Basin

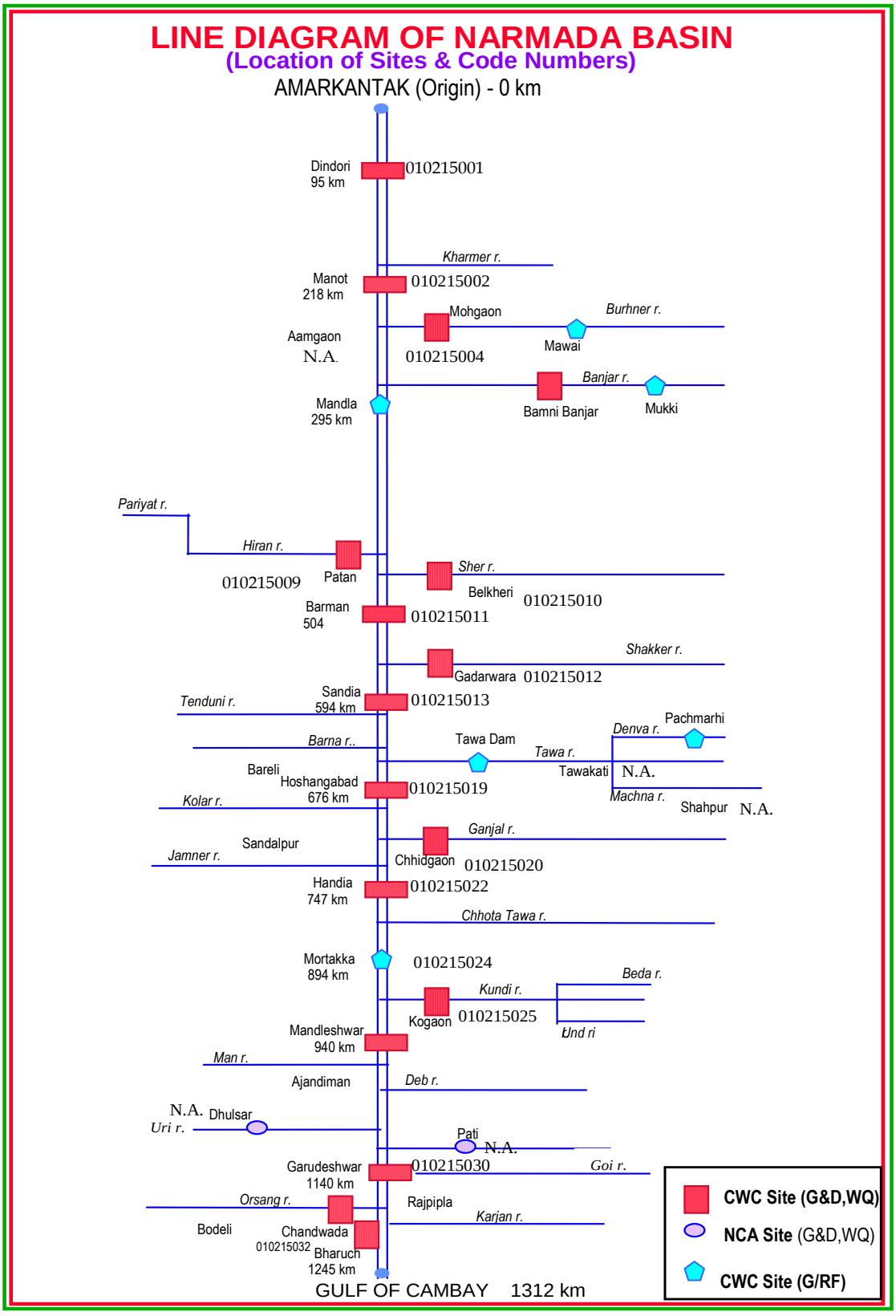


Plate 2: Index Map of Narmada Basin