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STATUS OF WATER QUALITY IN INDIA- 2009

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FOREWORD

Water quality data of water bodies in the country forms the basis of management and planning of water pollution control. Considering the above, CPCB envisaged a National Water Monitoring Programme (NWMP) with 1700 water quality monitoring stations, located on all important rivers, lakes including some wells for groundwater studies. The generated data is scrutinized, analysed and loaded on CPCB website.

The data collected during 2009 indicates that organic pollution, as indicated by Biochemical Oxygen Demand (BOD) and Coliform counts, continue to be the major water quality issues. Out of the 7100 observations made on 64 % indicate BOD within the acceptable range of 3 mg/l and 70% indicate faecal coliform less than 500 MPN/ 100 ml. Based on the data collected, polluted stretches have been identified and restoration plans conceived by the concerned State Pollution Control Boards / Pollution Control Committees.

The contribution of Ms. Sandhya Shrivastava, Ms. Shweta Gaur (JRFs), Ms. Garima Dublish, Mr. Ankur Rajpal (SRFs), Ms. Alpana Narula (JSA) and Ms. Suniti Parashar (SSA) in compilation of data and preparation of this Report is appreciable.The project study is coordinated by Shri R. M. Bhardwaj, Scientist 'D', Dr. D. D. Basu, Scientist 'E' and Shri J.S. Kamyotra, Member Secretary. The co-operation extended by State Pollution Control Boards, Pollution Control Committees and Zonal Offices of Central Pollution Control Board in this endeavor is gratefully acknowledged.

Hopefully, Report will be useful to all concerned with water quality management and its restoration to pristine purity.

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(S.P.Gautam)

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EXECUTIVE SUMMARY

The water quality data on rivers, lakes, ponds, tanks and groundwater locations being monitored under the network is evaluated against the water quality criteria and the monitoring locations in exceedence with respect to one or more parameters are identified as polluted and require action for restoration of water quality. The locations on rivers, lakes, ponds, tanks and groundwater not meeting the criteria are summarized briefly in this chapter.

The monitoring results obtained during 2009 indicate that organic pollution continues to be the predominant pollution of aquatic resources. The organic pollution measured in terms of bio-chemical oxygen demand (BOD) & Coliform bacterial count gives the indication of extent of water quality degradation in different parts of our country. It is observed that nearly 64% of the observations are having BOD less than 3 mg/l, 19% between 3-6 mg/l & 17% above 6 mg/l. Similarly Total & Faecal coliform which indicate presence of pathogens in water are also a major concern. About 49% observations are having Total Coliforms and 70% observations are having Faecal Coliform less than 500 MPN /100 ml.

Water Body Wise Status - Rivers

- Water quality of river Beas at D/s Mandi in Himachal Pradesh and river Satluj at U/s & D/s of Budhanala in Ludhiana, Boat Bridge Dharmkotnakodar Road, Bridge Harike, U/s & D/s Hussianwala, D/s Kiratpur Sahib and D/s of East Bein in Jalandhar found deteriorated and degraded as compared to stipulated requirement.

- River Ganga at Kanpur U/s & D/s, Bhagirathi at Gangotri, Bhagirathi B/c with Alaknanda at Devprayag, Alkananda A/c with Bhagirathi at Devprayag, Mandakini B/c Alkalnada at Rudraprayag, Alkananda B/c to Bhagirathi at Devprayag, Alkananda A/c Mandakini at Rudraprayag, Alkananda B/c Mandakini at Rudra Prayag, Garhmukteshwar, Varanasi U/s & D/s, Confluence of Sone (Doriganj-Chapra), Rishikesh, Haridwar, Bithoor, Kannauj U/s & D/s, Allahabad D/s, Allahabad (Rasoolabad), Dalmau , Narora, Kala Kankar, Indrapuri (Dehri on Sone), Trighat, Tribeni on Ganga, Buxar, Buxar (Ramrekhaghat), Patna U/s & D/s, Darbhanga Ghat (Patna), Mokama U/s & D/s, Sultanganj (Bhagalpur), Bhagalpur, Nabadip on Ganga, Ghoshpara, Kahalgaon, Munger, Diamond Harbour, Dakshineshwar, Howrah-Shivpur, Garden Reach, Palta, Serampore, Uluberia, Baharampore is not meeting the desired water quality for bathing. The water quality of river Yamuna is deteriorated at U/s Dak Patthar, Wazirabad, Agra U/s & D/s, Bateshwar, Etawah, Juhika, Nizamuddin, Okhla bridge, Okhla after meeting of Shahdara drain, Mazawali, Mathura U/s & D/s, Kalanaur, Sonepat, U/s Paonta Sahib, Hamirpur, Hathnikund , U/s of Lakhwar Dam, Shyama Chatti & Yamunotri. After the intake point of Wazirabad Barrage river Yamuna does not confirm to criteria for beneficial uses for over 500 km that extends beyond Etawah. Water quality at Okhla, Nizammudin Bridge is worst affected due to high BOD and Ammonia in the river Yamuna. Other tributaries having higher concentration of pollutants are Gomti at

Jaunpur D/s, Lucknow U/s & D/s & Varanasi; Ghaghara Near Chapra; Sai at Unnao; Daha River at D/s Sasamusa; Ramganga at Kannauj; Saryu at Ayodhya; Kalinadi at Kannauj, U/s of Gulaothi Town and U/s & D/s of Muzaffar Nagar; Chambal at Nagda U/s & D/s, Kota U/s & D/s, Etawah & Rameshwarghat; Betwa D/s After Mixing af River Bais at Vidisha, Before conf. Yamuna at Hamirpur, Charantirghat (Vidisha), Nayapur D/s, Near Road Bridge (Bhojpur) & Raisen; River Khan at Sakkar Khadi, Sanwer & Kabit Khedi; Hindon at Ghaziabad D/s, A/c Krishna & Saharanpur D/s; Kali near Binauli Town (Meerut); Kshipra at Siddhawat D/s (Ujjain), Trivenisangam & Ramghat (Ujjain); Govind Sagar; Tons River, H.P; Rapti A/c Honin Near Domingarh Rly Bridge (Gorakhpur); Churni at Gade Border & D/s of Santipur Town; Bokaro at Jarandi; Damodar at Haldia D/s, near Mujher Mana Village, D/s of IISCO, Narainpur A/c Nunia Nallah, Dishergarh & Burdwan Town; Vindyadhari U/s & D/s; Rupnarayan D/s at Kolaghat and B/c Ganga Near Geonkhali; Silabati D/s; Mahananda at Siliguri & D/s Ramghat; Barakar at Asansol; Matha Bhanga, Gobindapur; (Water Intake Point) (90,000 MPN/100 ml); Dwarka U/s & D/s of Tarapith; Kansi D/s at Midnapore and Jalangi at Krishna Nagar D/s are also not meeting the desired criteria.

- The mainstream of River Brahmaputra is exceeding the criteria at all the locations except Kherghat. The tributary streams Dhansiri, Disang, Subansiri, Bhogdoi, Bharalu, Digboi, Burhidihing, Deeparbeel, Kalong, Mora Bharali, Jai Bharali, Kharsang, Teesta, Dikchu, Maney Khola, Ranichu, Kapili, Sankosh, Ranga Nadi, Beki, Boginadi, Kundli, Sonai, Panchnai, Kaljani & Karola are also polluted and not conforming to the desired criteria.

- River Mahi is conforming to the desired water quality at most of the monitoring locations except Mahi (D/s) conf with R. Chap (under sagwara-sarhi rd. Bdg.) and tributary streams Shivna at Ramghat (Mandsaur), Chillar at Shajapur, Jammer at Dholowad, Ratlam and Anas at Dahod.

- River Sabarmati is grossly polluted at Hansaol Bridge, V.N. Bridge, Railway Bridge, A/c with Meshwa at Vautha (Near Dhokla), Village Miroli Taluka Ascroi and Kheroj in Gujarat. Water quality data indicates that the tributary stream Khari is grossly polluted with respect to DO, Total and Faecal Coliform and very high dissolved solid content in terms of Conductivity where as water quality of Shedi is not meeting the desired criteria in respect of pH and BOD.

- The mainstream of River Narmada and tributary streams are confirming to water quality for all the criteria parameters except pH and BOD which is exceeding at Sethanighat, Hoshangabad U/s & D/s and Korighat.

- The water quality of mainstream of river Tapi is exceeding criteria limits at Ajnand Village, Ukai Sherula Bridge & ONGC Bridge, Surat, Mandavi, Kathore NH-8 Bridge, Surat U/s Kathore, Rander Bridge, Near Bardoli (Kapp Bridge) Bardoli, Uphad village and Bhusawal U/s in Maharashtra whereas water quality of tributary streams Girna at Malegaon & Jalgaon, Rangavali at Navapur, Kim at Sahol Bridge

and River Denwa near Sarni, Road Bdg is also not meeting the desired water quality criteria.

- The water quality of mainstream of Mahanadi does not meet the criteria with respect to BOD at Cuttack U/s and Sambhalpur D/s in Orissa due to discharge of untreated sewage from cities. pH is not meeting the criteria at Kharad, Sheorinarayan Village and A/c with River Mand.Conductivity is exceeding the desired criteria at Paradeep U/s & D/s. DO is also not confirming with the water quality criteria at Rudri U/s, Dhamtori Reservoir. Faecal Coliform values are exceeding the criteria at Sambalpur D/s, Sambhalpur Fds at Huma, Cuttack D/s, Paradeep D/s and Cuttack Fds (Serua) at Sankhatrasa whereas Total Coliform is not meeting the criteria at Sambalpur D/s, Sambhalpur Fds at Huma, Cuttack D/s and Paradeep D/s.The Water Quality of tributary streams Seonath, Kharoon, Arpa, Kelo, Ib, Tel and Birupa are complying with the water quality criteria. Other streams such as Hasdeo is not meeting the criteria in respect of pH whereas Kathajodi at Cuttak D/s & Kuakhai at Bhubaneswar FU/s, Bhubaneshwar D/s and Bhubaneswar FD/s is not meeting the criteria limit in respect of BOD .Faecal Coliform & Total Coliform values are exceeding the criteria at Bhubaneshwar D/s and Bhubaneswar FD/s.

- The water quality of mainstream of Brahmani with respect to BOD is exceeding the criteria limit at Panposh D/s, Rourkela D/s and Rourkela FDS at Biritola in Orissa due to wastewater discharges from the industrial and residential complexes of Rourkela, Talcher, Bhuban and Dharamashala where as Faecal Coliform & Total Coliform values are exceeding the criteria limit at D/s Panposh, D/s Rourkela, Rourkela Fds at Biritola and Kamalanga in Orissa. The water quality of tributary streams Koel, Sankh and Karo is not complying the desired criteria with respect to BOD. The water quality of tributary stream Aul is not complying the desired criteria with respect to FC & TC.The water quality of major tributary stream Baitarni is not complying with the criteria limit in respect of conductivity at Dhamra & Chandbali and in respect of BOD at Dhamra whereas Faecal Coliform & Total Coliform is not meeting the criteria at Jajpur.

- In river Subarnarekha, BOD is exceeding the criteria limit at Muri Road Bridge, Bihar - West Bengal Border, Ranchi Tatisilwai, Gatalsud Dam, Hatia Dam and Namkum.

- The water quality of river Godavari in respect of BOD does not meet the criteria in Maharashtra at all locations due to proximity of large cities. In Andhra Pradesh water quality of mainstream of Godavari is exceeding the criteria limit with respect to BOD at Godavarikhani, Mancherial B/c to Raghavallu, Ramagundam U/s & D/s, Burgampahad, Mancherial and Bhadrachalam. Wainganga A/c with Kanhan; Kanhan at Sinora U/s & D/s, U/s of Gaurav Paper Mills near Jackwell, U/s of Ellora Paper Mills; Nira at Pulgaon cotton mill; Wainganga at Asthi, D/s of Ellora Paper Mills, D/s of Gaurav Paper Mills near Jackwell; Kolar before confluence to Kanhan at Kamptee; Kanhan D/s of Nagpur; Wardha at D/s of ACC Ghuggus, Rajura Bridge, Confluence

Point of River Penganga and Wardha at Juad; Purna at Dhupeshwar, A/c of Morna (Andura Village) in Maharashtra are not meeting the criteria for BOD.

- River Krishna does not meet the water quality criteria with respect to pH at Gadwal Bridge, Vijaywada, Vedadri at Guntoor and Wadapally A/c to river Musi in Andhra Pradesh, Ankali Bridge along Chikkodi Kagwad Road, U/s of Ugarkhurd Barrage and D/s of Devsagar Bridge in Karnataka, Sangli and Islampur in Maharashtra. Conductivity is not meeting the criteria at Hamsala Deevi in Andhra Pradesh due to estuarine region.The lower value of DO is observed at Gadwal Bridge,Wadapalli A/c with Musi in Andhra Pradesh, Kurunwad in Kolhapur, Rajapur Weir in Maharashtra whereas High values of BOD are observed at Kshetra Mahuli, Krishna-Venna Sangam at Mahuli,Wai, Krishna Bridge at Karad, Mahabaleshwar Dhom Dam near Koyna Dam in Maharashtra,Wadapally A/c with Musi, Amravati Guntoor, U/s of Ugarkhurd Barrage in Andhra Pradesh, D/s of Devsagar Bridge in Karnataka. High value of TC is observed at A/c of Tungabhadra in Maharashtra. The water quality of tributary streams Panchganga & Bhima is not meeting the desired water quality criteria with respect to Conductivity, DO, BOD, Faecal Coliform and Total Coliform. The tributary streams Ghatprabha, Malprabha, Nira, Venna, Koyna, Mula, Mula-Mutha, Mutha, Pawana, Indrayani, Tunghabhadra, Tungha, Bhadra, Musi, Chandrabhaga, Kagina, Nakkavagu, Hundri, Kinnersani & Sabari also not meeting the desired water quality criteria.

- River Pennar is not meeting the desired water quality criteria with respect to pH at A/c Cheyyuru, Somasile and Siddvata, Nellore. Conductivity and DO is not meeting the criteria at Siddvata, Nellore whereas BOD is observed more than the criteria at all locations.

- The Water Quality of River Cauvery is not meeting the desired water quality criteria at Picthavaram, Coleroon, Erode near Chirapalayam, Pitchavaram, Coleroon, Pallipalayam, Trichy- Grand Anicut, Thiruchirapalli D/s, Sri Rangapattanna D/s, Mettur and 1 Km D/s of Bhavani River Confluence whereas the tributary streams not meeting the criteria are Bhavani at Elachivazhy, Pathirakaliamman Koil, Sirumugai, Bhavani Sagar; Kabbani at Muthankara, Water Intake of KIADB (Nanjagud); Arkavathi at Kanakapura D/s; Laxmantirtha at D/s of Hunsur Town and Amravati at 1Km D/s From Eff. Dis. Pt. at Madhuthukkulam.

- Damanganga at Kachigaon D/s (Daman), Discharge Point of Distillery, Daman Jetty (Moti Daman), Lavacha Temple (Silvassa) & Naroli Bridge (Silvassa); Balehwar Khadi at N.H. No. 8; River Purna on Bridge at Surat-Navsari Highway; River Kaveri on Bridge at Billimora-Valsad Road; River Dhadar at Kothada; Ambika at Bilimora; Amlakhadi After Confl. of W. Water from Ankleshwar; Bhadar D/s Jetpur Vill. After Conf. of W.Water From Jetpur City; Mindhola at State Highway Bridge Sachin; River Bhogavo D/s of Surendranagar; Triveni Sangam Nr. Somnath Temple; River Sal Near Hotel Leela Mobor (Cavelossim); River Mapusa on Culvert On Highway Mapusa; Kalu at Atale Village; Ulhas at U/s of NRC Bund at Mohane; Ulhas at U/s of Badlapur; Mithi River; Kundalika River at Are Khurd; Patalganga at Shilphata;

Water Quality Status – Creeks/ Canals/ Lakes/Tanks

- The creeks in Gujarat and (Mumbai) Maharashtra and sea water in the vicinity of Mumbai are having high concentration of BOD due to discharge of waste water from metropolitan region and high conductivity due to effect of sea water.

- The Western Yamuna Canal downstream of Yamuna Nagar at 100 m D/s and at Damla is grossly polluted due to municipal and industrial waste water disposal. Similarly Pragati Vidhya Bhawan Canal in Agartala, Gurgaon Canal and Narmada Main Canal in Dist. Gandhinagar is also not meeting the criteria limits with respect to BOD.

- Lakes and Tanks having high concentration of organic matter and not complying to the standard limits for BOD are Kistrapetrareddy Tank, Sai Chevuru, Asani Kunta, Kajipally Tank, Noor Md. Kunta, Pedda Chevuru, Durgam Chevuru, Gandigudem Tank, Mallapur Tank, Saroornagar lake, Premajipet Tank, Nalla Chevuru, Hussain Sagar lake, Miralam Lake, Dharmasagar Tank, Laxminarayana Chevuru, Bhadrakali Chevuru, Himayat Sagar Lake & Pulicate lake in Andhra Pradesh; Udhagamadalem Lake (Ooty) and Kodai Kanal in Tamilnadu; Bahour Lake & Osteri Lake in Pondicherry; Heballa Valley & Ulsoor Lake in Karnataka; Oruvathilkotta Lake, Ashthamudi Lake, Sree Padmanabha Swamy Temple (TVPM) Pond, Paravur Lake & Kayamkulam Lake in Kerala; City Lake of Nadiad, Kankoria lake, Bindusarovar, Nalsarovar Lake, Chandola Lake, Kuwadava Lake, Dhudhia Talav, Narsimehta Talav, Dharoi Dam, Olpad Village Pond & Thol Tank in Gujarat; Udaisagar lake, Pushkar Lake & Pichola lake in Rajasthan; Lower lake, Upper Lake, Kewra Dam, Govingarh tank & Janunia Talab in Madhya Pradesh; Bindusagar, Swetaganga, Narendra Pokhari, Parvati sagar, Indradyumna Tank, Markanda Pokhari, Anshupa lake & Chilka Lake in Orissa; Khaziar Lake in Himachal Pradesh; Tighi Talab, Surajkund & Kawar Lake in Bihar; Rabindrasarobar, Mainh Ghat, Hanuman Ghat, Mirikh Lake, Hathishala Ghat, Kochbihar Lake, Delo Reservoir & Sahebbandh in West Bengal; Maahil Pond, Ramgarh Lake, Samarpur Jheel & Laxmi Pond in Uttar Pradesh; Naini Lake in Uttarakhand; Elangabeel System Pond, Padumpukhuri, Jaipal Pukhuri, Rajapukhuri, Botodriva Satra Pond, Ganga Pukhuri, Deepar Beel, Bishnu Puskar Pukhuri, Subhagya Kunda Pond, Chand Dubi Beel, Dighali Pukhuri, Gaurisagar Tank, Bor Beel, Mahamaya Mandir Pukhuri, Gophur Tank, Rajadinia Pukhuri, Baskandi, Bor Pukhuri, Gala Beel, Rajmaw, Sivasagar Tank & Saran Beel in

Assam; Loktak Lake in Manipur; Umiam Lake in Meghalaya and Laxminarayan Bari Palace in Tripura.

Water Quality Status – Groundwater

The groundwater monitoring locations with high conductivity and exceeding the water quality criteria for irrigation are observed at

- Bore well KrishnaMurthy, D No. 48-16-43 (Vijaywada);
- Open well near Rama Temple, Mindi, (Vishakhapatnam);
- Bore well, Panchayat Office , Medak;
- Bilaspur region in Chhatissgarh; Pratal Nagar, Dewas;
- Dosigaon , Ratlam;
- Trenching ground in the premises of M/s Rishabh Masala Udhyog;
- M/s Lakhani Foot Wear;
- Village Masat, Dadra; Village Dadra;
- Mira, Bhayander; Palghar;
- Savali. Sangli; Rasul wadi, Sambarwadi;
- Borewell at Katpur; dugwell at Ranjangaon;
- dug well near Khanegunt near Awasthi;
- Junagadh; Surendranagar;
- Dahod;
- Ankleshwar;
- Borewell of Plasana village;
- Bore well of Santej village;
- Bore well of Sachin GIDC;
- Bore well at OLPAD;
- Bore well of Navsari GIDC village;
- bore well at SNR Vinayak Mandali, Bavla;
- Bore well of Someshwar Rice Mill;
- Bore well of Pirana Terminal pumping station, Pirana;
- Well of Loomji Chaudhury, near Naya Gaon, Pali;
- Well of Bhopal Singh, 25 km of Pali town;
- Well kothi in village Bagar Rajput, Alwar;
- Well at village Santhla very, Bhiwadi Industrial area Bhiwadi;
- Hand pump of Vhidani village, Goner Road Jaipur;
- Well of Gujron ki Talai, Moahana Road, Jaipur;
- Pabupura Road near Civil Air Port Jodhpur;
- Village Vinayakia,(Badri Kumhar) Jodhpur;
- Village Vinayakia,(Hukam Singh Rathore) Jodhpur.

Groundwater locations with BOD levels higher than the criteria are

- Bore well Rudravelli (V), Nalogonda ;
- Bore well Panchyat office Bolaram (V);
- Medak; Guwahati;
- Tezpur (Mission Chairali);

Groundwater from open well from industrial

- Mandideep, Dist. Raisen;
- Well at Somnath Industrial Estate in Daman;
- Village Dabhel, Daman; villahe Kachigam;
- Village Athal, Dadra;
- Village Masat, Dadra;
- Village Piperia, Dadra;
- Village Dadra; Industrial estate Tarapur;
- Mira Bhayander, Dahanu, Vasai, Palghar;
- MSW site Pathardi (Nasik);
- MSW site Pimpri- Chinchwad (Pune);
- Phandarpur- Gangapur (Aurangabad);
- Khaperkheda, Koradi;
- Raipur,Nagpur;
- Bhamni- Kamleshwar;
- Bhandewari in Nagpur, Sangera, Gondia;
- Sukali (Amravati), Akot(Akola);
- Dug well at Ranjangaon., Mehasana, Nadiad;
- Bore well of Someshwar Rice mill;
- Vill. Bavla, Ahemdabad;
- Loomji Chaudhary near Nayagaon (Pali);
- Bhopal Singh 24 Km from Pali Town;
- U/s from Jodhpur Town;
- Ground water quality station, Sardnagar;
- Ground water quality station, Captanganj.

The nitrate concentration is observed higher than the desired criteria at Open well near Rama Temple, Mindi (Visakhapatnam) and Bore well near Panchayat Office, Bollaram (V) (Medak) in Andhra Pradesh; Well at Mutharaplatyam (PWD), Well at Karuvadikuppam, Well at Mettupalayam and Well at Kurumbapet in Pondicherry; well at Somnath Industrial Estate in Daman.

Extreme Levels of water quality in Rivers & Lakes/ponds/tanks

During 2009 the highest BOD (one of the most important indicators of pollution) levels observed in rivers are arranged in descending order are summarised in Table –I. The relatively low values of BOD are measured in river(s) Brahmaputra, Mahi, Pennar, Baitarni and Brahmani.

Table –I: Highest observed BOD levels in polluted rivers

Rivers	**BOD (mg/l)**
Markanda	593
Damanganga	382
Kalinadi (E)	353
Kalinadi (W)	203
Khan	150

Yamuna	103
Hindon	86.0
Mula	56.0
Satluj	55.0
Bharalu & Mithi	50.0
Amlakhadi	49.0
Mutha & Musi	48.0
Sabarmati	46.0
Mula-Mutha	38.6
Pawana	37.2
Nakkavagu, Kundalika, Wainganga & Kundu	32.0
Narmada	30.0
Bhima	28.5
Kanhan	27.0
Godavari	26.0
Denwa	25.0
Nambul	24.5
Karmana, Ghaggar & Swan	24.0
Nira (Krishna)	23.0
Chambal	22.0
Cauvery	17.0
Ganga, Purna (Godavari), Shedhi & Kolar	16.0
Mindhola & Sukhana	15.0
Indrayani	14.8
Wardha	14.4
Kalu & Kali	14.0
Gomti	13.0
Chandrabhaga	12.7
Kshipra, Tapi, Rangavali & Koel	12.0
Bhadar	11.0
Bhogavo, Baleshwar Khadi & Jumar	10.0
Krishna	9.6
Venna	9.2
Lakshmantirtha & Girna	9.0
Koyna & Betwa	8.8
Ramganga	8.4
Burhidihing	7.6
Deepar Beel	7.2
Mahanadi	7.1
Myntdu, Sai, Purna & Coringa	7.0
Tawi	6.7
Kalong	6.6
Mora Bharali	6.4
Subarnarekha	6.3
Digboi	6.1

Triveni Sangam	6.0

Lakes, Ponds and Tanks having very high values of Biochemical Oxygen Demand (BOD) are arranged in descending order are summarised in Table –II.

Table-II: Highest observed BOD levels in polluted lakes/tanks/ponds

Lakes/Tanks/Ponds	**BOD (mg/l)**
Kistrareddypet Tank, Kajipalli Tank, Pedda Chervuru, Asani Kunta, Sai Chevuru & Noor Mohammad Kunta in Andhra Pradesh	50.0
Durgam Chevuru in Andhra Pradesh	45.0
Elangbeel System Pond in Assam	42.0
City Lake in Gujarat	40.0
Gandigudem Tank in Andhra Pradesh & Kankoria Lake in Gujarat	38.0
Mallapur Tank	30.0
Bindusagar Pond in Orissa	29.0
Padumpukhuri in Assam	26.5
Saroornagar Lake in Andhra Pradesh & Loktak Lake in Manipur	23.0
Premajipet Tank & Nalla Chevuru in Andhra Pradesh	22.0
Swetaganga Pond in Orissa	20.5
Hussain Sagar Lake in Andhra Pradesh	19.0
Narendra Pokhri in Orissa & Bindusarovar in Assam	15.0
Nalsarovar Lake in Gujarat & Jaipal Pukhuri in Assam	14.0
Kahziar Lake in Himachal Pradesh, Chandola Lake in Gujarat & Rajapukhuri in Assam	13.0
Parvati Sagar in Orissa & Botodriva Satra Pond in Assam	12.5
Pushkar Lake in Rajasthan	12.2
Kuwadava Lake in Gujarat, Miralam Lake and Dharmasagar Tank in Andhra Pradesh & Tighi Talab in Bihar	12.0
Ganga Pukhuri in Assam	11.2
Udhagamadalem Lake in Tamil Nadu	11.1
Bishnu Pukhuri & Mer Beel in Assam	10.6
Umiam Lake in Meghalaya	10.5
Heballa Vellay in Karnataka & Laxminarayan Chevuru in Andhra Pradesh	10.0
Saubhagya Kunda Pond & Chand Dubi Beel in Assam	9.4
Dhudhiya Talav	9.0
Indradyumna Tank in Orissa	8.5
Dighali Pukhuri in Assam	8.2
Ulsoor Lake in Karnataka, Markanda Pokhari in Orissa & Gaurisagar Tank in Assam	8.0
Narsimehta Talav in Gujarat & Bor Beel	7.8
Mahamaya Mandir Pukhuri	7.6
Gophur Tank in Assam	7.2
Oruvathikatta Lake in Kerala	6.8

Rajadiniya Pukhuri in Assam	6.7
Bhadrakali Chevuru in Andhra Pradesh & Rabindrasarovar National Lake in West Bengal	6.1
Ashtamudi Lake in Kerala, Dharoi Dam in Rajasthan & Baskandi Pond in Assam	6.0

The level of DO is observed more than 4 in river Narmada, Brahmaputra, Brahmani, Baitarni, Subernarekha and Ganga throughout the year to sustain aquatic life whereas, the values less than 4 are observed in stretches of rivers at a number of locations downstream of urban settlements due to discharge of untreated/partially treated municipal wastewater which is responsible for high oxygen demand. During 2009 the lowest DO (one of the most important indicators of pollution) levels observed in rivers are arranged in ascending order are summarised in Table –III.

Table III: Lowest observed DO levels in polluted rivers

Rivers	**DO (mg/l)**
Amlakhadi, Betwa, Bharalu, Bhima, Bhogavo, Hindon, Kali (W), Kalinadi (E), Karmana, Khan, Khari, Krishna, Mithi, Mula, Mula-Mutha, Musi, Mutha, Pawana, Sabarmati & Yamuna	0.0
Mahanadi	0.2
Kadambayar	0.3
Chambal	0.4
Satluj	0.6
Gomti	0.7
Ghaggar	0.8
Dhansiri	1.2
Nambul &Vindyadhari	1.3
Chitthrapuzha	1.4
Cauvery	1.5
Lakshmantirtha	1.6
Dhadar	1.7
Myntdu & Nakkavagu	1.8
Churni & Kallai	2.1
Digboi & Dikchu	2.5
Ghaghara, Kundalika & Triveni Sangam	2.7
Indrayani & Sai	2.8
Burhidihing & Manjeera	2.9
Kanhan, Kshipra, Mindhola & Purna	3.0
Godavari & Uppala	3.2
Pennar & Periyar	3.3
Wainganga & Wardha	3.4
Kalu, Mahi & Tawi	3.5
Panchaganga	3.6
Ayroor, Ithikkara, Tapi & Kodra Dam	3.7

Chathe, Daha, Mogral & Pamba	3.8

Total Coliform and Faecal Coliform count (one of the most important indicators of pollution) are observed very high in rivers at a number of locations. The river Mahi, Subernarekha, Pennar, Beas and Narmada are relatively clean rivers as the number of Total Coliform and Faecal Coliform count are respectively less than criteria limit of 5000 MPN/100 ml and 2500 MPN/100 ml respectively. The highest TC &FC levels observed in rivers are summarised in Table –IV.

Table-IV: Highest observed Total Coliform & Fecal Coliform levels in polluted Rivers

Rivers	**Total Coliform (MPN/100ml)**	**Fecal Coliform (MPN/100ml)**
Yamuna	23×10^9	21×10^8
Kali (W)	55×10^7	4×10^7
Hindon	38×10^7	31×10^6
Kalinadi (E)	35×10^7	4×10^7
Chambal	31×10^5	27×10^4
Mahanadi	16×10^5	16×10^4
Damodar	85×10^4	7×10^5
Ganga	65×10^4	4×10^5
Satluj	25×10^4	11×10^4
Churni	22×10^4	13×10^4
Teesta	22×10^4	11×10^4
Gomti	17×10^4	13×10^4
Hundri	17×10^4	900
Krishna	17×10^4	1400
Rupnarayan	17×10^4	11×10^4
Tunghabhadra	17×10^4	1700
Barakar	16×10^4	9×10^4
Dwarka	16×10^4	5×10^4
Kathajodi	16×10^4	92×10^3
Kuakhai	15×10^4	14×10^3
Ghaggar	11×10^4	1×10^4
Khari	93×10^3	43×10^3
Tons (HP)	92×10^3	7300
Karmana	82×10^3	63×10^3
Mahananda	8×10^4	5×10^4
Matha Bhanga	8×10^4	7×10^4
Amlakhadi	5×10^4	14×10^3
Baleshwar Khadi	46×10^3	28×10^3
Sabarmati	46×10^3	15×10^3
Ambika	43×10^3	9325
Kaveri & Tapi	39×10^3	14×10^3
Silabati	3×10^4	13×10^3
Mindhola	28×10^3	14×10^3

Purna (Godavari)	28×10^3	11×10^3
Brahmaputra	24×10^3	1100
Jalangi & Vindyadhari	23×10^3	13×10^3
Brahmani	22×10^3	13×10^3
Sai	22×10^3	17×10^3
Betwa	17×10^3	700
Kansi	17×10^3	14×10^3
Bhadra	16×10^3	1600
Bhima	16×10^3	9000
Godavari	16×10^3	90
Budhabalanga	15×10^3	6300
Daya	14×10^3	7900
Kaljani	14×10^3	11×10^3
Nagavalli	9400	4600
Kim	9300	4300
Ramganga	9300	2300
Cauvery	9200	5400
Tungha	9000	500
Karola	8000	4000
Manjeswar	7000	4000
Saryu	7000	4600
Periyar	6120	880
Uppala	6000	4000
Mogral	5800	2200
Baitarni	5400	2800
Kharasrota	5400	3500
Shriya	5000	4000

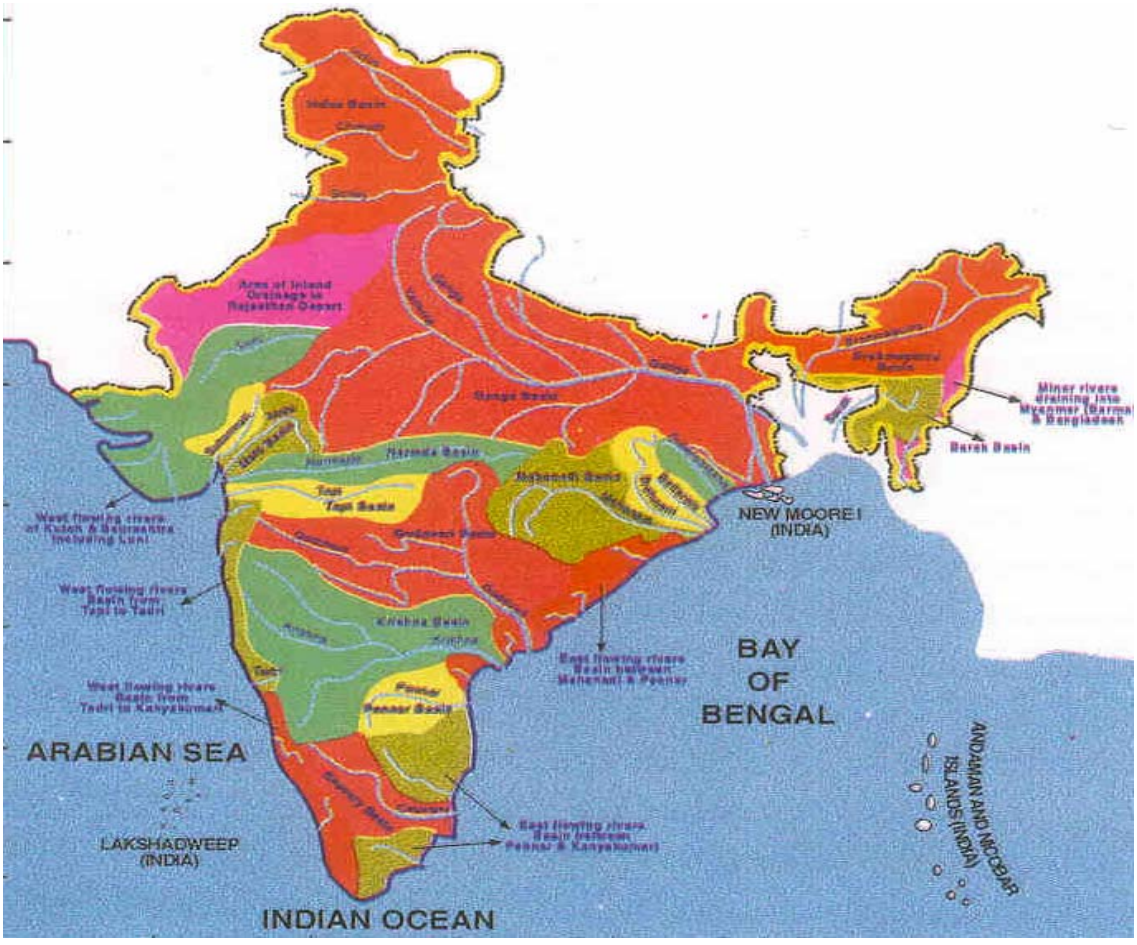
CHAPTER - I

Introduction and Methodology of National Water Quality Monitoring Programme

1.1 Introduction

In order to perform the functions laid down under the Water (Prevention and Control of Pollution) Act, 1974, Central Pollution Control Board (CPCB) and State Pollution Control Boards/Pollution Control Committees (SPCBs/PCCs) laid down a nationwide Water Quality Monitoring Network to understand the nature of water quality in the various water bodies such as rivers, lakes, ponds, tanks, creeks, canals and groundwater etc.

1.2 Water Resources of India



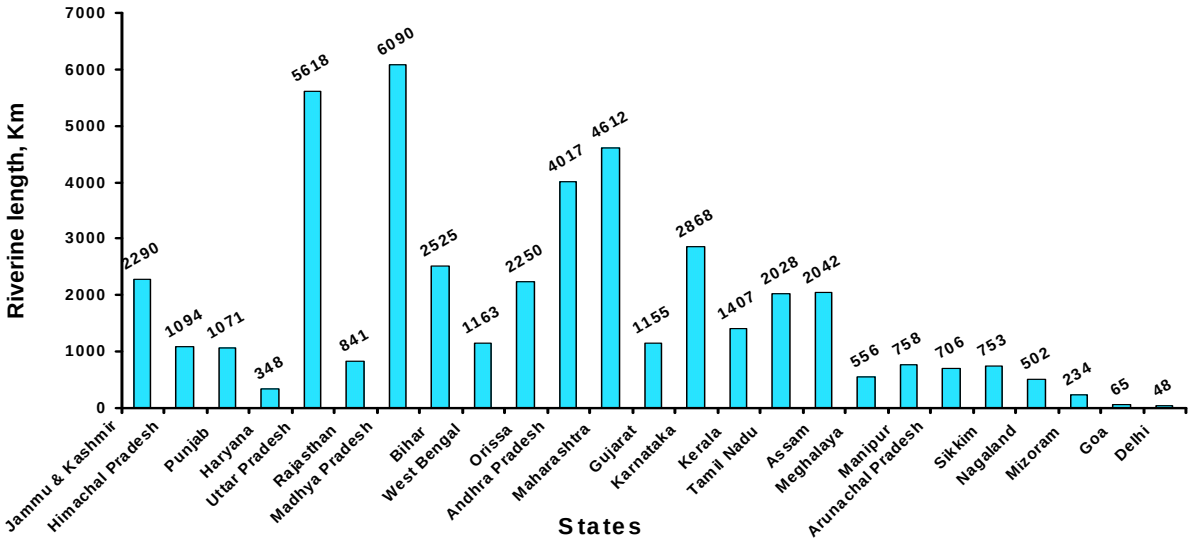
India receives 4000 Km^3 of water through rainfall. Out of this 3/4 part occurs only during monsoon. The surface flow is estimated as 1880 Km^3. The annual replenishable ground water resources are assessed to be about 600 Km^3 of which the annual usable resources are estimated at 420 Km^3. Inland water resources of the country are classified as rivers and canals; reservoirs; tanks and ponds; beels, oxbow lakes, derelict water; and brackish water. Other than rivers and canals, total water bodies cover an area of about 7 million hectare. Statewise details of inland water resources are given in table 1.There are few desert rivers, which flow for some distance and get lost in deserts. There are complete arid areas where evaporation equals rainfall and hence no surface-flow. The medium and minor river basins are coastal rivers. The Brahmaputra, Ganga, Indus and Godavari putting together cover more than half of the area of the country. The whole of the west coast stretching 1500 km between Surat in Gujarat and Cape Comorin in Tamilnadu are fed by fourteen medium and eighteen minor river basins leaving important cities like Bombay, Panaji, Cochin, Trivandrum out of major river basins. On the east coast of Peninsular India there are three areas, which are out of any major river basins. These three areas are: the area south of River Cauvery starting from Madurai to Cape Comorin; the area between Pennar and Cauvery basin wherein Chennai and Pondicherry are located; and the area between Mahanadi and Godavari basins in Orissa coast. There is a significant variation both in the quantity of

discharge from a major basin to minor one and also in the quality of discharge from region to region.

1.2.1 Surface Water

All the major river basins are not perennial. Only four of the thirteen major basin posses areas of high rainfall, i.e. Brahmaputra, Ganga, Mahanadi and Brahamani having annual average discharge of a minimum of 0.47 million cubic meter per Km^2, and they are perennial. Six basins (Krishna, Indus, Godavari, Narmada, Tapi and Subarnarekha) occupy the area of medium rainfall and have annual average discharge of a minimum of 0.26 million cubic meter per Km^2, and the remaining four (Cauvery, Mahi, Sabarmati and Pennar) occupy the area of low rainfall and have annual average discharge between of 0.06 and 0.24 million cubic meter per Km^2. Thus, many of the major river basins also go dry during summer leaving no available water for dilution of waste water discharged in them. State wise perennial riverine length in India is given in figure 1.1. The riverine length in Uttar Pradesh is inclusive of Uttarakhand. Similarly, the Chattisgarh is covered under Madhya Pradesh; and Jharkhand under Bihar.

Figure 1.1 : State-wise Perennial Riverine Length in India



1.2.2 Ground Water

Replenishable ground water potential of the country, has been estimated by Ministry of Water Resources as 431 Km^3 cubic kilometre per year. The potential available for irrigation is 360 Km^3 per year and 16 percent is for drinking, industrial and other purpose.The figure for net draft of ground water considering the present utilisation indicates that substantial portion of total potential (about 68 percent) is still remaining untapped.

Table-1.1 State wise Details of Inland Water Resources (Lakh Hectares)

S. No.	Name of the State/UT	Rivers/ Canals (Length, Kms)	Reservoir	Tanks, Lakes & Ponds	Beels, Oxbow Lakes & Derelict Water	Brackish Water	Total Water Bodies
1.	Andhra Pradesh	11514	2.34	5,17	-	0.64	8.15
2	Arunachal Pradesh	2000	-	0.01	0.03	-	0.04
3.	Assam	4820	0.02	0.23	1.10	-	1.35
4.	Bihar	3200	0.60	0.95	0.05	-	1.60
5.	Goa	250	0.03	0.03	-	-	0.06
6.	Gujarat	3865	2.43	0.71	0.12	3.76	7.02
7.	Haryana	5000	NEG	0.10	0.10	-	0.20
8.	Himachal Pradesh	27781	0.07	0.17	0.06	-	0.30
9.	Jammu and Kashmir	3000	0.42	0.01	-	-	0.43
10.	Karnataka	9000	2.20	4.14	-	0.08	6.42
11.	Kerala	3092	0.30	0.30	-	2.43	3.03
12.	Madhya Pradesh	20661	2.94	1.19	-	-	4.13
13.	Maharashtra	16000	2.79	0.50	-	0.10	3.39
14.	Manipur	3360	0.01	0.05	0.40	-	0.46
15.	Meghalaya	5600	0.08	0.02	NEG	-	0.10
16.	Mizoram	1395	-	0.02	-	-	0.02
17.	Nagaland	1600	0.17	0.50	NEG	-	0.67
18.	Orissa	4500	2.56	1.14	1.80	4.17	9.67
19.	Punjab	15270	NEG	0.07	-	-	0.07
20.	Rajasthan	N.A.	1.20	1.80	-	-	3.00
21.	Sikkim	900	-	-	-0.03	-	0.03
22.	Tamil Nadu	7420	0.52	6.91	N.A.	C.56	7.99
23.	Tripura	1200	0.05	0.12	-	-	0.17
24.	Uttar Pradesh	31200	1.50	1.62	1.33	-	4.45
25.	West Bengal (P)	2526	0.17	2.76	0.42	2.10	5.45
UNION TERRITORIES							
26	Andaman & Nicobar Islands	115	0.01	0.03	-	0.37	0.41
27	Chandigarh	2	-	NEG	NEG	-	-
28.	Dadra & Nagar Naveli	54	0.05	-	-	-	0.05
29.	Daman & Diu	12	-	-	-	-	-
30.	Delhi	150	0.04	-	-	-	0.04
31	Lakshadweep	-	-	-	-	-	-
32.	Pondicherry	247	-	NEG	0.01	0.01	0.02
	Total	**185734**	**20.50**	**28.55**	**5.45**	**14.22**	**68.72**

Source: Fisheries Division, Dept. of Agriculture & Co-operation, Ministry of Agriculture
N.A. : Not Available
(P) : Provisional
NEG: Negligible
: Included in brackish water area

1.3 Water Quality Monitoring Programme

1.3.1 Objectives

The preamble of Water (prevention and control of pollution) Act, 1974 stated that pollution control board both at States and Central level to restore and maintain the wholesomeness of water bodies in India.Water quality monitoring is therefore an imperative prerequisite in order to assess the extent of maintainance and restoration of water bodies are required.The water quality monitoring is performed with following main objectives in mind.

- Rational planning of pollution control strategies and their prioritisation;
- To assess nature and extent of pollution control needed in different water bodies or their part;
- To evaluate effectiveness of pollution control measures already in existence;
- To evaluate water quality trend over a period of time;
- To assess assimilative capacity of a water body thereby reducing cost on pollution control;
- To understand the environmental fate of different pollutants.
- To assess the fitness of water for different uses.

1.3.2 Monitoring Network

The Central Pollution Control Board (CPCB) has established a network of monitoring stations on rivers across the country. The present network comprises of 1700 stations in 27 States and 6 Union Territories spread over the country. The monitoring network covers 353 Rivers, 107 Lakes, 9 Tanks, 44 Ponds, 15 Creeks/Seawater, 14 Canals, 18 Drains and 490 Wells. Among the 1700 stations, 980 are on rivers, 117 on lakes, 18 on drains, 27 on canals, 9 on tank, 15 on creeks/seawater, 44 on pond and 490 are groundwater stations (Figure 1). Presently the inland water quality-monitoring network is operated under a three-tier programme i.e. Global Environmental Monitoring System (GEMS), Monitoring of Indian National Aquatic Resources System (MINARS) and Yamuna Action Plan (YAP). Water samples are being analyzed for 28 parameters consisting of physico-chemical and bacteriological parameters for ambient water samples apart from the field observations. Besides this, 9 trace metals and 28 pesticides are analyzed in selected samples. Biomonitoring is also carried out on specific locations. In view of limited resources, limited numbers of organic pollution related parameters are chosen for frequent monitoring i.e. monthly or quarterly and major cations, anions, other inorganic ions and micro pollutants (Toxic Metals & POP's) are analyzed once in a year to keep a track of water quality over large period of time. The water quality data are reported in Water Quality Status Year Book. Water body wise number of stations is depicted in Fig 1.2. Year Wise Growth of Monitoring Network is depicted in Fig 1.3. State wise/Union Territory wise and water body wise Distribution of Water Quality Monitoring Stations is given in Table 1. The frequency of monitoring stations in each State/Union Territory is given in Table 2. The numbers of water quality monitoring stations on each river, its tributary, sub tributary, lake, ponds, tanks, canals, creeks/sea water and on groundwater are summarized in Table 3.

Figure 1.2: National Water Quality Monitoring Network (Water body wise number of stations)

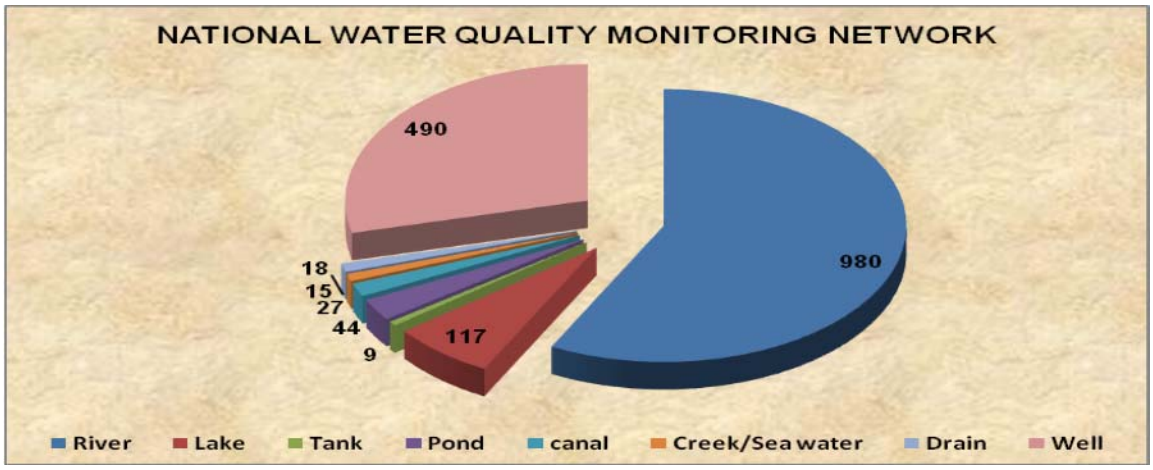


Figure 1.3: Year Wise Growth of Monitoring Network

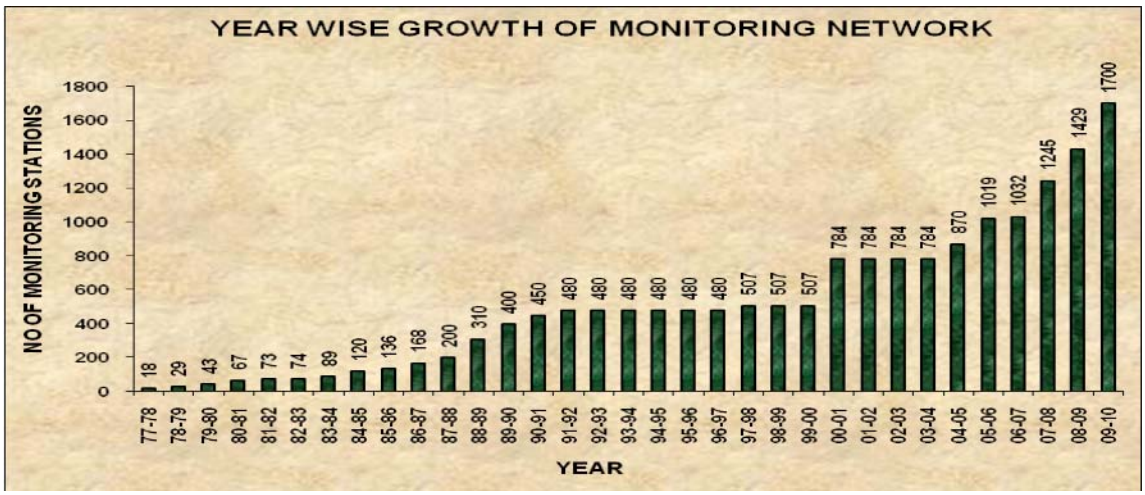


Figure 1.4: State wise water quality monitoring stations (In Numbers & Percentage wise)

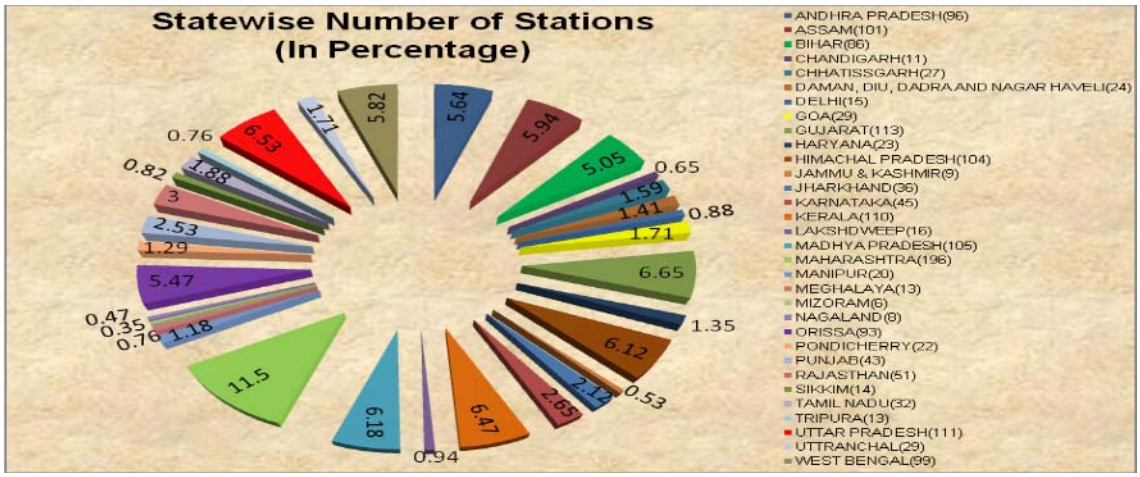


Table-1.2 State wise and water body wise Distribution of Water Quality Monitoring Stations

State	River	Lake	Tank	Pond	Canal	Creek/Sea water	Drain	Well	Total
ANDHRA PRADESH	49	8	7	6	2	-	-	24	96
ASSAM	43	2	1	23	-	-	-	32	101
BIHAR	37	2	-	2	-	-	-	45	86
CHANDIGARH	-	1	-	-	-	-	3	7	11
CHHATISSGARH	23	-	-	-	-	-	-	4	27
DAMAN, DIU, DADRA AND NAGAR HAVELI	12	-	-	-	-	-	-	12	24
DELHI	4	-	-	-	2	-	9	-	15
GOA	17	2	-	-	3	1	-	6	29
GUJARAT	49	15	1	2	2	2		42	113
HARYANA	8	2	-	-	11	-	2	-	23
HIMACHAL PRADESH	58	5	-	-	-	-	-	41	104
JAMMU & KASHMIR	7	2	-	-	-	-	-	-	9
JHARKHAND	31	4	-	1	-	-	-	-	36
KARNATAKA	43	2	-	-	-	-	-	-	45
KERALA	64	15	-	1	-	-	-	30	110
LAKSHDWEEP	-	-	-	1	-	-	-	15	16
MADHYA PRADESH	69	18	-	-	-	-	-	18	105
MAHARASHTRA	156	-	-	-	-	9	1	30	196
MANIPUR	11	4	-	-	-	-	-	5	20
MEGHALAYA	5	3	-	-	-	-	-	5	13
MIZORAM	4	-	-	-	-	-	-	2	6
NAGALAND	8	-	-	-	-	-	-	-	8
ORISSA	64	2	-	6	3	3	-	15	93
PONDICHERRY	5	2	-	-	-		-	15	22
PUNJAB	35	2	-	-	-	-	-	6	43
RAJASTHAN	7	7	-	-	-	-	-	37	51
SIKKIM	14	-	-	-	-	-	-	-	14
TAMIL NADU	27	3	-	-	-	-	-	2	32
TRIPURA	3	2	-	-	1	-	-	7	13
UTTAR PRADESH	63	3	-	2	-	-	3	40	111
UTTRANCHAL	26	1	-	-	1	-	-	1	29
WEST BENGAL	38	10	-	-	2	-	-	49	99
Total	**980**	**117**	**9**	**44**	**27**	**15**	**18**	**490**	**1700**

1.3.3 Parameters observed

The water samples are analysed for 9 core parameters and 19 general parameters. The monitoring agencies have also analysed the trace metals at few locations. The list of parameters identified under the National Water Quality Monitoring Programme is given in Table 1.3. In the present report data on core parameters is incorporated for interpretation and drawing inferences based on primary water quality criteria.The effects of important parameters are mentioned in Table 1.4.

Table-1.3 List of Parameters under National Water Quality Monitoring Programme

Core Parameters (9)	**Field Observations (7)**
PH	Weather
Temperature	Depth of main stream/depth of water table
Conductivity, µmhos/cm	Colour and intensity
Dissolved Oxygen, mg/L	Odour
BOD, mg/L	Visible effluent discharge
Nitrate – N , mg/L	Human activities around station
Nitrite – N, mg/L	Station detail
Faecal Coliform, MPN/100 ml	**Trace Metals (9)**
Total Coliform, MPN/100 ml	Arsenic, µg/L
General Parameters (19)	Cadmium, µg/L
Turbidity, NTU	Copper, µg/L
Phenolphthalein Alkalinity, as $CaCO_3$	Lead, µg/L
Total Alkalinity, as $CaCO_3$	Chromium (Total) , µg/L
Chlorides, mg/L	Nickel, µg/L
COD, mg/L	Zinc, µg/L
Total Kjeldahl - N, as N mg/L	Mercury, µg/L
Ammonia - N, as N mg/L	Iron (Total) , µg/L
Hardness, as $CaCO_3$	**Pesticides (15)**
Calcium, as $CaCO_3$	Alpha BHC, µg/L
Sulphate, mg/L	Beta BHC, µg/L
Sodium, mg/L	Gama BHC (Lindane) , µg/L
Total Dissolved Solids, mg/L	O P DDT, µg/L
Total Fixed Dissolved Solids, mg/L	P P DDT, µg/L
Total suspended Solid, mg/L	Alpha Endosulphan, µg/L
Phosphate, mg/L	Beta Endosulphan, µg/L
Boron, mg/L	Aldrin, µg/L
Magnesium, as $CaCO_3$	Dieldrin, µg/L
Potassium, mg/L	Carboryl(Carbamate) , µg/L
Fluoride, mg/L	2-4 D, µg/L
Bio-Monitoring (3)	Malathian, µg/L
Saprobity Index	Methyl Parathian, µg/L
Diversity Index	Anilophos, µg/L
P/R Ratio	Chloropyriphos, µg/L

Table-1.4 Parameters & their effects

PARAMETERS	ITS EFFECTS
CORE PARAMETERS	
Water Temperatures	Fish are not the only organisms requiring specific temperatures. Warm water also makes some substances, such as cyanides, phenol, xylene and zinc, more toxic for aquatic animals. If high water temperatures are combined with low dissolved oxygen levels, the toxicity is increased. Fish migration often is linked to water temperature.
pH	pH of water guides the corrosion/scaling tendency of water. The high pH waters are usually scale forming while the low pH waters are corrosive in nature. pH also affects mucous membrane, bitter taste and affects aquatic life.
Conductivity	Conductivity is the measure of ionisable solids in solution. High conductivity may increase the corrosion characteristics of water.
Nitrate	It causes Blue baby disease (methemoglobineamia). Nitrates can be reduced to toxic nitrites in the human intestine, and many babies have been seriously poisoned by well water containing high levels of nitrate-nitrogen. The U.S. Public Health Service has established 10 mg/L of nitrate-nitrogen as the maximum contamination level allowed in public drinking water.
Nitrite	Forms nitrosoamines which are carcinogenic.
GENERAL PARAMETERS	
Total Dissolved Solids	High dissolved solid is not desirable in water system. It may cause foaming in boilers. It also causes Undesirable taste, gastro intestinal irritation, solids corrosion or incrustation.
Total Hardness	Hardness of water is the measure of its calcium and magnesium ion content. Hardness which is due to presence of bicarbonate and carbonate ions is termed as carbonate hardness while hardness due to the presence of chloride, sulphate etc. is termed as non carbonate hardness. The main source of scale formation in heat exchanger equipment, boiler, pipeline etc. is hardness of water. It results in poor lathering with soap, deterioration of the quality of clothes, scale forming, skin irritation, boiled meat and food become poor in quality.
Total Alkalinity	Alkalinity is due to presence of bicarbonate, carbonate or hydroxide in water. In boiler bicarbonate and carbonate produce carbon dioxide which may cause corrosion in the condensate return line. High alkalinity may cause carryover and embrittlement of boiler steel. Due to presence of it boiled rice turns yellow.
Suspended Particles (Turbidity)	It may provide a place for harmful microorganisms to lodge. Some suspended particles may provide a breeding ground for bacteria.
Ammonia	Indicates pollution, growth of algae. It is toxic to fish and aquatic organisms, even in very low concentrations. Ammonia levels greater than approximately 0.1 mg/L usually indicate polluted waters.The danger ammonia poses for fish depends on the water's temperature and pH, along with the dissolved oxygen and carbon dioxide levels. The higher the pH and the warmer the temperature, the more toxic the ammonia.
MAJOR CATIONS AND ANIONS	
Calcium	Poor lathering and deterioration of the quality of clothes, incrustation in pipes and scale formation.
Magnesium	Poor lathering and deterioration of clothes with sulfate laxative.
Chloride	Chloride ion usually increases corrosive properties of water specially when the water is in contact with stainless steel material and also affects taste.
Sulphate	Sulphate ion in combination with other cation causes scales. Sulphates are

	sometimes reduced by microorganism and causes fouling specially in cooling water system. It affects taste and causes laxative effect and gastro intestinal irritation.
Phosphate	Algal growth and in very high concentrations will probably do little more than interfere with digestion.
Fluoride	Fluoride ion at a concentration below 1.5 mg/l is desired in potable water for protection of teeth. But higher concentration of fluoride ion is undesirable and may cause mottled enamel in teeth. It also causes dental & skeletal fluorosis and non-skeletal manifestations.
TRACE METALS	
Arsenic	Toxic, bio-accumulation, central nervous system affected, carcinogenic.
Mercury	Highly toxic, causes 'minamata' disease-neurological impairment and renal disturbances, mutagenic.
Cadmium	Highly toxic, causes 'itai-itai' disease- painful rheumatic condition, cardio vascular system affected, gastro intestinal upsets and hyper tension.
Total Iron	Iron may be present as ferric or ferrous state. These may be source of deposits on water lines. The presence of iron bacteria may also be encountered in iron – bearing waters. Its presence results in poor or sometime bitter taste, colour and turbidity, staining of clothes materials, iron bacteria causing slime.
Lead	Causes plumbism-tiredness, lassitudes, abdominal discomfort, irritability, anaemia, bio-accumulation, impaired neurological and motor development and damage to kidneys.
Chromium	Carcinogenic, ulceration, respiratory problems and skin complaints.
Copper	Liver damage, mucosal irritation, renal damage and depression, restricts growth of aquatic plants.
Zinc	Astringent taste, opalescence in water, gastro intestinal irritation, vomiting, dehydration, abdominal pain, nausea and dizziness.
PESTICIDES	
Pesticides	Affects central nervous system.

1.3.4 Frequency of monitoring

The frequency of monitoring stations in each State is given in Table 1.5. It is observed from the table that 32% stations have the frequency on monthly basis, 28.82 % on half yearly basis and 38.64 % on quarterly basis.

Figure 1.5: Frequency wise water quality monitoring stations (In Numbers)

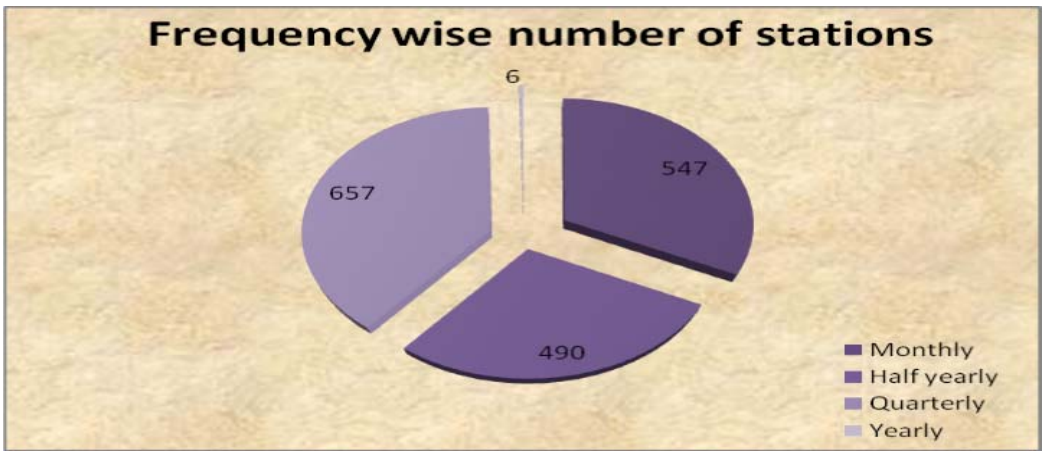


Table-1.5 Frequency of Water Quality Monitoring Stations

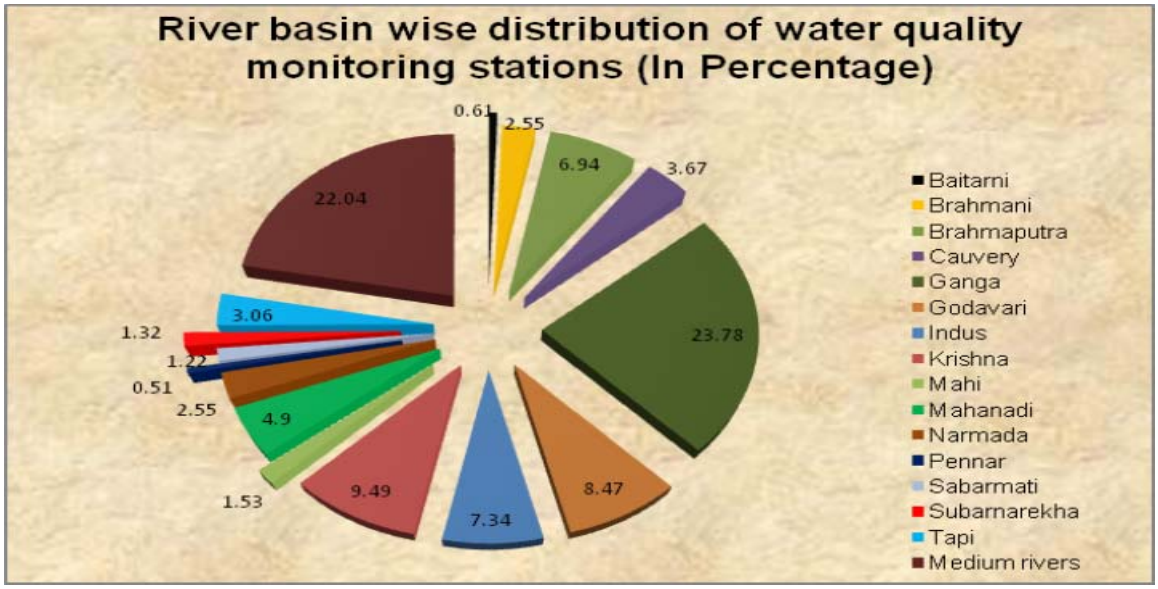
State	Monthly	Half yearly	Quarterly	Yearly	Total
ANDHRA PRADESH	50	23	23	-	96
ASSAM	6	32	63	-	101
BIHAR	13	45	28	-	86
CHANDIGARH	-	7	4	-	11
CHHATTISGARH	7	4	16	-	27
DAMAN, DIU, DADRA AND NAGAR HAVELI	11	12	1	-	24
DELHI	14	-	1	-	15
GOA	11	6	12	-	29
GUJARAT	36	42	35	-	113
HARYANA	5	18	-	-	23
HIMACHAL PRADESH	-	41	60	3	104
JAMMU & KASHMIR	-	-	9	-	9
JHARKHAND	23	-	13	-	36
KARNATAKA	23	-	22	-	45
KERALA	16	15	79	-	110
LAKSHADWEEP	-	15	1	-	16
MADHYA PRADESH	51	17	37	-	105
MAHARASHTRA	145	30	21	-	196
MANIPUR	-	5	15	-	20
MEGHALAYA	-	5	8	-	13
MIZORAM	-	2	4	-	6
NAGALAND	-	-	8	-	8
ORISSA	19	15	59	-	93
PONDICHERRY	4	15	3	-	22
PUNJAB	-	6	37	-	43
RAJASTHAN	4	37	10	-	51
SIKKIM	-	-	14	-	14
TAMIL NADU	20	2	10	-	32
TRIPURA	-	6	7	-	13
UTTAR PRADESH	64	40	7	-	111
UTTARAKHAND	16	1	9	3	29
WEST BENGAL	9	49	41	-	99
Total : -	**547**	**490**	**657**	**6**	**1700**

1.3.5 River basin wise distribution of Water Quality Monitoring Stations

The number of water quality monitoring stations on each river, its tributary, sub tributary, lake, ponds, tanks, canals, creeks and on groundwater are summarized in Table 1.6 (Annexure-II). Close examination to table 1.6 reveals that

- 764 stations i.e. 44.94 % are located in major River basins.Out of which Ganga is dominating nearly 30.49% of major river basin.
- Medium rivers have 216 stations i.e. 12.70 % where as 107 lakes, 9 tanks and 44 ponds have 170 stations nearly 10 % of total stations.
- Creeks, canals, drains have only 60 stations.
- Next to major river basin, the major locations of monitoring stations are in Ground water i.e. 490 and accounts for 28.82%.

Figure 1.6: River Basin wise distribution of water quality monitoring stations (In Percentage)



1.4 Approach to Water Quality Management

The water quality management in India is accomplished under the provision of Water (Prevention and Control of Pollution) Act, 1974. The basic objective of this Act is to maintain and restore the wholesomeness of national aquatic resources by prevention and control of pollution.It was considered ambitious to maintain or restore all natural water body at pristine level. Planning pollution control activities to attain such a goal is bound to be deterrent to developmental activities and cost prohibitive. Since the natural water bodies have got to be used for various competing as well as conflicting demands, the objective is aimed at restoring and/or maintaining natural water bodies or their parts to such a quality as needed for their best uses.

Thus, a concept of "designated best use" (DBU) was developed. According to this concept, out of several uses a water body is put to, the use which demands highest quality of water is termed as "designated best use", and accordingly the water body is designated. Primary water quality criteria for different uses have been identified. A summary of the use based classification system is presented in Table 1.7.

Table-1.7 Use based classification of surface waters in India

Designated-Best-Use	Class of water	Criteria
DrinkingWater Source without conventional treatment but after disinfection	A	1. Total Coliforms OrganismMPN/100ml shall be 50 or less 2. pH between 6.5 and 8.5 3. Dissolved Oxygen 6mg/l or more 4. Biochemical Oxygen Demand 5 days 20^{o}C 2mg/l or less
Outdoor bathing (Organised)	B	1. Total Coliforms Organism MPN/100ml shall be 500 or less 2. pH between 6.5 and 8.5 3. Dissolved Oxygen 5mg/l or more 4. Biochemical Oxygen Demand 5 days 20^{o}C 3mg/l or less
Drinking water source after conventional treatment and disinfection	C	1. Total Coliforms Organism MPN/100ml shall be 5000 or less 2. pH between 6 to 9 3. Dissolved Oxygen 4mg/l or more 4. Biochemical Oxygen Demand 5 days 20^{o}C 3mg/l or less
Propagation of Wild life and Fisheries	D	1. pH between 6.5 to 8.5 2. Dissolved Oxygen 4mg/l or more 3. Free Ammonia (as N) 1.2 mg/l or less
Irrigation, Industrial Cooling, Controlled Waste disposal	E	1. pH between 6.0 to 8.5 2. Electrical Conductivity at 25^{o}C micro mhos/cm Max.2250 3. Sodium absorption Ratio Max. 26 4. Boron Max. 2mg/l

The water resources of the country were classified according to their designated best uses and a "Water Use Map" was prepared. In order to identify the water bodies or their parts where water quality is at variance with water quality criteria, it was felt important to measure water quality of that water body or its part. It would help in preparation of "Water Quality Map" of India. The idea was to superimpose "Water Quality Map" on "Water Use Map" to identify the water bodies or their parts, which are in need of improvement (restoration). Subsequently through a wide network of water quality monitoring, water quality data are acquired. A large number of water bodies were identified as polluted stretches for taking appropriate measures to restore their water quality. Today almost all policies and programmes on water quality management are based on this concept including the Ganga Action Plan and National River Action Plans.

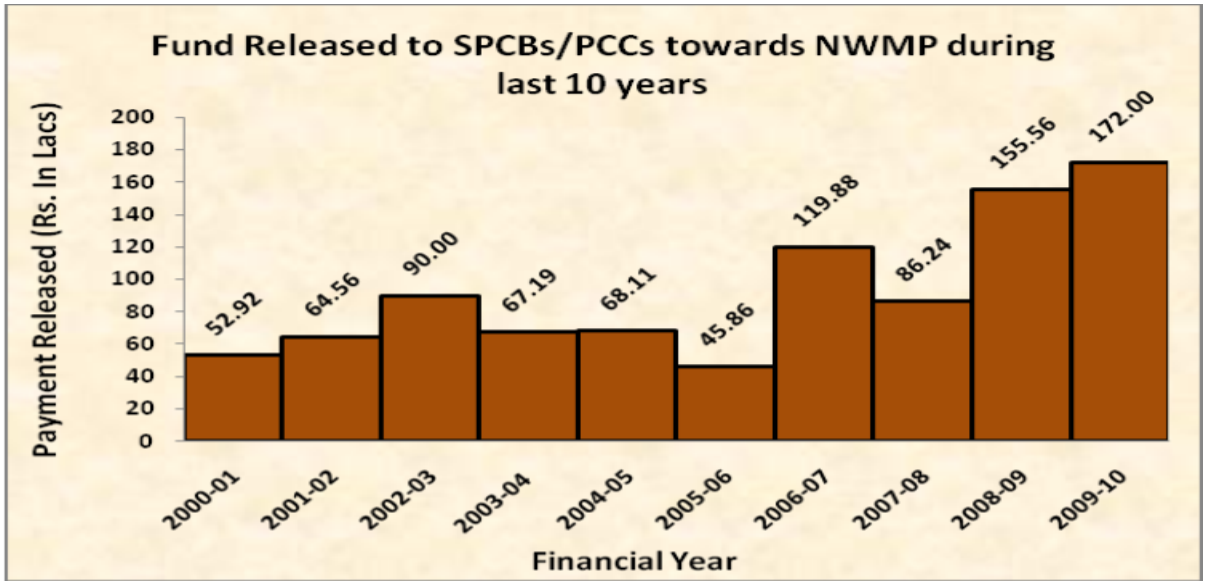
1.4.1 Water Quality Criteria for Bathing Reaches in River

Water Quality Criteria for bathing reaches in Rivers is notified by Ministry of Environment & Forests (MoEF) and is given in Table 1.8.

Table-1.8 Primary Water Quality Criteria for Bathing

CRITERIA	RATIONALE
1. Faecal Coliform MPN/100ml : 500 (desirable) 2500 (Maximum Permissible)	To ensure low sewage contamination. Faecal coliform and faecal streptococci are considered as they reflect the bacterial pathogenicity.
2. Faecal Streptococci MPN/100ml : 100 (desirable) 500 (Maximum Permissible)	The desirable and permissible limits are suggested to allow for fluctuation inenvironmental conditionssuch as seasonal changes, changes in flow conditions etc.
3. pH: Between 6.5-8.5	The range provides protection of the skin and delicate organs like eyes, nose, ears etc. which are directly exposed during outdoor bathing.
4. Dissolved Oxygen: 5 mg/l or more	The minmum dissolved oxygen concentration of 5 mg/l ensures reasonable freedom from oxygen consuming organic pollution immediately U/s which is necessary for preventing production of anaerobic gases (obnoxious gases) from sediments
5. Biochemical Oxygen Demand 3 day, 27°C: 3 mg/l or less	The Biochemical Oxygen Demand of 3 mg/l or less of the water ensures reasonable freedom from oxygen demanding pollutants and prevent production of obnoxious gases.

Figure 1.7: Fund Released to SPCBs/PCCs towards NWMP during last 10 years



CHAPTER II

Water Quality Trend in India

2.1 Water Quality Trend 2009

The water quality monitoring results obtained during 1995 to 2009 indicate that the organic and bacterial contamination are continued to be critical in water bodies. This is mainly due to discharge of domestic wastewater mostly in untreated form from the urban centres of the country. The municipal corporations at large are not able to treat increasing load of municipal sewage flowing into water bodies without treatment. Secondly the receiving water bodies also do not have adequate water for dilution. Therefore, the oxygen demand and bacterial pollution is increasing day by day.

The water quality monitoring results were analysed with respect to indicator of oxygen consuming substances (Bio-chemical Oxygen Demand) and indicator of pathogenic bacteria (Total coliform and Faecal coliform). The result of such analysis shows that there is gradual degradation in water quality. The number of observations having BOD and Coliform density has increased during 1995 to 2009. The water quality status for the period 1995 to 2009 in terms of number of observations having values of parameters in different ranges are given in the figure 2 to figure 4.

2.2 Biochemical Oxygen Demand (BOD)

The numbers of observed BOD values less than 3 mg/l were between 57-69% during year 1995 to 2009. The maximum value of 69% was observed during 2007. It was observed that there was a gradual decrease in number of observations having BOD < 3.

The number of observed BOD values ranges from 3-6 mg/l was between 17-28% during year 1995 to 2009, the maximum value of 28% was observed in the year 1998. It was observed that the number of observations remain unchanged and followed static trend in percentage of observations having BOD between 3-6 mg/l.

The numbers of observed BOD value> 6 mg/l were between 13 and 19% during year 1995-2009 and the maximum value of 19% was observed in the year 2001, 2002 & 2009. It was observed that there was a gradual decrease and in 2009 the percentage observation was 17 % having BOD >6.

2.3 Total Coliform (TC)

The numbers of observed TC values < 500 MPN/100 ml were between 44-63% during 1995-2009. The highest percentage of observations was observed as 63% in year 1999 which decreases to 49% during 2009.

The numbers of observed TC values ranges from 500-5000 were between 28-37% during year 1995-2009 the maximum value of 37% was observed in 1997 and this % was decreased to 36% in 2009.

The numbers of observed TC values > 5000 were between 9-24% during year 1995-2009. Minimum value of 9% was observed during the year 1999. The maximum value of 24% was observed in the year 2006. During 2009 it was observed as 15% indicating decreasing trend.

2.4 Faecal Coliform (FC)

The numbers of observed FC values <500 MPN/100 ml was between 48-70% during year 1995-2009. The maximum value of 70% was observed in the year 2009.

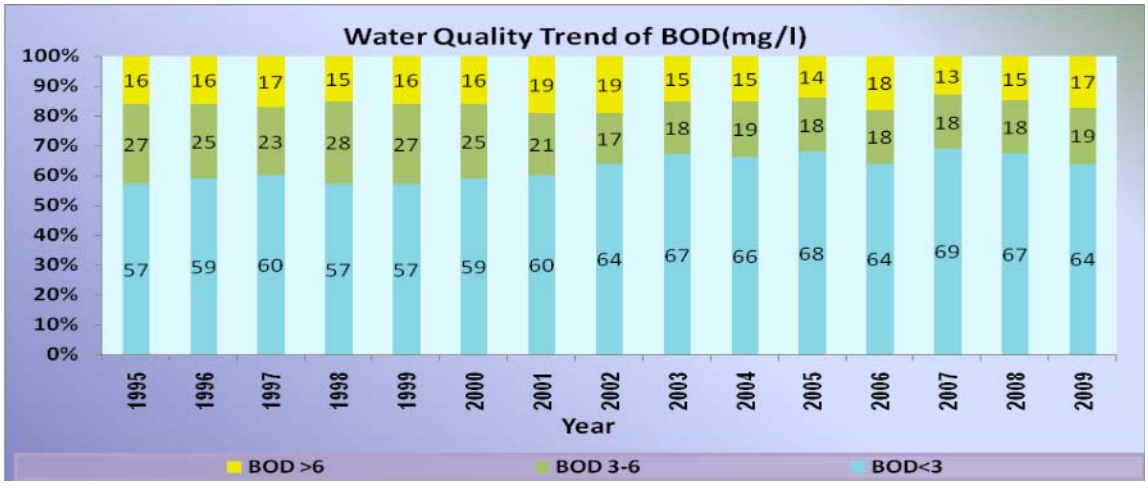
The numbers of observed FC values ranges from 500-5000 MPN/100 ml was between 22-35% during year 1995 to 2009. The maximum value of 35% was observed in the year 1999, which decreases to 20% in the year 2009.

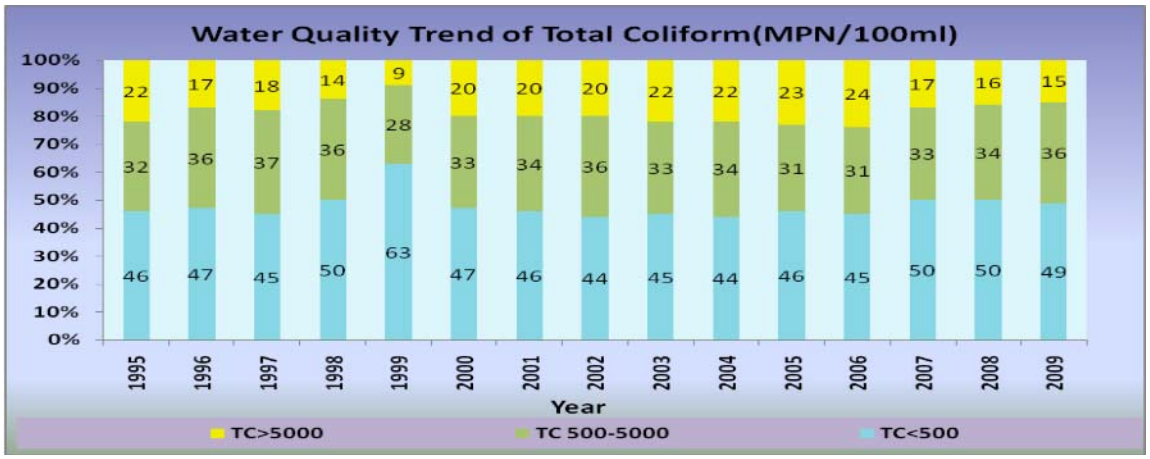
The numbers of observed FC values > 5000 MPN/100 ml was between 7-21% during year 1995-2009. The maximum value of 21% was observed in 2006, which decreases to 10% in the year 2009.

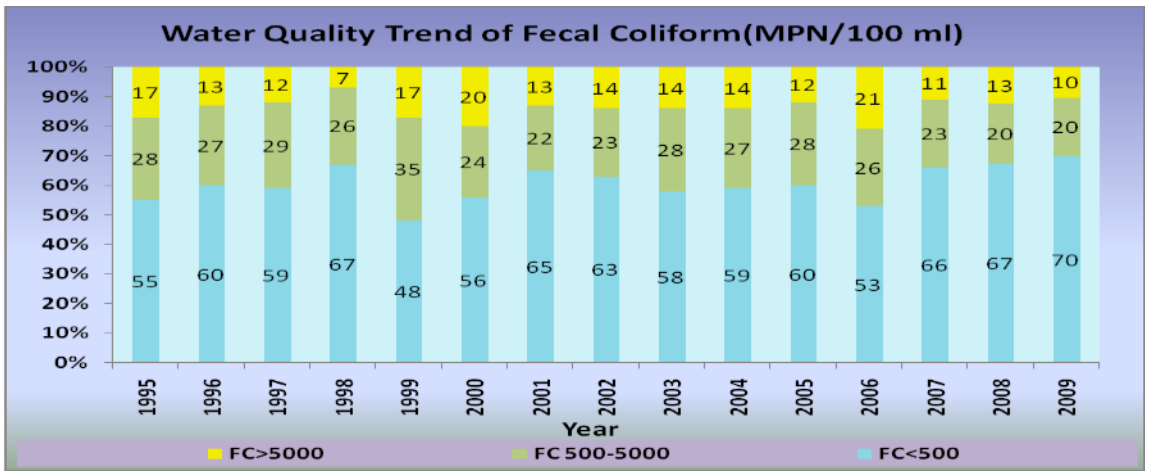
2.5 Water Quality Trend (1995 -2009)

The water quality monitoring results were analysed with respect to indicator of oxygen consuming substances (Bio-chemical Oxygen Demand) and indicator of pathogenic bacteria (Total coliform and Faecal coliform). The result of such analysis shows that there is gradual degradation in water quality. The number of observations having BOD and Coliform density has increased during 1995 to 2009. The water quality status for the period 1995 to 2009 in terms of number of observations having values of parameters in different ranges are given in the figure 2.1.

Figure 2.1: Water Quality Trend of BOD (mg/l), Total Coliform (MPN/100 ml) & Fecal Coliform (MPN/100 ml)







2.6 Water Quality trend of BOD in Rivers

The Water Quality trend of BOD in River Ganga, Yamuna, Sabarmati, Mahi, Tapi, Narmada, Godavari, Krishna, Cauvery, Mahanadi, Brahmani, Baitarni, Subarnarekha, Brahmaputra, Satluj, Beas, Pennar and Ghaggar depicting the data from 2002 to 2009 is presented in figure 2.2 to 2.19.

Figure 2.2: Water Quality Trend of BOD in River Ganga

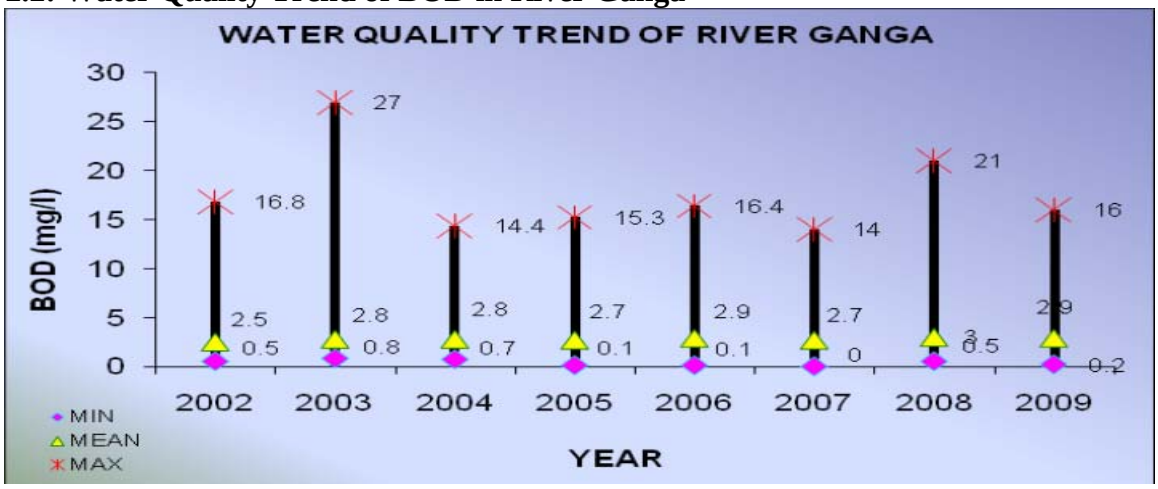


Figure 2.3: Water Quality Trend of BOD in River Yamuna

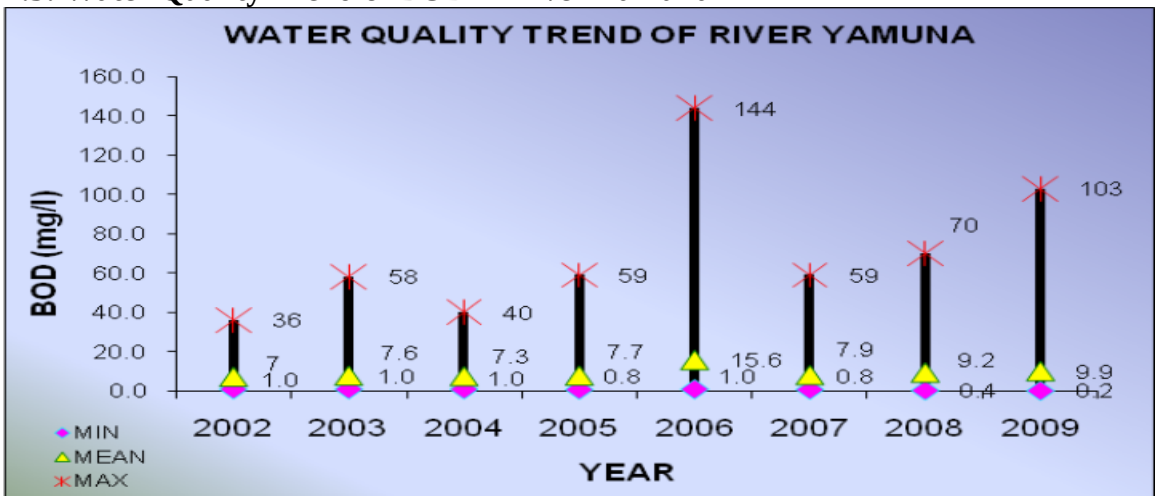


Figure 2.4: Water Quality Trend of BOD in River Sabarmati

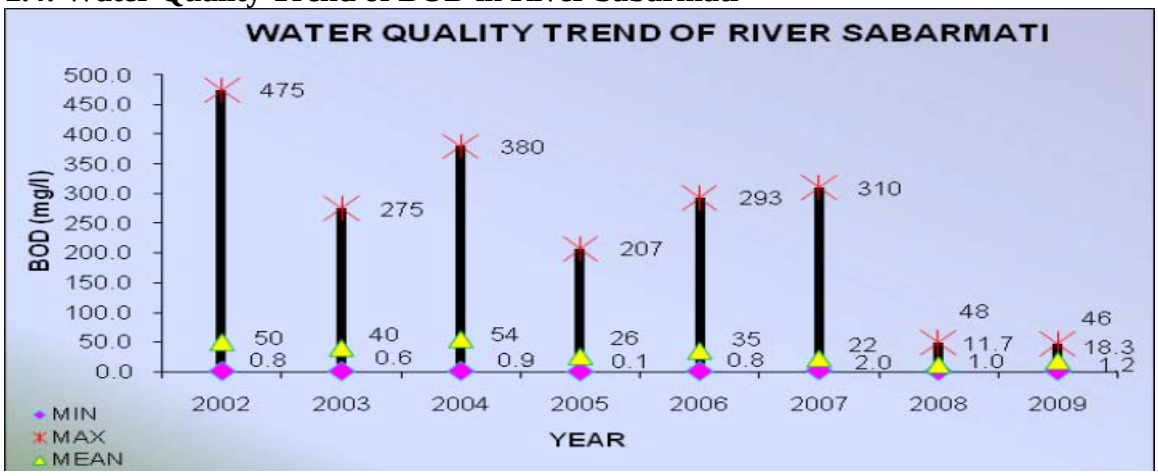


Figure2.5: Water Quality Trend of BOD in River Mahi

Figure 2.6: Water Quality Trend of BOD in River Tapi

Figure 2.7: Water Quality Trend of BOD in River Narmada

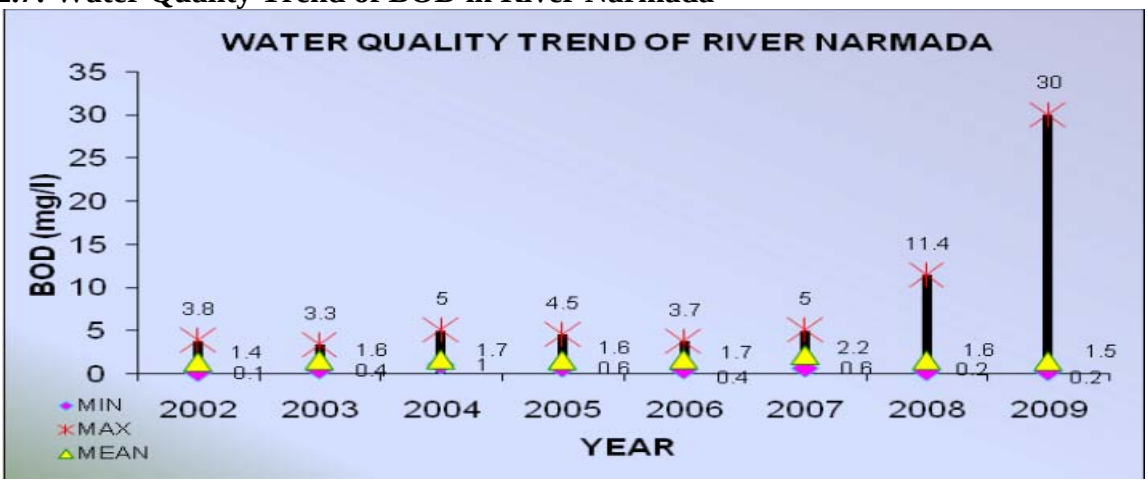


Figure 2.8: Water Quality Trend of BOD in River Godavari

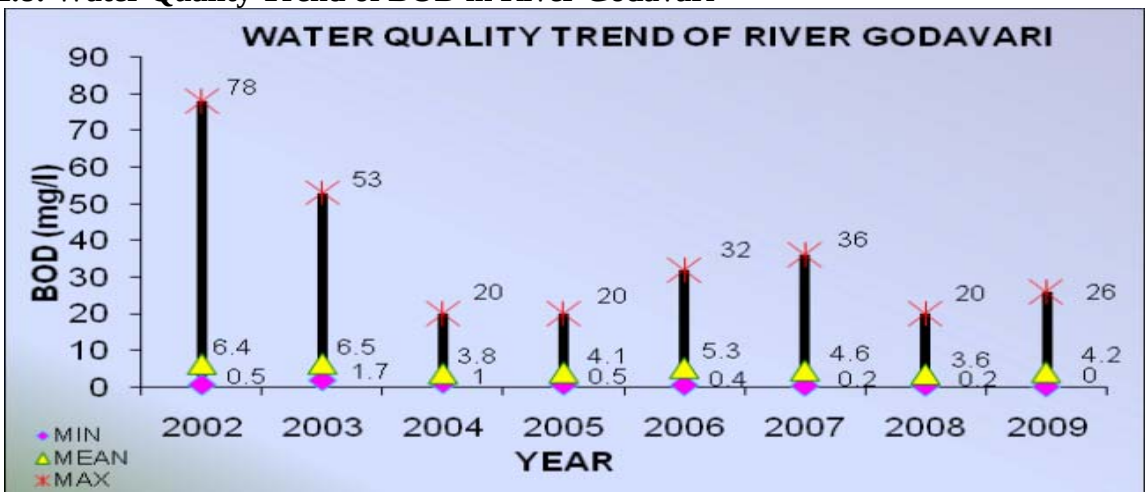


Figure 2.9: Water Quality Trend of BOD in River Krishna

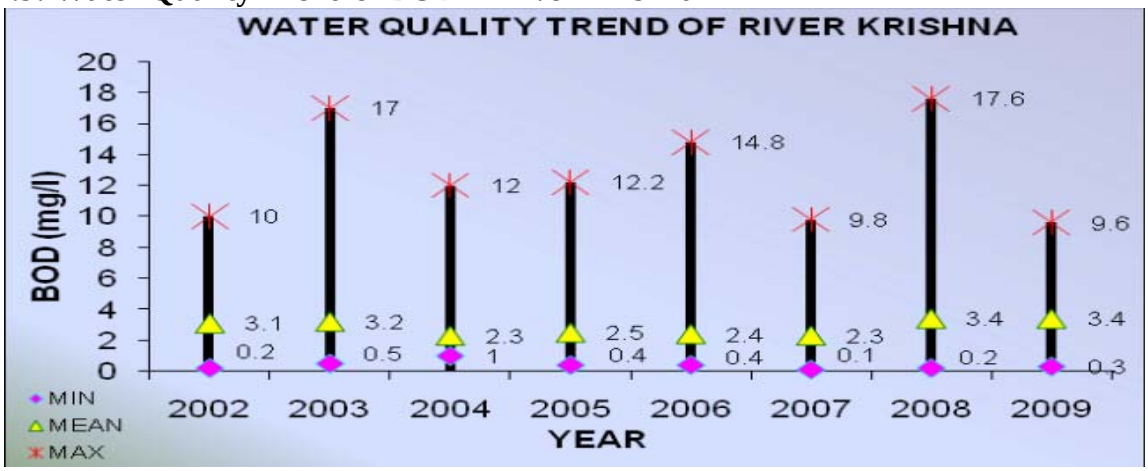


Figure 2.10: Water Quality Trend of BOD in River Cauvery

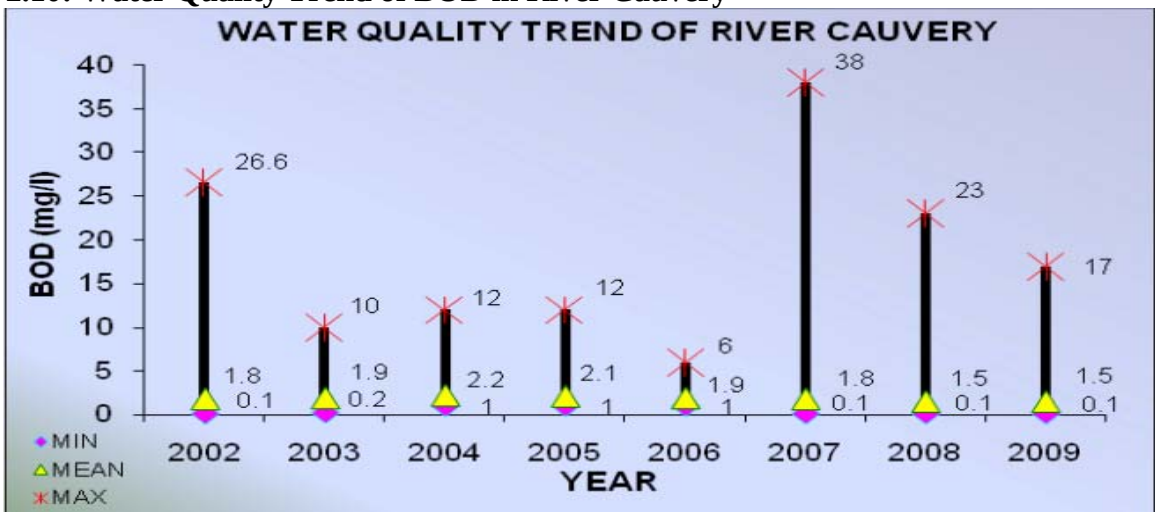


Figure 2.11: Water Quality Trend of BOD in River Mahanadi

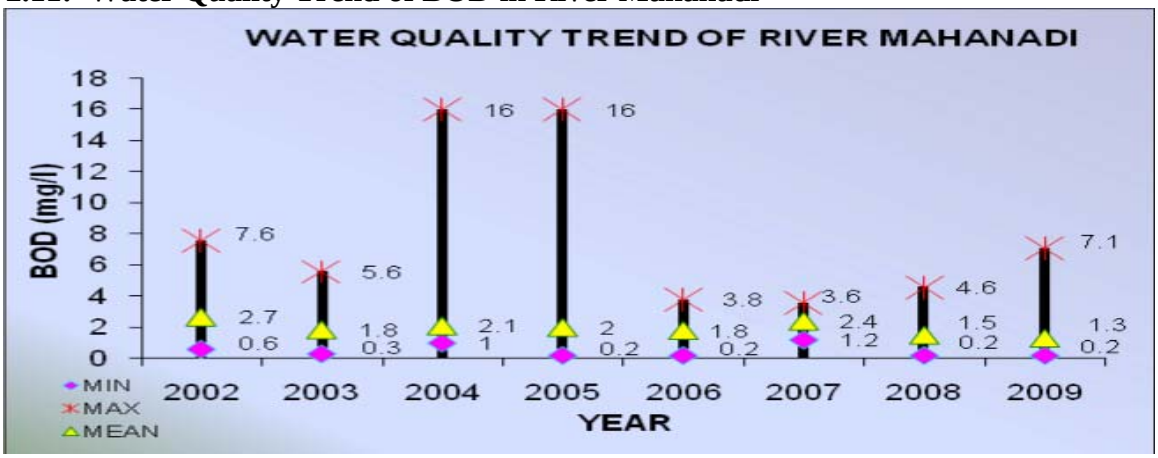


Figure 2.12: Water Quality Trend of BOD in River Brahmani

Figure 2.13: Water Quality Trend of BOD in River Baitarni

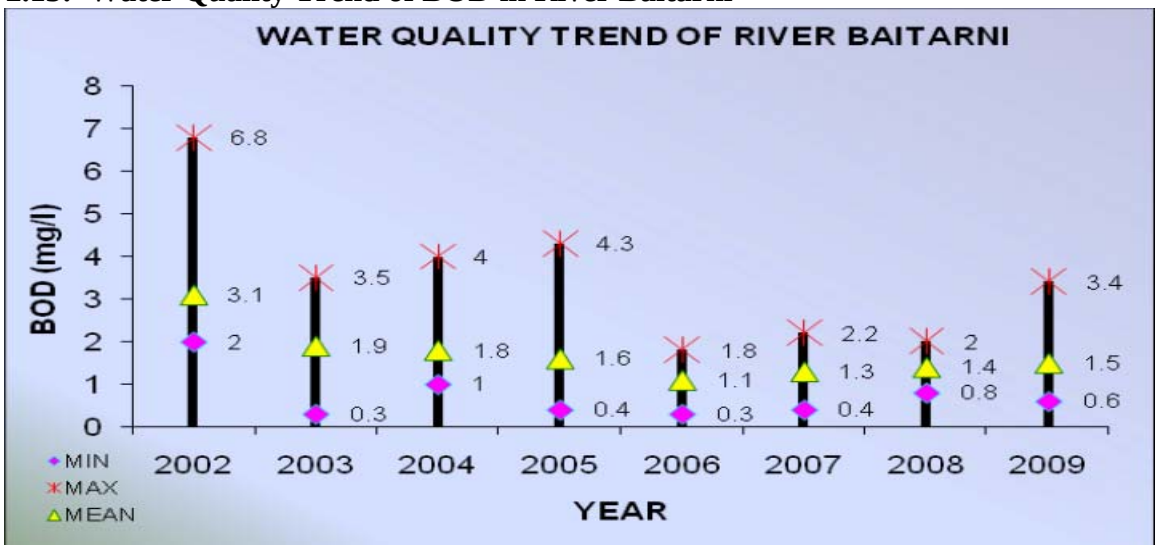


Figure 2.14: Water Quality Trend of BOD in River Subarnarekha

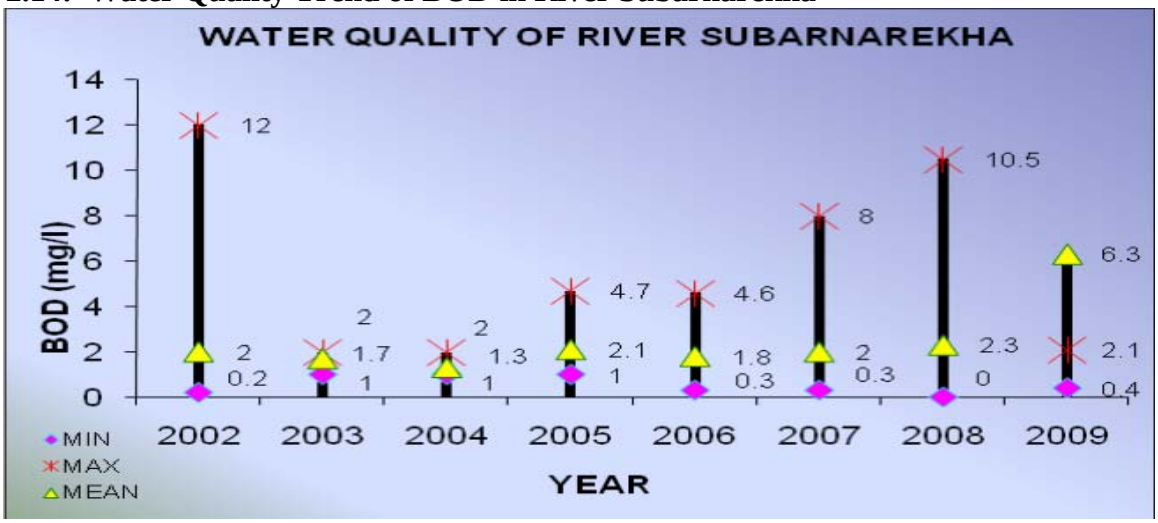


Figure 2.15: Water Quality Trend of BOD in River Brahmaputra

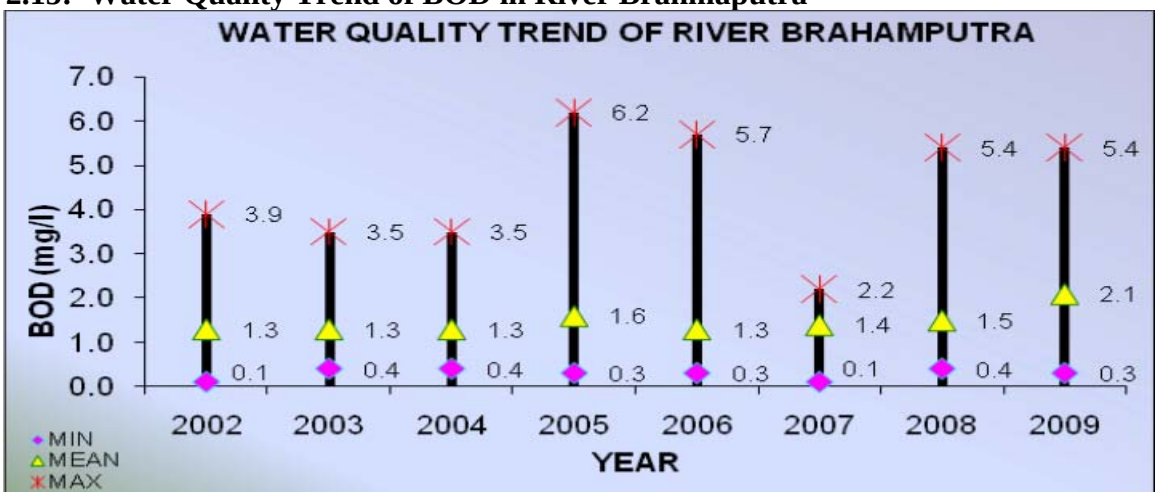


Figure 2.16: Water Quality Trend of BOD in River Satluj

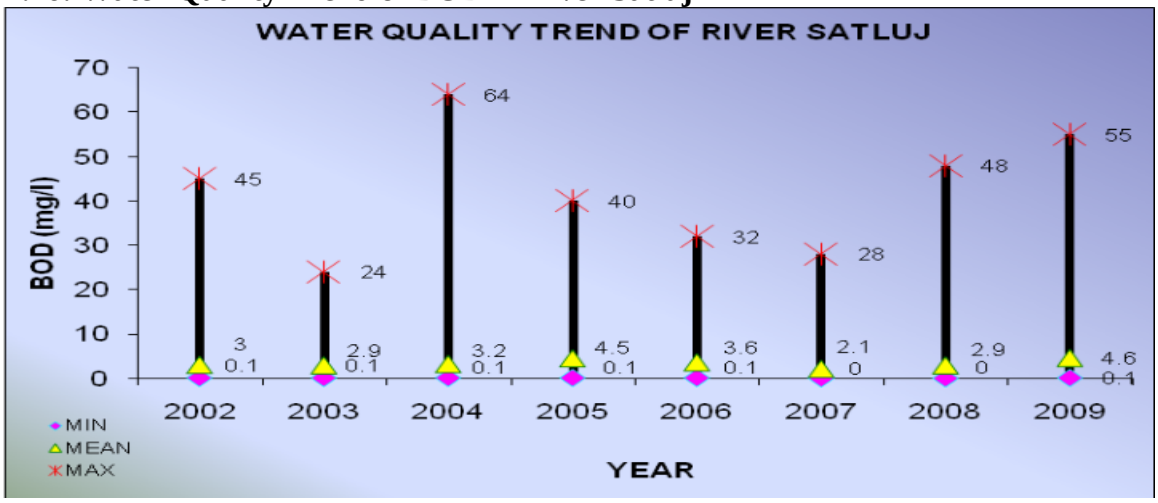


Figure 2.17: Water Quality Trend of BOD in River Beas

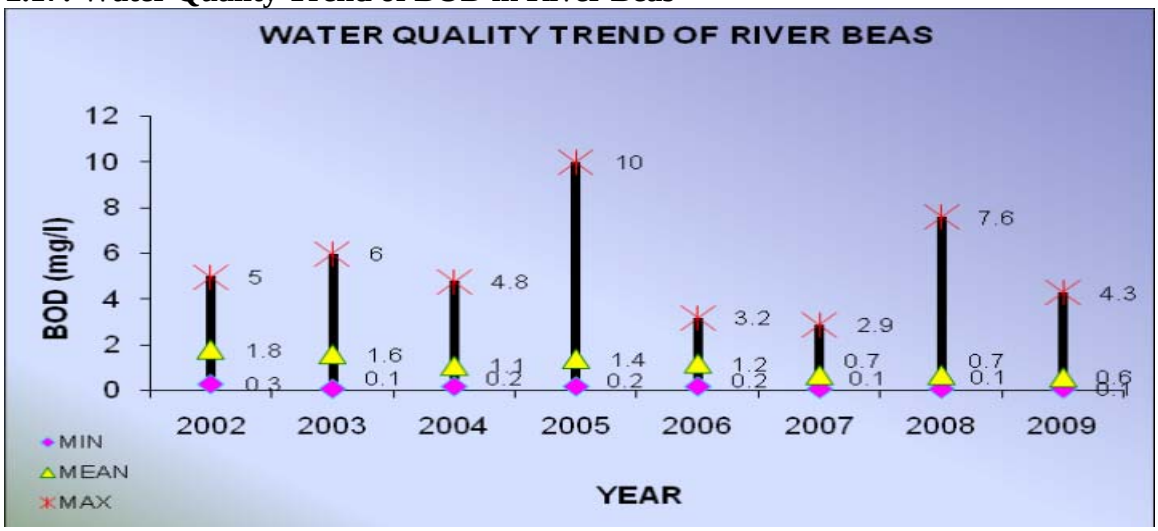


Figure 2.18: Water Quality Trend of BOD in River Pennar

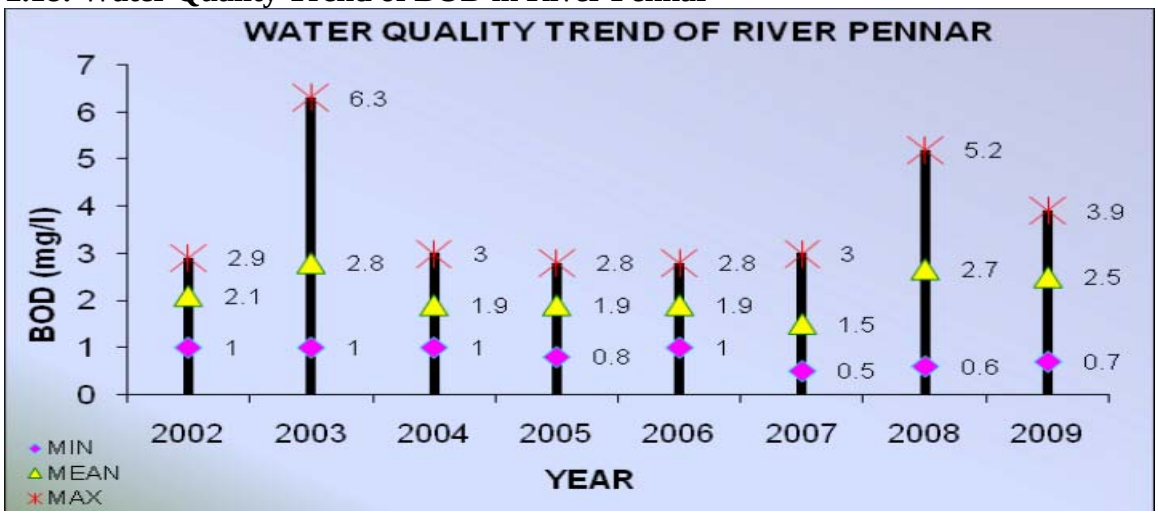
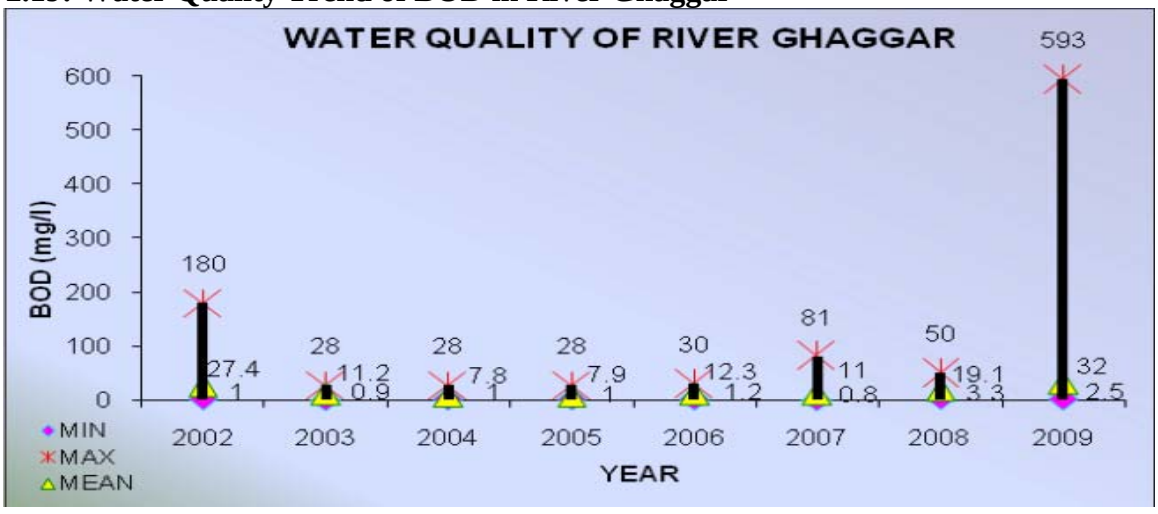


Figure 2.19: Water Quality Trend of BOD in River Ghaggar



CHAPTER III

Water Quality of Rivers at a Glance

3.1 Observed Water Quality

The monitoring results obtained during 2009 under National Water Quality Monitoring Programme reflect that organic matter & bacterial population of faecal origin continue to dominate the water pollution problem in India. The major water quality concerns as revealed from the monitoring results are pathogenic pollution as reflected through indicators i.e. Total Coliforms (TC) & Faecal Coliform (FC), organic matter as reflected through Biochemical Oxygen Demand (BOD) and salinity as reflected through conductivity. The observed range of water quality parameters in major Indian rivers for the year 2009 along with summary for the year 2002, 2003, 2004, 2005, 2006, 2007, 2008 and 2009 is given in Table 3.1 for comparative assessment of water quality trend between the years. A brief overview of these pollution related parameters is provided below.

3.2 Organic and Pathogenic Pollution

The Organic pollution as measured through Biochemical Oxygen Demand (BOD) and Chemical Oxygen Demand (COD) is considerably high; water bodies are saprobic and eutrophicated near large urban centres due to the discharge of partly treated or untreated wastewater. This results in depletion of oxygen in these stretches of water bodies. The rivers and lakes in hilly part of the country are not affected significantly by such pollution, as there are no large urban centres. Although, high BOD is associated with low Dissolved Oxygen (DO), but many times the DO measurement does not reflect such conclusion due to the fact that the DO is measured during daytime when the photosynthetic effects are prominent. In such stretches of water bodies, the diurnal variation in dissolved oxygen is quite large. The dissolved oxygen during daytime increases to super saturation level (sometimes as high as 300% saturation) whereas at night at the same place the dissolved oxygen goes as low as zero mg/l. The pathogenic pollution is one of the major causes for water borne disease. The majority of surface water monitoring locations is found contaminated with high levels of Faecal Coliform bacteria, which are indicators of pathogenic pollution.

The water quality of major rivers varied widely with respect to DO, BOD, Total Coliform (TC) and Faecal Coliform (FC). The level of DO is observed more than 4 mg/l in River Narmada, Brahmaputra, Brahmani, Baitarni, Subernarekha and Ganga throughout the year to sustain aquatic life whereas, the values less than 4 mg/l are observed in stretches of river Amlakhadi, Betwa, Bharalu, Bhima, Bhogavo, Hindon, Kali (W), Kalinadi (E), Karmana, Khan, Khari, Krishna, Mithi, Mula, Mula-Mutha, Musi, Mutha, Pawana, Sabarmati & Yamuna (0.0 mg/l); Mahanadi (0.2 mg/l); Kadambayar (0.3 mg/l); Chambal (0.4 mg/l); Satluj (0.6 mg/l); Gomti (0.7 mg/l); Ghaggar (0.8 mg/l); Dhansiri (1.2 mg/l); Nambul & Vindyadhari (1.3 mg/l); Chitthrapuzha (1.4 mg/l); Cauvery (1.5 mg/l); Lakshmantirtha (1.6 mg/l); Dhadar (1.7 mg/l); Myntdu & Nakkavagu (1.8 mg/l); Churni & Kallai (2.1 mg/l); Digboi & Dikchu (2.5 mg/l); Ghaghara, Kundalika & Triveni Sangam (2.7 mg/l); Indrayani & Sai (2.8 mg/l); Burhidihing & Manjeera (2.9 mg/l);

Kanhan, Kshipra, Mindhola & Purna (3.0 mg/l); Godavari & Uppala (3.2 mg/l); Pennar & Periyar (3.3 mg/l); Wainganga & Wardha (3.4 mg/l); Kalu, Mahi & Tawi (3.5 mg/l); Panchaganga (3.6 mg/l); Ayroor, Ithikkara, Tapi & Kodra Dam (3.7 mg/l); Chathe, Daha, Mogral & Pamba (3.8 mg/l) and at few locations D/s of urban settlements due to discharge of untreated/partially treated municipal wastewater, which is responsible for high oxygen demand.

Very high values of Biochemical Oxygen Demand (BOD) are observed in rivers Markanda (593 mg/l); Damanganga (382 mg/l); Kalinadi (E) (353 mg/l); Kalinadi (W) (203 mg/l); Khan (150 mg/l); Yamuna (103.0 mg/l); Hindon (86.0 mg/l); Mula (56.0 mg/l); Satluj (55.0 mg/l); Bharalu & Mithi (50.0 mg/l); Amlakhadi (49.0 mg/l); Mutha & Musi (48.0 mg/l); Sabarmati (46.0 mg/l); Mula-Mutha (38.6 mg/l); Pawana (37.2 mg/l); Nakkavagu, Kundalika, Wainganga & Kundu (32.0 mg/l); Narmada (30.0 mg/l); Bhima (28.5 mg/l); Kanhan (27.0 mg/l); Godavari (26.0 mg/l); Denwa (25.0 mg/l); Nambul (24.5 mg/l); Karmana, Ghaggar & Swan (24.0 mg/l); Nira (Krishna) (23.0 mg/l); Chambal (22.0 mg/l); Cauvery (17.0 mg/l); Ganga, Purna (Godavari), Shedhi & Kolar (16.0 mg/l); Mindhola & Sukhana (15.0 mg/l); Indrayani (14.8 mg/l); Wardha (14.4 mg/l); Kalu & Kali (14.0 mg/l); Gomti (13.0 mg/l); Chandrabhaga (12.7 mg/l); Kshipra, Tapi, Rangavali & Koel (12.0 mg/l); Bhadar (11.0 mg/l); Bhogavo, Baleshwar Khadi & Jumar (10.0 mg/l); Krishna (9.6 mg/l); Venna (9.2 mg/l); Lakshmantirtha & Girna (9.0 mg/l); Koyna & Betwa (8.8 mg/l); Ramganga (8.4 mg/l); Burhidihing (7.6 mg/l); Deepar Beel (7.2 mg/l); Mahanadi (7.1 mg/l); Myntdu, Sai, Purna & Coringa (7.0 mg/l); Tawi (6.7 mg/l); Kalong (6.6 mg/l); Mora Bharali (6.4 mg/l); Subarnarekha (6.3 mg/l); Digboi (6.1 mg/l) and Triveni Sangam (6.0 mg/l). The relatively low values of BOD are measured in river(s) Brahmaputra, Mahi, Pennar, Baitarni and Brahmani.

In respect of Total Coliform and Faecal Coliform Numbers, River Yamuna leading with highest count of $23x10^9$ MPN/100ml and $21x10^8$ MPN/100ml respectively followed by Kalinadi (W) is ($55x10^7$ MPN/100ml and $4x10^7$ MPN/100ml); Hindon ($38x10^7$ MPN/100ml and $31x10^6$ MPN/100ml); Kalinadi (E) ($35x10^7$ MPN/100ml and $4x10^7$ MPN/100ml); Chambal ($31x10^5$ MPN/100ml and $27x10^4$ MPN/100ml); Mahanadi ($16x10^5$ MPN/100ml and $16x10^4$ MPN/100ml); Damodar ($85x10^4$ MPN/100ml and $7x10^5$ MPN/100ml); Ganga ($65x10^4$ MPN/100ml and $4x10^5$ MPN/100ml); Satluj ($25x10^4$ MPN/100ml and $11x10^4$ MPN/100ml); Churni ($22x10^4$ MPN/100ml and $13x10^4$ MPN/100ml); Teesta ($22x10^4$ MPN/100ml and $11x10^4$ MPN/100ml); Gomti ($17x10^4$ MPN/100ml and $13x10^4$ MPN/100ml); Hundri ($17x10^4$ MPN/100ml and 900 MPN/100ml); Krishna ($17x10^4$ MPN/100ml and 1400 MPN/100ml); Rupnarayan ($17x10^4$ MPN/100ml and $11x10^4$ MPN/100ml); Tunghabhadra ($17x10^4$ MPN/100ml and 1700 MPN/100ml); Barakar ($16x10^4$ MPN/100ml and $9x10^4$ MPN/100ml); Dwarka ($16x10^4$ MPN/100ml and $5x10^4$ MPN/100ml); Kathajodi ($16x10^4$ MPN/100ml and $92x10^3$ MPN/100ml); Kuakhai ($15x10^4$ MPN/100ml and $14x10^3$ MPN/100ml); Ghaggar ($11x10^4$ MPN/100ml and $1x10^4$ MPN/100ml); Khari ($93x10^3$ MPN/100ml and $43x10^3$ MPN/100ml); Tons (HP) ($92x10^3$ MPN/100ml and 7300 MPN/100ml); Karmana ($82x10^3$ MPN/100ml and $63x10^3$ MPN/100ml); Mahananda ($8x10^4$ MPN/100ml and $5x10^4$ MPN/100ml); Matha Bhanga ($8x10^4$ MPN/100ml and $7x10^4$ MPN/100ml); Amlakhadi ($5x10^4$ MPN/100ml and $14x10^3$ MPN/100ml); Baleshwar Khadi ($46x10^3$ MPN/100ml and $28x10^3$ MPN/100ml); Sabarmati ($46x10^3$ MPN/100ml and $15x10^3$ MPN/100ml); Ambika

($43x10^3$ MPN/100ml and 9325 MPN/100ml); Kaveri & Tapi ($39x10^3$ MPN/100ml and $14x10^3$ MPN/100ml); Silabati ($3x10^4$ MPN/100ml and $13x10^3$ MPN/100ml); Mindhola ($28x10^3$ MPN/100ml and $14x10^3$ MPN/100ml); Purna (Godavari) ($28x10^3$ MPN/100ml and $11x10^3$ MPN/100ml); Brahmaputra ($24x10^3$ MPN/100ml and 1100 MPN/100ml); Jalangi & Vindyadhari ($23x10^3$ MPN/100ml and $13x10^3$ MPN/100ml); Brahmani ($22x10^3$ MPN/100ml and $13x10^3$ MPN/100ml); Sai ($22x10^3$ MPN/100ml and $17x10^3$ MPN/100ml); Betwa ($17x10^3$ MPN/100ml and 700 MPN/100ml); Kansi ($17x10^3$ MPN/100ml and $14x10^3$ MPN/100ml); Bhadra ($16x10^3$ MPN/100ml and 1600 MPN/100ml); Bhima ($16x10^3$ MPN/100ml and 9000 MPN/100ml); Godavari ($16x10^3$ MPN/100ml and 90 MPN/100ml); Budhabalanga ($15x10^3$ MPN/100ml and 6300 MPN/100ml); Daya ($14x10^3$ MPN/100ml and 7900 MPN/100ml); Kaljani ($14x10^3$ MPN/100ml and $11x10^3$ MPN/100ml); Nagavalli (9400 MPN/100ml and 4600 MPN/100ml); Kim (9300 MPN/100ml and 4300 MPN/100ml); Ramganga (9300 MPN/100ml and 2300 MPN/100ml); Cauvery (9200 MPN/100ml and 5400 MPN/100ml); Tungha (9000 MPN/100ml and 500 MPN/100ml); Karola (8000 MPN/100ml and 4000 MPN/100ml); Manjeswar (7000 MPN/100ml and 4000 MPN/100ml); Saryu (7000 MPN/100ml and 4600 MPN/100ml); Periyar (6120 MPN/100ml and 880 MPN/100ml); Uppala (6000 MPN/100ml and 4000 MPN/100ml); Mogral (5800 MPN/100ml and 2200 MPN/100ml); Baitarni (5400 MPN/100ml and 2800 MPN/100ml); Kharasrota (5400 MPN/100ml and 3500 MPN/100ml); Shriya (5000 MPN/100ml and 4000 MPN/100ml); Serua (4300 MPN/100ml and 2800 MPN/100ml); Pullur (4000 MPN/100ml and 2500 MPN/100ml) at certain other locations. The river Mahi, Subernarekha, Pennar, Beas and Narmada are relatively clean rivers as the number of Total Coliform and Faecal Coliform count are relatively less than 5000 MPN/100 ml and 2500 MPN/100 ml respectively.

3.3 Other parameters

The results of conductivity measurement revealed that it is conforming to the irrigation requirement in most of the rivers except estuarine parts. The level of conductivity observed in the mainstream of major river basins ranging between 46-81800 μmhos/cm and the higher values are in the estuarine region due to tidal influence. The conductivity values observed as high as 62730 in Vashi Creek at Vashi Bridge, 62420 in Bassein Creek, 60770 in Vashi Creek at Airoli Bridge, 60720 in Thane Creek & 53900 in Mahim Creek whereas in sea water it is observed high at Varsova (64220 μmhos/cm), Gateway of India (64140 μmhos/cm), Charni Road Choupathy (63960 μmhos/cm) & Worli Sea Face (63810 μmhos/cm) in Mumbai region. The hardness varies between 1-7200 mg/L in most of the rivers in the freshwater zones and the highest value is observed in river Mahanadi at Paradeep D/s. Total Alkalinity ranges between 0-1210 mg/L and the highest value is observed in River Markanda. The observed range of Boron in surface waters is 0.01-56.1 mg/l with a highest value in River Deepar Beel in Assam. The concentration of Fluoride observed is Nil-5.0 mg/L during the year and the higher value is observed in Pedda Chevuru in Andhra Pradesh.

3.4 Groundwater Quality

- **Andhra Pradesh** -Conductivity varies from 202.5 to 5620 µmhos/cm. Except few locations, conductivity is meeting the criteria limit for drinking as well as irrigation purposes. The highest value of nitrate is observed in bore well Panchyat Office Bolaram dist Medak (45.13 mg/l).
- **Assam, Meghalaya, Mizoram and Tripura-** Conductivity varies from 127- 3940 µmhos/cm and is meeting the criteria limit for drinking as well as irrigation purposes at majority of monitoring locations. The concentration of Nitrate (NO_3^-) is observed in the range of 0.02-6.01mg/l.
- **Chattisgarh and Madhya Pradesh-** Conductivity varies from 473 – 3070 µmhos/cm whereas the concentration of Nitrate (NO_3^-) is observed in the range of 0.66- 9.64 mg/l and the highest value is observed at Dosigaon, Ratlam region in Madhya Pradesh.
- **Himachal Pradesh, Chandigarh and Punjab-** Conductivity varies from 51.7 – 1282.5 µmhos/cm and the level of Nitrate (NO_3^-) is observed in the range of 0.02-13.41 mg/l.
- **Kerala-** Conductivity varies from 70 - 1437 µmhos/cm and is meeting the criteria limit for drinking as well as irrigation purposes. The concentration of Nitrate (NO_3^-) is observed in the range of 0.07-8.95 mg/l.
- **Orissa-** Conductivity varies from 102.5-1099 µmhos/cm. The concentration of Nitrate (NO_3^-) is observed in the range of 0.31- 9.19 mg/l.
- **Pondicherry and Tamil Nadu-** Conductivity varies from 166.5-2006 µmhos/cm and the higher values are due to sea water ingress in coastal tract. Nitrate is observed in the range of 0.24-95.18 mg/l.
- **Daman, Maharashtra and Gujarat**- Conductivity varies from 211 - 30300 µmhos/cm and higher values are attributed to concentrated industrial activities. The concentration of Nitrate is observed in the range of 0.1-12.29 mg/l.
- **Rajasthan**- The conductivity varies from 710 - 20500 µmhos/cm and the salinity is attributed to saline soils. The concentration of Nitrate (NO_3^-) is observed in the range of 0.4- 6.82 mg/l.
- **Uttar Pradesh and Uttarakhand-** Conductivity varies from 410 - 1142 µmhos/cm whereas the concentration of Nitrate (NO_3^-) is observed in the range of 0.26 – 18.6 mg/l.
- **Bihar-**Conductivity varies from 294-1105 µmhos/cm whereas the concentration of Nitrate (NO_3^-) is observed in the range of 0.22- 1.8 mg/l.
- **West Bengal-** Conductivity varies from 133-10824 µmhos/cm and the higher concentrations are in the vicinity of estuarine zone. The concentration of Nitrate (NO_3^-) is observed in the range of 0.1- 1.08 mg/l.

Table 3.1: Water Quality in Indian Rivers during the years – 2002, 2003, 2004, 2005, 2006, 2007, 2008 and 2009

Name of the River	Length (Km)	No of Monitoring locations	Year	Observed Range of Water Quality Parameters							
				Temp. (^{0}C)	pH	Conductivity (μmhos/cm)	DO (mg/l)	BOD (mg/l)	COD (mg/l)	Total Coliform (MPN/100 ml)	Faecal Coliform (MPN/100 ml)
Ganga	2525	34	2002	3-34	6.4-9.0	19-2720	2.7-11.5	0.5 – 16.8	1-30	300-25x10^5	20-11x10^5
		34	2003	4-34	6.8-8.9	49-1323	4-11	0.8-27	2-47.2	47-45x10^5	26-12x10^5
		34	2004	5-35	7-8.8	72-4080	0.3-13.2	0.7-14.4	-	11-45x10^5	11-7x10^5
		39	2005	4-39	6.1-9	23-1696	3.2-12.8	0.1-15.2	1.0-37.6	13-45x10^5	13-11x10^5
		39	2006	9-33	7.0-8.88	97-5620	2.2-11.9	0.1-16.4	4-38.4	1-25x10^5	17-11x10^5
		39	2007	4-33	6.1-8.8	23-5040	1.4-11	0-14	2.6-30	0-28x10^5	0-7 x10^5
		39	2008	2.5-35.5	6.1-8.9	39-6320	1.2 - 11.6	0.5-21.0	1-34	0- 101 x10^5	0 - 85 x10^4
		57	**2009**	**4-37**	**6.5-8.9**	**68-4460**	**4.3-11.2**	**0.2-16**	**2-34.2**	**2-65 x10^4**	**0-4 x10^5**
Yamuna	1376	23	2002	3-34	6.7-9.8	56-1959	0.1-22.7	1.0 – 36	1-112	27-26.3x10^6	11-17.2x10^5
		23	2003	2-38	6.6-10	45-3500	0.3-22.8	1-58	1-187	110-171x10^7	40-203x10^6
		23	2004	7-35	6.8-9	76-2150	0.3-19.5	1-40	-	21-1103x10^6	18-62x10^6
		23	2005	11-37	6.8-9.1	90-2290	0.5-17.3	0.8-59	1-180	14-307x10^6	11-52x10^5
		23	2006	4-34	7.14-9.5	220-1876	1.3-18.8	1.0-144	4-240	7-231x10^7	2-13x10^6
		23	2007	6.5-34	5-8.4	57-1940	0-17.7	0-93	1.0-407	0-32 x10^7	0-23 x10^6
		23	2008	7.5-32	6.8 - 9.5	40-3340	0.0 - 20.6	0.4-70.0	1-224	0 - 103x10^6	11 -109x10^5
		27	**2009**	**5-35**	**7.0 - 8.8**	**80 - 3040**	**0.0 - 17.9**	**0.2 - 103**	**2-115**	**4 - 23 x10^9**	**9 - 21 x10^8**
Sabarmati	371	8	2002	12-32	2.9-8.6	269-13530	0.6-7.9	0.8 – 475	4-1794	210-28x10^5	28-28x10^5
		8	2003	22-33	5.6-8.5	278-7270	1.2-9.8	0.6-275	4-803	9-11x10^6	4-46X10^5
		8	2004	26-35	6.6-8.8	286-4090	0.7-10.2	0.9-380	-	28-46X10^4	20-24X10^4
		9	2005	24-33	6.4-8.5	154-4290	0.3-11.5	0.1-207	12-95	15-11x10^5	9-11x10^5
		9	2006	20-34	6.79-8.67	256-3970	0.2-14.7	0.8-293	9-825	9-110x10^5	4-11x10^5
		9	2007	23-29	4.0-7.56	292-2920	0-8.0	2-310	16-203	43-75 x10^3	15-15 x10^3
		9	2008	22-33	6.9-8.7	191-3200	0-11.8	1-48	4-166	15- 21 x10^5	4-43 x10^3
		9	**2009**	**25-31**	**7.3-8.7**	**253-3200**	**0-8.9**	**1.2-46**	**36-44**	**240-46000**	**80-15000**
Mahi	583	7	2002	19-34	7.1-9.2	175-5720	0.2-8.5	0.1 – 3.0	9-163	3-2400	3-75
		7	2003	18-34	7-8.8	97-750	2.9-10.1	0.5-3.9	7-38	4-2400	2-28
		7	2004	20-34	7.4-9.2	166-650	2.7-8.7	0.3-4.9	-	4-1600	2-28
		9	2005	20-32	7.5-9	182-7080	4.1-11.1	0.2-5.9	3-18	3-14x10^3	2-1x10^3
		9	2006	16-28	7.2-8.9	263-580	7.3-12.1	1.1-8.5	-	3-180	2-9
		9	2007	20-31	7.6-8.89	234-3720	0.4-10.7	0.3-5.7	2.5-20	4-160	0-11
		9	2008	20- 32	7.2-8.9	225-1660	4.6-13	0.2-6.8	7- 14	0-210	0- 18
		9	**2009**	**22-32**	**7.1-10**	**160-766**	**3.5-8.6**	**0.1-4.0**	**6-13**	**3-170**	**0-9**

Name of the River	Length (Km)	No of Monitoring locations	Year	Observed Range of Water Quality Parameters							
				Temp. (^{0}C)	pH	Conductivity (μmhos/cm)	DO (mg/l)	BOD (mg/l)	COD (mg/l)	Total Coliform (MPN/100 ml)	Faecal Coliform (MPN/100 ml)
Tapi	724	10	2002	20-40	7.4-9.0	76-700	4.8-8.8	0.6 – 10.0	8-40	40-2100	2-210
		10	2003	18-36	3.1-9.2	119-1130	3.1-10.4	1-10	10-44	30-930	2-230
		10	2004	13-39	3.1-9.5	190-790	1.2-8.7	0.7-36	-	$3\text{-}5X10^5$	$2\text{-}9X10^4$
		13	2005	26-30	7.2-9.4	186-1084	4-8.4	1-25.1	-	$2\text{-}46X10^4$	$2\text{-}15X10^4$
		13	2006	14-31	7.7-9.28	161-923	4.6-9.7	0.3-24	5-47	$5\text{-}11X10^4$	$2\text{-}11X10^4$
		14	2007	23-39	7.3-8.5	210-581	3.7-8.7	1.1-25	9-36	17-46 $x10^3$	7-15 $x10^3$
		14	2008	19-41	6.6-8.9	132-26000	2.1- 8.8	0.1-21	7-28	0-46 $X10^4$	0-24 $X10^4$
		14	**2009**	**18-42**	**6.2-8.9**	**173-45400**	**3.7-8.2**	**0.6-12**	**6-68**	**14-39000**	**0-14000**
Narmada	1312	14	2002	-	6.9-9.3	102-1341	5.8-9.8	0.1 – 3.8	6-47	9-2400	2-64
		14	2003	12-31	7.1-8.5	95-441	4.5-9.5	0.4-3.3	7-29	4-1600	1-110
		14	2004	15-34	7-8.6	181-815	5.5-9.6	0.2-3.8	-	3-2400	2-15
		15	2005	21-30	3.3-9	190-1746	4.8-10.9	0.6-4.5	12-18.3	3-2400	2-210
		15	2006	9-32	7.1-8.6	188-682	6.2-11	0.4-3.7	3-50	3-2400	0-39
		15	2007	19-31	7.5-8.8	244-1629	6.2-10.4	1.2-3.5	3.0-19. 3	7-1600	0-15
		21	2008	14-32	6.8-10	180-853	4.9- 13	0.2 -11.4	5- 46	0-2400	0-140
		21	**2009**	**17-33**	**6.5-8.9**	**178-1930**	**4.2-11.5**	**0.2-30**	**6-60**	**2-1600**	**0-90**
Godavari	1465	11	2002	22-35	7.0-9.0	118-1400	3.1-10.9	0.5 – 78.0	3-96	8-5260	2-3640
		11	2003	22-37	7.1-8.7	115-1350	3.2-9.3	1.7-53	5-188	70-68200	3-1400
		11	2004	21-35	6.5-9	86-1290	2.4-9.2	0.2-15	-	4-22 x 10^4	2-5 x 10^4
		18	2005	23-32	6.7-9.1	121-1300	0.8-8.7	0.5-20	4.0-80	2-33 x 10^3	1-10 x 10^3
		18	2006	19-34	6.65-9.11	75-691	1.1-9.6	1.2-32	3-36	2-31 x 10^3	2-6 x 10^3
		18	2007	20-37	5.9-8.9	126-918	3.2-7.5	0.2-36	2-16	0-2200	5-36 $x10^3$
		35	2008	13-35	5.2-9.6	114-3994	1.2-11.3	0.2-20	4.0-24	3-28 $x10^3$	0-800
		35	**2009**	**15-41**	**6-9.2**	**115-3169**	**3.2-12.3**	**0.0-26**	**0.4-64**	**5-16000**	**0-340**
Krishna	1401	17	2002	18-33	6.8-9.5	28-11050	2.9-10.9	0.2 – 10.0	3-88	17-33300	3-1 x 10^3
		17	2003	18-35	6.7-8.9	36-40000	0.7-12.6	0.5-17	10.5-68	6-7 x 10^4	2-2 x 10^4
		17	2004	18-38	6.7- 9	71-44000	0.4-9.2	0.3-9	-	15-124 x 10^3	3-28 x 10^3
		21	2005	24-37	6.5-9.9	69-43300	1.4-8.8	0.4-40	4-44	17-84 x 10^3	1-34 x 10^3
		19	2006	15-40	6.32-9.30	76-2580	3.0-8.5	0.4-14.8	4-32.4	4-86 x 10^3	1-6 x 10^3
		19	2007	13-38	6.2-9.1	69-23400	3.0-10	0.1-9.8	4.0-48	0-71x10^3	0-1600
		22	2008	17.3-39	5.8-8.9	44-14290	1.1-9.8	0.2-17.6	4.0-40	8-16 x 10^3	0-3 x 10^3
		22	**2009**	**18.4-41**	**6.7-9.0**	**75-19960**	**0-12.6**	**0.3-9.6**	**4.0-45**	**8-170000**	**0-1400**

Name of the River	Length (Km)	No of Monitoring locations	Year	Observed Range of Water Quality Parameters							
				Temp. (^{0}C)	pH	Conductivity (μmhos/cm)	DO (mg/l)	BOD (mg/l)	COD (mg/l)	Total Coliform (MPN/100 ml)	Faecal Coliform (MPN/100 ml)
Cauvery	800	20	2002	21-37	2.0-9.2	31-53100	0.1-12.6	0.1 – 26.6	30	39-16 x 10^3	2-28 x 10^3
		20	2003	8-34	7-9.2	42-57200	2.1-13.5	0.2-10	16-128	4-22 x 10^3	2-4 x 10^3
		20	2004	19- 35	6.6-9	35-39720	3.3-9.9	1-9	-	2-5 x 10^4	2-17 x 10^3
		20	2005	20-37	6.2-9.5	28-48700	0.3-9.8	1-12	16-96	2-9500	1-3 x 10^3
		20	2006	20-34	7.0-9.3	26-1694	2.7-8.9	1-6	8-24	90-3500	3-1400
		20	2007	19-32	6.5-8.8	28-56500	0-12.4	0.1-38	8-45	40-28 x10^3	4-17 x10^3
		20	2008	20-35	6.5-8.8	27-28700	0.6-14	0.1-23	10-35	27-5400	0-3500
		20	**2009**	**20-34**	**6.5-8.9**	**65-81800**	**1.5-10.3**	**0.1-17**	**12-48**	**7-9200**	**2-5400**
Mahanadi	851	16	2002	18-38	7.3-8.9	114-15940	1.3-10.4	1.0 – 7.6	7-39	15-30000	50-17000
		16	2003	17-37	6.5-8.6	77-83600	4.7-10.1	0.3-5.6	10-70	4-35X10^3	50-28X10^3
		16	2004	17- 34	6.3-8.8	105-20700	4.4- 9.4	0.2-4	-	3-92X10^3	27-24X10^3
		21	2005	22-34	6.1-8.7	75-36279	4.5-10	0.2-16	4-150	3-92X10^3	78-54X10^3
		21	2006	20-32	6.97-8.9	113-34587	4.7-8.5	0.2-3.8	20-40	14-92X10^3	68-54X10^3
		21	2007	26-33	7.3-8.54	102-813	6.2-8.9	1.2-3.6	2.8-30	27-35 x10^3	700-17 x10^3
		22	2008	18-36	6.7-8.8	109-29400	0.8-8.9	0.2-4.6	3-87.4	15-16 x10^4	310- 54 x10^3
		22	**2009**	**17-39**	**6.7-8.8**	**103-48830**	**0.2-11**	**0.2-7.1**	**3.2-28**	**5-1600000**	**110-160000**
Brahamani	799	11	2002	20-38	7.0-8.4	81-376	5.2-9.8	1.5 – 6.0	8-13	80-90000	40-60000
		11	2003	17-35	6.6-8.4	69-501	6.1-10.2	0.2-6	4.2-4.2	90-24x10^3	60-14x10^3
		11	2004	16-28	6.3-8.4	47-402	6-9.6	0.2-7	-	490-28x10^3	22-13x10^3
		11	2005	16-34	6.3-8.7	65-850	5.1-13.8	0.3-5.2	4-32.6	490-16x10^4	330-16x10^4
		11	2006	18-32	6.9-8.4	102-380	4.6-8.9	0.3-5.4	8-20.2	940-5400	630-2400
		15	2007	20-40	6.7-8.5	91-582	1.9-8.9	0.3-4.9	5.1-64	210-54 x10^3	110-22 x10^3
		16	2008	18-38	6.4-8.4	93- 664	5.3- 9.7	0.4-6.2	3.9-84.2	750-21 x10^3	110- 14 x10^3
		16	**2009**	**12-40**	**6.6-8.5**	**70-431**	**4.5-18.3**	**0.2-5.8**	**2.5-37.4**	**940-22000**	**460-13000**
Baitarni	-	5	2002	24-36	7.3-8.3	54-78400	6.8-9.3	2.0 – 6.8	7	900-22000	700-11000
		5	2003	18-36	6.7-7.8	75-54802	5.4-11.3	0.3-3.5	-	330-16x10^3	230-9x10^3
		5	2004	18-32	6.6-8.1	64-29118	5.9-9.8	0.4-2.6	-	640-92000	310-35x10^2
		5	2005	24-34	7-8.6	68-42257	5.2-8.8	0.4-4.3	12.9-20.4	790-24x10^3	3330-11x10^3
		5	2006	15-25	7.6-8.4	90-2287	7.4-8.0	0.3-1.8	-	1400-4300	790-1700
		5	2007	22-35	7.3-8.2	136-19450	5.6-8.8	0.4-2.2	6-20.9	330-5400	170-2200
		5	2008	22-36	7.5-8.2	75-48400	6.3-9.2	0.8-2	5.9-19.9	940-5400	700-3500
		5	**2009**	**25-38**	**6.7-8.4**	**69-28400**	**6.1-9.0**	**0.6-3.4**	**3.9-22.2**	**630-5400**	**230-2800**

Name of the River	Length (Km)	No of Monitoring locations	Year	Observed Range of Water Quality Parameters							
				Temp. (^{0}C)	pH	Conductivity (μmhos/cm)	DO (mg/l)	BOD (mg/l)	COD (mg/l)	Total Coliform (MPN/100 ml)	Faecal Coliform (MPN/100 ml)
Subarnarekha	395	6	2002	18-36	6.5-8.0	113-355	5.2-8.5	0.2 – 12.0	4-96	150-1800	70-540
		6	2003	22-35	7.3-8.3	133-346	6.4-8.4	1-2	-	300-7900	130-3300
		6	2004	24-28	7.8-8.3	152-623	7.1-7.5	0.4-2.5	-	470-2200	270-700
		6	2005	20-36	6.8-8.3	130-405	5.5-8.6	1.0-4.7	4-38	110-1400	78-700
		6	2006	19-34	6.9-7.9	192-15013	5.8-8.2	0.3-4.6	8.0-68	2200	1300
		6	2007	19-37	6-8.1	134-740	4.6-8.7	0.9-8.0	4-100	540-2400	200-920
		12	2008	19-35.5	6.5-8.0	119-332	5.1-8.9	0.0-10.5	3.9-102	540-3500	200-1700
		12	**2009**	**19.5-40**	**6.4-8.4**	**164-717**	**4.0-8.5**	**0.4-6.3**	**4-104**	**280-2400**	**70-1300**
Brahmaputra	916	6	2002	15-32	6.5-9.0	104-684	1.1-10.5	0.1 – 3.9	6-11	360-240000	300-24000
		6	2003	14-32	6.4-8.4	77-570	1.2-11.5	0.4-3.5	4.8-27.4	360-24x10^4	300-24x10^4
		6	2004	15-34	5.2-9	91-445	1.1-9.4	0.4-4.3	-	360-24x10^4	300-24x10^4
		10	2005	-	5.9-7.6	20-408	2-10.5	0.3-6.2	-	300-24x10^4	150-24x10^4
		10	2006	18-30	6.9-8.0	55-485	4.2-10.2	0.3-5.7	3.0-47.2	1-24x10^4	300-24x10^4
		10	2007	18-32	5.9-7.9	76-645	5.1-10	0.1-3.4	3.1-15.4	0-24 x10^4	0-24 x10^4
		10	2008	12-32	6.1-8.1	75-460	3.3-9.6	0.4-5.4	6.1-12.1	1-24 x10^4	0-24 x10^3
		10	**2009**	**17-31**	**6.1-8.1**	**69-303**	**4.4-10.5**	**0.3-5.4**	**4.3-13.5**	**1-24000**	**0-1100**
Pennar	597	4	2002	-	7.5-8.7	364-978	6.0-9.3	1.0 – 2.9	14-16	-	-
		4	2004	23-33	7.6-8.4	401-1035	3.3-8.8	0.6-4.8	14-16	120-2400	3-3
		5	2005	27-30	7.8-8.8	447-2340	3.8-8	0.8-2.8	12-13.2	16-2790	2-35
		5	2006	20-30	6.9-8.2	438-1933	3.0-6.8	10-2.8	-	20-62x10^3	1-960
		5	2007	21-31	7-8.7	250-1916	2.8-7.8	0.5-3.0	10-12	14-50x10^3	2-110
		5	2008	24-33	7-8.7	226-1173	5-10.5	0.6-5.2	5-16	22-3500	4-140
		5	**2009**	**23-32**	**6.6-8.6**	**307-2450**	**3.3-10**	**0.7-3.9**	**5-24**	**9-3500**	**2-140**
Satluj	1078	20	2002	9-32	6.8-8.8	131-819	3.8-11.4	0.1 – 45.0	1-80	8-35000	2-3500
		20	2003	5-30	6.9-8.9	164-1226	3.4-11.5	0.1-24	0.8-61	3-3x10^4	1-1300
		20	2004	9-29	7.1-8.3	144-694	1.6-10.3	0.1-64	-	7-2x10^5	2-9x10^4
		21	2005	10-28	7.1-8.3	150-818	2.8-14.2	0.1-40	2.8-60	1-35x10^4	1-11x10^4
		21	2006	7-28	7.1-8.26	160-958	2.8-10.6	0.1-32	1.6-68	1-17x10^4	1-5x10^4
		21	2007	2-26	7-8.6	145-865	3.2-11.9	0-28	1.6-76	3-17 x10^4	0-9 x10^4
		21	2008	4.5-23	7.0-8.5	162-843	1.2 - 12.4	0.0-48	1.0-172	12- 11 x10^4	0 - 10 x10^3
		22	**2009**	**7.5-26**	**6.3-8.5**	**124-932**	**0.6-11.4**	**0.1-55**	**1.4-128**	**4-250000**	**0-110000**

Name of the River	Length (Km)	No of Monitoring locations	Year	Observed Range of Water Quality Parameters							
				Temp. (^{0}C)	pH	Conductivity (μmhos/cm)	DO (mg/l)	BOD (mg/l)	COD (mg/l)	Total Coliform (MPN/100 ml)	Faecal Coliform (MPN/100 ml)
Beas	460	19	2002	3-32	7.1-8.7	53-517	5.2-11.5	0.3 – 5.0	1-13	2-2400	2-1600
		19	2003	4-29	7.3-8.9	76-559	7-12	0.1-6	1-18	2-2400	2-1600
		19	2004	2-29	6.9-8.5	60-396	6.8-11.8	0.2-4.8	-	2-5x10^4	2-3500
		19	2005	4-27	7-8.8	54-395	4.8-13	0.2-10	1.8-22	2-11x10^3	2-1100
		19	2006	4-27	7.0-8.2	94-395	5.8-11.0	0.2-3.2	2-6.9	2-11x10^3	2-1100
		19	2007	2-22	6.2-8.9	86-470	5.9-12.8	0.1-2.9	1.2-38	0-2400	0-2400
		19	2008	1.5-22	7.0-8.4	53-432	3.8-12.5	0.1-7.6	1-28	2-1600	2-1600
		23	**2009**	**5- 26**	**7.1-8.5**	**46-338**	**6.4-11.8**	**0.1-4.3**	**1.5-7.6**	**7-2400**	**2-1600**
Ghaggar	291	15	2002	11-33	7.0-9.5	320-1012	2.6-9.6	1-180	4-560	43-14000	9-2500
		15	2003	18-30	6.5-8.1	280-1477	3.5-7.9	0.9-28	9.6-251.2	28-6000	9-600
		15	2004	16-29	7.2-8.5	188-1390	0.8-8	0.5-28	-	500-17x10^4	28-9x10^4
		19	2005	14-29	7-9	21-2682	2.2-8.9	1-626	96-1600	43-15x10^4	14-5x10^4
		19	2006	14-22	7.1-7.9	230-1156	1.8-7.3	1.2-30	7.8-90	600-24x10^4	170-11x10^4
		19	2007	10-34	6.5-8.8	50-4260	0.3-8.6	0.2-218	4.6-200	7-35 x10^5	3-23 x10^4
		19	2008	10-41	4.5-8.6	257-3640	0.4-8.8	0.4-50	4-1572	21-25 x10^5	7-5 x10^5
		19	**2009**	**15-34**	**6-8.5**	**350-2660**	**0.8-7.5**	**2.5-593**	**0.0-15.8**	**500-1 x10^4**	**900-11 x10^4**
Amlakhedi	-	1	2002	27-32	1.7-7.2	7160-16770	0-0	485 – 1561.6	1821-3860	28-1100	3-28
		1	2003	27-32	3.1-7.4	3070-3070	-	33-1463	-	3-3	3-3
		1	2004	20-32	2.2-7.4	7020-13400	0.4-0.4	247-947	-	9-93	2-4
		1	2005	27-27	2.4-7.5	300-11810	3.9-3.9	35-714	1548-1548	7-15	2-4
		1	2006	27-29	6.83-7.60	14440-16720	-	281-582	1678-1678	7-9	6-7
		1	2007	26-28	7.3-7.9	316-9470	-	73-522	1750-1750	4-28	2-4
		2	2008	30	71	3080	0	46	-	9000	3000
		2	**2009**	**27-32**	**6.6-7.8**	**271-14800**	**0.0-2.4**	**24-538**	**16-199**	**1700-21 x10^4**	**800-5 x10^4**
Kali East	-	2	2002	15-30	7.2-8.7	24-1930	6.7-11.9	1.9 – 67.0	66-421	2100-48x10^6	10 x10^4-36 x10^4
		2	2003	16-32	6.4-8.3	225-1590	4.9-8.6	2-149	357-552	2800-19x10^7	40-46x10^6
		2	2004	15-31	7-8.3	273-1704	0.1-7.9	1.8-165	-	2300-29x10^6	200-95x10^5
		2	2005	17-25	7.4-8.4	23-1730	1.7-10.6	2-136	48-492	7500-18x10^6	2300-122x10^4
		2	2006	15-23	7.48-8.90	236-1623	4.9-14.7	3.6-160	501-501	9300-26x10^5	7500-161x10^4
		2	2007	25-30	7.1-7.4	53-296	6.9-7.8	1-3	8.0-8.0	140-1800	80-550
		2	2008	15-34	7.0-9.0	61-2570	0.0-10.6	3.1-183	76	1100-11x10^7	400 -51x10^4
		2	**2009**	**18-32**	**7.3-9.2**	**72-2124**	**0.0-13.3**	**3.6-353**	**140-140**	**2800-35 x10^7**	**400-4 x10^7**

Name of the River	Length (Km)	No of Monitoring locations	Year	Observed Range of Water Quality Parameters							
				Temp. (^{0}C)	pH	Conductivity (μmhos/cm)	DO (mg/l)	BOD (mg/l)	COD (mg/l)	Total Coliform (MPN/100 ml)	Faecal Coliform (MPN/100 ml)
Chambal	-	7	2003	2-36	7-9.3	181-8800	1-10.8	0.3-10	2-28	28-145x10^5	9-22x10^4
		7	2004	16-33	7-9.2	150-10900	4.3-11.1	0.7-24	-	28-39x10^4	11-41x10^3
		8	2005	16-39	6.9-9.5	170-10400	2.8-14.3	0.3-25	2-172.6	14 -5x10^4	3 -7100
		8	2006	16-28.5	7.6-8.8	290-9200	4.2-9.5	0.6-20	4-14	4 -20x10^4	4 -3x10^4
		8	2007	14-33	6.8-8.8	220-10680	0-13.3	0.2-34	1.7-64	4 -87 x10^5	3-22 x10^3
		8	2008	13-35.5	6.8-8.7	270-9340	3.2-12.4	0.1-6.2	2.4-77.6	4 -88 x10^4	3 -36000
		8	**2009**	**18-36**	**7.1-8.9**	**166-9720**	**0.4-9.9**	**0.1-22**	**2-230**	**4-31 x10^4**	**3-27 x10^4**

Chapter IV

IDENTIFICATION OF POLLUTED RIVER STRETCHES

4.1 Concept of water quality management

The natural water bodies are used for various competing as well as conflicting purposes viz. drinking water source; religious bathing; propagation of wild life and fisheries; irrigation, industrial cooling and controlled waste disposal. The uses of rivers for various purposes require specific physiochemical and bacteriological characteristics. The ambient water in environment is not recommended to use directly for drinking purposes unless treated and disinfected by an organised water supply system. However for religious bathing, masses are advised to use specified stretches. The critical parameters for maintenance of water quality with respect to public health are coliform group of bacteria and organic matter. Thus the organic matter in terms of Biochemical Oxygen Demand is the most critical parameter representing municipal sewage pollution and industrial pollution from agro based industries. The organised water supplies with high organic matter in ambient water may cause formation of chlorinated compounds in the process of disinfection using chlorine. The presence of high organic matter from municipal origin account for higher number of coliform group of bacteria including faecal coliforms. Therefore the need for water quality management in river is broadly concentrated on control of organic matter (in terms of BOD) by providing infrastructure for sewage treatment as first priority. Other aspects of water quality management from inorganic components of geogenic nature as well as water quality degradation due to effluents discharged by specific group of industrial sources will be addressed selectively.

The rivers in its entire length are not polluted and generally meet the water quality criteria for various beneficial uses. Water quality degradation is observed after large scale abstraction and point source of waste water disposal from municipal areas and industrial establishments.

The water quality monitoring over the years provided information on river stretches having higher concentration of BOD and are identified as polluted. The water quality deterioration of aquatic resources is a matter of concern, as it affects public health and aquatic life. Therefore corrective actions are required to be taken to prevent and control pollution in the identified polluted stretches.

4.2 Methodology and criteria for identification of polluted river stretches

The stretches of rivers not meeting the water quality criteria and having BOD above 3 are identified as polluted stretches. These polluted stretches are further classified under different priority levels on the basis of extent of pollution.

The water quality data is analysed and monitoring locations exceeding the water quality criteria are identified as polluted locations with respect to risk. Priority levels of polluted stretch are based on the risk. Risk is defined as;

RISK= FREQUENCY OF VIOLATION OF CRITERIA X CONSEQUENCE (MAGNITUDE)

The degree of violation is with respect to water quality criteria for drinking water source with conventional treatment with respect to BOD. The polluted locations in a continuous sequence are defined as polluted river stretches.

OUTCOME:- The priority wise number of river stretches are given below:-

Priority	**Number of Stretches**
Priority 1	35
Priority 2	15
Priority 3	26
Priority 4	38
Priority 5	36
Total	**150**

CHAPTER V

Water Quality of Rivers in Indus Basin

5.1 Indus River System

The Indus Basin is bounded on the east by the Great Himalayas, on the north by the Karakoram and Haramosh ranges, on the west by the Sulaiman and Kirthar ranges and on the south by the Arabian Sea. The basin in Indian Territory has a maximum east-west length of about 855 km and maximum north south width of about 560 km.

The Indus rises near Manasarowar Lake in Tibet Plateau (China). The river has five tributaries in India; they are the Jhelum, the Chenab, the Ravi, the Beas, and the Sutlaj. The Jhelum, the Ravi and the Sutluj rivers each have a considerable length running along the international boundary.

The basin area of Indus is covering the States of Jammu & Kashmir, Haryana, Himachal Pradesh, Punjab, Chandigarh and Rajasthan., The important urban centres in these States are Ambala, Shimla, Jalandhar, Moga, Pathankot, Ludhiana, Batala, Patiala, Hoshiarpur, Amritsar, Bathinda, Abohar, Ganganagar, Chandigarh, Barnala, Faridkot, Fazilka, Firozpur, FirozpurCantt., Gurdaspur, Kapurthala, Khanna, KotKapura, Malerkotla, Malout, Mansa, Muktsar, Phagwara, Rajpura, S.A.S.Nagar, (Mohali), Sangrur, Nabha, Panchkula Urban Estate, Hanumangarh.

5.2 Water Quality Monitoring in Indus Basin

The State Pollution Control Boards of Himachal Pradesh, Punjab, Haryana and Rajasthan at 72 locations carry out the water quality monitoring of tributaries of River Indus in the basin. The ranges of water quality observed in rivers Beas, Satluj, Ravi, Sirsa, Swan, Largi, Parvati, Tawi, Chuntaol, Jhelum, Chenab, Gawkadal, Baspa, Binwa, Neugal, Siuel, Spiti and Suketi Khad with respect to Temperature, pH, Conductivity, DO, BOD, COD, Nitrite, Nitrate, Ammonia-N, Total Coliforms (TC) and Faecal Coliform (FC) are presented as minimum, maximum and mean value to assess the extent of water quality variation throughout the year. The detail list of water Quality Monitoring locations in Indus Basin is given in the Table 5(a).

Table 5(a): Water Quality Monitoring locations in Indus Basin

Name of Monitoring Station	State Name	Name of Water Body
Beas at U/s Manali	Himachal Pradesh	Beas
Beas at D/s Kulu	Himachal Pradesh	Beas
Beas at D/s Aut	Himachal Pradesh	Beas
Beas at U/s Pandon Dam	Himachal Pradesh	Beas
Beas at Exit of Tunnel Dehal Power House	Himachal Pradesh	Beas
U/s Mandi	Himachal Pradesh	Beas
Beas at D/s Mandi	Himachal Pradesh	Beas
Beas at D/s Alampur	Himachal Pradesh	Beas
Beas at D/s Dehragopipur	Himachal Pradesh	Beas
Beas at D/s Pong Dam	Himachal Pradesh	Beas
Beas at Talwara H/W	Punjab	Beas
U/s Pathankot	Punjab	Beas
D/s Pathankot	Punjab	Beas
Beas at Mirthal Bridge, Gurdaspur	Punjab	Beas
Beas at 1km.D/s of Effl. Discharge Point at Mukerian	Punjab	Beas
Beas at G.T.Road Under Bdg. Near Kapurthala	Punjab	Beas
U/s Goindwal	Punjab	Beas
Beas at 100m D/s Indust. Disch. Goindwal	Punjab	Beas
Beas at Harike	Punjab	Beas
Satluj at Neptha Zakhai	Himachal Pradesh	Satluj
Satluj at U/s Tatapani	Himachal Pradesh	Satluj
Satluj at U/s Slapper	Himachal Pradesh	Satluj
Satluj at D/s Slapper	Himachal Pradesh	Satluj
Satluj at D/s Bhakhra	Himachal Pradesh	Satluj
Satluj at 100m U/s of Headworks, Nangal	Punjab	Satluj
Satluj at 100m D/s ,Nangal	Punjab	Satluj
Satluj at 1 Km. D/s of Zenith	Punjab	Satluj
Satluj at U/s Head Works Ropar	Punjab	Satluj
Satluj at D/s NFL	Punjab	Satluj
Satluj at D/s Kiratpur Sahib	Punjab	Satluj
U/s Budha Nallah (Upper)	Punjab	Satluj
Satluj at 100m D/s Budha Nala Confl., Ludhiana	Punjab	Satluj
Satluj at Boat Bdg. Dharmkotnakodar Road, Jalandhar	Punjab	Satluj
Satluj at D/s East Basin	Punjab	Satluj
U/s Hussaniwala - H/W Ferozepur	Punjab	Satluj
D/s Hussaniwala-H/W Ferozepur	Punjab	Satluj
Satluj at Bridge Harike, Amritsar	Punjab	Satluj
Ravi at U/s Madhopur	Himachal Pradesh	Ravi
Ravi at U/s of Madhopur Headworks,Gurdaspur	Punjab	Ravi
Largi at D/s	Himachal Pradesh	Largi

Sirsa , U/s Sitomajri Nallahgarh	Himachal Pradesh	Sirsa
River Sirsa , D/s Nalagarh Bridge	Himachal Pradesh	Sirsa
Jhelam at Anantnag D/s	Jammu & Kashmir	Jhelam
Jhelam at Dalagate (Inlet), Srinagar	Jammu & Kashmir	Jhelam
Jhelam at Chattabal Weir (Outlet)	Jammu & Kashmir	Jhelam
Chenab at Jammu D/s	Jammu & Kashmir	Chenab
Tawi at Jammu U/s, (Tawi Bridge)	Jammu & Kashmir	Tawi
Gawkadal, Srg *(Sherghari, Srg)	Jammu & Kashmir	Gawkadal
Chunt Kol * (Maulana Azad Bridge)	Jammu & Kashmir	Chuntkol
Parvati Before Conf. to River Beas	Himachal Pradesh	Parvati (Indus)
Satluj at D/s Rampur	Himachal Pradesh	Satluj
Ravi at U/s Chamba	Himachal Pradesh	Ravi
Satluj at U/s Rampur	Himachal Pradesh	Satluj
River Sirsa at D/s Nalagarh Distt. Solan	Himachal Pradesh	Sirsa
River Swan at D/s Nangal Distt. Una	Himachal Pradesh	Swan
River Satluj B/c With River Spiti at Khab, Distt.Kinnaur	Himachal Pradesh	Satluj
Beas at D/s Manali	Himachal Pradesh	Beas
Beas at U/s Kullu	Himachal Pradesh	Beas
Beas at D/s Pandoh Dam	Himachal Pradesh	Beas
Beas at D/s Jaisinghpur	Himachal Pradesh	Beas
Parvati at U/s Manikaran	Himachal Pradesh	Parvati (Indus)
Parvati at D/s Manikaran	Himachal Pradesh	Parvati (Indus)
Suketi Khad at D/s Mandi	Himachal Pradesh	Suketi Khad
Binwa at D/s Paprola/Baijnath	Himachal Pradesh	Binwa
Neugal at D/s Thural	Himachal Pradesh	Neugal
Spiti at Khab	Himachal Pradesh	Spiti
Satluj at Khab	Himachal Pradesh	Satluj
Baspa at U/s Reservoir Baspa Project	Himachal Pradesh	Baspa
Ravi at D/s of Chamba Town	Himachal Pradesh	Ravi
Ravi at at Chamera Reservoir	Himachal Pradesh	Ravi
Ravi at at D/s Chamera III HEP	Himachal Pradesh	Ravi
Siuel at D/s Surgani	Himachal Pradesh	Siuel

5.2.1 Water Quality of River Beas

The Water Quality of River Beas for year 2009 is given in Annexure-I (Table 5.1). The summary of water quality of river Beas with respect to pH, conductivity, Dissolved Oxygen (DO), Bio chemical Oxygen Demand (BOD), Total coliform (TC) and Faecal coliform (FC) is given below.

pH:-

- The criteria for pH is 6.5 to 8.5.
- pH is observed in the range of 7.1-8.5 and is meeting the criteria.

Conductivity: -

- The criteria of Conductivity for irrigation is 2250 µmhos/cm.
- Conductivity lies in the range of 46-338 µmhos/cm and is meeting the criteria.

Dissolved Oxygen: -

- The criteria for DO should be more than 4 mg/l.
- DO lies in the range of 6.4-11.8 mg/l and is meeting the criteria.

Bio chemical Oxygen Demand: -

- The criteria for BOD should be less than 3 mg/l.
- BOD was observed in the range of 0.1-4.3 mg/l.
- BOD is not meeting the desired criteria at D/s Mandi (4.3 mg/l)

Faecal Coliform

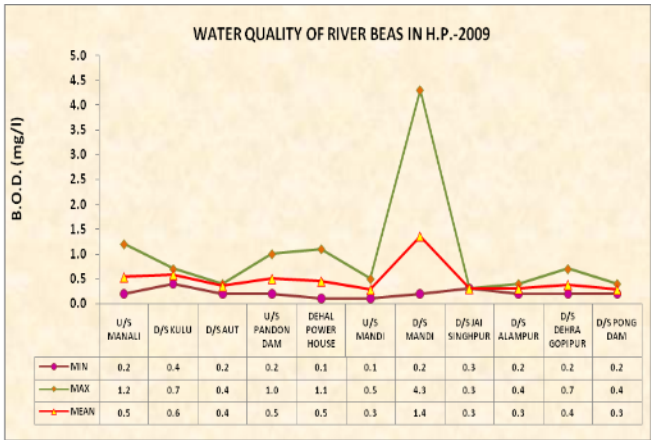
- Faecal Coliform should be less than 2500 MPN/100ml.
- Faecal Coliform ranges from 2-1600 MPN/100ml and is meeting the criteria.

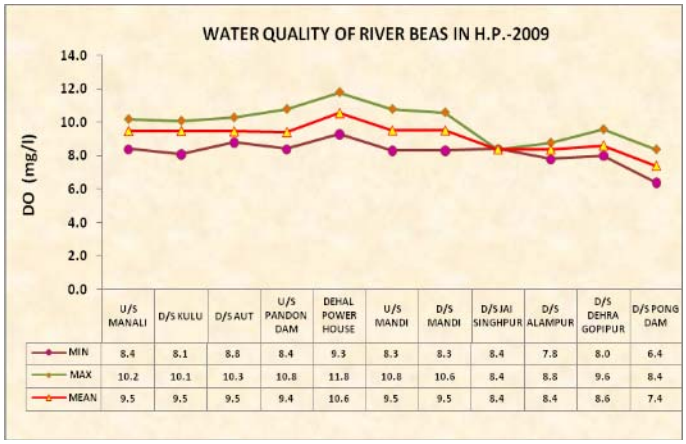
Total Coliform

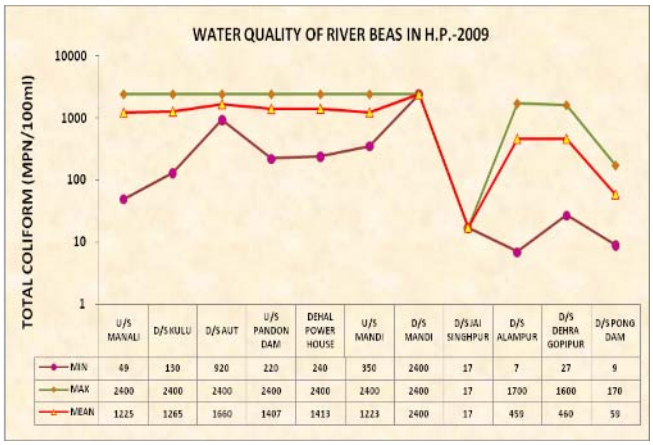
- Total Coliform should be less than 5000 MPN/100ml
- Total Coliform is in the range of 7-2400 MPN/100ml and meeting the criteria.

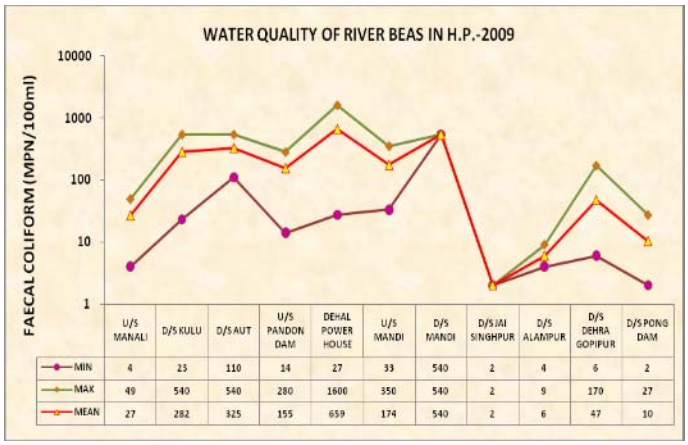
The spatial trend of water quality of River Beas with respect to BOD, DO, Total Coliform, Faecal Coliform and Conductivity is presented in Figure 5.1 & 5.2.

Figure 5.1: Spatial Trend of Water Quality of River Beas in Himachal Pradesh









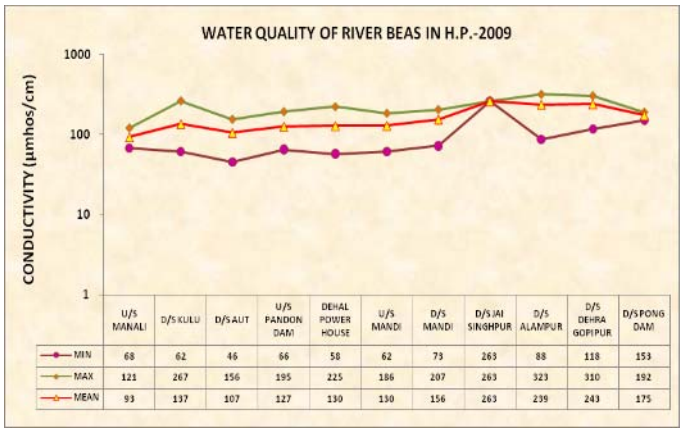
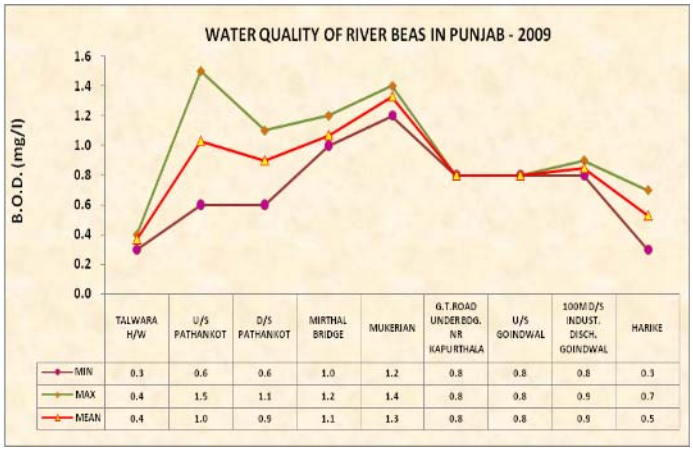
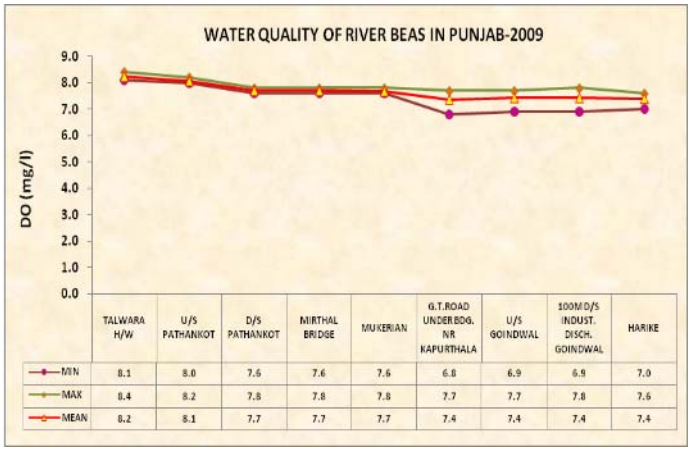
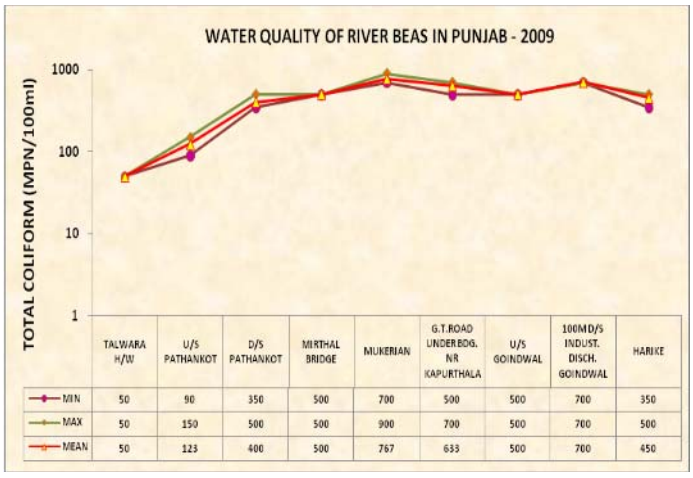
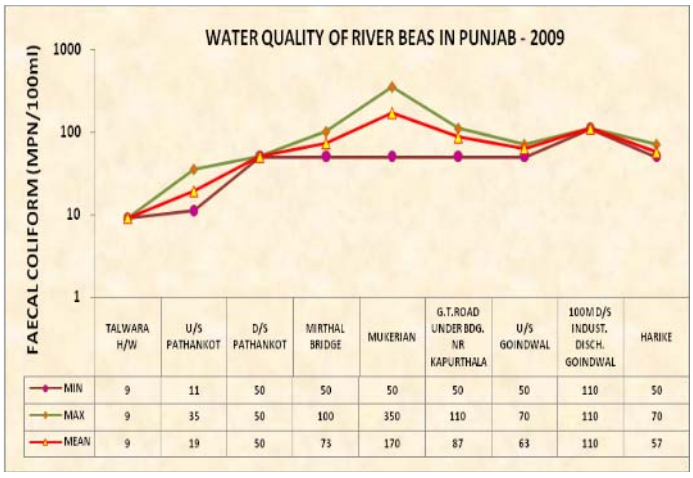


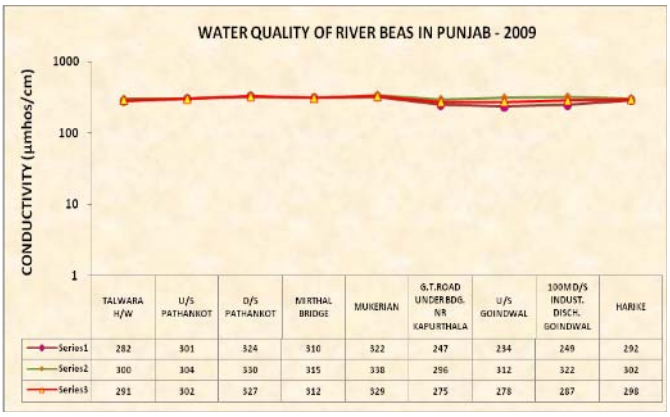
Figure 5.2: Spatial Trend of Water Quality of River Beas in Punjab











5.2.2 Water Quality of River Satluj

The Water Quality of River Satluj for year 2009 is given in Annexure-I (Table 5.2). The summary of water quality of river Satluj with respect to pH, conductivity, Dissolved Oxygen (DO), Bio chemical Oxygen Demand (BOD), Total coliform (TC) and Faecal coliform (FC) is given below.

pH:-

- The criteria for pH is 6.5 to 8.5.
- pH is observed in the range of 6.3-8.5.
- pH is not meeting the desired criteria before meeting River Spiti at Khab.

Conductivity: -

- The criteria of Conductivity for irrigation is 2250 µmhos/cm
- Conductivity lies in the range of 124-932 µmhos/cm and is meeting the criteria.

Dissolved Oxygen: -

- The criteria for DO should be more than 4 mg/l.
- DO lies in the range of 0.6-11.4 mg/l.
- DO is not meeting the desired criteria at
    - 100m D/s Budha Nala Confluence, Ludhiana (0.6 mg/l)
    - Boat Bridge Dharmkotnakodar Road, Jalandhar (2.4 mg/l)

Bio chemical Oxygen Demand: -

- The criteria for BOD should be less than 3 mg/l.
- BOD was observed in the range of 0.1-55 mg/l.
- BOD is not meeting the desired criteria in Punjab at
    - 100m D/s Budha Nala Confluence, Ludhiana (55 mg/l),
    - Boat Bridge Dharmkotnakodar Road of Jalandhar (16.0 mg/l),
    - Bridge Harike, Amritsar (14.0 mg/l),
    - D/s Hussainwala, Ferojpur (8.0 mg/l),
    - D/s of East Bein (6.1 mg/l),
    - U/s Hussainwala, Ferojpur (6.0 mg/l),
    - U/s Budhanala (4.5 mg/l).

Faecal Coliform

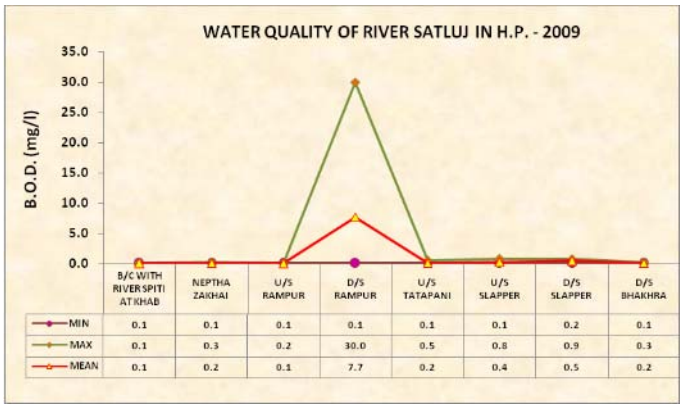
- Faecal Coliform should be less than 2500 MPN/100ml.
- Faecal Coliform ranges from 0-110000 MPN/100ml
- Faecal Coliform is not complying with the permissible limit of water quality criteria for bathing at
    - 100m D/s Budha Nala Confluence, Ludhiana (110000 MPN/100ml),
    - Boat Bridge Dharmkotnakodar Road of Jalandhar (50000 MPN/100ml),
    - D/s of East Bein (10000 MPN/100ml).

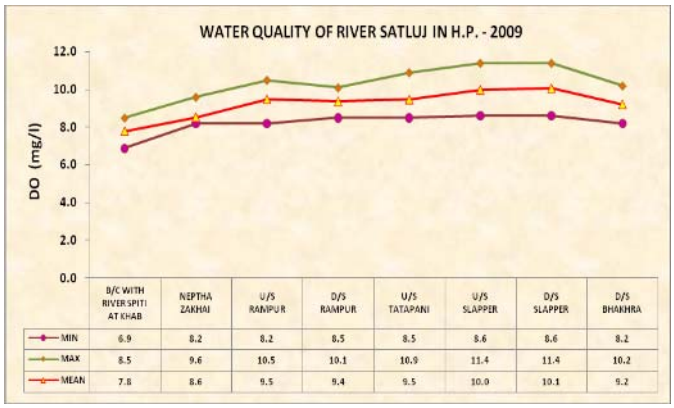
Total Coliform

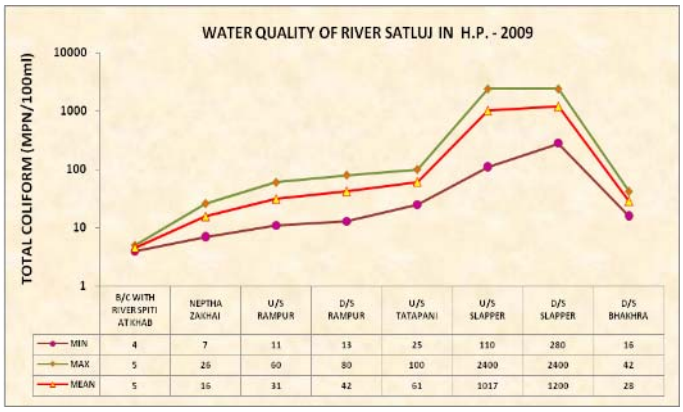
- Total Coliform should be less than 5000 MPN/100ml
- Total Coliform is in the range of 4-250,000 MPN/100ml
- The highest count of Total Coliform is observed at
    - 100m D/s Budha Nala Confluence, Ludhiana (250000 MPN/100ml),
    - Boat Bridge Dharmkotnakodar Road of Jalandhar (110000 MPN/100ml),
    - D/s of East Bein (100000 MPN/100ml)
    - U/s Budha Nala (25000 MPN/100ml)
    - D/s Kiratpur Sahib (9000 MPN/100ml)

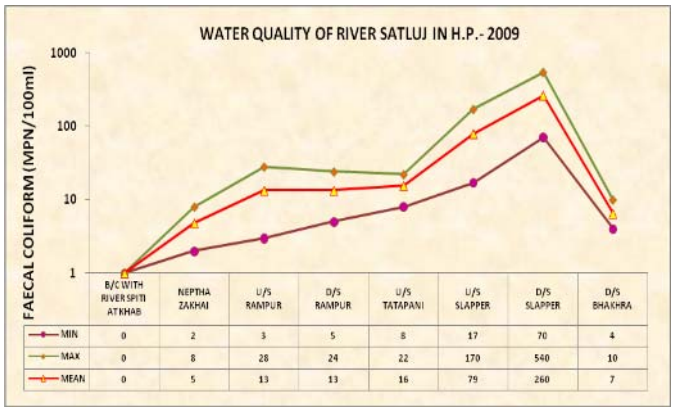
The spatial trend of water quality of River Satluj with respect to BOD, DO, Total Coliform, Faecal Coliform and Conductivity is presented in Figure 5.3 & 5.4.

Figure 5.3: Spatial Trend of Water Quality of River Satluj in Himachal Pradesh









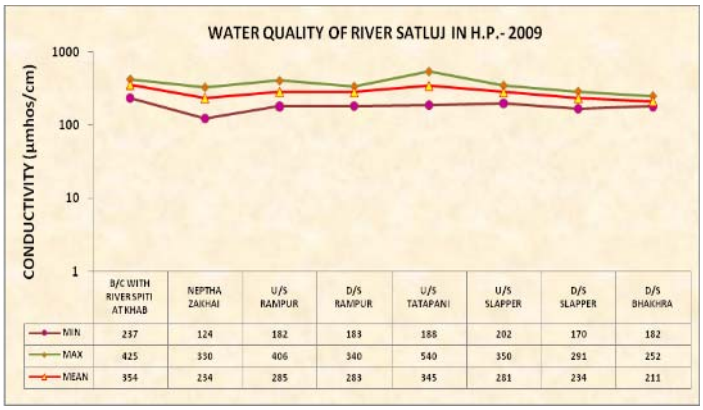
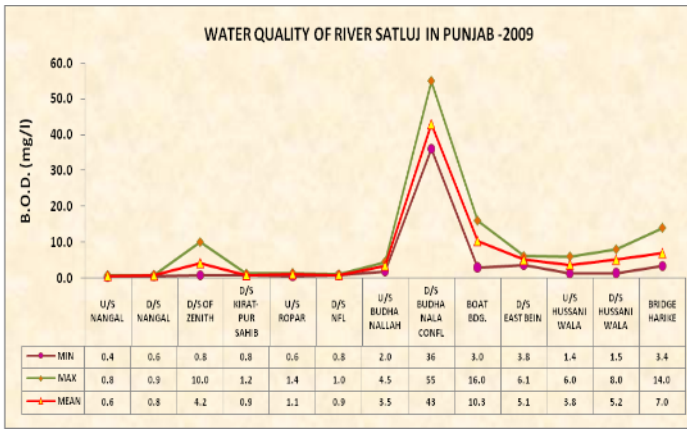
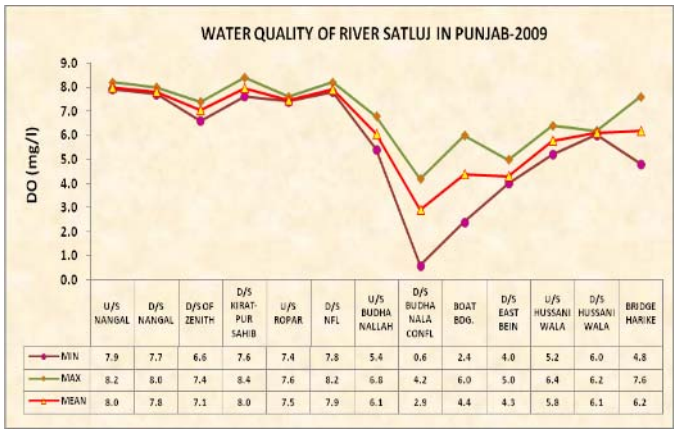
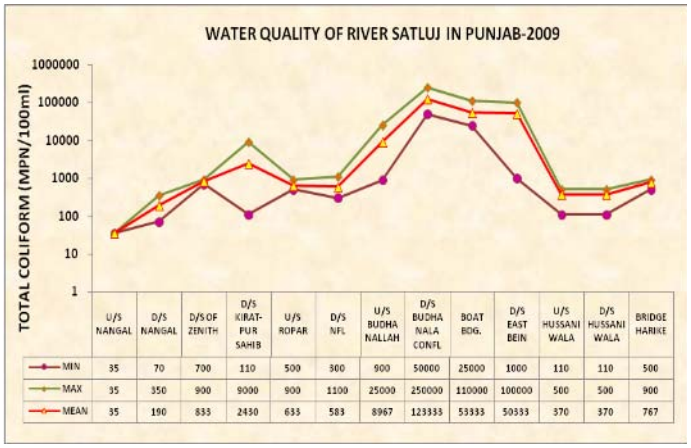
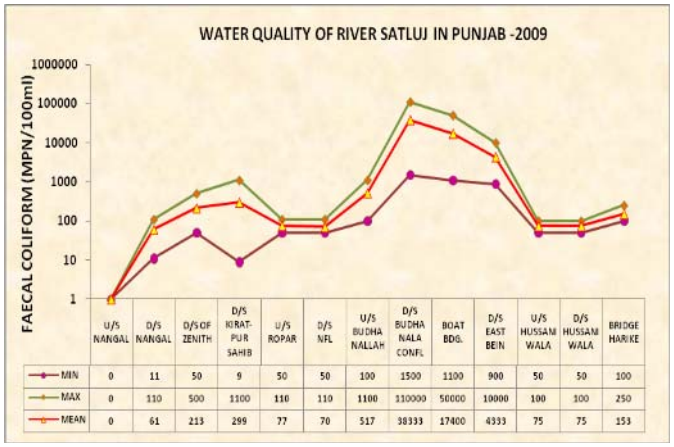


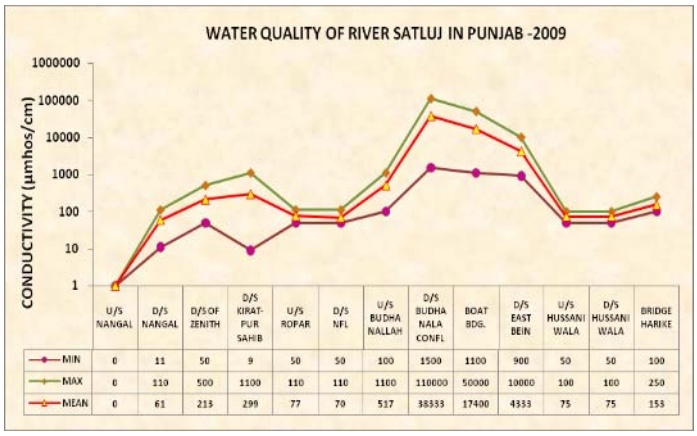
Figure 5.4: Spatial Trend of Water Quality of River Satluj in Punjab











5.2.3 Water Quality of River Ravi, Parvati, Largi, Swan and Sirsa

The water quality of River Ravi, Sirsa, Swan, Largi, Parvati, Tawi, Chenab, Neugal, Siuel and Suketi Khad are meeting the water quality criteria for pH, DO, Conductivity, BOD, TC and FC at all locations in the year during the period of monitoring except BOD at River Swan D/s Nalagarh Distt. Una (5.0 mg/l) and Tawi at Jammu U/s (6.7 mg/l). The Water Quality of river(s) Ravi, Sirsa, Swan, Largi, Parvati, Tawi, Chenab, Neugal, Siuel and Suketi Khad is given in Annexure-I (Table 5.3).

The Water Quality of River Ravi, Sirsa, Swan, Largi, Parvati, Tawi, Chenab, Neugal, Siuel and Suketi Khad for year 2009 are given in Annexure-I (Table 5.3). The summary of water quality of River Ravi, Sirsa, Swan, Largi, Parvati, Tawi, Chenab, Neugal, Siuel and Suketi Khad with respect to pH, conductivity, Dissolved Oxygen (DO), Bio chemical Oxygen Demand (BOD), Total coliform (TC) and Faecal coliform (FC) is given below.

pH:-

- The criteria for pH is 6.5 to 8.5 and is meeting the criteria.
- The pH ranges from 7.3 - 8.6
- pH is not meeting the desired criteria in
    - Sirsa at D/s Nalagarh Distt. Solan (8.6)
    - Sirsa at D/s Nalagarh Bridge (8.6)

Conductivity: -

- The criteria of conductivity for irrigation is 2250 µmhos/cm and meeting the criteria.
- The conductivity ranges from 44 to 835 µmhos/cm.

Dissolved Oxygen: -

- The criteria for DO should be more than 4 mg/l.
- The Dissolved Oxygen ranges from 3.5 – 12.3 mg/l.
- DO is not meeting the desired criteria in Tawi at Jammu U/s (3.5 mg/l).

Bio chemical Oxygen Demand: -

- The criteria for BOD should be less than 3 mg/l.
- BOD is not meeting the desired criteria in
    - River Swan D/s Nalagarh Distt.Una (5.0 mg/l)
    - Tawi at Jammu U/s (6.7 mg/l).

Faecal Coliform

- Faecal Coliform should be less than 2500 MPN/100ml.
- Faecal Coliform is in the range of 2-920 MPN/100ml and is meeting the criteria.

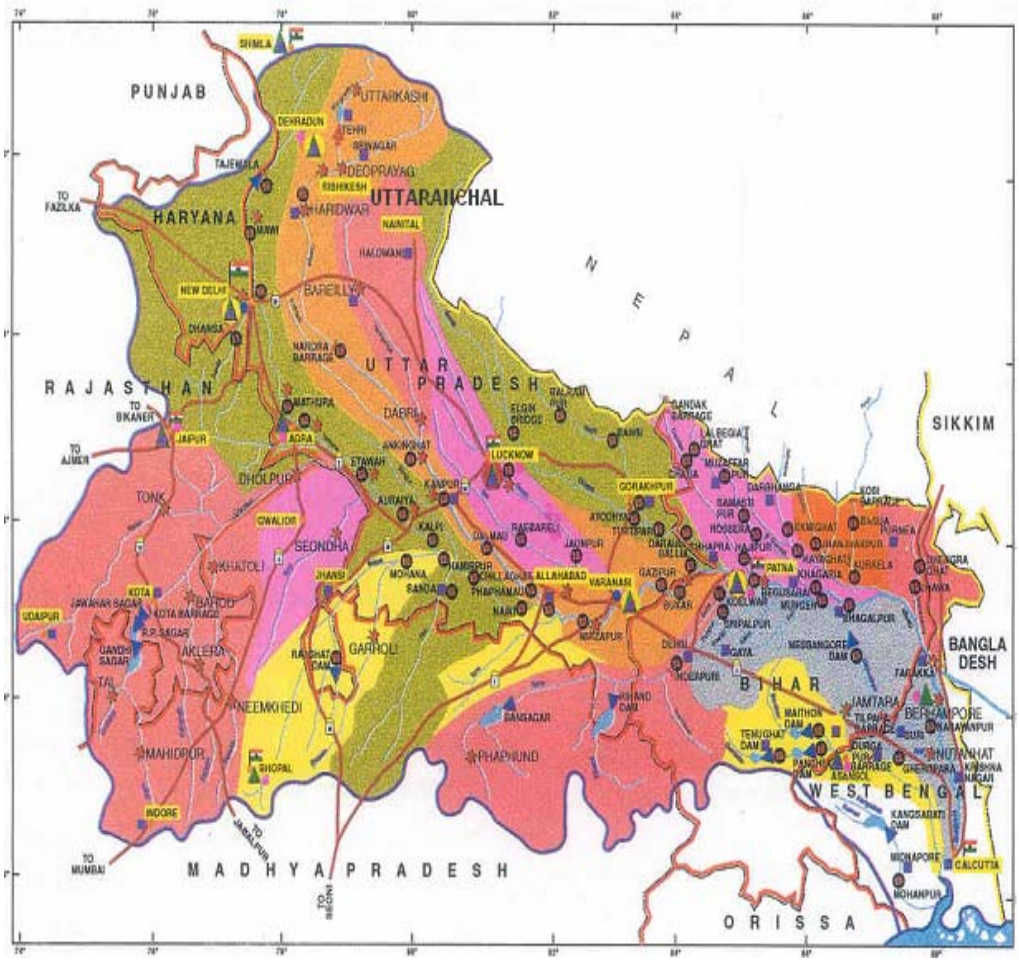
Total Coliform

- Total Coliform should be less than 5000 MPN/100ml.
- Total Coliform is in the range of 7-2400 MPN/100ml.

CHAPTER VI

Water Quality of Rivers in Ganga Basin

6.1 Ganga River System



The Ganga basin covers slightly more than one-fourth (26.3 per cent) of the country's total geographical area, and is the biggest river basin. In India the basin covers the whole of Uttarakhand, Uttar Pradesh, Bihar and the Union Territory of Delhi and parts of Punjab, Haryana, Himachal Pradesh, Rajasthan, Madhya Pradesh, Jharkhand and West Bengal. The main river, rising in the northern most part of Uttarakhand, flows through Uttar Pradesh, Bihar and West Bengal and finally falls into the Bay of Bengal. The Ganga Basin is bound on the north by the Himalayas and on the south by the Vindhyas. The ridge between the Indus system and the Ganga system, the Great desert of Rajasthan and the Aravalli hills form the boundary on the west. After traversing a length of 1450 km in Uttarakhand and Uttar Pradesh and 110 km in the boundary between U.P. and Bihar the river then enters Bihar and flows 445 km more or less through the middle of the State. The length of the river measured along the Bhagirathi and the Hugli during its course in West Bengal is about 520 km.

The Ganga has a large number of tributaries. Some of these are of Himalayan origin having considerably large water wealth. The important tributaries within India are the Kali, the Ramganga, the Yamuna, the Gomti, the Ghaghara, the Gandak and the Kosi. The Yamuna although a tributary of the Ganga, is virtually a river by itself. Its major tributaries are the Chambal, the Sind, the Betwa and the Ken. The main plateau tributaries of the Ganga are the Tons, the Son, the Damodar and the Kasai-Haldi.

6.2 Water Quality Monitoring in Ganga Basin

The water quality monitoring of the River Ganga and its several tributaries are being done in the basin by the State Pollution Control Boards of Uttarakhand, Uttar Pradesh, Bihar, West Bengal, Haryana, Himachal Pradesh, Rajasthan, Madhya Pradesh, Jharkhand and Central Pollution Control Board at 233 locations. The ranges of water quality observed in rivers in Ganga Basin with respect to pH, Conductivity, DO, BOD, Total Coliform and Faecal Coliform are calculated and presented as minimum, maximum and mean value to assess the extent of water quality variation throughout the year. The detail list of water Quality Monitoring locations on River Ganga is given in the Table 6(a).

Table 6(a): Water Quality Monitoring locations on River Ganga

Name of Monitoring Station	State Name	Name of Water Body
Ajay River at Masanjore Dam	Jharkhand	Ajay
Ashwani at U/s Yashwant Nagar	Himachal Pradesh	Ashwani
Barakar at Maithan Dam	Jharkhand	Barakar
Barakar at Asansol (Water Intake Point)	West Bengal	Barakar
Batta at U/s Paonta	Himachal Pradesh	Batta
Batta Before Confluence to Yamuna	Himachal Pradesh	Batta
R.Betwa Near Intake Point, Vidisha	Madhya Pradesh	Betwa
Betwa U/s, Beena	Madhya Pradesh	Betwa
Betwa D/s, Beena	Madhya Pradesh	Betwa
Betwa at Nayapur D/s Mandideep Indl. Area No.1, Dist.Raisen	Madhya Pradesh	Betwa
Betwa Near Road Bridge, Bhojpur	Madhya Pradesh	Betwa
Betwa Near W/S Intake Well Point Raisen	Madhya Pradesh	Betwa
Betwa at Charantirghat, Vidisha	Madhya Pradesh	Betwa
Betwa D/s After Mixing of River Bais at Vidisha	Madhya Pradesh	Betwa
Betwa Before Conf. Yamuna at Hamirpur	Uttar Pradesh	Betwa
Govind Sagar	Uttar Pradesh	Betwa
Bhalla River U/s Kashipur	Uttarakhand	Bhalla
Bhalla River at Lohia Bridge D/s Kashipur	Uttarakhand	Bhalla
River Bichia, Bridge Govindgarh Road	Madhya Pradesh	Bichia
River Bihar D/s Near Forest Office	Madhya Pradesh	Bihar
Bokaro at Jarandi	Jharkhand	Bokaro
Burhi Gandak at Akharaghat, Muzaffarpur	Bihar	Burhi Gandak
Chambal at Nagda U/s (Water Intake Point)	Madhya Pradesh	Chambal
Chambal at Nagda D/s	Madhya Pradesh	Chambal
Chambal at Gandhi Sagar Dam, Rampura	Madhya Pradesh	Chambal
R. Chambal at Dholpur	Madhya Pradesh	Chambal
Chambal at Kota U/s (Intake Pt. Near Barrage)	Rajasthan	Chambal
Chambal at Kota D/s (2 Km. From City)	Rajasthan	Chambal
Chambal at Rameshwarghat Nr. Sawaimadhopur	Rajasthan	Chambal
Chambal at Etawah Before Confl. To R. Yamuna	Uttar Pradesh	Chambal
Churni at Gade Border (Bangladesh - India Border)	West Bengal	Churni

Churni D/s of Santipur Town	West Bengal	Churni
Churni, Majhadia	West Bengal	Churni
Daha at Siwam	Bihar	Daha
D/s Daha River at Sasamusa	Bihar	Daha
Daha River at Itwa Bridge, Siwan	Bihar	Daha
Damodar D/s Bhairabi at Rajrappa	Jharkhand	Damodar
Damodar at Ramgarh Road Bridge	Jharkhand	Damodar
Damodar at Phusro Road Bridge	Jharkhand	Damodar
Damodar U/s Jamadova	Jharkhand	Damodar
Damodar D/s Sindri	Jharkhand	Damodar
Damodar at Panchet Dam	Jharkhand	Damodar
Damodar at Dishergarh Vill.(Nr.Bihar-West Bengal Border)	West Bengal	Damodar
Damodar at D/s of Iisco After 3rd Outfall at Dhenna Village	West Bengal	Damodar
Damodar at Narainpur After Confl. of Nunia Nallah	West Bengal	Damodar
Damodar Near Mujher Mana Village A/C of Tamla Nallah	West Bengal	Damodar
Damodar at Haldia D/s (2 Km Away From Haldia Town)	West Bengal	Damodar
Water Intake Point For Burdwan Town	West Bengal	Damodar
Dhela River U/s at Kashipur Moradabad Road Bridge	Uttarakhand	Dhela
Dhela River D/s at Thakurdwara Aliganj Road	Uttarakhand	Dhela
Dhous at Madhubani	Bihar	Dhous
Water Intake Point For Bankura Town On River Dwarakeshwar	West Bengal	Dwarakeshwar
U/s of Tarapith On River Dwarka at Sadhak Bamdeb Ghat	West Bengal	Dwarka
D/s of Tarapith On River Dwarka, Satighat	West Bengal	Dwarka
Farmar at Jogbani	Bihar	Farmar
Gandak at Sonepur, Patna (Before Confl.)	Bihar	Gandak
Gandak at Rewaghat, Mujaffarpur	Bihar	Gandak
Gandak Atsamastipur Road Bridge	Bihar	Gandak
Ganga at Buxar	Bihar	Ganga
Ganga at Khurji, Patna U/s	Bihar	Ganga
Ganga at Patna D/s (Ganga Bridge)	Bihar	Ganga
Ganga at Mokama (D/s)	Bihar	Ganga
Ganga at Kahalgaon	Bihar	Ganga
Ganga at Mokama (U/s)	Bihar	Ganga
Ganga at Munger	Bihar	Ganga
Ganga at Bhagalpur	Bihar	Ganga
Ganga at Buxar, Ramrekhaghat	Bihar	Ganga
Ganga Darbhanga Ghat at Patna	Bihar	Ganga
Ganga at Fatuha	Bihar	Ganga
Ganga at Sultanganj, Bhagalpur	Bihar	Ganga
Ganga at Punpun, Patna	Bihar	Ganga
Ganga at Indrapuri, Dehri On Sone	Bihar	Ganga
Ganga at Confluence of Sone River Doriganj, Chapra	Bihar	Ganga
Ganga at Rajmahal	Jharkhand	Ganga
Ganga at Allahabad (Rasoolabad)	Uttar Pradesh	Ganga
Ganga at Allahabad D/s (Sangam)	Uttar Pradesh	Ganga
Ganga at Garhmukteshwar	Uttar Pradesh	Ganga
Ganga at Kannauj U/s (Rajghat)	Uttar Pradesh	Ganga
Ganga at Kannauj D/s	Uttar Pradesh	Ganga
Ganga at Kanpur U/s (Ranighat)	Uttar Pradesh	Ganga
Ganga at Kanpur D/s (Jajmau Pumping Station)	Uttar Pradesh	Ganga
Ganga at Varanasi U/s (Assighat)	Uttar Pradesh	Ganga
Ganga at Varanasi D/s (Malviya Bridge)	Uttar Pradesh	Ganga
Ganga at Trighat (Ghazipur)	Uttar Pradesh	Ganga
Ganga at Narora (Bulandsahar)	Uttar Pradesh	Ganga
Ganga at Bithoor (Kanpur)	Uttar Pradesh	Ganga
Ganga at Dalmau (Rai Bareilly)	Uttar Pradesh	Ganga
Ganga U/s, Vindhyachal, Mirzapur	Uttar Pradesh	Ganga
Ganga D/s, Mirzapur	Uttar Pradesh	Ganga
Ganga at Kadaghat, Allahabad	Uttar Pradesh	Ganga

Ganga U/s, Anoopshahar	Uttar Pradesh	Ganga
Ganga D/s, Anoopshahar	Uttar Pradesh	Ganga
Ganga at Kachhla Ghat, Aligarh	Uttar Pradesh	Ganga
Ganga at Kala Kankar, Raebareli	Uttar Pradesh	Ganga
Ganga at Rishikesh U/s	Uttarakhand	Ganga
Ganga at Haridwar D/s	Uttarakhand	Ganga
Alkananda B/c Mandakini at Rudra Prayag	Uttarakhand	Ganga
Mandakini B/c Alkalnada at Rudraprayag	Uttarakhand	Ganga
Alkananda A/c Mandakini at Rudraprayag	Uttarakhand	Ganga
Alkananda B/c To Bhagirathi at Devprayag	Uttarakhand	Ganga
Bhagirathi B/c With Alaknanda at Devprayag	Uttarakhand	Ganga
Alkananda A/c With Bhagirathi at Devprayag	Uttarakhand	Ganga
Bhagirathi at Gangotri	Uttarakhand	Ganga
Ganga A/C of Song Near Satyanarayan Temple D/s Raiwala	Uttarakhand	Ganga
Upper Ganga River D/s Roorkee	Uttarakhand	Ganga
Ganga at Uluberia	West Bengal	Ganga
Ganga at Dakshineshwar	West Bengal	Ganga
Ganga at Palta	West Bengal	Ganga
Ganga at Baharampore	West Bengal	Ganga
Ganga at Diamond Harbour	West Bengal	Ganga
Ganga at Garden Reach	West Bengal	Ganga
Ganga at Howrah-Shivpur	West Bengal	Ganga
Ganga at Serampore	West Bengal	Ganga
Tribeni On Ganga, Near Burning Ghat	West Bengal	Ganga
Nabadip On Ganga,Ghoshpara Near Monipurghat	West Bengal	Ganga
Ghaghara Near Chapra	Bihar	Ghaghara
Ghaghara at Deoria D/s	Uttar Pradesh	Ghaghara
River Ghaghra at Barhalganj, Gorakhpur	Uttar Pradesh	Ghaghara
Giri at D/s Yashwant Nagar	Himachal Pradesh	Giri
Giri at U/s Cci Mines	Himachal Pradesh	Giri
Giri D/s Sataun	Himachal Pradesh	Giri
Gohad Dam, Gohad	Madhya Pradesh	Gohad
Gola River at Haldwani	Uttarakhand	Gola
Gomti at Varanasi	Uttar Pradesh	Gomti
Gomti at Sitapur U/s at Water Intake	Uttar Pradesh	Gomti
Gomti at Lucknow U/s at Water Intake Point	Uttar Pradesh	Gomti
Gomti at Lucknow D/s	Uttar Pradesh	Gomti
Gomti at Jaunpur D/s	Uttar Pradesh	Gomti
Harbora River at Narkatiaganj	Bihar	Harbora
Hindon at Saharanpur D/s	Uttar Pradesh	Hindon
Hindon at Ghaziabad D/s	Uttar Pradesh	Hindon
Hindon A/C With R. Krishna & Kali Near Binauli Town, Meerut	Uttar Pradesh	Hindon
Hindon at Sardhana Budhana Road, Village Baparsi, Meerut	Uttar Pradesh	Hindon
Jalangi, D/s of Krishna Nagar	West Bengal	Jalangi
R.Johila Near Narojabad Near Umaria Road Bridge	Madhya Pradesh	Johila
Kalinadi at U/s of Muzaffar Nagar	Uttar Pradesh	Kali (W)
Kalinadi at D/s of Muzaffar Nagar	Uttar Pradesh	Kali (W)
Kalinadi at Kannauj (Before Conf.)	Uttar Pradesh	Kalinadi (E)
Kalinadi at U/s of Gulaothi Town In Bulandsahar	Uttar Pradesh	Kalinadi (E)
Kali East at Kharkhoda-Parikshit Garh Road, Vill. Kol, Meerut	Uttar Pradesh	Kalinadi (E)
River Kaliasot Near Road Bridge, Mandideep	Madhya Pradesh	Kalisot
Kamala River at Benipatti (Madhubani)	Bihar	Kamala
Kamala River at Darbhanga	Bihar	Kamala
Kansi D/s, Midnapore,Near New Hanuman Mandir, Gandhighat	West Bengal	Kansi
Khan at Kabit Khedi (Near Indore)	Madhya Pradesh	Khan
River Khan at Sakkar Khadi, Indore	Madhya Pradesh	Khan
River Khan at Sanwer	Madhya Pradesh	Khan
Kichha River at Kichha U.S. Nagar	Uttarakhand	Kichha
Kolar Dam Water Supply Intake Well, Distt. Sehore	Madhya Pradesh	Kolar

Konar at Tilaya Dam	Jharkhand	Konar
Konar at Konar Dam	Jharkhand	Konar
Konar at Tenughat Dam	Jharkhand	Konar
Koshi River at Kurshela at Katihar	Bihar	Koshi
Koshi River at Madhepura	Bihar	Koshi
Kosi River at Kashipur Bajpur Road Bridge	Uttarakhand	Kosi
Kshipra at Ramghat at Ujjain	Madhya Pradesh	Kshipra
Kshipra at Trivenisangam (1 Km. D/s of Sangam)	Madhya Pradesh	Kshipra
Kshipra at Siddhawat (D/s) of Ujjain.	Madhya Pradesh	Kshipra
Mahananda at Thakurganj, Kishanganj Road Bridge	Bihar	Mahananda
Mahananda at Siliguri	West Bengal	Mahananda
Mahananda D/s, Ramghat	West Bengal	Mahananda
Mandakini at Chitrakut	Madhya Pradesh	Mandakini
Manusmar River at Riga, Sitamarhi	Bihar	Manusmar
Matha Bhanga, Gobindapur	West Bengal	Matha Bhanga
Water Intake Point For Suri Town On River Mayurakshi	West Bengal	Mayurakshi
Nalkari Tributary at Patratu	Jharkhand	Nalkari
Nandaur River U/s Sitarganj Industrial Area, Us Nagar	Uttarakhand	Nandaur
Nandaur River D/s Sitarganj Industrial Area, Us Nagar	Uttarakhand	Nandaur
Pabbar at U/s Dhambari	Himachal Pradesh	Pabbar
Pabbar at U/s Rohru	Himachal Pradesh	Pabbar
Pabbar at D/s Swarakuddu	Himachal Pradesh	Pabbar
Parvati Near Village Bataodapar	Madhya Pradesh	Parvati
Parvati River, Guna	Madhya Pradesh	Parvati
Parvati A/c of Vindhyachal Nalla, Pilukhedi	Madhya Pradesh	Parvati
R.Parvati Near Intake Point Pillukhedi Distt. Rajgarh	Madhya Pradesh	Parvati
Pilkhar River After Bilaspur Rampur	Uttar Pradesh	Pilkhar
Ram Rekha River at Harinagar	Bihar	Ram Rekha
Ramganga at Kannauj (Before Conf.)	Uttar Pradesh	Ramganga
Rapti A/C of R. Honin Nr. Domingarh Rly Bridge, Gorakhpur	Uttar Pradesh	Rapti
River Rapti at Rajghat, Gorakhpur	Uttar Pradesh	Rapti
Rihand at Renukut U/s	Uttar Pradesh	Rihand
Rihand at Renukut D/s	Uttar Pradesh	Rihand
Rupnarayan Before Confl. To River Ganga Near Geonkhali	West Bengal	Rupnarayan
D/s of Rupnarayan at Kolaghat, Near Kolaghat Rail Bridge No.3	West Bengal	Rupnarayan
Sai at Unnao After Drain Outfall	Uttar Pradesh	Sai
River Sai at Jalalpur, Jaunpur	Uttar Pradesh	Sai
Sankh at Tigra Reservoir	Madhya Pradesh	Sankh
Saryu at Ayodhya at Main Bathing Ghat	Uttar Pradesh	Saryu
Sikrahna River at Lal Parse, Bittiah	Bihar	Sikrana
Sikrana at Chanpatiya	Bihar	Sikrana
D/s of Silabati at Ghatal,	West Bengal	Silabati
R. Sindh at Dabra	Madhya Pradesh	Sindh
Sirsa at Ruxol	Bihar	Sirsa
Sone at Koelwar	Bihar	Sone
Sone at Chachai	Madhya Pradesh	Sone
Sone at Amlai	Madhya Pradesh	Sone
R.Sone at Origine Amarkantak	Madhya Pradesh	Sone
R.Sone at Devload Out Let of Bansagar Dam	Madhya Pradesh	Sone
Suswa River at Mothrawala, Dehradun	Uttarakhand	Suswa
Tons River	Himachal Pradesh	Tons (Hp)
Tons at Chakghat	Madhya Pradesh	Tons (Mp)
Tons at Madhavgarh	Madhya Pradesh	Tons (Mp)
River Varuna at Rameshwar, Varanasi	Uttar Pradesh	Varuna
River Varuna B/c With River Ganga at Varanasi	Uttar Pradesh	Varuna
U/s of Vindyadhari River at Haroa Bridge	West Bengal	Vindyadhari
D/s of Vindyadhari River at Malancha Burning Ghat	West Bengal	Vindyadhari
Yamuna at Wazirabad	Delhi	Yamuna
Yamuna at Nizamuddin	Delhi	Yamuna

Yamuna at Okhla Bridge (Inlet of Agra Canal)	Delhi	Yamuna
River Yamuna at Okhla After Meeting of Shahdara Drain	Delhi	Yamuna
Yamuna at Hathnikund	Haryana	Yamuna
Yamuna at Sonepat	Haryana	Yamuna
Yamuna at Kalanaur,	Haryana	Yamuna
River Yamuna , U/s Paonta Sahib	Himachal Pradesh	Yamuna
River Yamuna , D/s Paonta Sahib	Himachal Pradesh	Yamuna
Yamuna at Allahabad D/s (Balua Ghat)	Uttar Pradesh	Yamuna
Yamuna at Mathura U/s	Uttar Pradesh	Yamuna
Yamuna at Mathura D/s	Uttar Pradesh	Yamuna
Yamuna at Agra U/s	Uttar Pradesh	Yamuna
Yamuna at Etawah	Uttar Pradesh	Yamuna
Yamuna at Allahabad	Uttar Pradesh	Yamuna
Yamuna at Mazawali	Uttar Pradesh	Yamuna
Yamuna at Bateswar	Uttar Pradesh	Yamuna
Yamuna at Juhika B/c With Chanbal, Etawah	Uttar Pradesh	Yamuna
Yamuna at Hamirpur	Uttar Pradesh	Yamuna
River Yamuna at Shahpur	Uttar Pradesh	Yamuna
Yamuna at Vishramghat, Mathura	Uttar Pradesh	Yamuna
Yamuna at Kesighat, Vrindavan	Uttar Pradesh	Yamuna
Yamuna at D/s of Agra	Uttar Pradesh	Yamuna
Yamuna at U/s Dak Patthar,	Uttarakhand	Yamuna
Yamuna at Yamunotri	Uttarakhand	Yamuna
Yamuna at Hanumanchatti	Uttarakhand	Yamuna
Yamuna at U/s of Lakhwar Dam	Uttarakhand	Yamuna

6.2.1 Water Quality of River Ganga

The Water Quality of River Ganga for year 2009 is given in Annexure-I (Table 6.1). The summary of water quality of river Ganga with respect to pH, conductivity, Dissolved Oxygen (DO), Bio chemical Oxygen Demand (BOD), Total coliform (TC) and Faecal coliform (FC) is given below.

pH:-

- The criteria for pH is 6.5 to 8.5.
- pH is observed in the range of 6.5-8.9
- pH is not meeting the desired criteria at
    - Varanasi D/s and Mokama U/s (8.9)
    - Confluence of Sone River Doriganj, Chapra (8.8)
    - Rishikesh, Haridwar, Kannauj U/s & D/s and Indrapuri, Dehri on Sone (8.7)
    - Bithoor, Trighat and Kanpur U/s (8.6)

Conductivity: -

- The criteria of Conductivity for irrigation is 2250 µmhos/cm.
- Conductivity lies in the range of 68-4460 µmhos/cm.
- Conductivity is not meeting the criteria at Diamond Harbour (4460 µmhos/cm)

Dissolved Oxygen: -

- The criteria for DO should be more than 4 mg/l.
- DO lies in the range of 4.3-9.2 mg/l and is meeting the criteria.

Bio chemical Oxygen Demand: -

- The criteria for BOD should be less than 3 mg/l.
- BOD was observed in the range of 0.2-16.0 mg/l.
- BOD is not meeting the desired criteria at
    - Kanpur D/s (16.0 mg/l)
    - Varanasi D/s (12.8 mg/l)
    - Dakshineshwar (6.7 mg/l)
    - Haridwar (5.6 mg/l)
    - Bithoor (5.4 mg/l)
    - Kannauj D/s and Kanpur U/s (5.2 mg/l)
    - Kannauj U/s and Howrah-Shivpur (4.9 mg/l)
    - Allahabad D/s (4.8 mg/l)
    - Trighat (4.4 mg/l)
    - Allahabad (Rasoolabad) (4.3 mg/l)
    - Garhmukteshwar (4.2 mg/l)
    - Dalmau and Kala Kankar (3.9 mg/l)
    - Varanasi U/s (3.8 mg/l)
    - Narora (3.6 mg/l)

Faecal Coliform

- Faecal Coliform should be less than 2500 MPN/100ml.
- Faecal Coliform ranges from 0-400000 MPN/100ml
- Faecal Coliform is not complying with the permissible limit of water quality criteria for bathing at
    - Dakshineshwar (400000 MPN/100ml)
    - Howrah-Shivpur and Garden Reach (250000 MPN/100ml)
    - Palta (170000 MPN/100ml)
    - Serampore, Uluberia and Diamond Harbour (110000 MPN/100ml)
    - Varanasi D/s (90000 MPN/100ml)
    - Baharampore (80000 MPN/100ml)
    - Kanpur D/s (75000 MPN/100ml)
    - Tribeni on Ganga (70000 MPN/100ml)
    - Bhagirathi B/c with Alaknanda at Devprayag (40000 MPN/100ml)
    - Alkananda A/c with Bhagirathi at Devprayag (30000 MPN/100ml)
    - Trighat (27000 MPN/100ml)
    - Mandakini B/c Alkalnada at Rudraprayag (21000 MPN/100ml)
    - Varanasi U/s (13000 MPN/100ml)
    - Alkananda B/c to Bhagirathi at Devprayag (11900 MPN/100ml)
    - Alkananda A/c Mandakini at Rudraprayag (11700 MPN/100ml)
    - Alkananda B/c Mandakini at Rudra Prayag (9900 MPN/100ml)
    - Buxar – Ramrekhaghat, Patna D/s and Mokama U/s (9000 MPN/100ml)
    - Nabadip on Ganga,Ghoshpara (7000 MPN/100ml)
    - Buxar, Darbhanga Ghat at Patna and Kahalgaon (5000 MPN/100ml)
    - Dalmau (4900 MPN/100ml)
    - Kala Kankar (4900 MPN/100ml)
    - Garhmukteshwar and Allahabad D/s (Sangam) (4000 MPN/100ml)

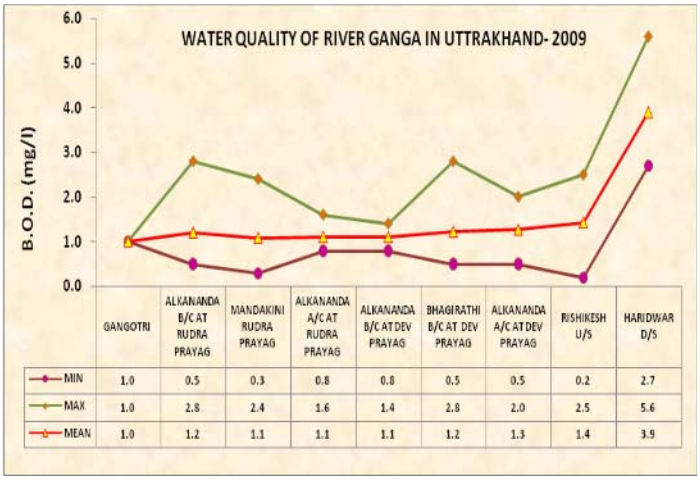
- Khurji- Patna U/s, Mokama D/s, Sultanganj- Bhagalpur and Bhagalpur (3000 MPN/100ml)
- Kannauj D/s (2800 MPN/100ml)

Total Coliform

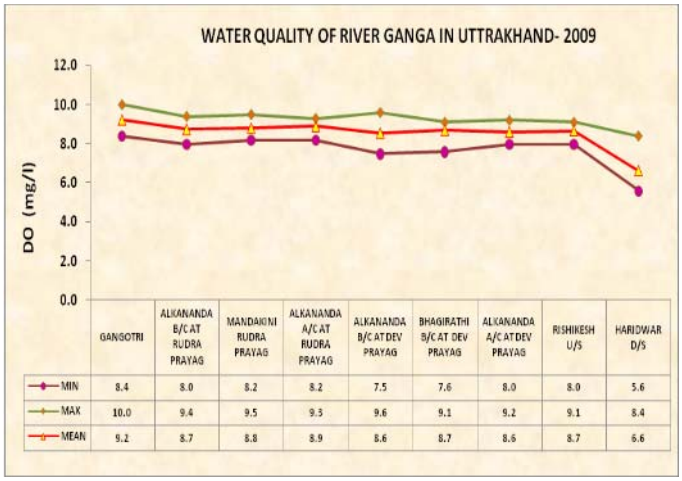
- Total Coliform should be less than 5000 MPN/100ml
- Total Coliform is in the range of 2-650000 MPN/100ml
- The highest count of Total Coliform is observed at
  - Dakshineshwar (650000 MPN/100ml)
  - Howrah-Shivpur (550000 MPN/100ml)
  - Garden Reach (350000 MPN/100ml)
  - Uluberia (280000 MPN/100ml)
  - Palta (220000 MPN/100ml)
  - Alkananda A/c with Bhagirathi at Devprayag (210000 MPN/100ml)
  - Bhagirathi B/c with Alaknanda at Devprayag (200000 MPN/100ml)
  - Alkananda B/c Mandakini at Rudra Prayag (171000 MPN/100ml)
  - Diamond Harbour (170000 MPN/100ml)
  - Varanasi D/s and Serampore (140000 MPN/100ml)
  - Kanpur D/s (120000 MPN/100ml)
  - Baharampore and Tribeni on Ganga (110000 MPN/100ml)
  - Alkananda B/c to Bhagirathi at Devprayag (102000 MPN/100ml)
  - Alkananda A/c Mandakini at Rudraprayag (88000 MPN/100ml)
  - Mandakini B/c Alkalnada at Rudraprayag (75000 MPN/100ml)
  - Bhagirathi at Gangotri (71000 MPN/100ml)
  - Trighat (34000 MPN/100ml)
  - Buxar- Ramrekhaghat, Patna D/s and Mokama U/s & D/s (24000 MPN/100ml)
  - Varanasi U/s (17000 MPN/100ml)
  - Garhmukteshwar, Kahalgaon and Buxar (16000 MPN/100ml)
  - Darbhanga Ghat at Patna (15000 MPN/100ml)
  - Nabadip on Ganga,Ghoshpara (14000 MPN/100ml)
  - Kannauj D/s (9300 MPN/100ml)
  - Khurji-Patna U/s, Sultanganj-Bhagalpur, Bhagalpur and Munger (9000 MPN/100ml)
  - Dalmau (7900 MPN/100ml)
  - Kannauj U/s, Bithoor and Kanpur U/s (7500 MPN/100ml)
  - Allahabad D/s (Sangam) (6000 MPN/100ml)
  - Narora (5400 MPN/100ml)

The state-wise water quality status of mainstream of River Ganga with respect to BOD, DO, Total Coliform, Faecal Coliform and Conductivity is given in Figure 6.1 to 6.6.

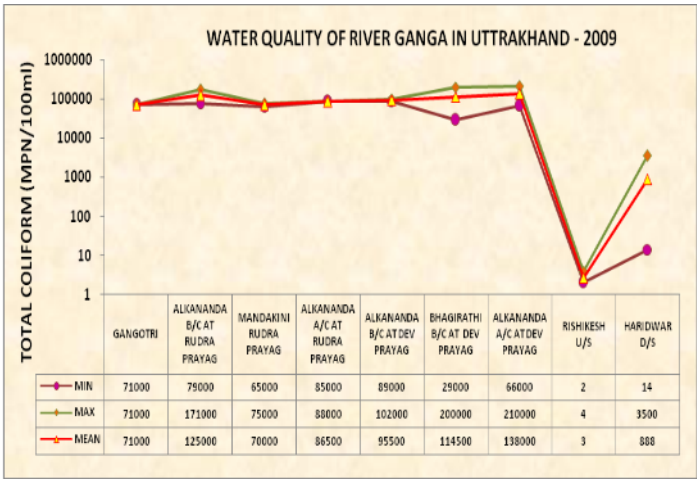
Figure 6.1: Spatial Trend of Water Quality of River Ganga in Uttarakhand



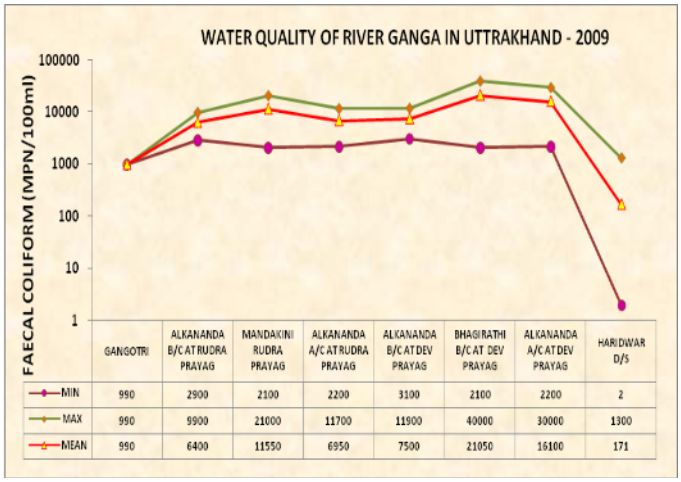
	GANGOTRI	ALKANANDA B/C AT RUDRA PRAYAG	MANDAKINI RUDRA PRAYAG	ALKANANDA A/C AT RUDRA PRAYAG	ALKANANDA B/C AT DEV PRAYAG	BHAGIRATHI B/C AT DEV PRAYAG	ALKANANDA A/C AT DEV PRAYAG	RISHIKESH U/S	HARIDWAR D/S
MIN	1.0	0.5	0.3	0.8	0.8	0.5	0.5	0.2	2.7
MAX	1.0	2.8	2.4	1.6	1.4	2.8	2.0	2.5	5.6
MEAN	1.0	1.2	1.1	1.1	1.1	1.2	1.3	1.4	3.9



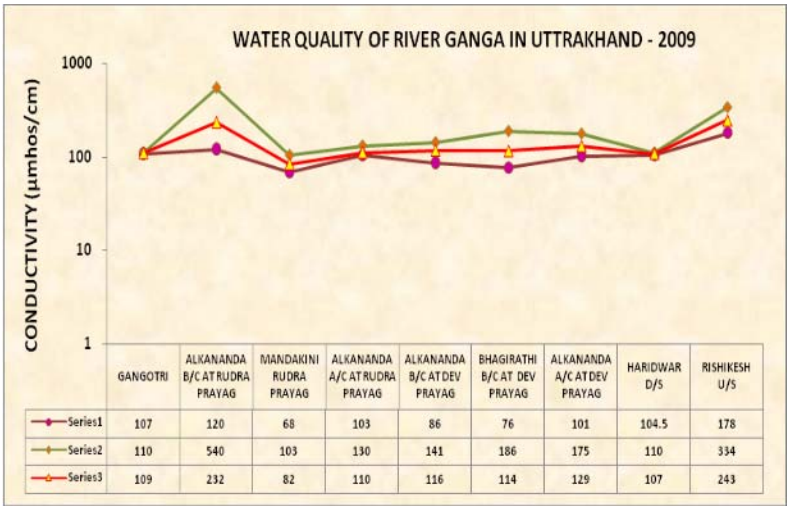
	GANGOTRI	ALKANANDA B/C AT RUDRA PRAYAG	MANDAKINI RUDRA PRAYAG	ALKANANDA A/C AT RUDRA PRAYAG	ALKANANDA B/C AT DEV PRAYAG	BHAGIRATHI B/C AT DEV PRAYAG	ALKANANDA A/C AT DEV PRAYAG	RISHIKESH U/S	HARIDWAR D/S
MIN	8.4	8.0	8.2	8.2	7.5	7.6	8.0	8.0	5.6
MAX	10.0	9.4	9.5	9.3	9.6	9.1	9.2	9.1	8.4
MEAN	9.2	8.7	8.8	8.9	8.6	8.7	8.6	8.7	6.6



	GANGOTRI	ALKANANDA B/C AT RUDRA PRAYAG	MANDAKINI RUDRA PRAYAG	ALKANANDA A/C AT RUDRA PRAYAG	ALKANANDA B/C AT DEV PRAYAG	BHAGIRATHI B/C AT DEV PRAYAG	ALKANANDA A/C AT DEV PRAYAG	RISHIKESH U/S	HARIDWAR D/S
MIN	71000	79000	65000	85000	89000	29000	66000	2	14
MAX	71000	171000	75000	88000	102000	200000	210000	4	3500
MEAN	71000	125000	70000	86500	95500	114500	138000	3	888

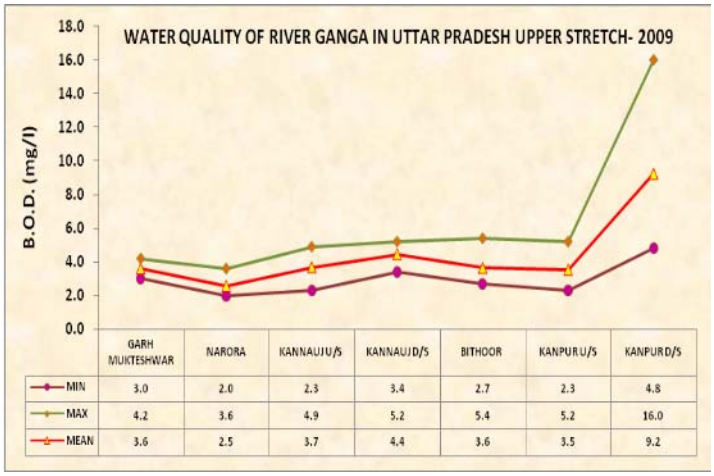


	GANGOTRI	ALKANANDA B/C AT RUDRA PRAYAG	MANDAKINI RUDRA PRAYAG	ALKANANDA A/C AT RUDRA PRAYAG	ALKANANDA B/C AT DEV PRAYAG	BHAGIRATHI B/C AT DEV PRAYAG	ALKANANDA A/C AT DEV PRAYAG	HARIDWAR D/S
MIN	990	2900	2100	2200	3100	2100	2200	2
MAX	990	9900	21000	11700	11900	40000	30000	1300
MEAN	990	6400	11550	6950	7500	21050	16100	171

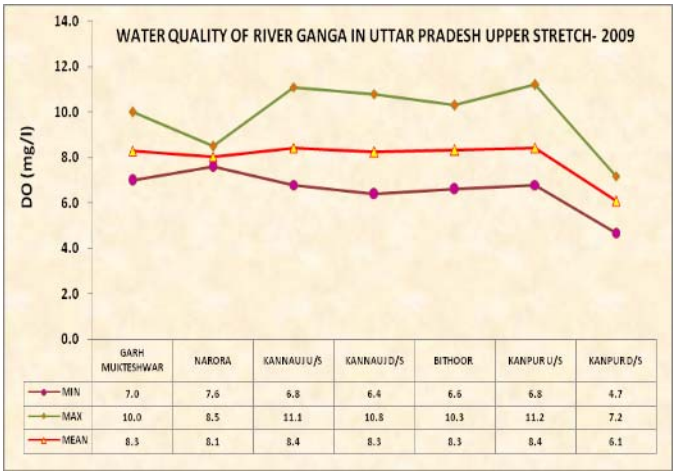


	GANGOTRI	ALKANANDA B/C AT RUDRA PRAYAG	MANDAKINI RUDRA PRAYAG	ALKANANDA A/C AT RUDRA PRAYAG	ALKANANDA B/C AT DEV PRAYAG	BHAGIRATHI B/C AT DEV PRAYAG	ALKANANDA A/C AT DEV PRAYAG	HARIDWAR D/S	RISHIKESH U/S
Series1	107	120	68	103	86	76	101	104.5	178
Series2	110	540	103	130	141	186	175	110	334
Series3	109	232	82	110	116	114	129	107	243

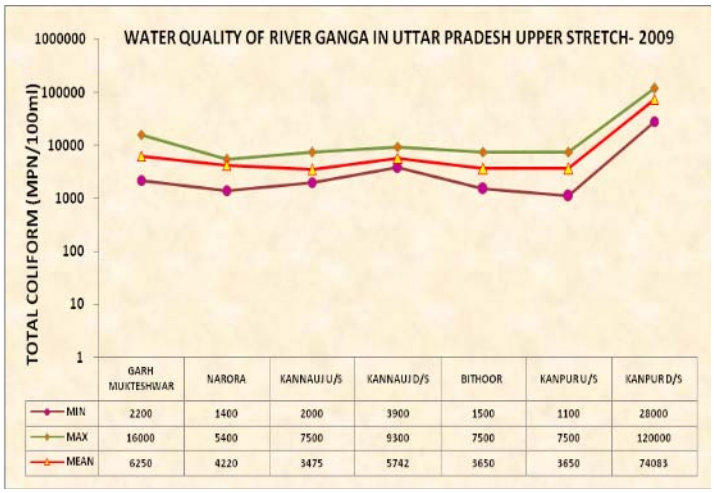
Figure 6.2: Spatial Trend of Water Quality of River Ganga in Uttar Pradesh (Upper Stretch)



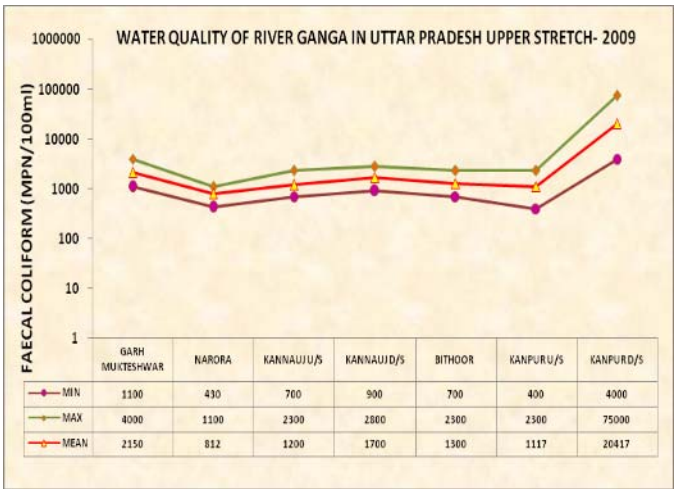
	GARH MUKTESHWAR	NARORA	KANNAUJU/S	KANNAUJD/S	BITHOOR	KANPURU/S	KANPURD/S
MIN	3.0	2.0	2.3	3.4	2.7	2.3	4.8
MAX	4.2	3.6	4.9	5.2	5.4	5.2	16.0
MEAN	3.6	2.5	3.7	4.4	3.6	3.5	9.2



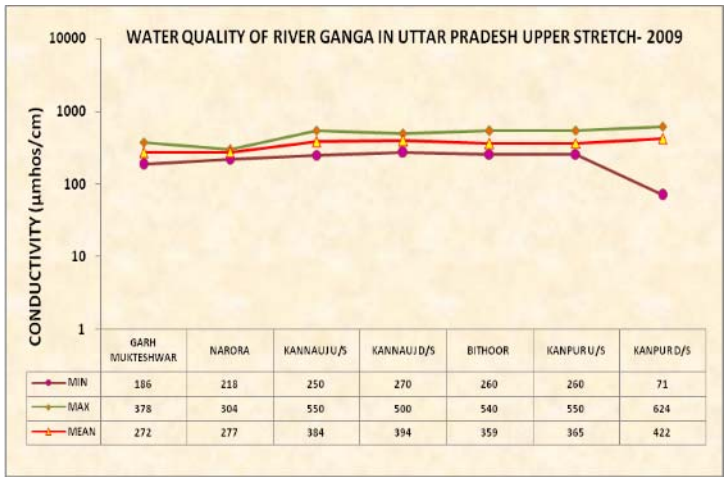
	GARH MUKTESHWAR	NARORA	KANNAUJU/S	KANNAUJD/S	BITHOOR	KANPURU/S	KANPURD/S
MIN	7.0	7.6	6.8	6.4	6.6	6.8	4.7
MAX	10.0	8.5	11.1	10.8	10.3	11.2	7.2
MEAN	8.3	8.1	8.4	8.3	8.3	8.4	6.1



	GARH MUKTESHWAR	NARORA	KANNAUJU/S	KANNAUJD/S	BITHOOR	KANPURU/S	KANPURD/S
MIN	2200	1400	2000	3900	1500	1100	28000
MAX	16000	5400	7500	9300	7500	7500	120000
MEAN	6250	4220	3475	5742	3650	3650	74083

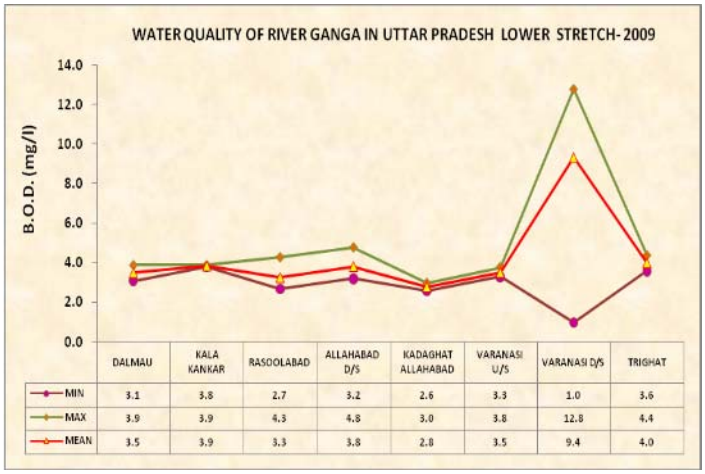


	GARH MUKTESHWAR	NARORA	KANNAUJU/S	KANNAUJD/S	BITHOOR	KANPURU/S	KANPURD/S
MIN	1100	430	700	900	700	400	4000
MAX	4000	1100	2300	2800	2300	2300	75000
MEAN	2150	812	1200	1700	1300	1117	20417

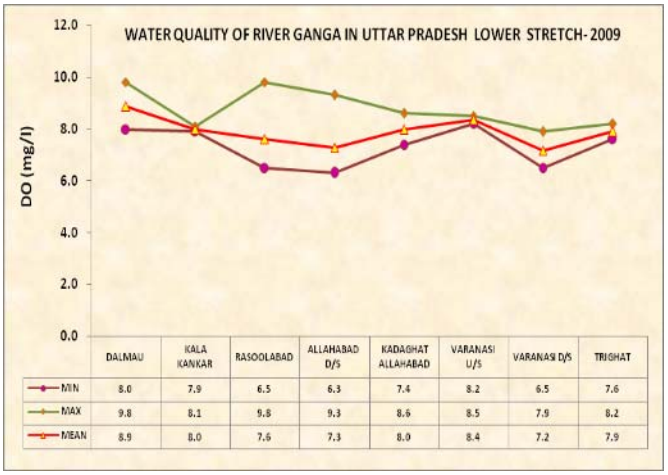


	GARH MUKTESHWAR	NARORA	KANNAUJU/S	KANNAUJD/S	BITHOOR	KANPURU/S	KANPURD/S
MIN	186	218	250	270	260	260	71
MAX	378	304	550	500	540	550	624
MEAN	272	277	384	394	359	365	422

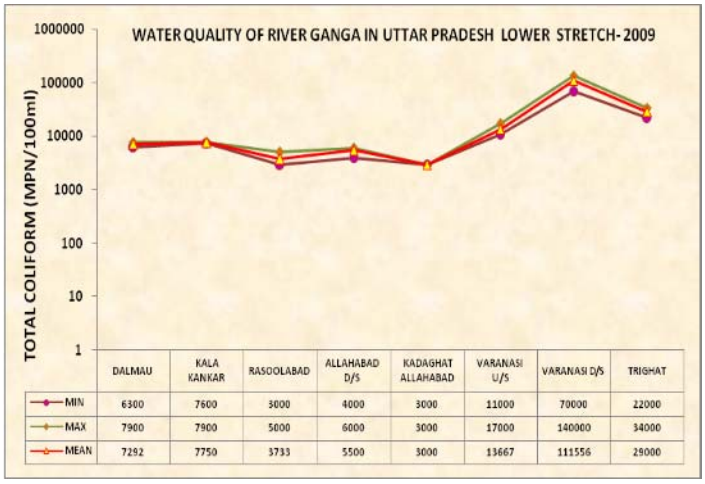
Figure 6.3: Spatial Trend of Water Quality of River Ganga in Uttar Pradesh (Lower Stretch)



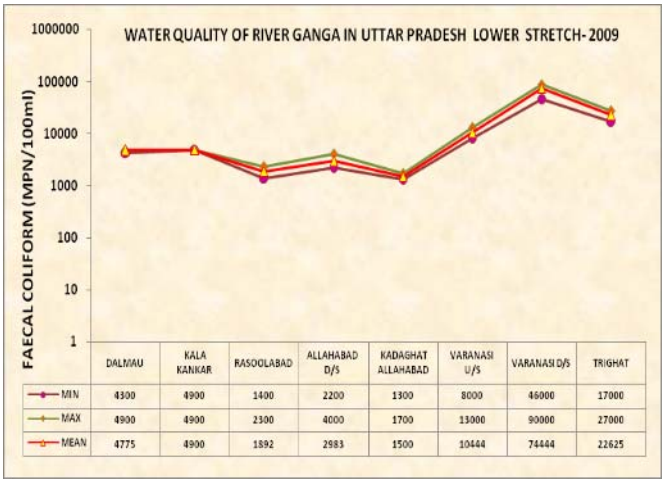
	DALMAU	KALA KANKAR	RASOOLABAD	ALLAHABAD D/S	KADAGHAT ALLAHABAD	VARANASI U/S	VARANASI D/S	TRIGHAT
MIN	3.1	3.8	2.7	3.2	2.6	3.3	1.0	3.6
MAX	3.9	3.9	4.3	4.8	3.0	3.8	12.8	4.4
MEAN	3.5	3.9	3.3	3.8	2.8	3.5	9.4	4.0



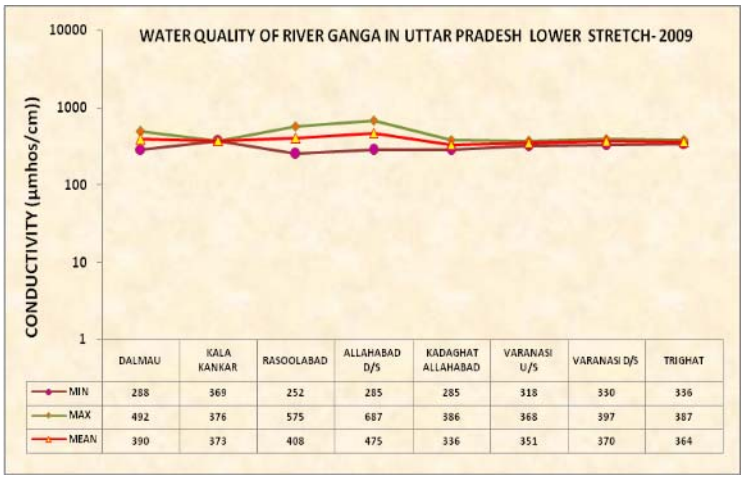
	DALMAU	KALA KANKAR	RASOOLABAD	ALLAHABAD D/S	KADAGHAT ALLAHABAD	VARANASI U/S	VARANASI D/S	TRIGHAT
MIN	8.0	7.9	6.5	6.3	7.4	8.2	6.5	7.6
MAX	9.8	8.1	9.8	9.3	8.6	8.5	7.9	8.2
MEAN	8.9	8.0	7.6	7.3	8.0	8.4	7.2	7.9



	DALMAU	KALA KANKAR	RASOOLABAD	ALLAHABAD D/S	KADAGHAT ALLAHABAD	VARANASI U/S	VARANASI D/S	TRIGHAT
MIN	6300	7600	3000	4000	3000	11000	70000	22000
MAX	7900	7900	5000	6000	3000	17000	140000	34000
MEAN	7292	7750	3733	5500	3000	13667	111556	29000

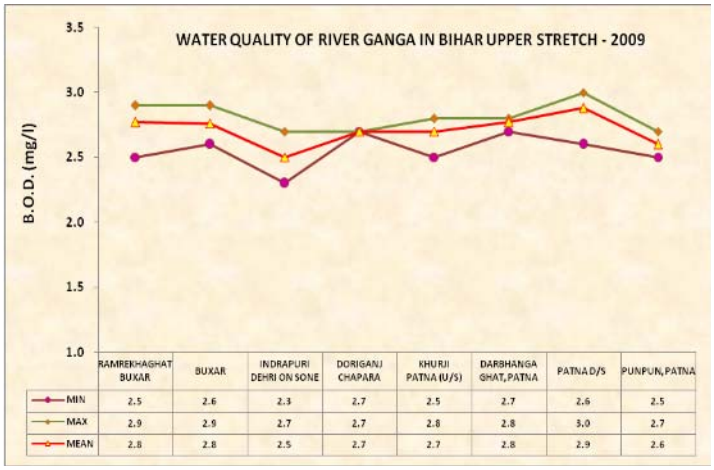


	DALMAU	KALA KANKAR	RASOOLABAD	ALLAHABAD D/S	KADAGHAT ALLAHABAD	VARANASI U/S	VARANASI D/S	TRIGHAT
MIN	4300	4900	1400	2200	1300	8000	46000	17000
MAX	4900	4900	2300	4000	1700	13000	90000	27000
MEAN	4775	4900	1892	2983	1500	10444	74444	22625

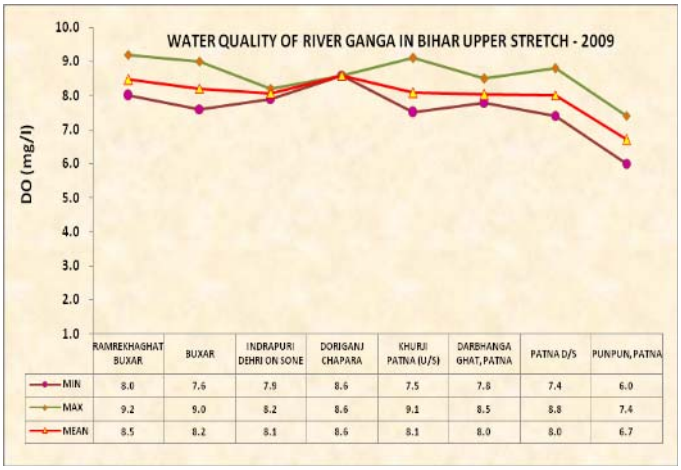


	DALMAU	KALA KANKAR	RASOOLABAD	ALLAHABAD D/S	KADAGHAT ALLAHABAD	VARANASI U/S	VARANASI D/S	TRIGHAT
MIN	288	369	252	285	285	318	330	336
MAX	492	376	575	687	386	368	397	387
MEAN	390	373	408	475	336	351	370	364

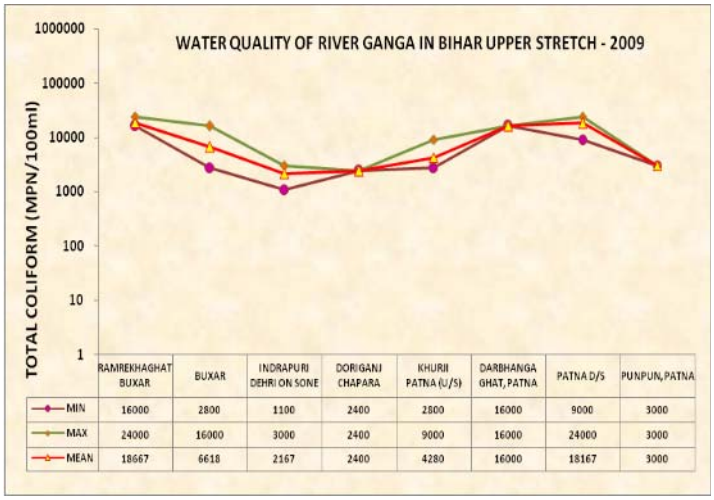
Figure 6.4: Spatial Trend of Water Quality of River Ganga in Bihar (Upper Stretch)



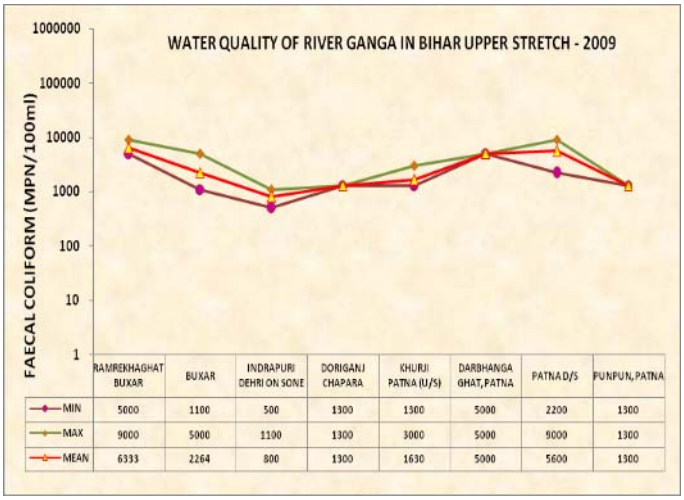
	RAMREKHAGHAT BUXAR	BUXAR	INDRAPURI DEHRI ON SONE	DORIGANJ CHAPARA	KHURJI PATNA (U/S)	DARBHANGA GHAT, PATNA	PATNA D/S	PUNPUN, PATNA
MIN	2.5	2.6	2.3	2.7	2.5	2.7	2.6	2.5
MAX	2.9	2.9	2.7	2.7	2.8	2.8	3.0	2.7
MEAN	2.8	2.8	2.5	2.7	2.7	2.8	2.9	2.6



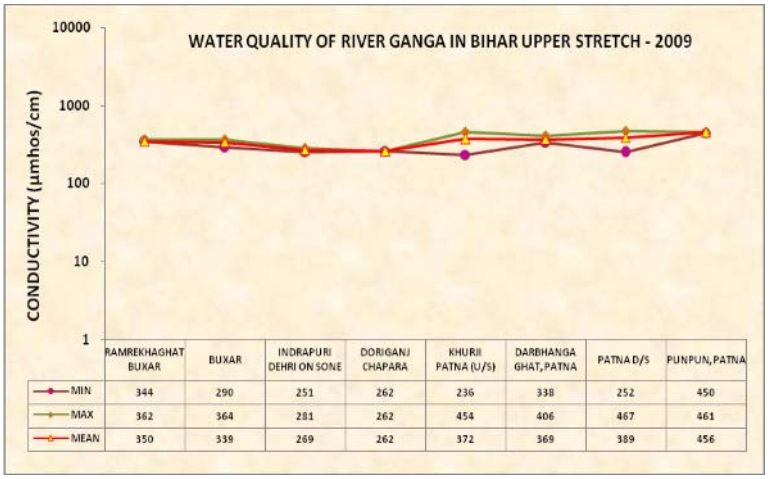
	RAMREKHAGHAT BUXAR	BUXAR	INDRAPURI DEHRI ON SONE	DORIGANJ CHAPARA	KHURJI PATNA (U/S)	DARBHANGA GHAT, PATNA	PATNA D/S	PUNPUN, PATNA
MIN	8.0	7.6	7.9	8.6	7.5	7.8	7.4	6.0
MAX	9.2	9.0	8.2	8.6	9.1	8.5	8.8	7.4
MEAN	8.5	8.2	8.1	8.6	8.1	8.0	8.0	6.7



	RAMREKHAGHAT BUXAR	BUXAR	INDRAPURI DEHRI ON SONE	DORIGANJ CHAPARA	KHURJI PATNA (U/S)	DARBHANGA GHAT, PATNA	PATNA D/S	PUNPUN, PATNA
MIN	16000	2800	1100	2400	2800	16000	9000	3000
MAX	24000	16000	3000	2400	9000	16000	24000	3000
MEAN	18667	6618	2167	2400	4280	16000	18167	3000

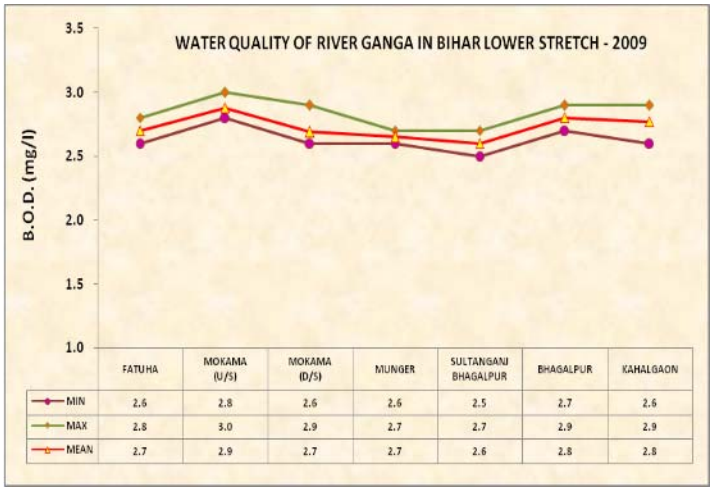


	RAMREKHAGHAT BUXAR	BUXAR	INDRAPURI DEHRI ON SONE	DORIGANJ CHAPARA	KHURJI PATNA (U/S)	DARBHANGA GHAT, PATNA	PATNA D/S	PUNPUN, PATNA
MIN	5000	1100	500	1300	1300	5000	2200	1300
MAX	9000	5000	1100	1300	3000	5000	9000	1300
MEAN	6333	2264	800	1300	1630	5000	5600	1300

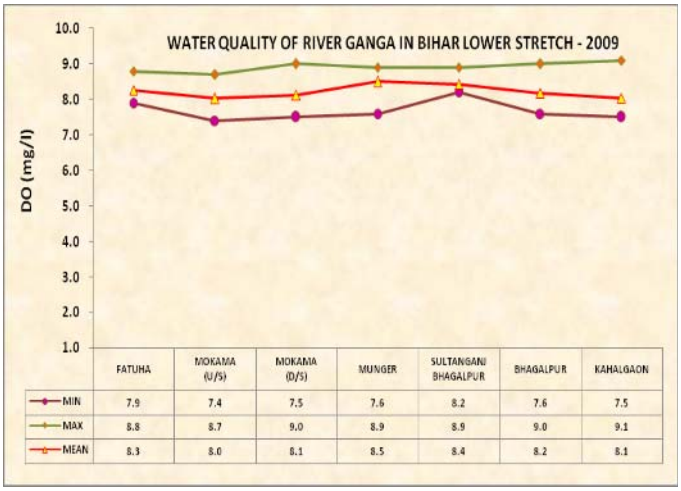


	RAMREKHAGHAT BUXAR	BUXAR	INDRAPURI DEHRI ON SONE	DORIGANJ CHAPARA	KHURJI PATNA (U/S)	DARBHANGA GHAT, PATNA	PATNA D/S	PUNPUN, PATNA
MIN	344	290	251	262	236	338	252	450
MAX	362	364	281	262	454	406	467	461
MEAN	350	339	269	262	372	369	389	456

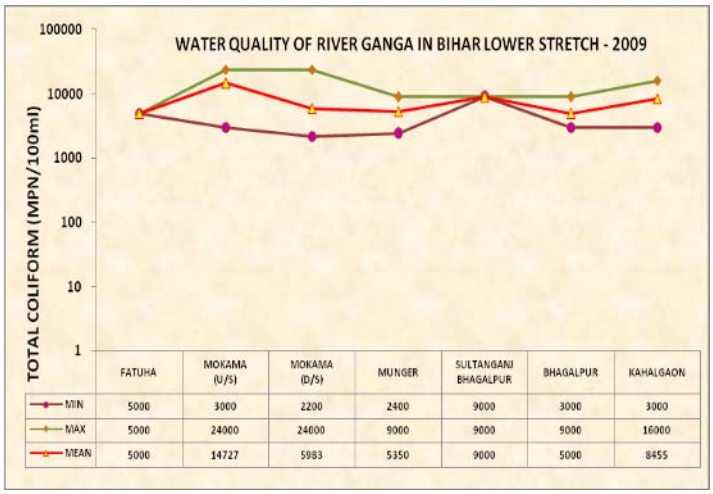
Figure 6.5: Spatial Trend of Water Quality of River Ganga in Bihar (Lower Stretch)



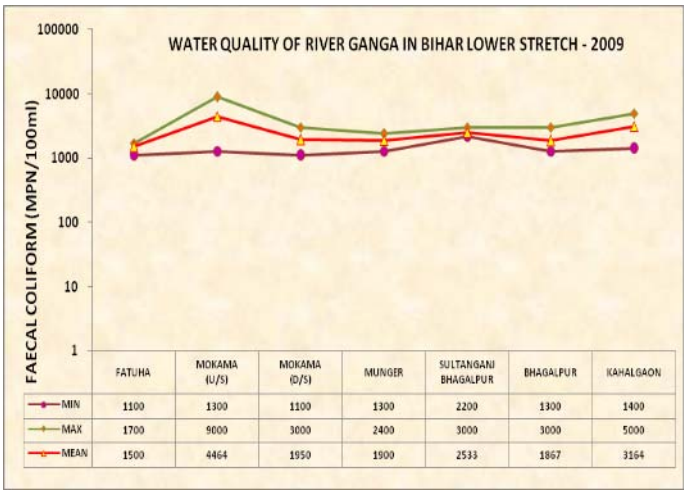
	FATUHA	MOKAMA (U/S)	MOKAMA (D/S)	MUNGER	SULTANGANJ BHAGALPUR	BHAGALPUR	KAHALGAON
MIN	2.6	2.8	2.6	2.6	2.5	2.7	2.6
MAX	2.8	3.0	2.9	2.7	2.7	2.9	2.9
MEAN	2.7	2.9	2.7	2.7	2.6	2.8	2.8



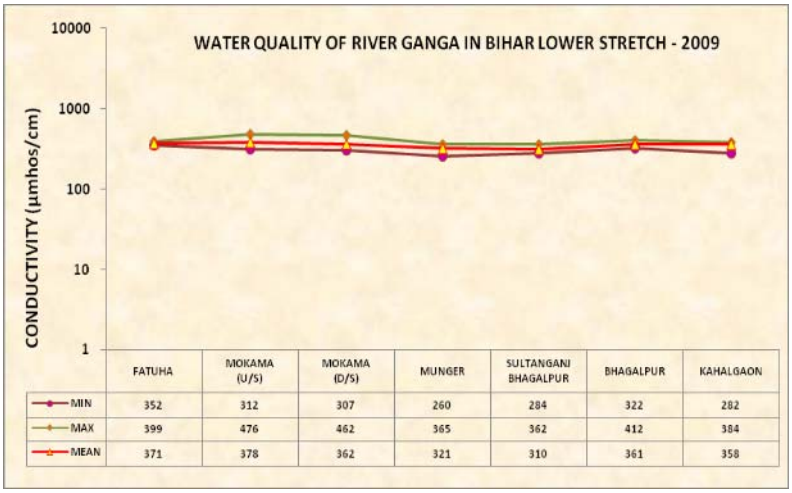
	FATUHA	MOKAMA (U/S)	MOKAMA (D/S)	MUNGER	SULTANGANJ BHAGALPUR	BHAGALPUR	KAHALGAON
MIN	7.9	7.4	7.5	7.6	8.2	7.6	7.5
MAX	8.8	8.7	9.0	8.9	8.9	9.0	9.1
MEAN	8.3	8.0	8.1	8.5	8.4	8.2	8.1



	FATUHA	MOKAMA (U/S)	MOKAMA (D/S)	MUNGER	SULTANGANJ BHAGALPUR	BHAGALPUR	KAHALGAON
MIN	5000	3000	2200	2400	9000	3000	3000
MAX	5000	24000	24000	9000	9000	9000	16000
MEAN	5000	14727	5983	5350	9000	5000	8455

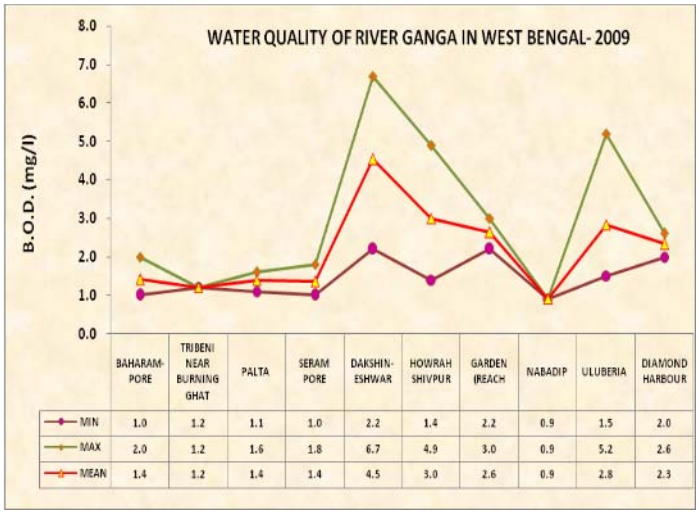


	FATUHA	MOKAMA (U/S)	MOKAMA (D/S)	MUNGER	SULTANGANJ BHAGALPUR	BHAGALPUR	KAHALGAON
MIN	1100	1300	1100	1300	2200	1300	1400
MAX	1700	9000	3000	2400	3000	3000	5000
MEAN	1500	4464	1950	1900	2533	1867	3164

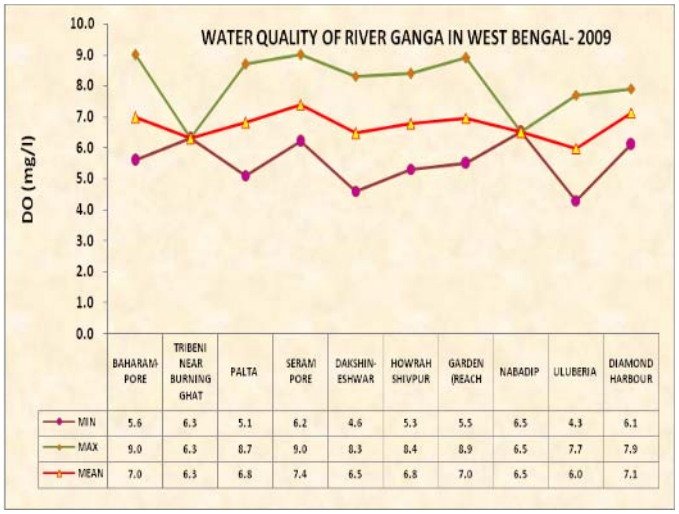


	FATUHA	MOKAMA (U/S)	MOKAMA (D/S)	MUNGER	SULTANGANJ BHAGALPUR	BHAGALPUR	KAHALGAON
MIN	352	312	307	260	284	322	282
MAX	399	476	462	365	362	412	384
MEAN	371	378	362	321	310	361	358

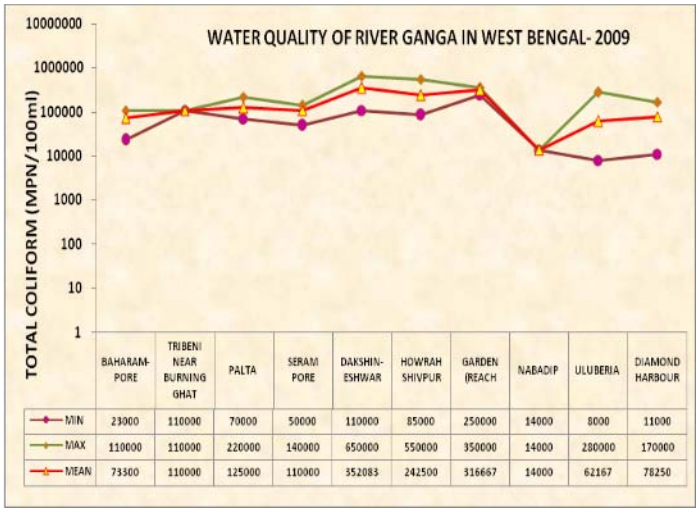
Figure 6.6: Spatial Trend of Water Quality of River Ganga in West Bengal



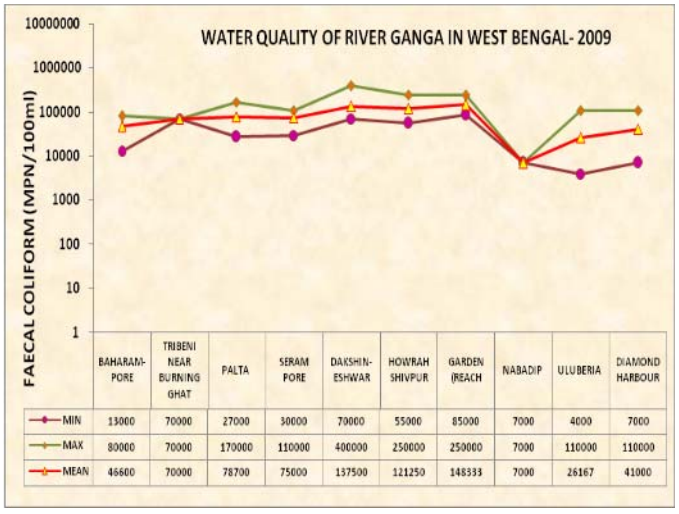
	BAHARAM-PORE	TRIBENI NEAR BURNING GHAT	PALTA	SERAM PORE	DAKSHIN-ESHWAR	HOWRAH SHIVPUR	GARDEN (REACH	NABADIP	ULUBERIA	DIAMOND HARBOUR
MIN	1.0	1.2	1.1	1.0	2.2	1.4	2.2	0.9	1.5	2.0
MAX	2.0	1.2	1.6	1.8	6.7	4.9	3.0	0.9	5.2	2.6
MEAN	1.4	1.2	1.4	1.4	4.5	3.0	2.6	0.9	2.8	2.3



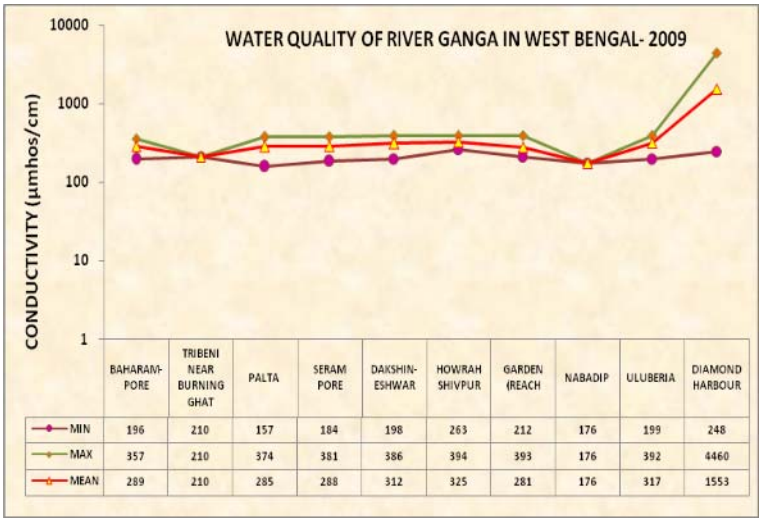
	BAHARAM-PORE	TRIBENI NEAR BURNING GHAT	PALTA	SERAM PORE	DAKSHIN-ESHWAR	HOWRAH SHIVPUR	GARDEN (REACH	NABADIP	ULUBERIA	DIAMOND HARBOUR
MIN	5.6	6.3	5.1	6.2	4.6	5.3	5.5	6.5	4.3	6.1
MAX	9.0	6.3	8.7	9.0	8.3	8.4	8.9	6.5	7.7	7.9
MEAN	7.0	6.3	6.8	7.4	6.5	6.8	7.0	6.5	6.0	7.1



	BAHARAM-PORE	TRIBENI NEAR BURNING GHAT	PALTA	SERAM PORE	DAKSHIN-ESHWAR	HOWRAH SHIVPUR	GARDEN (REACH	NABADIP	ULUBERIA	DIAMOND HARBOUR
MIN	23000	110000	70000	50000	110000	85000	250000	14000	8000	11000
MAX	110000	110000	220000	140000	650000	550000	350000	14000	280000	170000
MEAN	73300	110000	125000	110000	352083	242500	316667	14000	62167	78250



	BAHARAM-PORE	TRIBENI NEAR BURNING GHAT	PALTA	SERAM PORE	DAKSHIN-ESHWAR	HOWRAH SHIVPUR	GARDEN (REACH	NABADIP	ULUBERIA	DIAMOND HARBOUR
MIN	13000	70000	27000	30000	70000	55000	85000	7000	4000	7000
MAX	80000	70000	170000	110000	400000	250000	250000	7000	110000	110000
MEAN	46600	70000	78700	75000	137500	121250	148333	7000	26167	41000



	BAHARAM-PORE	TRIBENI NEAR BURNING GHAT	PALTA	SERAM PORE	DAKSHIN-ESHWAR	HOWRAH SHIVPUR	GARDEN (REACH	NABADIP	ULUBERIA	DIAMOND HARBOUR
MIN	196	210	157	184	198	263	212	176	199	248
MAX	357	210	374	381	386	394	393	176	392	4460
MEAN	289	210	285	288	312	325	281	176	317	1553

6.2.2 Water Quality of River Yamuna

The River Yamuna is a major tributary of River Ganges. In the upper course of 200 km stretch it draws water from several major streams namely Rishi-Ganga, Unta and Hanuman Ganga, Tons, Giri, and Ashan. The combined stream flows through the shivalik range of hills of Uttarakhand, Himachal Pradesh, and Uttar Pradesh and enters into the plains in the Dak Phatthar in Haryana where this river regulated through weir and diverted into canal for power generation. From Tajewala barrage in Yamunanagar district of Haryana, river again diverted into Western Yamuna Canal and Eastern Yamuna Canal for irrigation. River regain its water from ground water accrual and feeding canal through Somnadi (seasonal stream) just U/s of Kalanaur and traverses a route of about 1150 km through three states i.e. Haryana, Delhi and U.P. and finally to its confluence with Ganges at Allahabad. It receives major tributaries like Chambal, Betwa, Sindh and Ken from right bank and Hindon from left bank.

The availability of water in River Yamuna is greatly varied with time and space. Precipitation is confined to only three months in a year and varies greatly. Most of the water flows in the Yamuna (nearly 80%) in monsoon period (July, August and September) only. Whatever water flows in non-monsoon period (October to June) is extensively used for irrigation and drinking leaving very little or no water in the river to flow.

It is observed that about 500 km long stretch of the river is in bad shape, having water quality, most of the time, below desired level for "designated best use". In the dry season four distinct gradients of pollutional load can be discerned in the river stretch between Wazirabad and Etawah. The stretch between Wazirabad and Okhla is the most heavily polluted one, carrying the massive input of wastewater from Delhi. This input has sets off a progressive series of chemical and biological events in the D/s water. This stretch is characterised by high bacterial population, cloudy appearance high BOD and strong disagreeable odour - all indicating general depletion of oxygen. Masses of gaseous sludge rising from the bottom are often noticed floating near the surface of the water. During monsoon due to flood the sludge deposited in this stretch is flushed and stay in suspension causes rise in oxygen uptake in the D/s. This causes heavy fish mortality every year during first flushing after onset of monsoon.

Though there are number of bathing "Ghats along the river in Delhi stretch, the quality of water is far below the bathing standards. Even in this short stretch, remarkable purification takes place due to high temperature and long retention time in this stretch due to the two barrages one at Okhla and another at ITO (nearly 10 km U/s of Okhla Barrage). The ITO Barrage is used divert the Yamuna water for cooling purpose of the two Thermal Power Plants located near ITO. In the stretch between Okhla and Agra the same assimilative capacity can be observed after the sewage input at Okhla, Mathura and Agra. After a few kilometers the repeated additions of sewage are mainly noticeable by a higher state of eutrophication leading to the formation of algal mats in the River. Excessive algal can cause problems associated with the oxygen balance in the water (daytime super saturation and nighttime oxygen depletion). The water quality from DO, BOD, and

bacterial point of view is not fit for designated best uses of this stretch. The Agra Water Works is drawing its raw water from this only.

The stretch from Agra to the confluence with the River Chambal at Etawah is characterized by self- purification processes of the Agra effluents. The confluence with relatively clean Chambal River is of great value in diluting the pollution load of River Yamuna before it joins the Ganga at Allahabad.

During the monsoon period due to huge mass of water flows in the river the barrages are opened leading to a more or less continuous system. The high load of untreated biodegradable material (domestic sewage) leads several gradients in saprobic and eutrophic conditions; major part of the Yamuna can hardly fulfill the designated uses.

6.2.2.1 Major Water Quality Segments

The Yamuna is classified into 5 distinct segments due to characteristic Hydrological and Ecological conditions. These segments are:

Himalayan Segment	From origin to Tajewala Barrage (172 kms.)
Upper Segment	Tajewala Barrage to Wazirabad Barrage (224 kms.)
Delhi Segment	Wazirabad Barrage to Okhla Barrage (22 kms.)
Eutrophicated Segment	Okhla Barrage to Chambal Confluence (490 kms.)
Diluted Segment	Chambal Confluence to Ganga Confluence (468 kms.)

6.2.2.2 Critical Segments

The water quality in the Himalayan Segment and the Diluted Segment is comparatively good. However, due to heavy abstraction from and discharge of pollutants into the river system, there are critical segments, which require pollution abatement measures to improve the water quality of the river. These segments with the causes of pollution are:

Wazirabad to Okhla	Domestic and industrial waste water of Delhi.
Okhla to Vrindavan	Domestic wastewater from Delhi and industrial effluent from Saharanpur, Muzaffarnagar, Ghaziabad, Noida, etc.
Vrindavan to Mathura	Domestic wastewater and industrial effluent from dyeing and printing industry of Vrindavan and Mathura
Mathura to Etawah	Domestic wastewater from Agra and Etawah.

6.2.2.3 Water Quality of River Yamuna

The Water Quality of River Yamuna for year 2009 is given in Annexure-I (Table 6.2). The summary of water quality of river Yamuna with respect to pH, conductivity, Dissolved Oxygen (DO), Bio chemical Oxygen Demand (BOD), Total coliform (TC) and Faecal coliform (FC) is given below.

pH:-

- The criteria for pH is 6.5 to 8.5.
- pH is observed in the range of 7.0-9.4
- pH is not meeting the desired criteria at
    - U/s Dak Patthar (9.4)
    - Juhika B/c with Chanbal, Etawah (8.8)
    - Etawah (8.7)
    - Wazirabad, Delhi (8.6)
    - Agra U/s (8.6)

Conductivity: -

- The criteria of Conductivity for irrigation is 2250 µmhos/cm
- Conductivity lies in the range of 80-3040 µmhos/cm
- Conductivity is not meeting the criteria at Wazirabad (3040 µmhos/cm)

Dissolved Oxygen: -

- The criteria for DO should be more than 4 mg/l.
- DO lies in the range of 0.0-17.9 mg/l and is meeting the criteria.
- DO is not meeting the desired criteria in the stretch of Delhi to Agra D/s at
    - Nizamuddin (0.0 mg/l)
    - Okhla bridge (inlet of Agra canal) (0.0 mg/l)
    - Okhla after meeting of Shahdara drain (0.0 mg/l)
    - Mazawali (0.0 mg/l)
    - Mathura U/s (1.9 mg/l)
    - Mathura D/s (2.8 mg/l)
    - Agra U/s (3.4 mg/l)
    - Agra D/s (0.0 mg/l)

Bio chemical Oxygen Demand: -

- The criteria for BOD should be less than 3 mg/l.
- BOD was observed in the range of 0.2-103 mg/l.
- BOD is not meeting the desired criteria in the stretch of Kalanaur to Juhika at
    - Okhla after meeting of Shahdara drain (103 mg/l)
    - Nizamuddin (33 mg/l)
    - Okhla bridge (inlet of Agra canal) (33 mg/l)
    - Agra D/s (32 mg/l)
    - Mazawali (28 mg/l)
    - Bateshwar (20 mg/l)
    - Etawah (19 mg/l)
    - Mathura U/s (14 mg/l)
    - Mathura D/s (16 mg/l)
    - Agra U/s (11 mg/l)
    - Kalanaur, Yamuna Nagar (7 mg/l)
    - Sonepat (7 mg/l)
    - Juhika B/c with Chambal, Etawah (7 mg/l)
    - Wazirabad (6 mg/l)

- U/s Dak Patthar (3.8 mg/l)

Faecal Coliform

- Faecal Coliform should be less than 2500 MPN/100ml.
- Faecal Coliform ranges from 9- 21, 00,00,00,00 MPN/100ml.
- Faecal Coliform is not complying with the permissible limit of water quality criteria for bathing at
    - Okhla after meeting of Shahdara drain (2100000000 MPN/100ml)
    - Nizamuddin (17900000 MPN/100ml)
    - Okhla bridge (inlet of Agra canal) (6600000 MPN/100ml)
    - Agra D/s (5400000 MPN/100ml)
    - Mazawali (2700000 MPN/100ml)
    - Bateshwar (780000 MPN/100ml)
    - Etawah (1500000 MPN/100ml)
    - Mathura U/s (290000 MPN/100ml)
    - Mathura D/s (500000 MPN/100ml)
    - Agra U/s (1500000 MPN/100ml)
    - Kalanaur, Yamuna Nagar (830000 MPN/100ml)
    - Sonepat (320000 MPN/100ml)
    - Juhika B/c with Chambal, Etawah (1340000 MPN/100ml)
    - Wazirabad (43000 MPN/100ml)
    - U/s Paonta Sahib (530000 MPN/100ml)
    - Hamirpur (730000 MPN/100ml)
    - Hathnikund (690000 MPN/100ml)
    - U/s Dak Patthar (29000 MPN/100ml)
    - U/s of Lakhwar Dam (19700 MPN/100ml)
    - Shyama Chatti (3300 MPN/100ml)

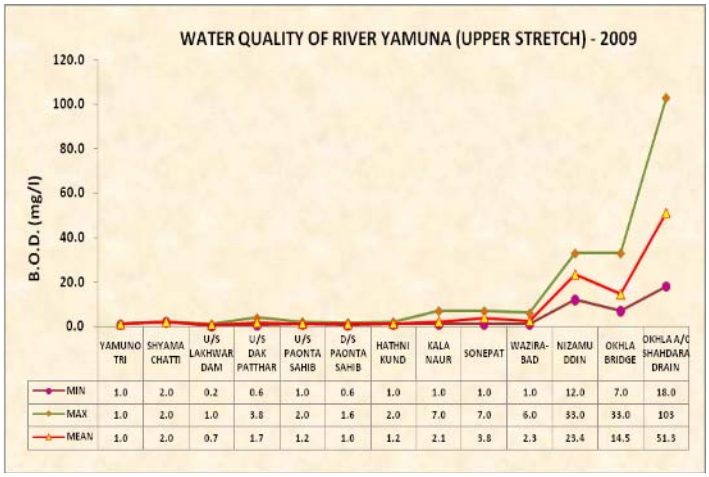
Total Coliform

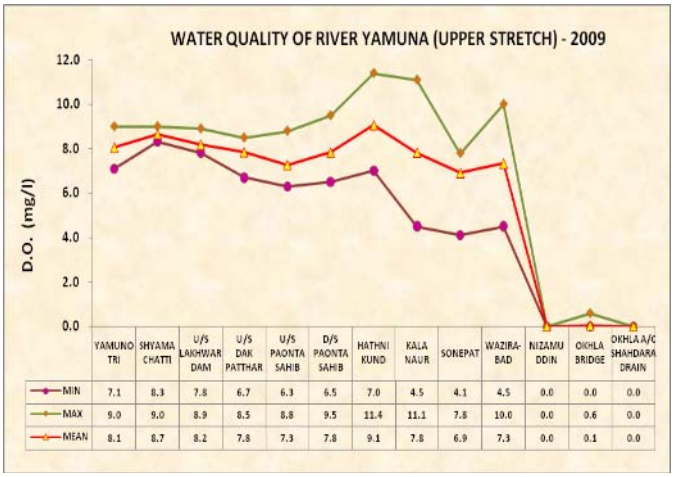
- Total Coliform should be less than 5000 MPN/100ml.
- Total Coliform is in the range of 4- 23,00,00,00,000 MPN/100ml.
- Total Coliform is not complying at
    - Okhla after meeting of Shahdara drain (23000000000 MPN/100ml)
    - Nizamuddin (410000000 MPN/100ml)
    - Okhla bridge (inlet of Agra canal) (80000000 MPN/100ml)
    - Agra D/s (88000000 MPN/100ml)
    - Mazawali (38000000 MPN/100ml)
    - Bateshwar (10600000 MPN/100ml)
    - Etawah (14500000 MPN/100ml)
    - Mathura U/s (8500000 MPN/100ml)
    - Mathura D/s (35000000 MPN/100ml)
    - Agra U/s (24000000 MPN/100ml)
    - Kalanaur, Yamuna Nagar (7500000 MPN/100ml)
    - Sonepat (33000000 MPN/100ml)
    - Juhika B/c with Chanbal, Etawah (6700000 MPN/100ml)
    - Wazirabad (810000 MPN/100ml)

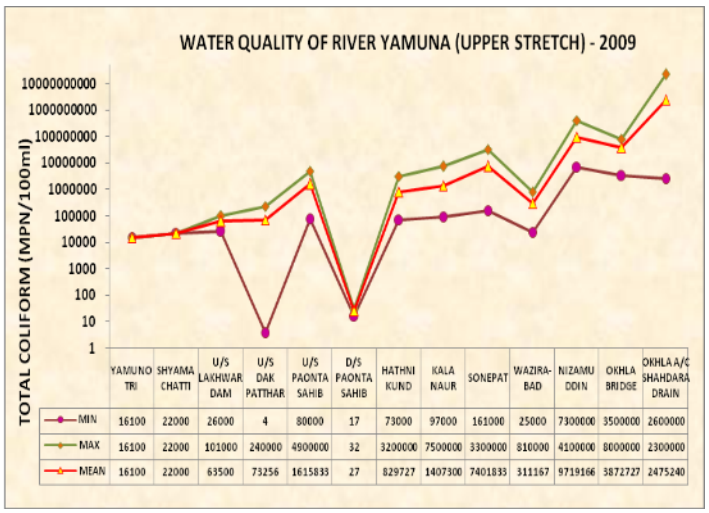
- U/s Paonta Sahib (4900000 MPN/100ml)
- Hamirpur (2200000 MPN/100ml)
- Hathnikund (3200000 MPN/100ml)
- U/s Dak Patthar (240000 MPN/100ml)
- U/s of Lakhwar Dam (101000 MPN/100ml)
- Shyama Chatti (22000 MPN/100ml)
- Yamunotri (16100 MPN/100ml)

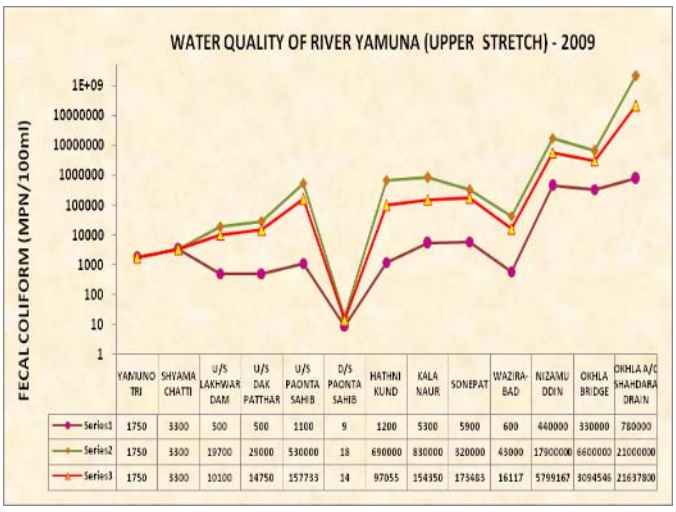
The water quality status of mainstream of River Yamuna with respect to BOD, DO, Total Coliform, Faecal Coliform and Conductivity is given in Figure 6.7 & 6.8.

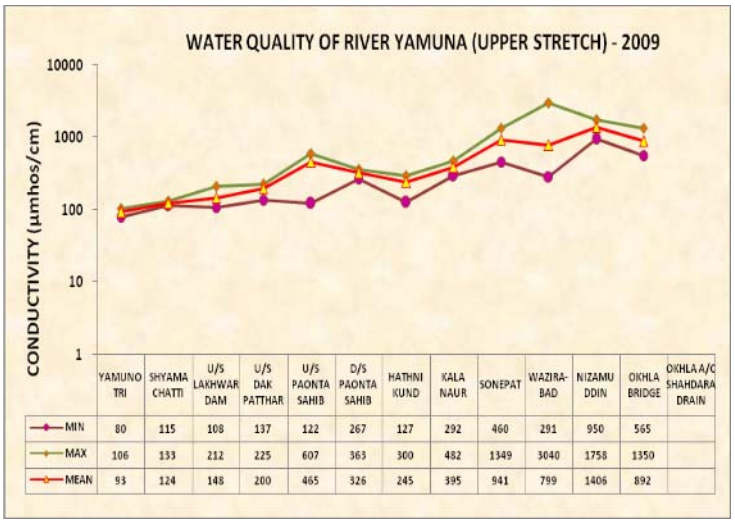
Figure 6.7: Spatial Trend of Water Quality of River Yamuna (Upper Stretch)





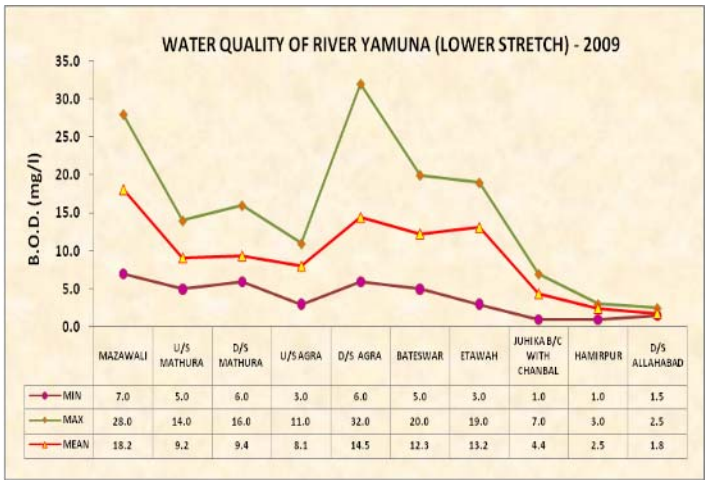




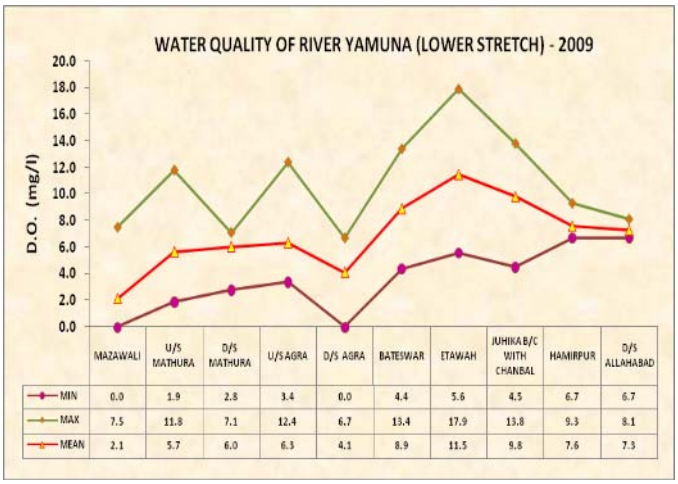


	YAMUNOTRI	SHYAMA CHATTI	U/S LAKHWAR DAM	U/S DAK PATTHAR	U/S PAONTA SAHIB	D/S PAONTA SAHIB	HATHNI KUND	KALA NAUR	SONEPAT	WAZIRA-BAD	NIZAMU DDIN	OKHLA BRIDGE	OKHLA A/C SHAHDARA DRAIN
MIN	80	115	108	137	122	267	127	292	460	291	950	565	
MAX	106	133	212	225	607	363	300	482	1349	3040	1758	1350	
MEAN	93	124	148	200	465	326	245	395	941	799	1406	892	

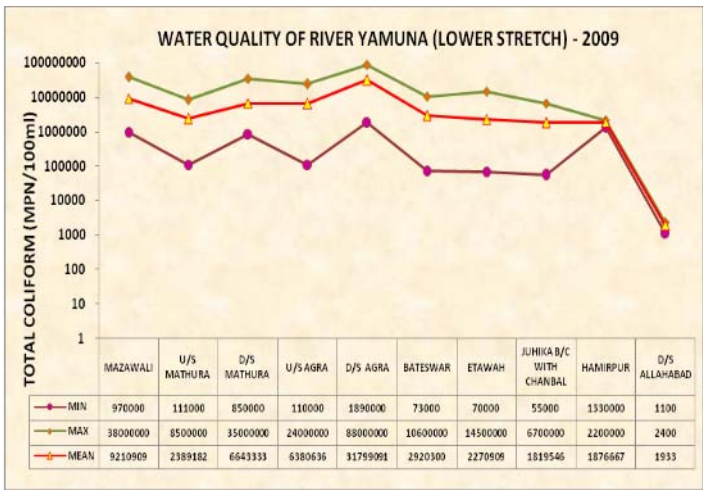
Figure 6.8: Spatial Trend of Water Quality of River Yamuna (Lower Stretch)



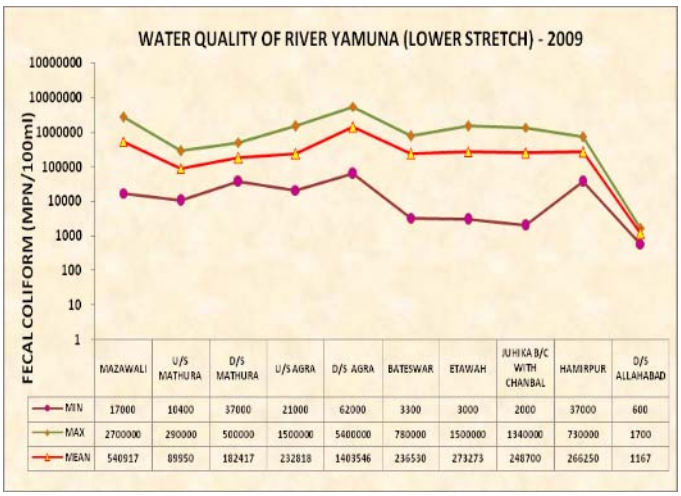
	MAZAWALI	U/S MATHURA	D/S MATHURA	U/S AGRA	D/S AGRA	BATESWAR	ETAWAH	JUHIKA B/C WITH CHANBAL	HAMIRPUR	D/S ALLAHABAD
MIN	7.0	5.0	6.0	3.0	6.0	5.0	3.0	1.0	1.0	1.5
MAX	28.0	14.0	16.0	11.0	32.0	20.0	19.0	7.0	3.0	2.5
MEAN	18.2	9.2	9.4	8.1	14.5	12.3	13.2	4.4	2.5	1.8



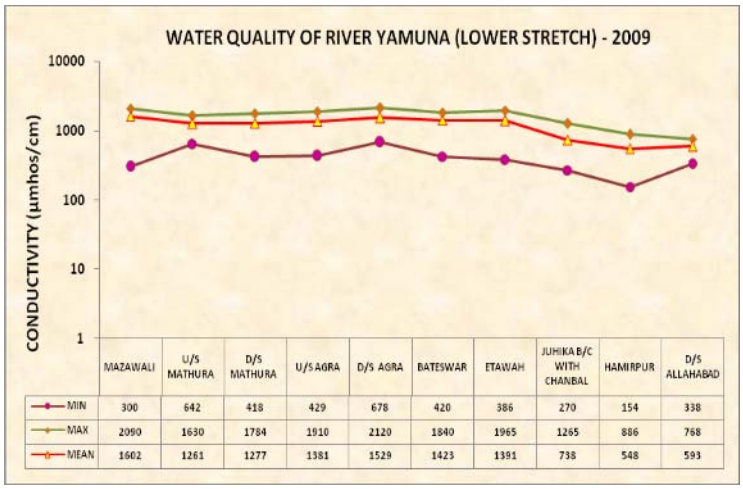
	MAZAWALI	U/S MATHURA	D/S MATHURA	U/S AGRA	D/S AGRA	BATESWAR	ETAWAH	JUHIKA B/C WITH CHANBAL	HAMIRPUR	D/S ALLAHABAD
MIN	0.0	1.9	2.8	3.4	0.0	4.4	5.6	4.5	6.7	6.7
MAX	7.5	11.8	7.1	12.4	6.7	13.4	17.9	13.8	9.3	8.1
MEAN	2.1	5.7	6.0	6.3	4.1	8.9	11.5	9.8	7.6	7.3



	MAZAWALI	U/S MATHURA	D/S MATHURA	U/S AGRA	D/S AGRA	BATESWAR	ETAWAH	JUHIKA B/C WITH CHANBAL	HAMIRPUR	D/S ALLAHABAD
MIN	970000	111000	850000	110000	1890000	73000	70000	55000	1330000	1100
MAX	38000000	8500000	35000000	24000000	88000000	10600000	14500000	6700000	2200000	2400
MEAN	9210909	2389182	6643333	6380636	31799091	2920300	2270909	1819546	1876667	1933



	MAZAWALI	U/S MATHURA	D/S MATHURA	U/S AGRA	D/S AGRA	BATESWAR	ETAWAH	JUHIKA B/C WITH CHANBAL	HAMIRPUR	D/S ALLAHABAD
MIN	17000	10400	37000	21000	62000	3300	3000	2000	37000	600
MAX	2700000	290000	500000	1500000	5400000	780000	1500000	1340000	730000	1700
MEAN	540917	89950	182417	232818	1403546	236530	273273	248700	266250	1167



	MAZAWALI	U/S MATHURA	D/S MATHURA	U/S AGRA	D/S AGRA	BATESWAR	ETAWAH	JUHIKA B/C WITH CHANBAL	HAMIRPUR	D/S ALLAHABAD
MIN	300	642	418	429	678	420	386	270	154	338
MAX	2090	1630	1784	1910	2120	1840	1965	1265	886	768
MEAN	1602	1261	1277	1381	1529	1423	1391	738	548	593

6.2.3 Water Quality of tributaries - Ramganga, Gomti, Saryu, Ghaghara, Rihand, Sai, Sirsa, Daha, Farmar, Burhi Gandak and Gandak

The water quality of tributaries namely Ramganga, Gomti, Saryu, Ghaghara, Rihand, Sai, Sirsa, Daha, Farmar, Burhi Gandak and Gandak for year 2009 is given in Annexure-I (Table 6.3). The summary of water quality of river Ramganga, Gomti, Saryu, Ghaghara, Rihand, Sai, Sirsa, Daha, Farmar, Burhi Gandak and Gandak with respect to pH, conductivity, Dissolved Oxygen (DO), Bio chemical Oxygen Demand (BOD), Total coliform (TC) and Faecal coliform (FC) is given below.

pH:-

- The criteria for pH is 6.5 to 8.5
- pH ranges from 7.1 to 8.7.
- pH is not meeting the criteria in
    - Gomti at Jaunpur D/s (8.7)

Conductivity: -

- The criteria of conductivity for irrigation is 2250 µmhos/cm.
- Conductivity ranges from 67-967µmhos/cm and meeting the criteria.

Dissolved Oxygen: -

- The criteria for DO should be more than 4 mg/l.
- DO rages from 0.7 to 10.7 mg/l.
- DO is not meeting the criteria in
    - Gomti at Lucknow D/s (0.7 mg/l)
    - Ghaghara Near Chapra (2.7 mg/l)
    - Sai at Unnao After Drain Outfall (2.8 mg/l)
    - D/s Daha River at Sasamusa (3.8 mg/l)

Bio chemical Oxygen Demand: -

- The criteria for BOD should be less than 3 mg/l.
- BOD ranges from 1.4 to 13.0 mg/l.

- BOD is not meeting the desired criteria in
    - Gomti at Lucknow D/s (13.0 mg/l)
    - Ramganga at Kannauj (Before conf.) (8.4 mg/l)
    - Sai at Unnao After Drain Outfall (7.0 mg/l)
    - Gomti at Jaunpur D/s (5.2 mg/l)
    - Gomti at Varanasi (4.4 mg/l)
    - Sirsa at Ruxol (3.5 mg/l)
    - Saryu at Ayodhya at Main Bathing Ghat (3.5 mg/l)
    - Gomti at Lucknow U/s at Water Intake Point (3.5 mg/l)

Faecal Coliform

- Faecal Coliform should be less than 2500 MPN/100ml
- Faecal Coliform is in the range of 60-130,000MPN/100ml.
- Faecal Coliform is not meeting the criteria in
    - Gomti at Lucknow D/s (130000 MPN/100 ml)
    - Gomti at Jaunpur D/s (27000 MPN/100 ml)
    - Gomti at Varanasi (23000 MPN/100 ml)
    - Sai at Unnao After Drain Outfall (17000 MPN/100 ml)
    - Saryu at Ayodhya at Main Bathing Ghat (4600 MPN/100 ml)
    - Gomti at Lucknow U/s at Water Intake Point (3400 MPN/100ml)

Total Coliform

- Total Coliform should be less than 5000 MPN/100ml
- Total Coliform is in the range of 400-850,000 MPN/100ml.
- Total Coliform is not meeting the criteria in
    - Gomti at Lucknow D/s (170000 MPN/100 ml)
    - Gomti at Jaunpur D/s (34000 MPN/100 ml)
    - Gomti at Varanasi (31000 MPN/100 ml)
    - Sai at Unnao After Drain Outfall (22000 MPN/100 ml)
    - Ramganga at Kannauj (Before conf.) (9300 MPN/100 ml)
    - Saryu at Ayodhya at Main Bathing Ghat (7000 MPN/100 ml)
    - Gomti at Lucknow U/s at Water Intake Point (5400 MPN/100ml)

6.2.4 Water Quality of tributaries – Kali Nadi, Hindon, Chambal, Khan, Kshipra, Parvati, Betwa, Tons, Sind, Sone, Sankh, Sikrana, Dhous, Kaliasot and Churni

The water quality of tributaries namely Kali Nadi, Hindon, Chambal, Khan, Kshipra, Parvati, Betwa, Tons, Sind, Sone, Sankh, Sikrana, Dhous, Kaliasot and Churni for year 2009 is given in Annexure-I (Table 6.4). The summary of water quality of river Kali Nadi, Hindon, Chambal, Khan, Kshipra, Parvati, Betwa, Tons, Sind, Sone, Sankh, Sikrana, Dhous, Kaliasot and Churni with respect to pH, conductivity, Dissolved Oxygen (DO), Bio chemical Oxygen Demand (BOD), Total coliform (TC) and Faecal coliform (FC) is given below.

pH:-

- The criteria for pH is 6.5 to 8.5

- pH ranges from 6.8 to 9.2.
- pH is not meeting the criteria in
    - Kalinadi at Kannauj (Before Conf.) (9.2)
    - Chambal at Nagda U/s (Water Intake Point) (9.0)
    - Betwa D/s After Mixing af River Bais at Vidisha (8.9)
    - Betwa Before conf. Yamuna at Hamirpur (8.9)
    - Chambal at Kota D/s (2 Km. From City) (8.9)
    - Chambal at Kota U/s (Intake Pt. Near Barrage) (8.8)
    - Chambal at Etawah before Confl. to R. Yamuna (8.6)
    - Betwa at Charantirghat, Vidisha (8.6)

Conductivity: -

- The criteria of conductivity for irrigation is 2250 µmhos/cm.
- Conductivity ranges from 72-9720 µmhos/cm and meeting the criteria.
- Conductivity is not meeting the criteria in
    - Chambal at Nagda D/s (9720 µmhos/cm)
    - Betwa at Nayapur D/s Mandideep Indl. Area No.1, Raisen (5466 µmhos/cm)
    - River Khan at Sakkar Khadi, Indore (2520 µmhos/cm)

Dissolved Oxygen: -

- The criteria for DO should be more than 4 mg/l.
- DO rages from 0.0 to 10.7 mg/l.
- DO is not meeting the criteria in
    - Kalinadi at U/s of Gulaothi Town In Bulandsahar (0.0 mg/l)
    - Kalinadi at D/s of Muzaffar Nagar (0.0 mg/l)
    - Hindon A/c with R. Krishna & Kali near Binauli Town, Meerut (0.0 mg/l)
    - Hindon at Ghaziabad D/s (0.0 mg/l)
    - Betwa at Nayapur D/s Mandideep Indl. Area No.1, Dist.Raisen (0.0 mg/l)
    - Betwa D/s after mixing of River Bais at Vidisha (0.0 mg/l)
    - River Khan at Sanwer (0.0 mg/l)
    - River Khan at Sakkar Khadi, Indore (0.0 mg/l)
    - Khan at Kabit Khedi (Near Indore) (0.0 mg/l)
    - Chambal at Nagda D/s (0.4 mg/l)
    - Hindon at Saharanpur D/s (2.9 mg/l)
    - Kshipra at Siddhawat (D/s) of Ujjain (3.0 mg/l)
    - Chambal at Rameshwarghat near Sawaimadhopur (3.5 mg/l)

Bio chemical Oxygen Demand: -

- The criteria for BOD should be less than 3 mg/l.
- BOD ranges from 0.1 to 353.0 mg/l.
- BOD is not meeting the desired criteria in
    - Kalinadi at U/s of Gulaothi Town In Bulandsahar (353 mg/l)
    - Kalinadi at D/s of Muzaffar Nagar (203 mg/l)
    - Khan at Kabit Khedi (Near Indore) (150.0 mg/l)
    - Hindon A/c with R. Krishna & Kali near Binauli Town, Meerut (86 mg/l)
    - River Khan at Sakkar Khadi, Indore (68.0 mg/l)

- River Khan at Sanwer (60.0 mg/l)
- Hindon at Ghaziabad D/s (49.5 mg/l)
- Chambal at Nagda D/s (22 mg/l)
- Hindon at Saharanpur D/s (17.0 mg/l)
- Kshipra at Siddhawat (D/s) of Ujjain (12.0 mg/l)
- Kalinadi at Kannauj (Before Conf.) (10.8 mg/l)
- Kshipra at Ramghat At Ujjain (10.0 mg/l)
- Betwa Near Road Bridge, Bhojpur (8.8 mg/l)
- Chambal at Etawah before Confl. to R. Yamuna (8.6 mg/l)
- Betwa at Nayapur D/s Mandideep Indl. Area No.1, Dist.Raisen (8.5 mg/l)
- Govind Sagar (5.1 mg/l)
- R. Betwa Near Intake Point, Vidisha (6.0 mg/l)
- Kshipra at Trivenisangam (1 Km. D/s Of Sangam) (6.0 mg/l)
- Tons River, H.P (5.0 mg/l)
- Betwa Near W/S Intake Well Point Raisen (4.9 Mg/L)
- Betwa Before conf. Yamuna at Hamirpur (4.8 mg/l)
- Betwa at Charantirghat, Vidisha (4.7 mg/l)
- Chambal at Kota D/s (2 Km. From City) (4.6 mg/l)
- Betwa D/s After Mixing af River Bais at Vidisha (4.4 mg/l)
- Chambal at Kota U/s (Intake Pt. Near Barrage) (4.1 mg/l)
- Rapti A/c of R. Honin Nr. Domingarh Rly Bridge, Gorakhpur (3.2 mg/l)

Faecal Coliform

- Faecal Coliform should be less than 2500 MPN/100ml
- Faecal Coliform is in the range of 0-40,000,000MPN/100ml.
- Faecal Coliform is not meeting the criteria in
    - Kalinadi at U/s of Gulaothi Town In Bulandsahar (40000000 MPN/100 ml)
    - Kalinadi at D/s of Muzaffar Nagar (40000000 MPN/100 ml)
    - Hindon A/c with Krishna & Kali near Binauli,Meerut (31000000 MPN/100 ml)
    - Kalinadi at U/s of Muzaffar Nagar (950000 MPN/100 ml)
    - Chambal at Etawah before Confl. to R. Yamuna (270000 MPN/100 ml)
    - Hindon at Ghaziabad D/s (180000 MPN/100 ml)
    - Churni at Gade Border (Bangladesh - India Border) (130000 MPN/100 ml)
    - Churni D/s Of Santipur Town (50000 MPN/100 ml)
    - Tons River, H.P (7300 MPN/100 ml)

Total Coliform

- Total Coliform should be less than 5000 MPN/100ml
- Total Coliform is in the range of 4-550,000,000 MPN/100ml.
- Total Coliform is not meeting the criteria in
    - Kalinadi at D/s of Muzaffar Nagar (550000000 MPN/100 ml)
    - Kalinadi at U/s of Gulaothi Town In Bulandsahar (350000000 MPN/100 ml)
    - Hindon after confl. with R. Krishna & Kali near Binauli Town, Meerut (380000000 MPN/100 ml)
    - Kalinadi at U/s of Muzaffar Nagar (11900000 MPN/100 ml)
    - Chambal at Etawah before Confl. to R. Yamuna (3100000 MPN/100 ml)

- Hindon at Ghaziabad D/s (280000 MPN/100 ml)
- Churni at Gade Border (Bangladesh - India Border) (220000 MPN/100 ml)
- Tons River, H.P (92000 MPN/100 ml)
- Churni D/s Of Santipur Town (70000 MPN/100 ml)
- Govind Sagar (14000 MPN/100 ml)
- Kalinadi at Kannauj (Before Conf.) (7500 MPN/100 ml)

6.2.5 Water Quality of tributaries – Damodar, Barakar, Mahananda, Jumar, Bokaro, Konar, Rupnarayan, Dwarakeshwar, Dwarka, Vindyadhari, Silabati, Ram Rekha, Mayurakshi, Matha Bhanga, Manusmar, Koshi, Kansi, Kamala, Jalangi and Harbora

The water quality of the tributary streams Damodar, Barakar, Mahananda, Jumar, Bokaro, Konar, Rupnarayan, Dwarakeshwar, Dwarka, Vindyadhari, Silabati, Ram Rekha, Mayurakshi, Matha Bhanga, Manusmar, Koshi, Kansi, Kamala, Jalangi and Harbora for year 2009 is given in Annexure-I (Table 6.5). The summary of water quality of river The water quality of the tributary streams Damodar, Barakar, Mahananda, Jumar, Bokaro, Konar, Rupnarayan, Dwarakeshwar, Dwarka, Vindyadhari, Silabati, Ram Rekha, Mayurakshi, Matha Bhanga, Manusmar, Koshi, Kansi, Kamala, Jalangi and Harbora with respect to pH, conductivity, Dissolved Oxygen (DO), Bio chemical Oxygen Demand (BOD), Total coliform (TC) and Faecal coliform (FC) is given below.

pH:-

- The criteria for pH is 6.5 to 8.5
- pH ranges from 6.0 to 8.4
- pH is not meeting the criteria in Bokaro at Jarandi (6.0)

Conductivity: -

- The criteria of conductivity for irrigation is 2250 µmhos/cm.
- Conductivity ranges from 105 – 55800 µmhos/cm
- Conductivity is not meeting the criteria in Damodar at Haldia D/s (2 Km Away From Haldia Town (55,800 µmhos/cm)

Dissolved Oxygen: -

- The criteria for DO should be more than 4 mg/l.
- DO rages from 1.3 to 10.8 mg/l.
- DO is not meeting the criteria in
    - U/s of Vindyadhari River at Haroa Bridge (2.9 mg/l)
    - D/s of Vindyadhari River at Malancha Burning Ghat (1.3 mg/l)

Bio chemical Oxygen Demand: -

- The criteria for BOD should be less than 3 mg/l.
- BOD ranges from 0.2 to 5.7 mg/l.
- BOD is not meeting the desired criteria in
    - D/s of Rupnarayan at Kolaghat, Near Kolaghat Rail Bridge No.3 (5.7 mg/l)
    - D/s of Silabati at Ghatal (5.3 mg/l)

- Damodar near Mujher Mana Village after Conf. Of Tamla Nallah (5.3 mg/l)
- Damodar at D/s Of Iisco After 3rd Outfall At Dhenna Village (5.2 mg/l)
- Damodar at Haldia D/s (2 Km Away From Haldia Town) (4.9 mg/l)
- Damodar at Narainpur after Confl. Of Nunia Nallah (4.8 mg/l)
- Mahananda at Siliguri (4.3 mg/l)
- Bokaro at Jarandi (4.0 mg/l)
- Damodar at Dishergarh Vill. (Nr. Bihar-West Bengal Border) (3.6 mg/l)
- Damodar Water Intake Point for Burdwan Town (3.4 mg/l)

Faecal Coliform

- Faecal Coliform should be less than 2500 MPN/100ml
- Faecal Coliform is in the range of 200-700,000 MPN/100ml.
- Faecal Coliform is not meeting the criteria in
    - Damodar at Haldia D/s (700,000 MPN/100 ml)
    - D/s of Rupnarayan at Kolaghat, Near Rail Bridge No.3 (110,000 MPN/100 ml)
    - Rupnarayan before Confl. to Ganga Near Geonkhali (105,000 MPN/100 ml)
    - Damodar at Dishergarh (Nr. Bihar-West Bengal Border) (90,000 MPN/100 ml)
    - Damodar at Mujher Mana Village A/C of Tamla Nallah (90,000 MPN/100 ml)
    - Damodar at Narainpur after Confl. Of Nunia Nallah (50,000 MPN/100 ml)
    - Barakar at Asansol (Water Intake Point) (90,000 MPN/100 ml)
    - Matha Bhanga, Gobindapur (70,000 MPN/100 ml)
    - Mahananda at Siliguri (50,000 MPN/100 ml)
    - U/s of Tarapith on Dwarka at Sadhak Bamdeb Ghat (50,000 MPN/100 ml)
    - Damodar at D/s of IISCO After 3rd Outfall at Dhenna Village (35,000 MPN/100 ml)
    - D/s of Tarapith on River Dwarka, Satighat (30,000 MPN/100 ml)
    - Mahananda D/s, Ramghat (17,000 MPN/100 ml)
    - U/s Of Vindyadhari River At Haroa Bridge (17,000 MPN/100 ml)
    - D/s of Kansi at Midnapore, Near New Hanuman Mandir, Gandhighat (14,000 MPN/100 ml)
    - Jalangi, D/s of Krishna Nagar (13,000 MPN/100 ml)
    - D/s of Silabati at Ghatal (13,000 MPN/100 ml)
    - D/s Of Vindyadhari River At Malancha Burning Ghat (13,000 MPN/100 ml)

Total Coliform

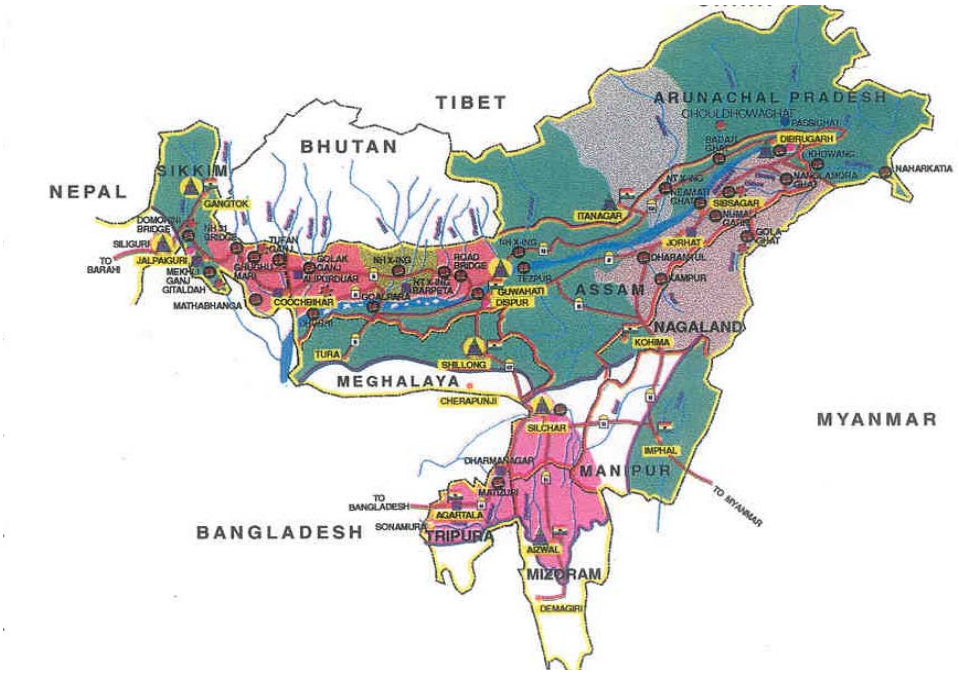
- Total Coliform should be less than 5000 MPN/100ml
- Total Coliform is in the range of 400-850,000 MPN/100ml.
- Total Coliform is not meeting the criteria in
    - Damodar at Haldia D/s (850,000MPN/100 ml)
    - D/s of Rupnarayan at Kolaghat, Near Kolaghat Rail Bridge No.3 (170,000 MPN/100 ml)
    - Damodar at Dishergarh (Nr. Bihar-West Bengal Border) (160,000 MPN/100 ml)
    - Damodar at D/s Of Iisco After 3rd Outfall At Dhenna Village
    - (160,000 MPN/100 ml)
    - U/s of Tarapith on Dwarka at Sadhak Bamdeb Ghat (160,000 MPN/100 ml)

- Damodar near Mujher Mana Village after Conf. Of Tamla Nallah (160,000 MPN/100 ml)
- Barakar at Asansol (Water Intake Point) (160,000 MPN/100 ml)
- Rupnarayan before Confl. to Ganga Near Geonkhali (130,000 MPN/100 ml)
- Damodar at Narainpur after Confl. of Nunia Nallah (90,000 MPN/100 ml)
- Mahananda at Siliguri (80,000 MPN/100 ml)
- Matha Bhanga, Gobindapur (80,000 MPN/100 ml)
- Mahananda D/s, Ramghat (50,000 MPN/100 ml)
- D/s of Tarapith on River Dwarka, Satighat (50,000 MPN/100 ml)
- D/s of Silabati at Ghatal (30,000 MPN/100 ml)
- Jalangi, D/s of Krishna Nagar (23,000 MPN/100 ml)
- D/s Of Vindyadhari River at Malancha Burning Ghat (23,000 MPN/100 ml)
- U/s Of Vindyadhari River at Haroa Bridge (22,000 MPN/100 ml)
- D/s of Kansi at Midnapore, Near New Hanuman Mandir, Gandhighat (17,000 MPN/100 ml)

CHAPTER VII

Water Quality of Rivers in Brahmaputra Basin

7.1 Brahmaputra River System



The Brahmaputra basin extends over an area of nearly 5, 80,000 sq km and traverses a distance of about 2900 km through Tibet (China), India and Bangladesh. In India, the basin lies in the states of Arunachal Pradesh, Assam, Nagaland, Meghalaya and West Bengal. The river rises in the Great glacier in the northern-most chain of the Himalayas in the Kailash range at an elevation of about 5,510 m. It enters India across the Sadiya frontiers tract, west of Sadiya town into the Assam valley. Here it is joined by two more tributaries viz. the Dibang or Sikang and the Lohit, from here onwards the river is known as the Brahmaputra. The river then descends down into the Assam valley from east to west for a distance of about 720 km with its channels meandering from side to side and forming several islands, one of these islands, Majuli covers an area of 1,250 sq. Km. during its course the river receives many more tributaries both from the north and the south while some of them are trans-Himalayan rivers with considerable discharges.

The Brahmaputra has the highest discharge of all the rivers, in India, because of heavy annual average rainfall in the catchment area. The river has eight significant tributaries in India, three from the north are the Manas, the Kameng (or the Jia Bharali) and the Subansiri and three from the east are the Dibang or Sikang, the lohit and the Buri Dihing and two from the North West are the Tista and the Jaldhaka.

The basin area of Brahmaputra is covering the States of Arunachal Pradesh, Assam, Nagaland, Meghalaya, Sikkim and West Bengal. The important urban centres in these States are Shillong (Meghalaya), Guwahati, Jorhat Dibrugarh, Siliguri, Alipurduar, Dhubri, Nagaon, Tezpur, Tinsukia (Assam), Dimapur (Nagaland), Kohima (Sikkim), Darjeeling, Dabgram Jalpaiguri, Koch-Bihar (West Bengal).

7.1.1 Water Quality Monitoring in Brahmaputra Basin

The State Pollution Control Boards of Assam, Nagaland and Sikkim at 68 locations are doing the water quality monitoring of the River Brahmaputra and its several tributaries in the basin. The tributary streams covered under the monitoring programme are Burhidihing, Dhansiri, Disang, Jhanji, Subansiri, Bhogdoi, Bharalu, Borak, Deepar Bill, Digboi, Mora Bharali, Teesta, Dickhu, Maney Khola, Ranchu, Rangit, Jai Bharali, Kathakal, Kharsang, Kolong, Manas, Pagldia, Chathe, Dzu, Kapili, Beki, Kundli, Kushiara, Panchnai, Sankosh, Sonai, Kohara, Ranga, Boginadi, Dikhow, Kaljani and Karola. The ranges of water quality observed in the mainstream and tributaries with respect to pH, Conductivity, DO, BOD, Nitrate, Nitrite, Ammonical Nitrogen, Total Coliform (TC) and Faecal Coliform (FC) are presented as minimum, maximum and mean value to assess the extent of water quality variation throughout the year. The detail list of Water Quality Monitoring locations in Brahmaputra Basin is given in the Table 7(a).

Table 7(a): Water Quality Monitoring locations in Brahmaputra Basin

Name of Monitoring Station	State Name	Name of Water Body
Barak River at D/s of Silchar	Assam	Barak
Beki River at Nh-37 Crossing at Barpeta Road	Assam	Beki
Bharalu River at Guwahati	Assam	Bharalu
Bhogdoi River at Jorhat ,Assam	Assam	Bhogdoi
Boginadi Near Bridge Nh-52, Lakhimpur	Assam	Boginadi
Borak at Panchagram , Assam	Assam	Borak
Brahamputra at Kherghat (After Confl. With Dibang & Dihang)	Assam	Brahmaputra
Brahamputra at Dibrugarh, Assam	Assam	Brahmaputra
Brahamputra at Nimatighat, Assam	Assam	Brahmaputra
Brahmputra River at Dhenukhapahar	Assam	Brahmaputra
Brahamputra at Pandu, Assam	Assam	Brahmaputra
Brahamputra at Jogijhoga Near Bridge	Assam	Brahmaputra
Brahmaputra River at Chandrapur, Guwahati	Assam	Brahmaputra
Brahmaputra River at Dhubri	Assam	Brahmaputra
Brahmputra River at Sualkuchi, Dist. Kamrup	Assam	Brahmaputra
Brahmputra Near Water Intake Point at Kacharighat,Panbazar,Guwahati	Assam	Brahmaputra
Burhidihing at Margherita, Assam	Assam	Burhidihing
Burhidihing River at Duliajan (Intake Point of Oil India Ltd.)	Assam	Burhidihing
Buridihing Near Duliajan at D/s, Tinsukia	Assam	Buridihing
Chathe at Medziphema, Dimapur	Nagaland	Chathe
Deepar Bill, Assam*	Assam	Deepar Bill
Dhansiri at Golaghat, Assam	Assam	Dhansiri
Full Nagarjan, Nagaland	Nagaland	Dhansiri
Town Boundary Bridge (Diphu Road)	Nagaland	Dhansiri
Bridge Near Purana Bazaar, Nagaland	Nagaland	Dhansiri
Nuton Basti, Nagaland	Nagaland	Dhansiri
Near Check Gate (Dimapur Khutkhuti Road)	Nagaland	Dhansiri
Dhansiri at Nagaland-Assam Border, Dimapur	Nagaland	Dhansiri
Digboi River at Lakhipathe, Reserve Forest, Digboi	Assam	Digboi

Dikchu B/C With Teesta Near Nhpc Hydroelectric Power Project	Sikkim	Dikchu
Dikhow River at Dikhow Bridge Sivasagar	Assam	Dikhow
Disang at Gundamghat, Assam	Assam	Disang
Disang River at Dillighat, Dibrugarh Dist	Assam	Disang
Dzu D/s Kohima Town	Nagaland	Dzu
Jai Bharali River Near Biswanath Charali, Sonitpur	Assam	Jai Bharali
Jhanji at N.H. Crossing Jorhat, Assam	Assam	Jhanji
Kaljani D/s of Alipurdwar, Municipality Discharge Point	West Bengal	Kaljani
Kalong River at U/s of Anandaram Dekial Phukan Bridge, Nagaon	Assam	Kalong
Kapili River at Dharmtul Bridge, Nh-31, Nagaon	Assam	Kapili
Karola, D/s of Jalpaiguri, Near Min Bhawan	West Bengal	Karola
U/s of Kathakal at Matijuri, Dist. Hailakandi	Assam	Kathakal
Kharsang B/C Buridihing Near Kharsang (Assam-Arunanchal Border)	Assam	Kharsang
Kohora River at N.H. Crossing, Kohora	Assam	Kohora
Kolong River at Marigaon	Assam	Kolong
Kundli River at Kundli/ Sapakhowa, Sadia.	Assam	Kundli
Kushiara River at Karimganj	Assam	Kushiara
Manas River at NH-31 Crossing, Barpeta	Assam	Manas
Maney Khola at Burtuk Near Army Base Camp, 4 Km U/s of Gangtok	Sikkim	Maney Khola
River Maney Khola After Confluence With Ray Khola at Adampool After Meeting Waste of Stp, Gangtok D	Sikkim	Maney Khola
*Mora Bharali at Tezpur, Assam	Assam	Mora Bharali
Pagldia River Near Nalbari Town, Dist. Nalbari	Assam	Pagldia
Panchnai River at Nh-52 Crossing, Orang	Assam	Panchnai
Ranga Nadi D/s of Hydel Project	Assam	Ranga
Rangit at Treveni	Sikkim	Rangit
Rangit River at Dam Site (Nhpc)	Sikkim	Rangit
Rangit River at Legship	Sikkim	Rangit
Rangit River at Reshi	Sikkim	Rangit
Rangit River at Jorethang	Sikkim	Rangit
After Confluence of Ranichu And Rorachu at Ranipool	Sikkim	Ranichu
Ranichu Before Confluence With River Teesta at Singtam	Sikkim	Ranichu
Sankosh River, Dhubri	Assam	Sankosh
Sonai River at Sonai	Assam	Sonai
Subansiri at Gerekamukh, Before Confl. With Brah.)	Assam	Subansiri
Teesta A/C of Rivers Lachenchu And Lachungchu at Chungthaang	Sikkim	Teesta
River Teesta After Confluence With River Ranichu at Singtam	Sikkim	Teesta
Teesta A/C With Rangichu After Meeting The Industrial Effluents From The Town Ra	Sikkim	Teesta
River Teesta at Melli Downstream	Sikkim	Teesta
Teesta at Siliguri	West Bengal	Teesta

7.1.2 Water Quality of River Brahmaputra

The water quality of River Brahmaputra is presented in Annexure-I Table 7.1. The summary of water quality of River Brahmaputra with respect to pH, Conductivity, Dissolved oxygen (DO), Biochemical Oxygen Demand (BOD), Total Coliform (TC) and Faecal Coliform (FC) is given below:

pH: -

- The criteria for pH is 6.5 to 8.5.
- pH is observed in the range of 6.1 to 8.1.
- Low value of pH is found at Nimaighat.

Conductivity: -

- The criteria of conductivity for irrigation is 2250 µmhos/cm.
- Conductivity ranges from 69 to 303 µmhos/cm and is meeting the desired criteria.

Dissolved Oxygen: -

- The criteria for DO should be more than 4 mg/l.
- DO is observed in the range of 4.4 to 10.5 mg/l and is meeting the criteria.

Biochemical Oxygen Demand: -

- The criteria for BOD should be less than 3 mg/l.
- The BOD value ranges from 0.3 to 5.4 mg/l.
- BOD observed more than the criteria at all locations except Kherghat. The highest value of BOD (5.4 mg/l) is observed at Kacharighat.

Faecal Coliform: -

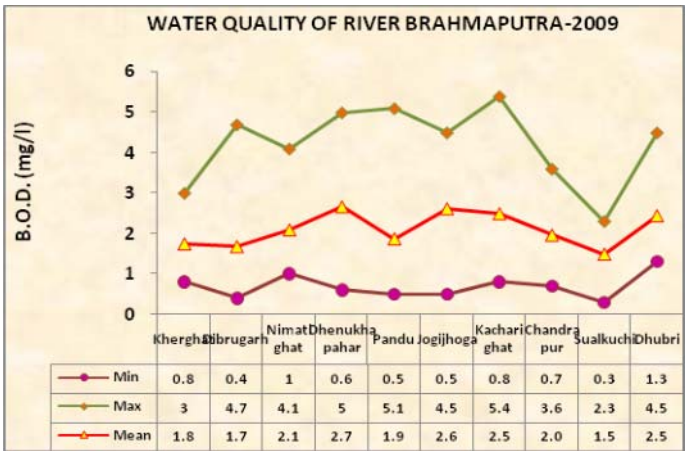
- Faecal Coliform should be less than 2500 MPN/100ml.
- Faecal Coliform (FC) ranges from 0 to 1100 MPN/100ml and confirming the desired criteria.

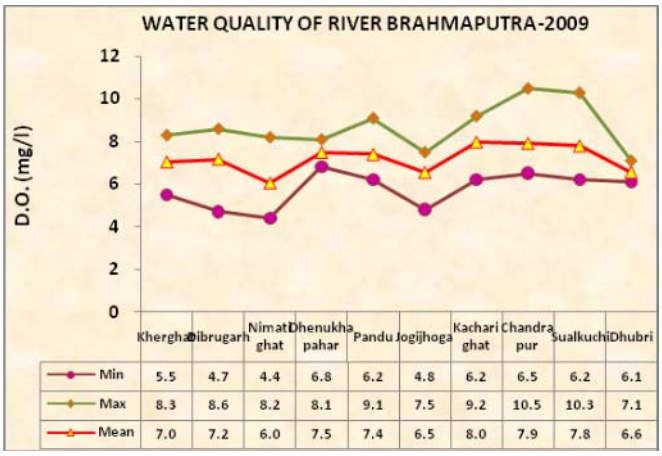
Total Coliform: -

- Total Coliform should be less than 5000 MPN/100ml.
- Total Coliform lies in the range of 1 to 24,000 MPN/100ml.
- The maximum number of Total Coliform observed 24,000 MPN/100ml at Dhenukapahar.

The spatial trend of River Brahmaputra with respect to BOD, DO, Total Coliform, Faecal Coliform and Conductivity is presented in Figure 7.1.

Figure 7.1: Spatial Trend of Water Quality of River Brahmaputra





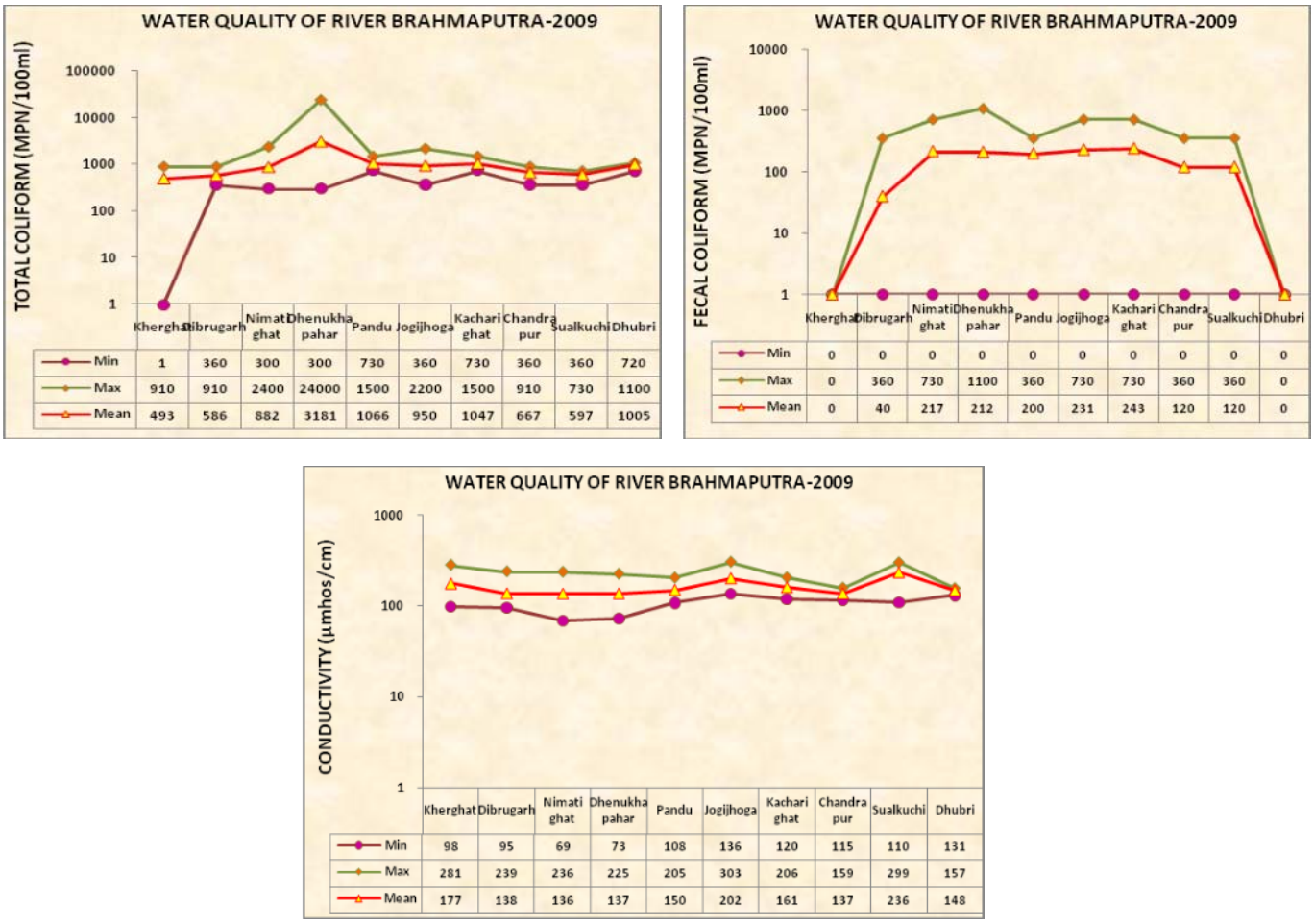
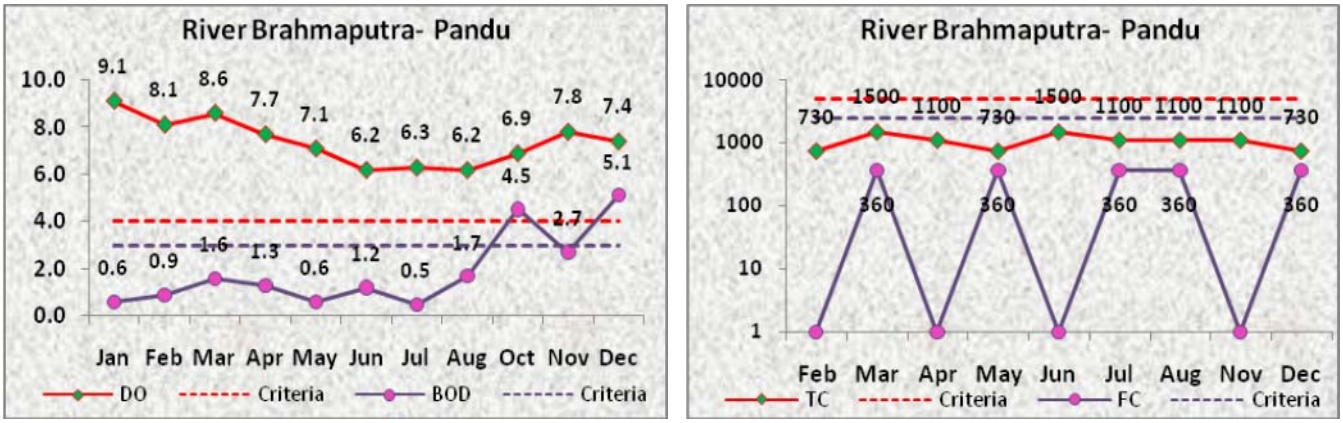
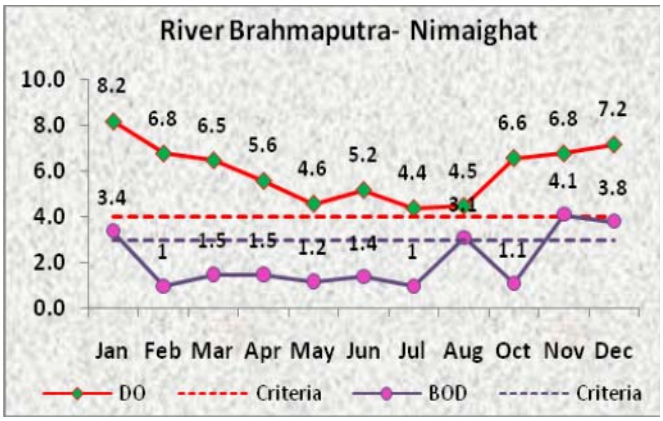
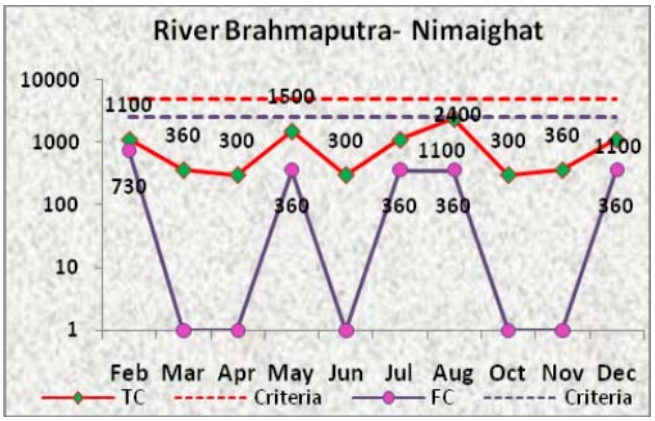
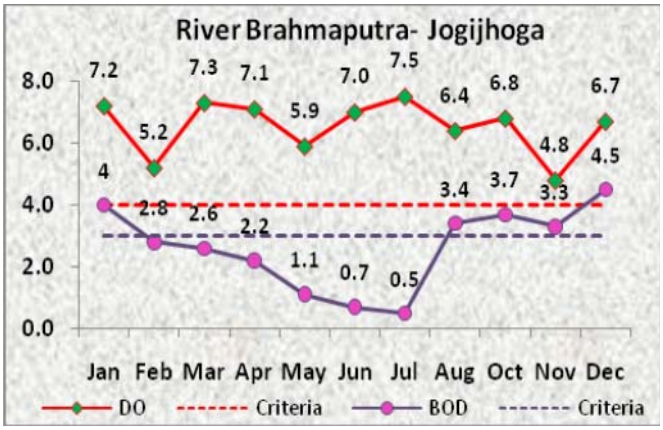


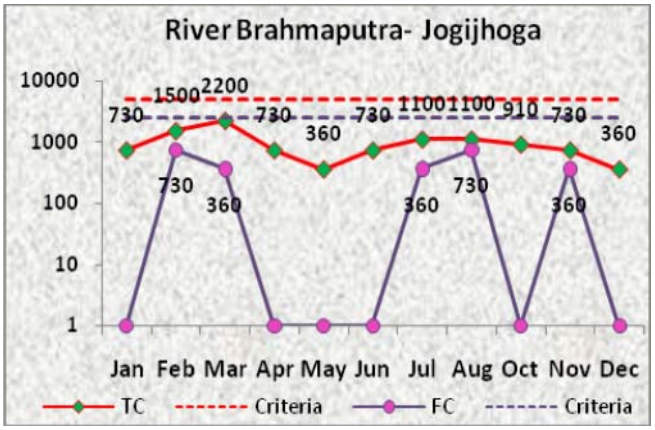
Figure 7.2: Temporal Trend of Water Quality of River Brahmaputra

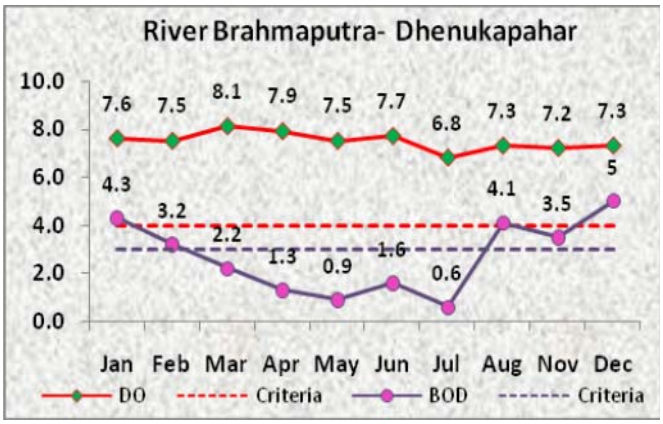


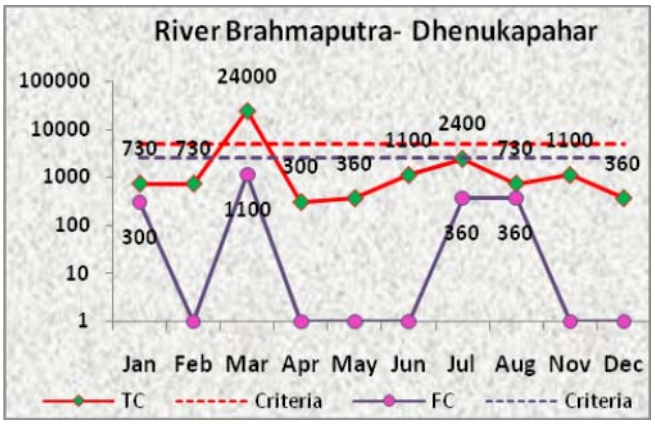












7.1.3 Water Quality of River Dhansiri & its tributary streams Dzu & Chathe

Dhansiri is flowing through Golaghat (Assam) and Dimapur (Nagaland). It originates from Laisang peak of Nagaland. It flows through a distance of 352 km from south to north before joining the Brahmaputra on its south bank. Its total catchment area is 1220 km² and has several types of important wood bearing trees along its bank like Itanki Forest.

The water quality of River Dhansiri & its tributary streams Dzu & Chathe is presented in Annexure-I Table 7.2. The summary of water quality of River Dhansiri with respect to pH,

Conductivity, Dissolved oxygen (DO), Biochemical Oxygen Demand (BOD), Total Coliform (TC) and Faecal Coliform (FC) is given below:

pH: -

- The criteria for pH is 6.5 to 8.5.
- pH is observed in the range of 6.7 to 8.4 and is found within the criteria.

Conductivity: -

- The criteria of conductivity for irrigation is 2250 μmhos/cm.
- Conductivity varies from 68 to 386 μmhos/cm and is meeting the desired criteria.

Dissolved Oxygen: -

- The criteria for DO should be more than 4 mg/l.
- DO ranges from 1.2 to 9.6 mg/l.
- The lowest value of DO (1.2 mg/l) is observed in Dhansiri at Nuton Basti in Nagaland.

Biochemical Oxygen Demand: -

- The criteria for BOD should be less than 3 mg/l.
- BOD is observed in the range of 0.1 to 4.5 mg/l.
- BOD is found 4.5 mg/l Dhansiri at Golaghat in Assam.

7.1.4 Water Quality of tributary streams Subansiri, Kharsang, Burhidihing, Pagldia, Digboi, Jai Bharali, Kolong, Manas, Disang, Jhanji, Bhogdoi, Mora Bharali, Borak, Bharalu, Deepar Bill & Kathakal

Dihing or Burhi Dihing is a large tributary of the Brahmaputra in Upper Assam. The river originates in the Eastern Himalayas (the Patkai Mountain Range) in Arunachal Pradesh and flows through Tinsukia (Tinicukeeya) and Dibrugarh Districts in Assam to its confluence with the Brahmaputra at Dihingmukh. The Dihing has created number of oxbow lakes in the area. The Disam is a tributary of the Dihing in its southern bank. The Joy-Dihing Rainforest, numerous petroleum fields, wet-paddy fields, bamboo orchards and tea gardens provide a unique landscape along its course. Ledo, Margherita, Digboi, Duliajan and Naharkatia (Nahorkotiya) are the small towns in its valley.Dihing is the one of the most important contributor to the Brahmaputra river.The plains of the Dihing Valley has a rich variety of floura and founa.The Bitel nuts are produced most in the areas of the Dihing Plains.

The water quality of tributary streams Subansiri, Kharsang, Burhidihing, Pagldia, Digboi, Jai Bharali, Kolong, Manas, Disang, Jhanji, Bhogdoi, Mora Bharali, Borak, Bharalu, Deepar Bill & Kathakal is presented in Annexure-I Table 7.3. The summary of water quality of tributary streams Subansiri, Kharsang, Burhidihing, Pagldia, Digboi, Jai Bharali, Kolong, Manas, Disang, Jhanji, Bhogdoi, Mora Bharali, Borak, Bharalu, Deepar Bill & Kathakal with respect to pH, Conductivity, Dissolved oxygen (DO), Biochemical Oxygen Demand (BOD), Total Coliform (TC) and Faecal Coliform (FC) is given below:

pH: -

- The criteria for pH is 6.5 to 8.5.
- pH is observed in the range of 6.2 to 7.9.
- Lower values of pH are found in
    - Disang at Dillighat (6.2)
    - Subansiri at Gerekamukh (6.3)
    - Bhogdoi at Jorhat and Burhidihing at Duliajan (6.4)

Conductivity: -

- The criteria of conductivity for irrigation is 2250 µmhos/cm.
- Conductivity varies from 67 to 774 µmhos/cm and is meeting the desired criteria.

Dissolved Oxygen: -

- The criteria for DO should be more than 4 mg/l.
- DO ranges from 0.0 to13 mg/l.
- The lower values of DO are observed in
    - Bharalu at Guwahati (0.0 mg/l)
    - Digboi at Lakhipathe, Digboi (2.5 mg/l)
    - Burhidihing at Margherita (2.9 mg/l) in Assam.

Biochemical Oxygen Demand: -

- The criteria for BOD should be less than 3 mg/l.
- BOD ranges from 0.3 to 50 mg/l/.
- High values of BOD are observed in
    - Bharalu at Guwahati (50 mg/l)
    - Burhidihing at Duliajan (7.6 mg/l)
    - Deeparbill (7.2 mg/l)
    - Kalong at U/s of Anandaram Dekial Phukan Bridge,Nagaon (6.6 mg/l)
    - Mora Bharali At Tezpur (6.4 mg/l)
    - Digboi at Lakhipathe, Reserve Forest, Digboi (6.1 mg/l)
    - Burhidihing near Duliajan D/s Tinsukia (4.6 mg/l)
    - Jai Bharali at Sonitpur (4.2 mg/l)
    - Kaharsang B/c Burhidihing (3.8 mg/l)
    - Subansiri at gerekamukh (3.6 mg/l) and
    - Burhiding at Margherita (3.1 mg/l)

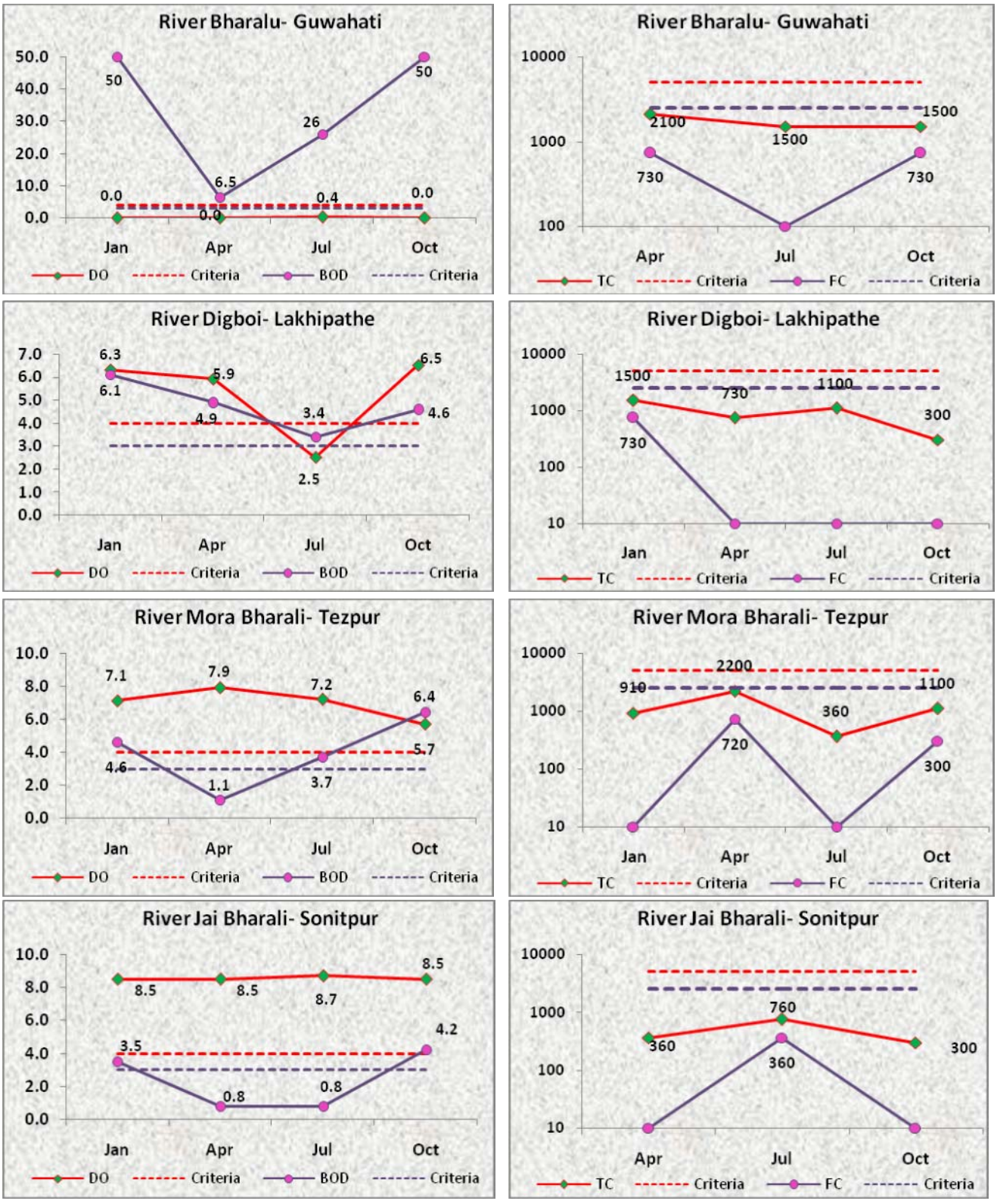
Faecal Coliform: -

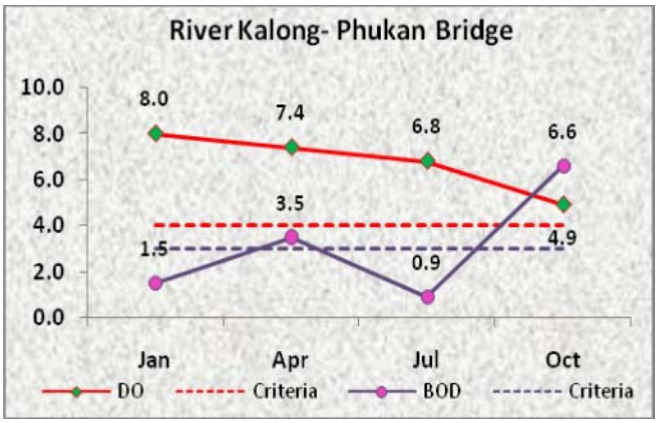
- Faecal Coliform should be less than 2500 MPN/100ml.
- Faecal Coliform (FC) ranges from 0 to 730MPN/100ml and confirming the desired criteria.

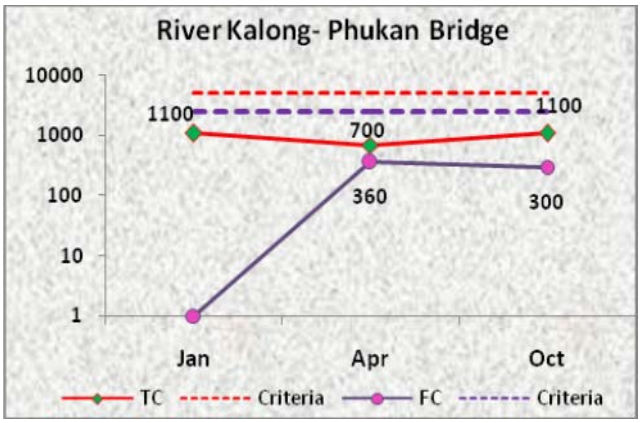
Total Coliform: -

- Total Coliform should be less than 5000 MPN/100ml.
- The Total Coliform count varies from 1 to 2200 MPN/100 ml and is meeting the desired criteria.

Figure 7.3: Temporal Trend of Water Quality of tributary streams Bharalu, Digboi, Mora Bahrali, Jai Bharali and Kalong







7.1.5 Water Quality of tributary streams Teesta, Dikchu, Maney Khola, Ranichu, Kundli, Dikhow, Kohora, Boginadi, Ranga, Pachnai, Kapili, Beki, Sankosh, Barak, Sonai, Kushiyara Karola & Kaljani

The River Teesta or Tista is said to be the lifeline of the Indian state of Sikkim, flowing for almost the entire length of the state and carving out verdant Himalayan temperate and tropical river valleys. The emerald-coloured river then forms the border between Sikkim and West Bengal before joining the Brahmaputra as a tributary in Bangladesh. Total length of the river is 315 kilometres (196 mi). The river originates from Cholamo Lake at an elevation of 5,330 m (17,487 ft) above sea level in the Himalayas. This lake lies to the north of the Donkia pass near Shetschen, where the summit of the pass is about eight kilometres north-east of Darjeeling.

The Teesta River is then fed by rivulets which arise in the Thangu, Yumthang and Donkia-La ranges. The river then flows past the town of Rangpo where it forms the border between Sikkim and West Bengal up to Teesta Bazaar. At Teesta Suspension Bridge, which joins Kalimpong with Darjeeling, the river is met by its main tributary, the Rangeet River. At this point, it changes course southwards flowing entirely into West Bengal. The river hits the plains at Sevoke, where it is spanned by the Coronation Bridge which links the north east states to the rest of India. The river then courses its way to Jalpaiguri and then to Rangpur District of Bangladesh, before finally merging with the mighty Brahmaputra at Fulchori.

The water quality of tributary streams Teesta, Dikchu, Maney Khola, Ranichu, Kundli, Dikhow, Kohora, Boginadi, Ranga, Pachnai, Kapili, Beki, Sankosh, Barak, Sonai, Kushiyara Karola & Kaljani is presented in Annexure-I Table 7.4. The summary of water quality of tributary streams Teesta, Dikchu, Maney Khola, Ranichu, Kundli, Dikhow, Kohora, Boginadi, Ranga, Pachnai, Kapili, Beki, Sankosh, Barak, Sonai, Kushiyara Karola & Kaljani with respect to pH, Conductivity, Dissolved oxygen (DO), Biochemical Oxygen Demand (BOD), Total Coliform (TC) and Faecal Coliform (FC) is given below:

pH: -

- The criteria for pH is 6.5 to 8.5.
- pH is observed in the range of 6.0 to 7.9.

- Lower values of pH are found in
    - Teesta A/c of Lachenchu and Lachungchu at Chungthaang, A/c with Ranichu at Singtam, A/c with Rangichu after meeting the Indl Effs from the Town RA and at Melli Downstream (6.0) in Sikkim
    - Dikchu B/c with Teesta near NHPC Hydroelectric Power Project (6.0), Sikkim
    - Maney Khola A/c with Ray Khola at Adampool after meeting waste of STP, Gangtok D (6.0) in Sikkim
    - A/c of Ranichu and Rorachu at Ranipool (6.0), Sikkim
    - Ranichu B/c with Teesta at Singtam (6.0), Sikkim
    - Maney Khola at Burtuk near Army Base Camp, 4 Km U/s of Gangtok (6.2), Sikkim
    - Kapili River at Dharmtul Bridge, NH-31, Nagaon (6.2), Sikkim

Conductivity: -

- The criteria of conductivity for irrigation is 2250 µmhos/cm.
- Conductivity varies from 69 to 640 µmhos/cm and is meeting the desired criteria.

Dissolved Oxygen: -

- The criteria for DO should be more than 4 mg/l.
- DO ranges from 2.5 to 12.5 mg/l.
- The low value of DO is observed in River Dikchu B/c with Teesta near NHPC Hydroelectric Power Project (2.5 mg/l) in Sikkim.

Biochemical Oxygen Demand: -

- The criteria for BOD should be less than 3 mg/l.
- BOD ranges from 0.3-5.9 mg/l.
- High values of BOD are observed in
    - Sankosh at Dhubri (5.9 mg/l)
    - Ranga Nadi D/s (5.3 mg/l)
    - Beki at NH-37, Barpeta (4.9 mg/l)
    - Boginadi near bridge, NH-52, lakhimpur (4.6 mg/l)
    - Kundli at Sadia (3.9 mg/l)
    - Sonai at Sonai (3.6 mg/l)
    - Teesta at Chungthaang A/c of Lachenchu and Lachungchu, A/c with Ranichu after meeting the effluent from Town RA, Singtam A/c with Ranichu and Melli D/s, River Ranichu at Singtam B/c with Teesta, Ranipool A/c of Ranichu and Rorachu & Dikchu B/c with Teesta near NHPC Hydroelectric Power Project (3.5 mg/l)
    - Panchnai at NH-52, Orang (3.4 mg/l)
    - Maney Khola at Adampool A/c with Ray Khola after meeting waste of STP, Gangtok & Burtuk, U/s of Gangtok (3.2 mg/l)
    - Teesta at Siliguri (3.1 mg/l)

Faecal Coliform: -

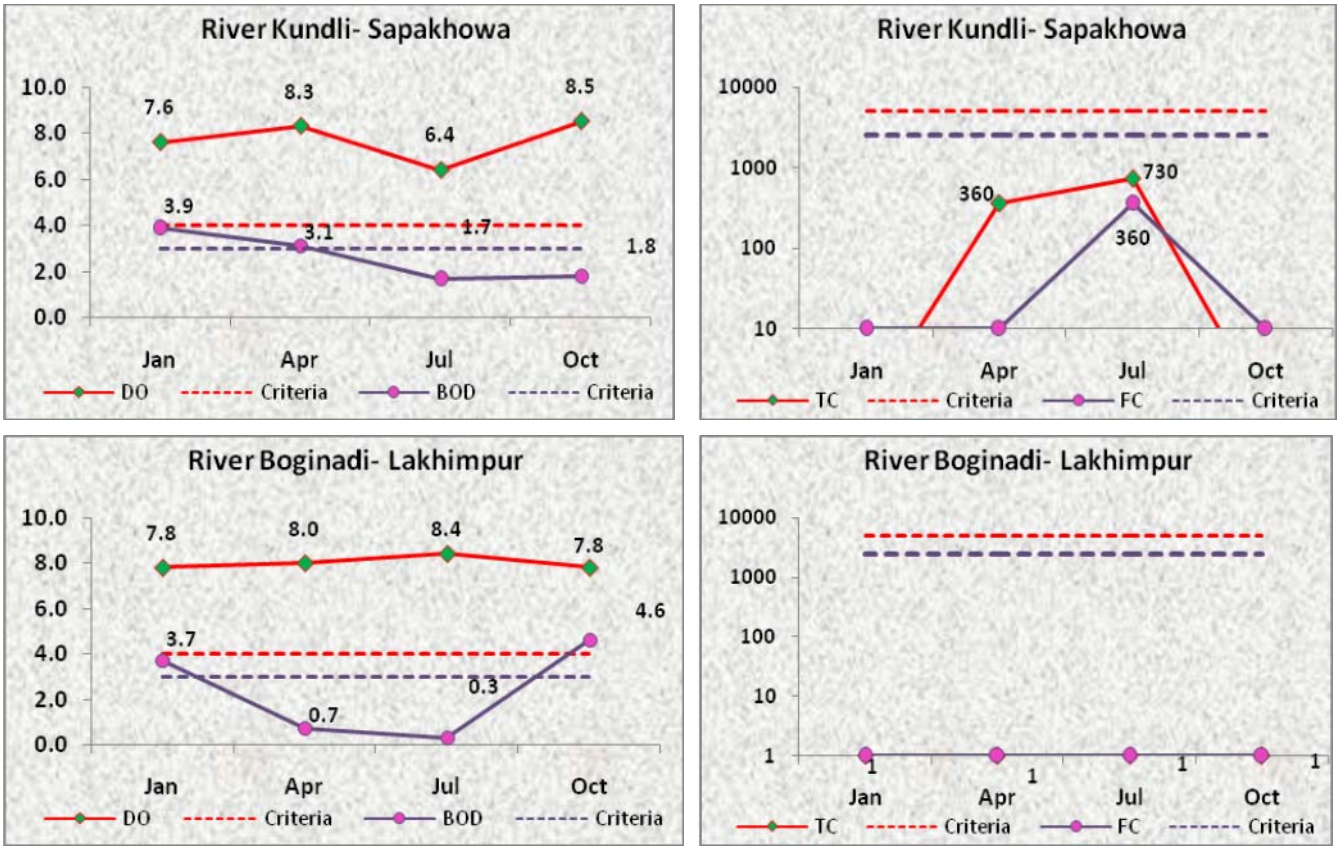
- Faecal Coliform should be less than 2500 MPN/100ml.
- Faecal Coliform (FC) ranges from 0 to 1, 10,000 MPN/100 ml.

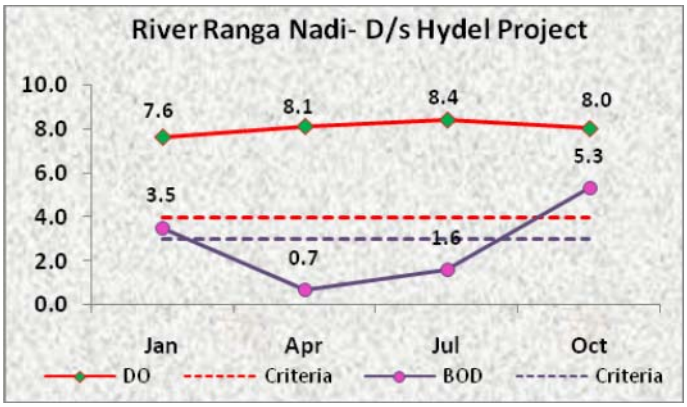
- High values are observed in
  - Teesta at Siliguri (1, 10,000 MPN/100 ml)
  - Kaljani D/s of Alipurdwar (11,000 MPN/100 ml)
  - Karola D/s of Jalpaiguri (4000 MPN/100 ml)

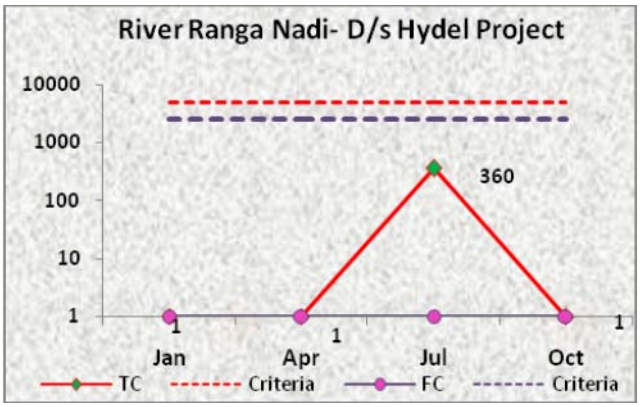
Total Coliform: -

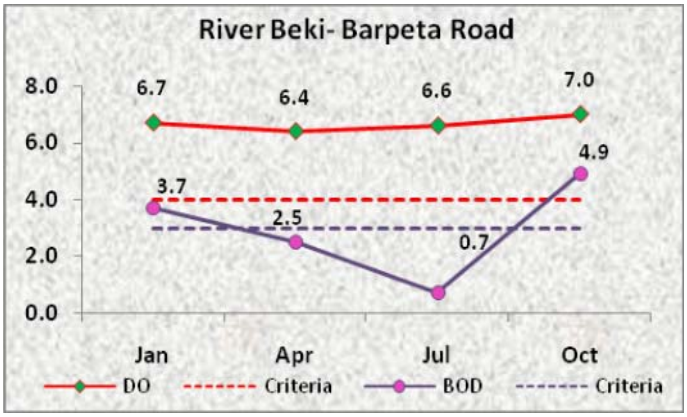
- Total Coliform should be less than 5000 MPN/100ml.
- The Total Coliform count varies from 1 to 2, 20,000 MPN/100 ml.
- High values are observed in
  - Teesta at Siliguri (2, 20,000 MPN/100 ml)
  - Kaljani D/s of Alipurdwar (14,000 MPN/100 ml)
  - Karola D/s of Jalpaiguri (8000 MPN/100 ml)

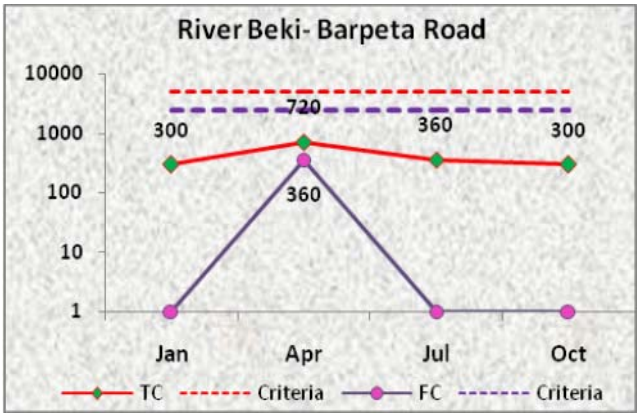
Figure 7.4: Temporal Trend of Water Quality of tributary streams Kundali, Boginadi, Ranganadi and Beki




River Ranga Nadi- D/s Hydel Project
10.0
8.0
6.0
4.0
2.0
0.0
7.6
8.1
8.4
8.0
3.5
0.7
1.6
5.3
Jan
Apr
Jul
Oct
DO
Criteria
BOD
Criteria


River Ranga Nadi- D/s Hydel Project
10000
1000
100
10
1
1
1
360
1
Jan
Apr
Jul
Oct
TC
Criteria
FC
Criteria

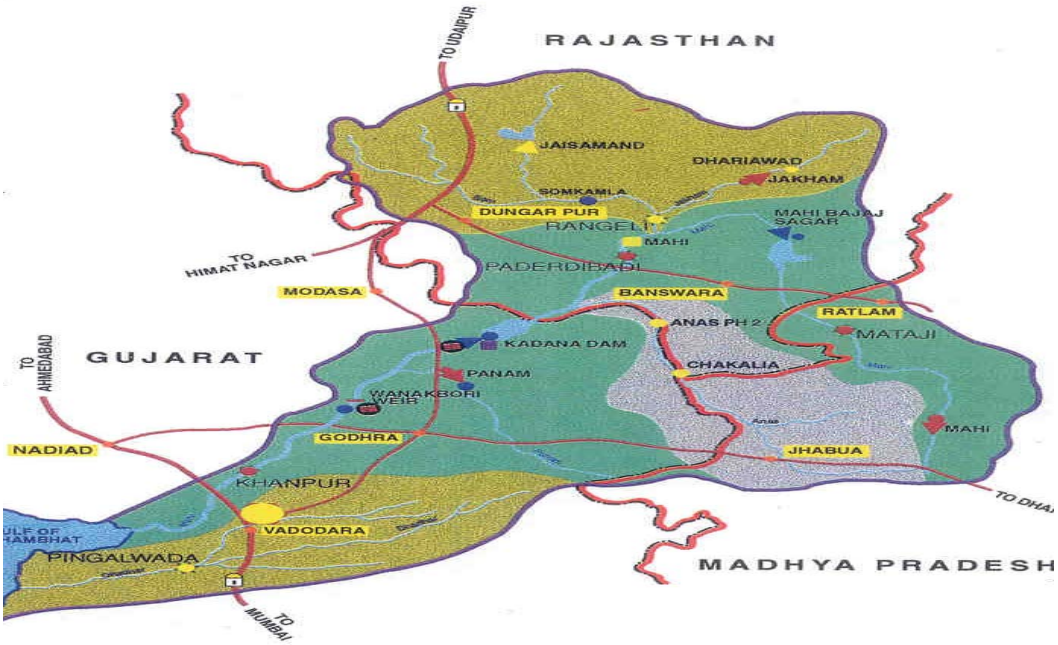

River Beki- Barpeta Road
8.0
6.0
4.0
2.0
0.0
6.7
6.4
6.6
7.0
3.7
2.5
0.7
4.9
Jan
Apr
Jul
Oct
DO
Criteria
BOD
Criteria


River Beki- Barpeta Road
10000
1000
100
10
1
300
720
360
300
360
Jan
Apr
Jul
Oct
TC
Criteria
FC
Criteria

CHAPTER VIII

Water Quality of Rivers in Mahi Basin

8.1 Mahi River System



The Mahi basin extends over an area of 34,842 sq. km. The interstate river Mahi is 583 km long, originating in Madhya Pradesh, passing through Rajasthan and Gujarat and draining into the Gulf of Khambhat. The Mahi flows northwards initially entering into Banswara district and then turning southward flowing through Udaipur and Dungarpur districts before entering into Gujarat. In Gujarat, it flows through Panchmahal, Kheda, Vadodara and Bharuch districts before draining into the Gulf. The principal tributaries of the river are the Som from the right and the Anas and the Panam from the left. The important urban centres in the watershed of Mahi are Godhra, Vadodara, Dohad and Dadhoi in Gujarat; Ratlam, Jaora in Madhya Pradesh; and Banswara in Rajasthan.

Vadodara is a metropolitan city as well as a centre for industrial activity. In Vadodara majority of industrial units are pharmaceutical and petrochemicals, besides units of caustic soda; distillery, fertilizer, dyes and pesticides also exist. The wastewater generated by IPCL, GSFC, Gujarat refinery, GIDC, Indian Dye stuff (P) Ltd. are being discharged into the Gulf of Khambhat through the Vadodara effluent channel. Although the large Vadodara industrial complex has extended considerably to the west of the small Dhadhar creek and discharges large quantity of effluent into the tidal segment of the river Mahi, the Dhadhar has its own independent catchment area (outside Mahi Basin) inclusive of its tiny

tributary Viswamitri which is extremely polluted by the effluent generated from Vadodara.

8.2 Water Quality Monitoring in Mahi Basin

The State Pollution Control Boards of Gujarat and Rajasthan at 15 locations are doing the water quality monitoring of the River Mahi and several tributaries in the basin. The monitoring locations are on mainstream of River Mahi (9) and tributaries- Anas (1), Panam (1), Jammer(1), Malei(1), Shivna(1) and Chillar(1). The ranges of water quality observed in River Mahi, Panam and Anas with respect to pH, Conductivity, DO, BOD, Total Coliform (TC) and Faecal Coliform (FC) are presented as minimum, maximum and mean value to assess the extent of water quality variation throughout the year. The detail list of Water Quality Monitoring locations in Mahi Basin is given in the Table 8(a).

Table 8(a): Water Quality Monitoring locations in Mahi Basin

Name of Monitoring Station	State Name	Name of Water Body
Anas at Dahod,(Kushalgarh),Dist. Panchmahal	Gujarat	Anas
River Chillar at Shajapur	Madhya Pradesh	Chillar
River Jammer at Dholowad, Ratlam	Madhya Pradesh	Jammer
Mahi After Conf. With Anas at Pardi (Banaswada)	Gujarat	Mahi
Mahi Near Rajasthan Border at Kadana Dam	Gujarat	Mahi
Mahi at Virpur	Gujarat	Mahi
Mahi at Vasad	Gujarat	Mahi
Mahi at Sevalia	Gujarat	Mahi
Mahi at Umeta Bridge	Gujarat	Mahi
Mahi at Mujpur	Gujarat	Mahi
Mahi at Badnawar	Madhya Pradesh	Mahi
Mahi (D/s) Conf With R. Chap (Under Sagwara-Sarhi Rd. Bdg.)	Rajasthan	Mahi
River Malei at Jaora	Madhya Pradesh	Malei
Panam at Lunawada	Gujarat	Panam
River Shivna at Ramghat, Mandsaur	Madhya Pradesh	Shivna

8.2.1 Water Quality of River Mahi and its tributaries

The water quality data of River Mahi and its tributaries is presented in Annexure-I Table 8.1. The summary of water quality of river Mahi with respect to pH, conductivity, Dissolved Oxygen (DO), Bio chemical Oxygen Demand (BOD), Total coliform (TC) and Faecal coliform (FC) is given below.

pH:-

- The criteria for pH is 6.5 to 8.5.
- pH is observed in the range of 7.1-10.
- pH is not meeting the criteria in
    - Mahi (D/s) conf with R. Chap (under sagwara-sarhi rd. Bdg.)(8.7)
    - River Shivna at Ramghat, Mandsaur (8.6)
    - River Chillar at Shajapur (10)

Conductivity: -

- The criteria of Conductivity for irrigation is 2250 µmhos/cm
- Conductivity lies in the range of 160-766 µmhos/cm and is meeting the criteria.

Dissolved Oxygen: -

- The criteria for DO should be more than 4 mg/l.
- DO lies in the range of 3.5-8.6 mg/l.
- DO is not meeting the criteria at Mahi (D/s) conf with R. Chap (under sagwara-sarhi rd. Bdg.)(3.5)

Bio chemical Oxygen Demand: -

- The criteria for BOD should be less than 3 mg/l.
- BOD was observed in the range of 0.1-4.0 mg/l.
- BOD is not meeting the desired criteria in
    - River Jammer at Dholowad, Ratlam (4.0 mg/l)
    - River Anas at Dahod (3.8 mg/l)

Faecal Coliform:-

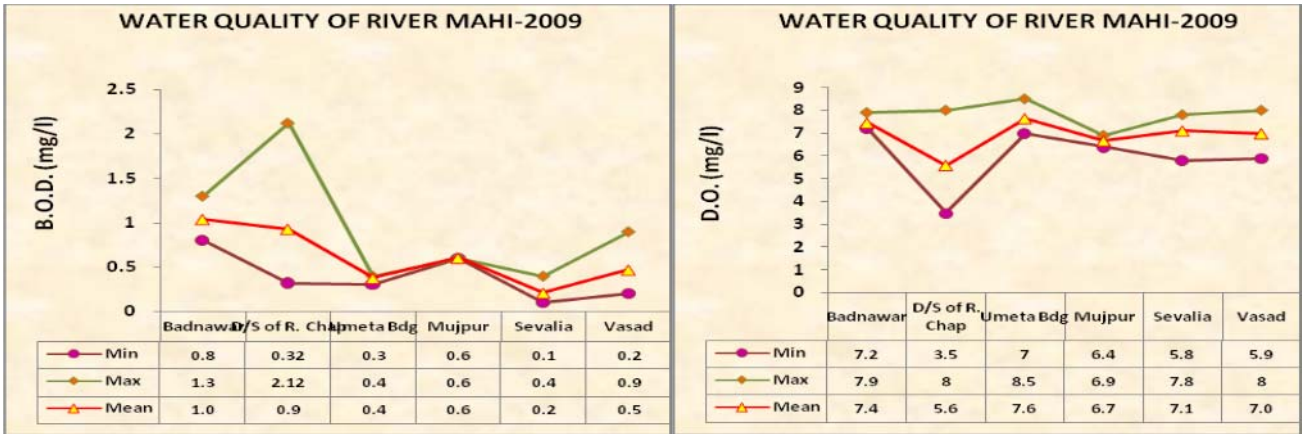
- Faecal Coliform should be less than 2500 MPN/100ml.
- Faecal Coliform ranges from 0-9 MPN/100ml and is meeting the criteria.

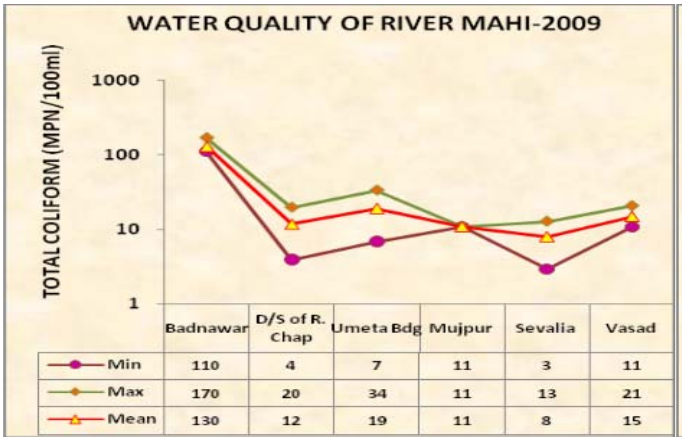
Total Coliform:-

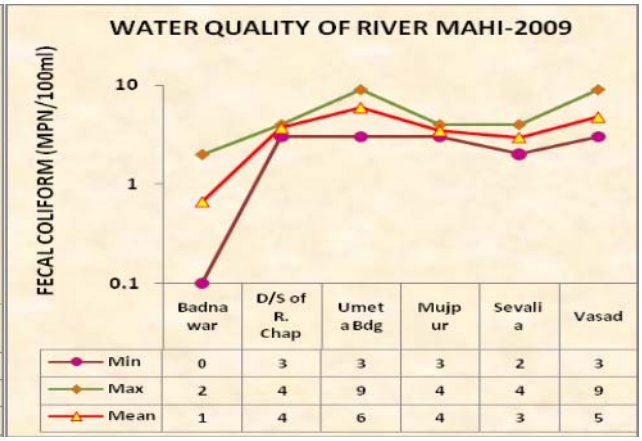
- Total Coliform should be less than 5000 MPN/100ml
- Total Coliform is in the range of 3-170 MPN/100ml and is meeting the criteria.

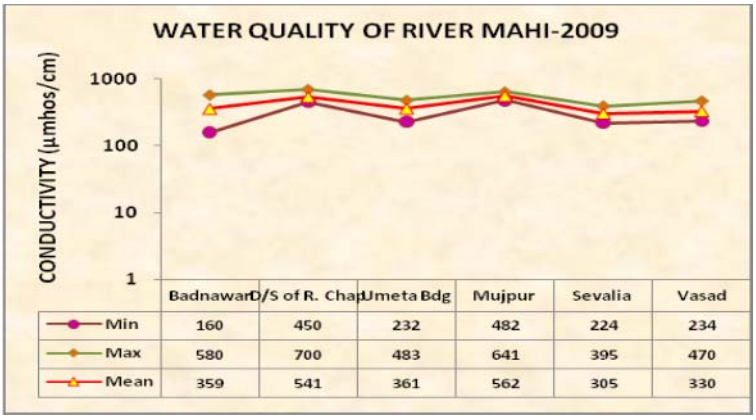
The spatial trend of water quality of River Mahi with respect to BOD, DO, Total Coliform, Faecal Coliform and Conductivity is presented in Figure 8.1.

Figure 8.1: Spatial Trend of Water Quality of River Mahi




WATER QUALITY OF RIVER MAHI-2009
TOTAL COLIFORM (MPN/100ml)
1000
100
10
1
Badnawar
D/S of R. Chap
Umeta Bdg
Mujpur
Sevalia
Vasad
Min 110 4 7 11 3 11
Max 170 20 34 11 13 21
Mean 130 12 19 11 8 15

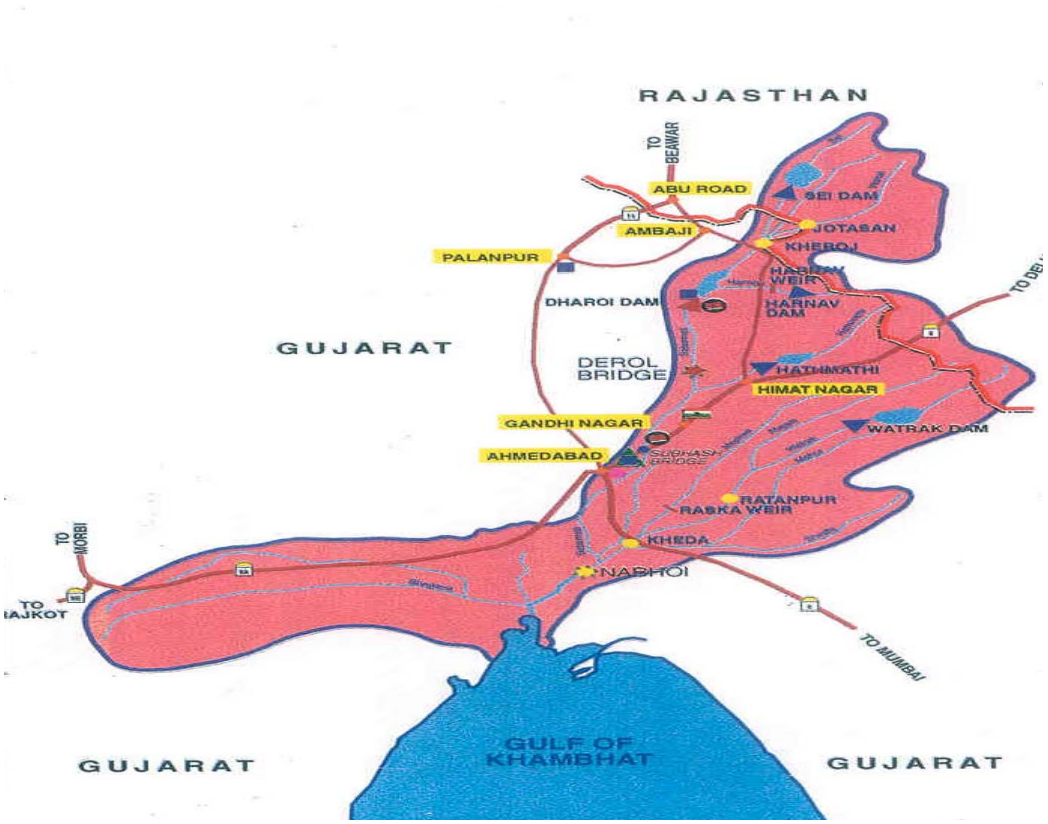

WATER QUALITY OF RIVER MAHI-2009
FECAL COLIFORM (MPN/100ml)
10
1
0.1
Badna war
D/S of R. Chap
Umet a Bdg
Mujp ur
Sevali a
Vasad
Min 0 3 3 3 2 3
Max 2 4 9 4 4 9
Mean 1 4 6 4 3 5


WATER QUALITY OF RIVER MAHI-2009
CONDUCTIVITY (µmhos/cm)
1000
100
10
1
Badnawar
D/S of R. Chap
Umeta Bdg
Mujpur
Sevalia
Vasad
Min 160 450 232 482 224 234
Max 580 700 483 641 395 470
Mean 359 541 361 562 305 330

CHAPTER IX

Water Quality of Rivers in Sabarmati Basin

9.1 Sabarmati River System



The Sabarmati basin extends over an area of 21,674 sq km. Located in Western India, the basin covers areas in the States of Rajasthan and Gujarat. It rises in the Aravalli hills. The total length of the river from the head to its outfall into the sea is 371 km. The principal tributaries of the river are the Sei, the Wankal, the Harnay, the Hathmati, and the Vatrak and the Meshwa. The river Sabarmati and its tributaries are all rain-fed. The rainfall being fairly low in the basin, its water wealth potential is one of the two lowest in India. The lower part of the basin has become a haven for industries and GIDC has encouraged a new gene of small and medium industries many of them being engineering and chemical units generating significant water pollution. The textile industry continues to dominate the industrial scene in Ahmedabad. In the recent times about 100 km long 30 km wide Gandhinagar-Vadodara belt is a prosperous and fast developing urban industrial area.

The river is one of the most polluted rivers in the country although it is the lifeline of the State of Gujarat. Intensive agricultural practices coupled with intensive withdrawal of water for cropping had left the river absolutely dry after it entered the Ahmedabad city limits. The river is in a very serious state and deserves urgent attention. Large number of industrial units is located in Ahmedabad. Besides this there are thousands of small scale

industries (SSI) units engaged in diversified products mostly concentrated in various industrial states like Naroda, Odhar, Vatva, Pilas and Chandola etc. All these industries are discharging their waste waters D/s (D/s) of Sabarmati Ashram whereas thermal power plant is discharging U/s (U/s) of Sabarmati Ashram.

The river Sabarmati U/s of Ahmedabad city to Sabarmati Ashram and from Sabarmati Ashram to Vautha have been identified as polluted stretches. The immense urban and industrial growth combined with growing demand of irrigation water has taken their toll as observed by the deteriorating water quality recorded particularly from Ahmedabad city to Vautha. The total length of the stretch from Ahmedabad city to Vautha is of 52 km and in the polluted river stretch; the main contributing outfalls are the Maninagar (mixed effluent) and river Khari (industrial).

The basin area of Sabarmati is covering the States of Rajasthan, Madhya Pradesh and Gujarat. The important urban centres in Gujarat are Gandhi Nagar, Junagadh, Ahmadabad, Surendranagar, Gandhidham, Anand, Dholka, Himatnagar, Kalol, Unjha, Viramgam and Visnagar.

9.2 Water Quality Monitoring in Sabarmati Basin

The water quality monitoring of the River Sabarmati and its tributaries are being done in the basin by the State Pollution Control Boards of Gujarat. The monitoring locations are on mainstream of River Sabarmati and tributaries- Meshwa, Shedi and Khari. The ranges of water quality observed in Sabarmati Basin with respect to pH, Conductivity, DO, BOD, COD, Total Coliform (TC) and Faecal Coliform (FC) are presented as minimum, maximum and mean value to assess the extent of water quality variation throughout the year. The detail list of Water Quality Monitoring locations in Sabarmati Basin is given in the Table 9(a).

Table 9(a): Water Quality Monitoring locations in Sabarmati Basin

Name of Monitoring Station	State Name	Name of Water Body
Khari at Lali Village Near Ahmedabad	Gujarat	Khari
Meshwa Near Rajasthan Border at Samlaji	Gujarat	Meshwa
Sabarmati at Kheroj Bridge	Gujarat	Sabarmati
Sabarmati at Mahudi Jain Temple, 150 Km. Form Origin	Gujarat	Sabarmati
Sabarmati at Gandhi Nagar Chiloda Bridge,Lekawada	Gujarat	Sabarmati
Sabarmati at Dharoi Dam	Gujarat	Sabarmati
Sabarmati at Ahmedabad at V.N. Bridge	Gujarat	Sabarmati
Sabarmati at Railway Bridge Ahmedabad	Gujarat	Sabarmati
Sabarmati at Vill. Miroli Taluka Ddascroi,Ahmedabad	Gujarat	Sabarmati
Sabarmati After Conf. With Meshwa at Vautha (Near Dhokla)	Gujarat	Sabarmati
River Sabarmati at Hansaol Bridge	Gujarat	Sabarmati
Shedhi at Kheda	Gujarat	Shedhi

9.2.1 Water Quality of River Sabarmati

The water quality of River Sabarmati is given in Annexure-I Table 9.1. The summary of water quality of river Sabarmati with respect to pH, Conductivity, Dissolved Oxygen (DO), Bio chemical Oxygen Demand (BOD), Total coliform (TC) and Faecal coliform (FC) is given below.

pH:-

- The criteria for pH is 6.5 to 8.5.
- pH is observed in the range of 7.3-8.7.
- pH is not meeting the criteria at Hansaol Bridge ,V.N. Bridge & Railway Bridge(8.6) and A/c with Meshwa at Vautha (Near Dhokla)(8.7).

Conductivity: -

- The criteria of Conductivity for irrigation is 2250 µmhos/cm
- Conductivity lies in the range of 253-3200 µmhos/cm.
- Conductivity is not meeting the criteria at Village Miroli Taluka Dascroi (3200 µmhos/cm) and A/c with Meshwa at Vautha (Near Dhokla) (2800 µmhos/cm).

Dissolved Oxygen: -

- The criteria for DO should be more than 4 mg/l.
- DO lies in the range of 0-8.9 mg/l.
- The low value of DO is observed at V.N.Bridge (0 mg/l), Village Miroli Taluka Dascroi (0 mg/l) and A/c with Meshwa at Vautha (0 mg/l) in Gujarat.

Bio chemical Oxygen Demand: -

- The criteria for BOD should be less than 3 mg/l.
- BOD was observed in the range of 1.2- 46 mg/l and is not meeting the criteria at all the locations.
- BOD was observed maximum at
    - Village Miroli Taluka Dascroi (46 mg/l)
    - A/c with Meshwa at Vautha & V.N.Bridge (39 mg/l)
    - Kheroj Bridge at Ahmedabad (9 mg/l)
    - Railway Bridge at Ahemdabad (13 mg/l)
    - Hansaol Bridge (12 mg/l) in Gujarat.
- The high concentration of BOD is attributed to the discharge of untreated wastewater into the river.

Faecal Coliform:-

- Faecal Coliform should be less than 2500 MPN/100ml
- Faecal Coliform count ranges from 80 - 15000 MPN/100ml.
- The highest count of Fecal Coliform is observed at village Miroli Taluka Dascroi (15000 MPN/100ml) and A/c with Meshwa at Vautha (7500 MPN/100ml).

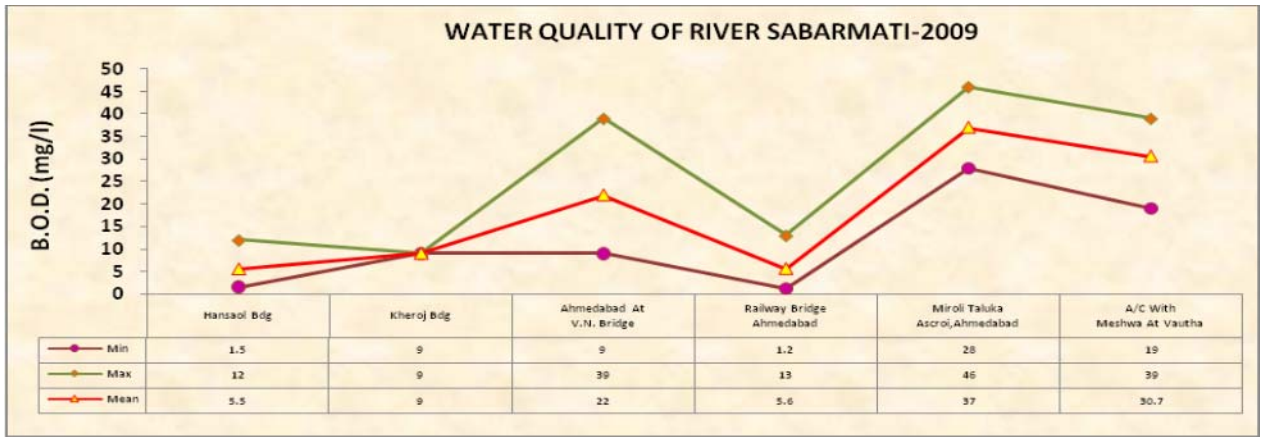
Total Coliform:-

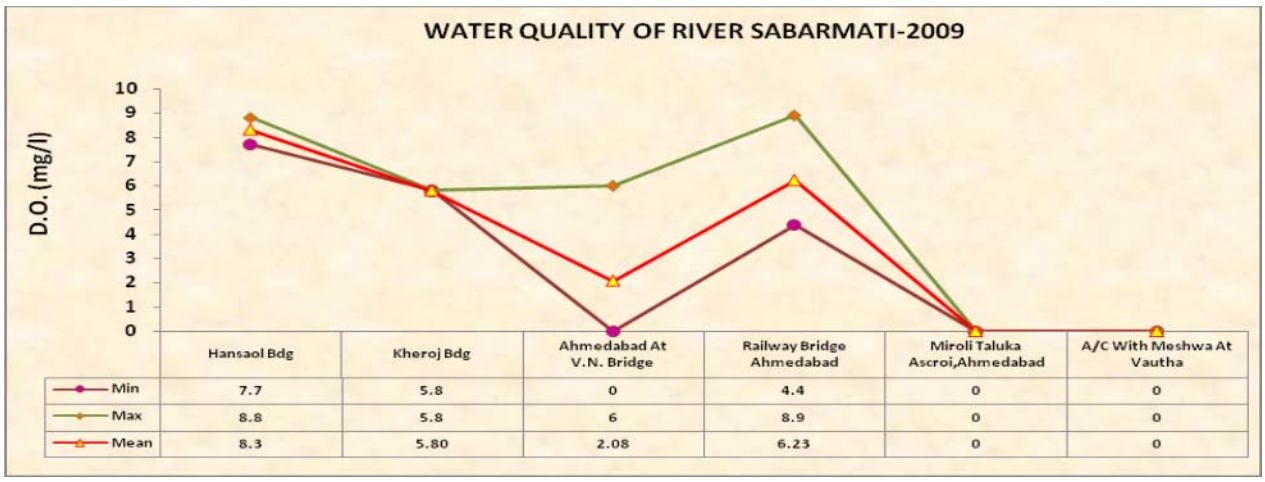
- The Total Coliform count in the river ranges from 240-46000 MPN/100ml.

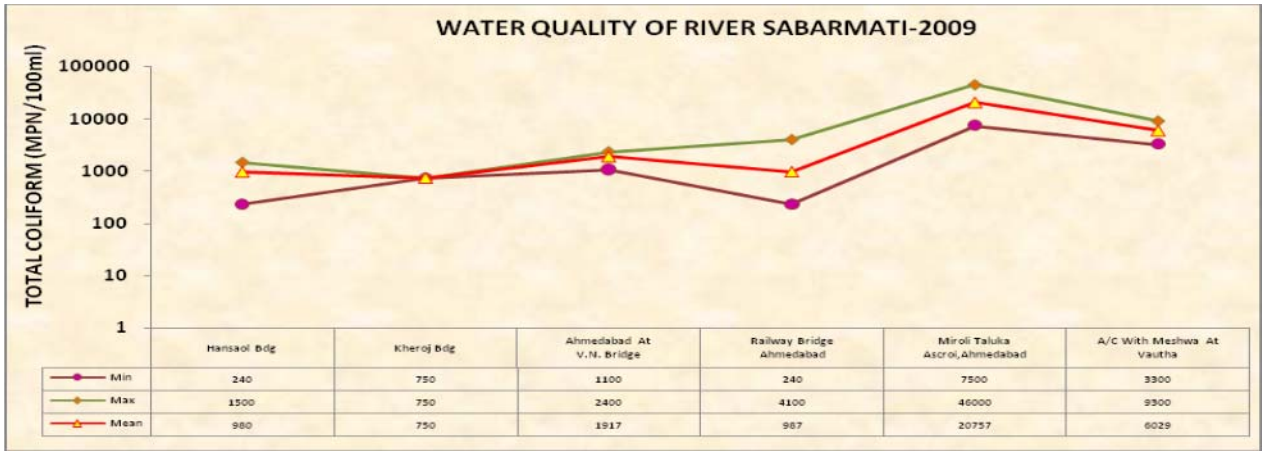
- The highest count of Total Coliform is observed at village Miroli Taluka Dascroi (46000 MPN/100ml) and A/c with Meshwa at Vautha (9300 MPN/100ml).

The spatial trend of water quality of River Sabarmati with respect to BOD, DO, Total Coliform, Faecal Coliform and Conductivity is given in figure 9.1.

Figure 9.1: Spatial Trend of Water Quality of River Sabarmati







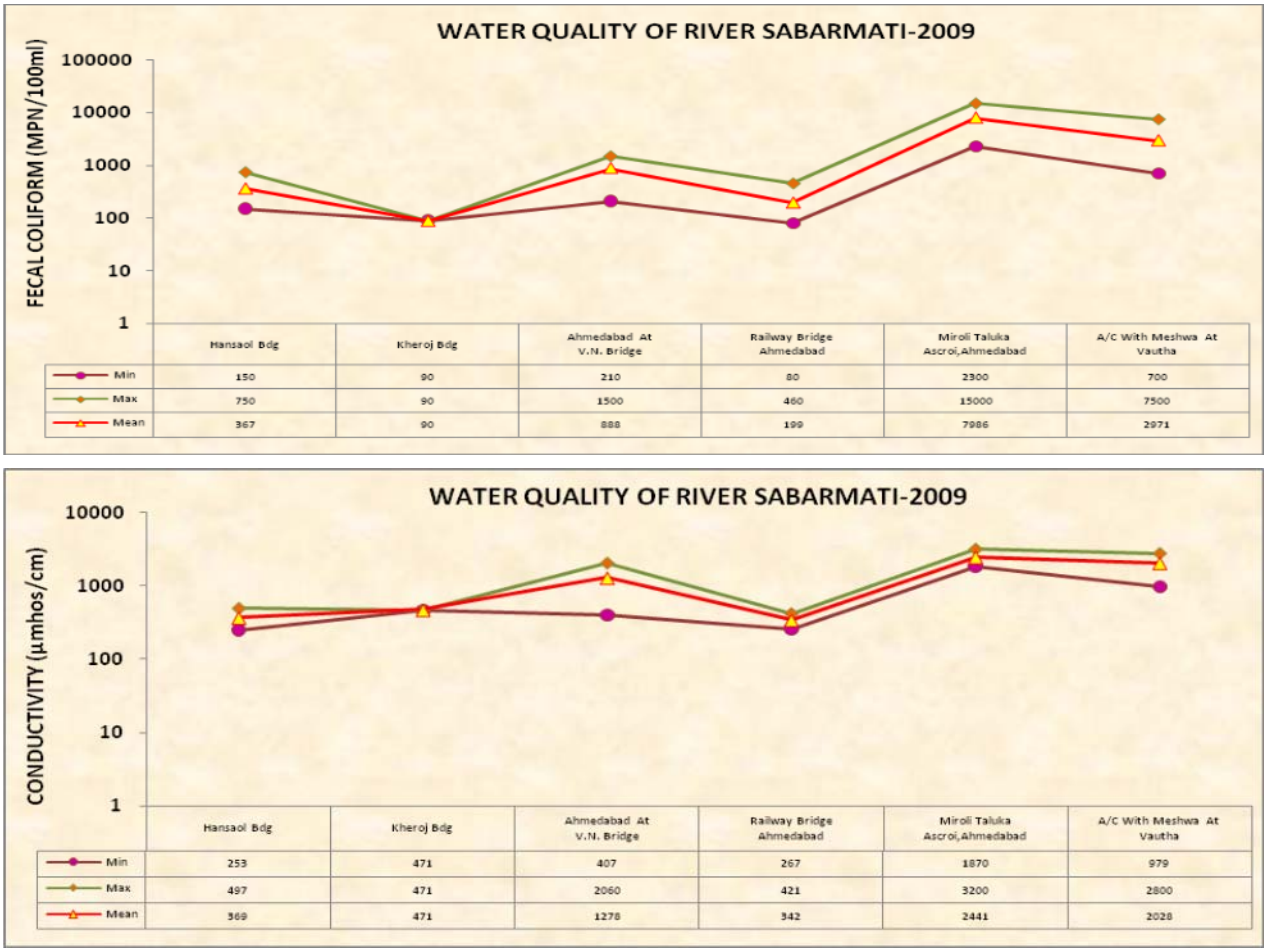
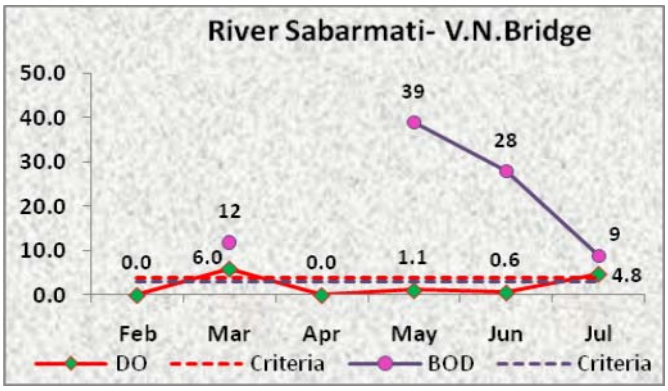
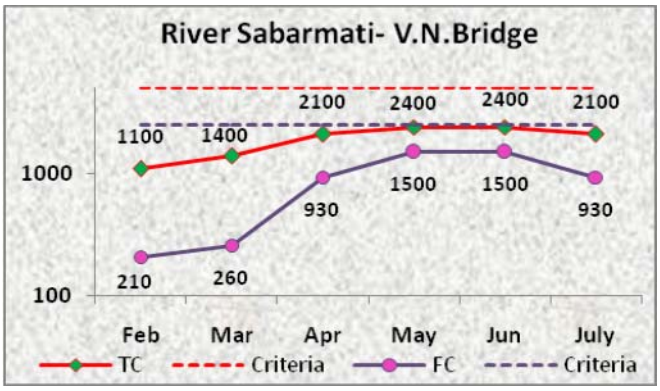
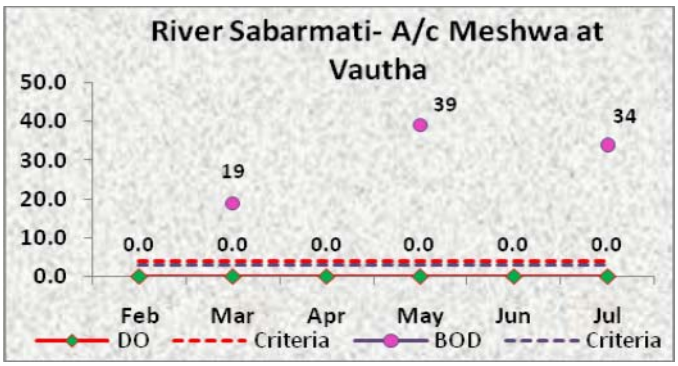
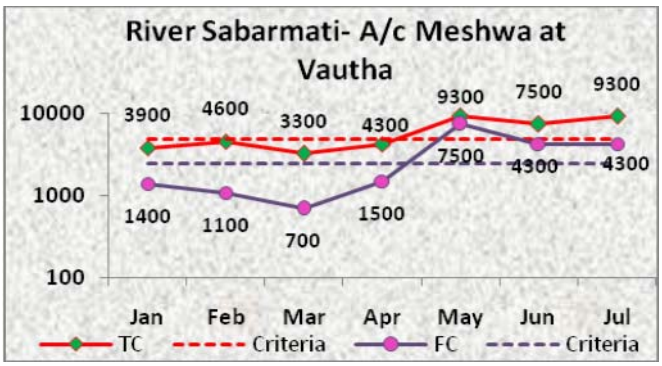


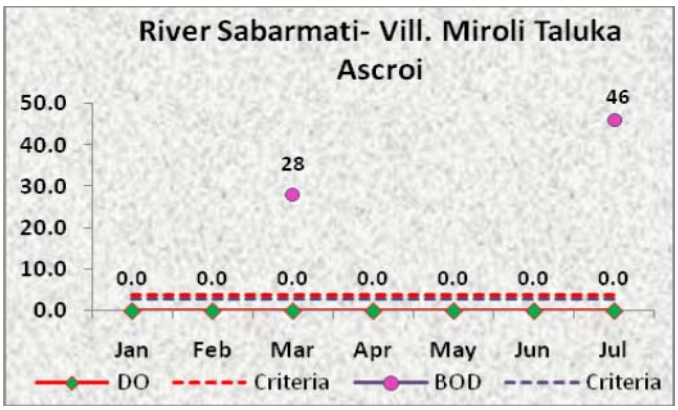
Figure 9.2: Temporal Trend of Water Quality of River Sabarmati

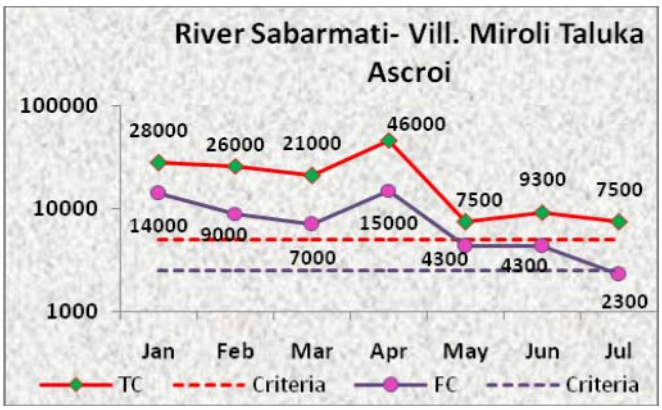





River Sabarmati- A/c Meshwa at Vautha
50.0
40.0
30.0
20.0
10.0
0.0
0.0
19
39
34
0.0
0.0
0.0
0.0
0.0
Feb
Mar
Apr
May
Jun
Jul
DO
Criteria
BOD
Criteria


River Sabarmati- A/c Meshwa at Vautha
10000
1000
100
3900
4600
3300
4300
9300
7500
9300
1400
1100
700
1500
7500
4300
4300
Jan
Feb
Mar
Apr
May
Jun
Jul
TC
Criteria
FC
Criteria


River Sabarmati- Vill. Miroli Taluka Ascroi
50.0
40.0
30.0
20.0
10.0
0.0
0.0
28
46
0.0
0.0
0.0
0.0
0.0
0.0
0.0
Jan
Feb
Mar
Apr
May
Jun
Jul
DO
Criteria
BOD
Criteria


River Sabarmati- Vill. Miroli Taluka Ascroi
100000
10000
1000
28000
26000
21000
46000
7500
9300
7500
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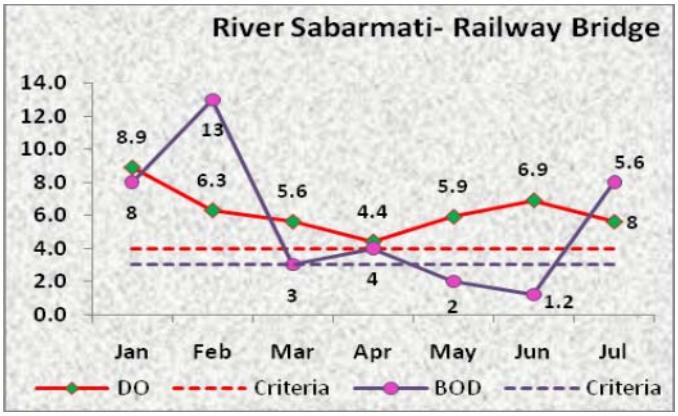
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6.0
4.0
2.0
0.0
8.9
13
6.3
5.6
4.4
5.9
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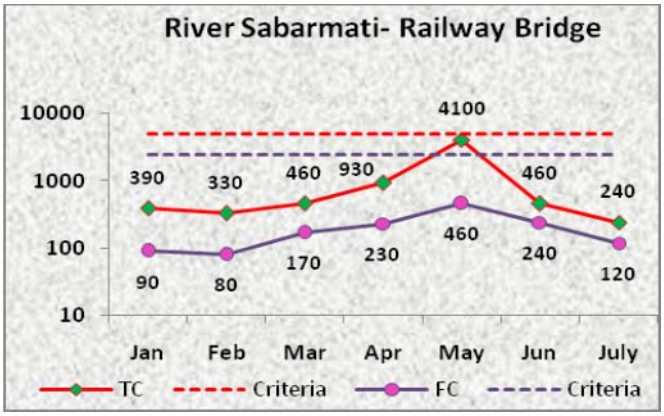
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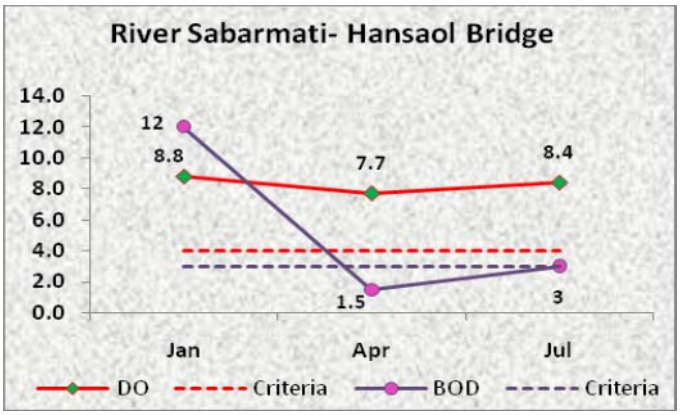
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8.0
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4.0
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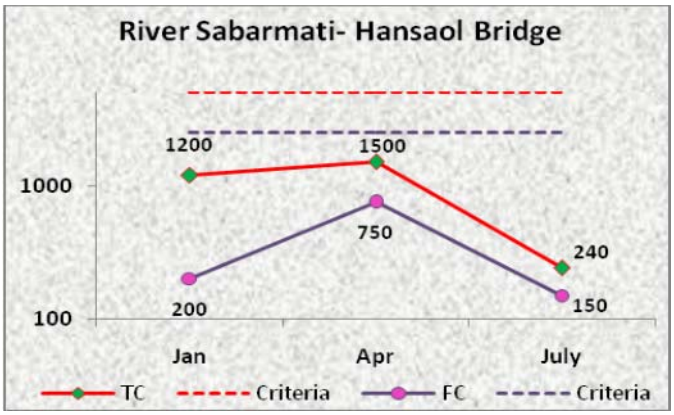
River Sabarmati- Hansaol Bridge
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100
1200
1500
750
240
200
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Apr
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TC
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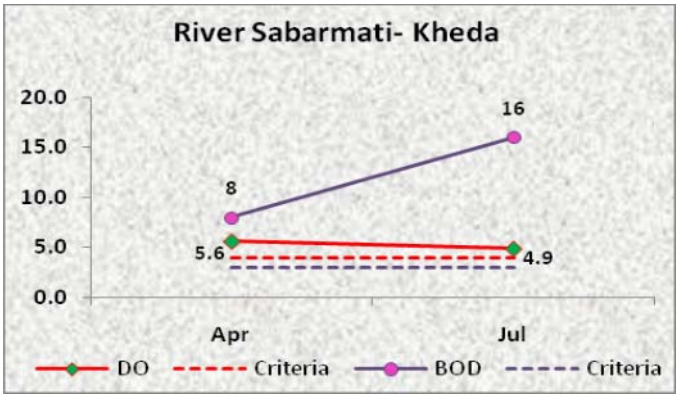
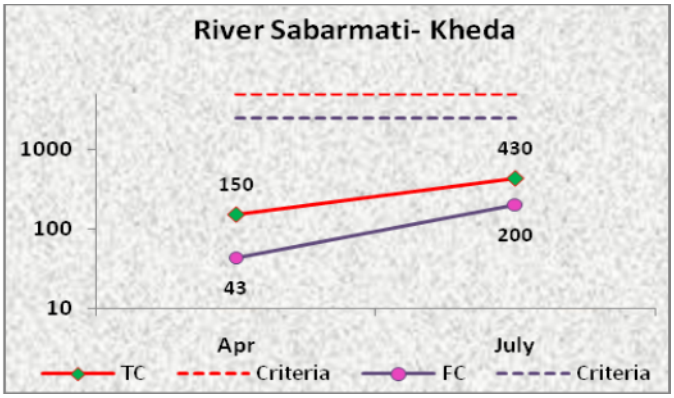
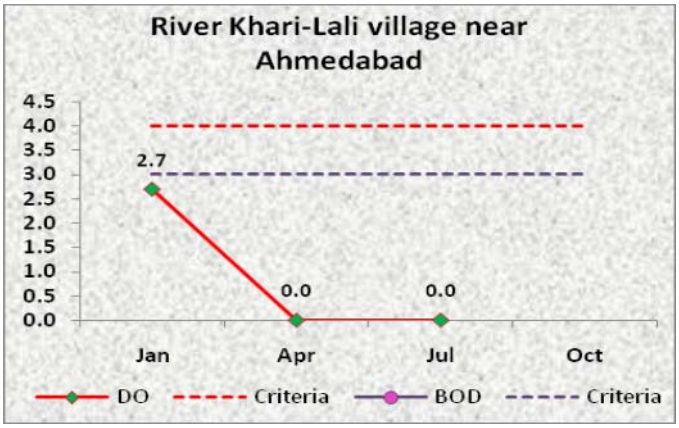
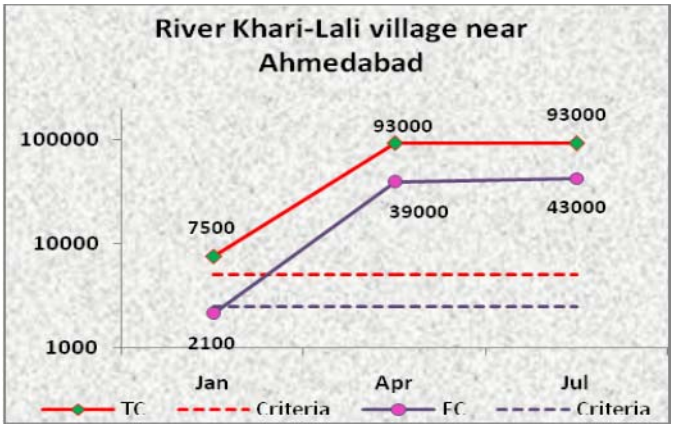
Criteria









9.2.2 Water Quality of tributary streams Shedi and Khari

The water quality status of River Shedi is given in Annexure-I Table 9.1.The summary of water quality of river Shedi with respect to pH, conductivity, Dissolved Oxygen (DO), Bio chemical Oxygen Demand (BOD), Total coliform (TC) and Faecal coliform (FC) is given below.

pH:-

- The criteria for pH is 6.5 to 8.5.
- pH is observed in the range of 8.2-9.0 and is not meeting the desired water quality criteria.

Conductivity: -

- The criteria of Conductivity for irrigation is 2250 µmhos/cm
- Conductivity lies in the range of 735-1690 µmhos/cm and is meeting the criteria.

Dissolved Oxygen: -

- The criteria for DO should be more than 4 mg/l.
- DO lies in the range of 4.9-7.6 mg/l and is meeting the criteria.

Bio chemical Oxygen Demand: -

- The criteria for BOD should be less than 3 mg/l.
- BOD was observed in the range of 5.0-16 mg/l and is not meeting the criteria.

Faecal Coliform:-

- Faecal Coliform should be less than 2500 MPN/100ml
- Faecal Coliform ranges from 43-200 MPN/100ml and is meeting the criteria.

Total Coliform:-

- Total Coliform should be less than 5000 MPN/100ml.
- The Total Coliform count ranges from 150-430 MPN/100ml and is meeting the criteria.

The water quality status of River Khari is given in Annexure-I Table 9.1.The summary of water quality of river Khari with respect to pH, conductivity, Dissolved Oxygen (DO), Bio chemical Oxygen Demand (BOD), Total coliform (TC) and Faecal coliform (FC) is given below.

pH:-

- The criteria for pH is 6.5 to 8.5.
- pH is observed in the range of 7.7-8.3 and is meeting the criteria.

Conductivity: -

- The criteria of Conductivity for irrigation is 2250 µmhos/cm
- Conductivity lies in the range of 6450-9900 µmhos/cm and is not meeting the criteria.

Dissolved Oxygen: -

- The criteria for DO should be more than 4 mg/l.
- DO lies in the range of 0-2.7 mg/l and is not meeting the criteria.

Faecal Coliform:-

- Faecal Coliform should be less than 2500 MPN/100ml
- Faecal Coliform ranges from 2100-43000 MPN/100 ml and is not meeting the criteria.

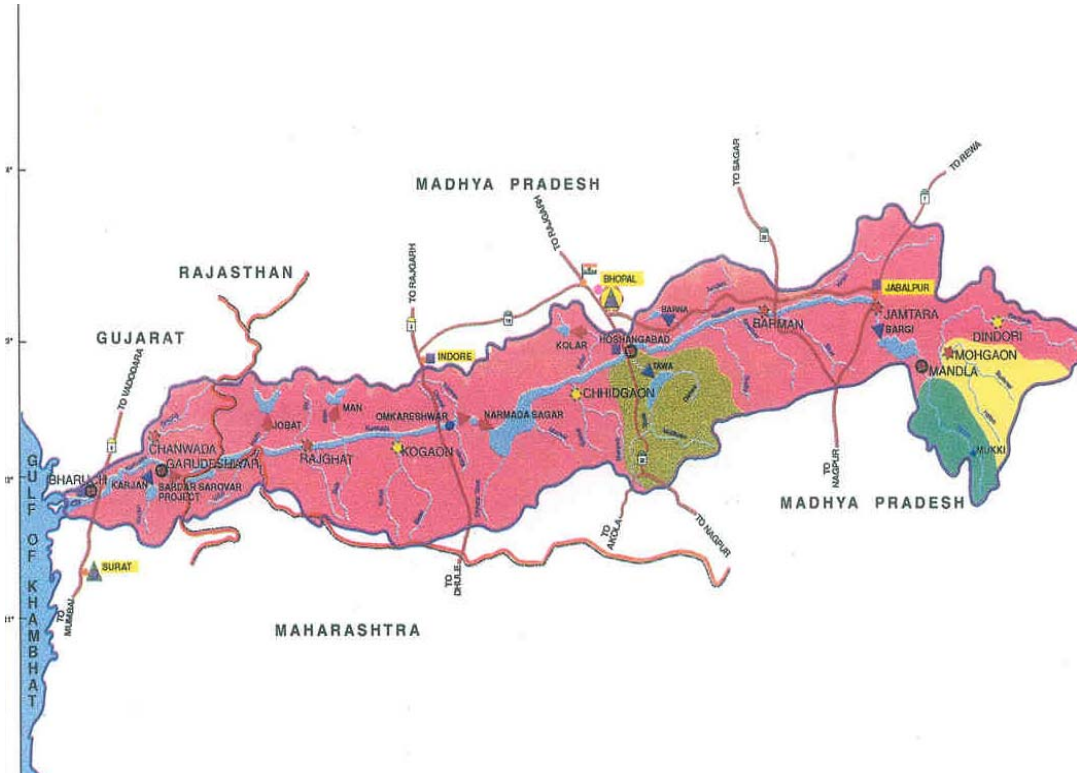
Total Coliform:-

- Total Coliform should be less than 5000 MPN/100ml.
- The Total Coliform count ranges from 7500-93000 MPN/100ml and is not meeting the criteria.

CHAPTER X

Water Quality of Rivers in Narmada Basin

10.1 Narmada River System



The Narmada basin extends over an area of 98,796 sq km. Lying in the northern extremity of the Deccan plateau, the basin covers large areas in the Madhya Pradesh and Gujarat and a comparatively smaller area in Maharashtra. The Narmada Basin is bounded on the north by the Vindhya, on the east by the Maikala range, on the south by the Satpura and on the west by the Arabian Sea.

Narmada is the largest west-flowing river of the Indian peninsula. Narmada rises from Amarkantak, in the Shahdol district of Madhya Pradesh. The total length of the river from the head to its outfall into the Gulf of Khambhat is 1,312 km. Although entirely rain fed, the Narmada has a fairly heavy discharge because of moderately heavy annual average rainfall in the basin, particularly in the upper catchment area.

Urbanisation unlike in other basins has been going on in a slow pace in this basin mainly due to the river passing through hilly terrain that has made it inaccessible in most places. The major urbanisation centres are Jabalpur, Dewas and Khandwa besides Bharuch in Gujarat State.

The industrial development in the Narmada basin is lower as compared to other river basins. The industrialized districts of the Narmada basin are Dhar, Jabalpur and Bharuch consisting of clusters of pharmaceuticals, pesticides, dyes & distilleries, leather & fertilizer units whereas in Jabalpur, Khandwa and Hoshangabad the main industrial activity are the paper mills. In most of the other districts the industries are almost non-existent.

The basin area of Narmada is covering the States of Madhya Pradesh, Gujarat and Maharashtra. The important urban centres in these States are Bharuch and Ankleshwar in Gujarat; Murwara (Katni), Jabalpur, Khandwa, Betul, Hoshangabad, Itarsi and Khargone in Madhya Pradesh.

10.2 Water Quality Monitoring in Narmada Basin

The State Pollution Control Boards of Madhya Pradesh and Gujarat are doing the water quality monitoring of the River Narmada at 21 locations and its tributary streams Chota Tawa, Gour, Katni and Kunda at one location each. The ranges of water quality observed in River Narmada and tributary streams Chota Tawa, Gour, Katni and Kunda with respect to pH, Conductivity, DO, BOD, COD, Total Coliform (TC) and Faecal Coliform (FC) are presented as minimum, maximum and mean value to assess the extent of water quality variation throughout the year. The detail list of Water Quality Monitoring locations in Narmada Basin is given in the Table 10(a).

Table 10(a): Water Quality Monitoring locations in Narmada Basin

Name of Monitoring Station	State Name	Name of Water Body
Chota Tawa Before Confl. With River Narmada	Madhya Pradesh	Chota Tawa
Gour River Bhoga Door, Jabalpur	Madhya Pradesh	Gour
Katni River Near Nagar Nigam	Madhya Pradesh	Katni
River Kunda at Khargone	Madhya Pradesh	Kunda
Narmada at Garudeshwar	Gujarat	Narmada
Narmada at Chandod	Gujarat	Narmada
Narmada at Panetha	Gujarat	Narmada
Narmada at Bharuch,Zadeshvar	Gujarat	Narmada
Narmada at Zanor (Ntpc), Bharuch	Gujarat	Narmada
Narmada at Sethanighat	Madhya Pradesh	Narmada
Narmada at Narsinghpur	Madhya Pradesh	Narmada
Narmada Near Source at Amarkantak	Madhya Pradesh	Narmada
Narmada at Mandla Near Road Bdg.	Madhya Pradesh	Narmada
Narmada at Hoshangabad U/S	Madhya Pradesh	Narmada
Narmada at Hoshangabad D/S	Madhya Pradesh	Narmada
Narmada at D S of Omkareshwar	Madhya Pradesh	Narmada
Narmada at Mandleshwar	Madhya Pradesh	Narmada
Narmada at Maheshwar	Madhya Pradesh	Narmada
Narmada at Badwani	Madhya Pradesh	Narmada
River Narmada Near Mortakka Bridge, Badwah	Madhya Pradesh	Narmada
River Narmada Near Punasa Dam, Punasa	Madhya Pradesh	Narmada
Narmada River at D/s of Kapildhara	Madhya Pradesh	Narmada
Narmada at Korighat Hoshangabad	Madhya Pradesh	Narmada
River Narmada Lalpur, Jabalpur	Madhya Pradesh	Narmada
River Narmada at Nemawar	Madhya Pradesh	Narmada

10.2.1 Water Quality of River Narmada and its tributaires

The water quality status of River Narmada is given in Annexure-I Table 10.1.The summary of water quality of river Narmada with respect to pH, conductivity, Dissolved Oxygen (DO), Bio chemical Oxygen Demand (BOD), Total coliform (TC) and Faecal coliform (FC) is given below.

pH:-

- The criteria for pH is 6.5 to 8.5.
- pH is observed in the range of 6.5-8.9 and is not meeting the criteria.
- pH is not meeting the criteria at Sethanighat & Hoshangabad U/s (8.9), Korighat (8.8) and Hoshangabad D/s (8.6).

Conductivity: -

- The criteria of Conductivity for irrigation is 2250 µmhos/cm
- Conductivity lies in the range of 178-1930 µmhos/cm and is meeting the criteria.

Dissolved Oxygen: -

- The criteria for DO should be more than 4 mg/l.
- DO lies in the range of 4.2-11.5 mg/l and is meeting the criteria.

Bio chemical Oxygen Demand: -

- The criteria for BOD should be less than 3 mg/l.
- BOD was observed in the range of 0.2-30 mg/l.
- BOD was observed maximum at Korighat (30 mg/l), Hoshangabad U/s (4.7 mg/l), Sethanighat (3.9 mg/l) and Hoshangabad D/s (3.6 mg/l).

Faecal Coliform:-

- Faecal Coliform should be less than 2500 MPN/100ml
- Faecal Coliform ranges from Nil-90 MPN/100ml and is meeting the criteria.

Total Coliform:-

- Total Coliform should be less than 5000 MPN/100ml.
- Total Coliform count ranges from 2-1600 MPN/100ml and is meeting the criteria.

The water quality status of tributary stream Chota Tawa is given in Annexure-I Table 10.1.The summary of water quality of tributary stream Chota Tawa with respect to pH, conductivity, Dissolved Oxygen (DO), Bio chemical Oxygen Demand (BOD), Total coliform (TC) and Faecal coliform (FC) is given below.

pH:-

- The criteria for pH is 6.5 to 8.5.
- pH is observed in the range of 7.5-8.3 and is meeting the criteria.

Conductivity: -

- The criteria of Conductivity for irrigation is 2250 µmhos/cm
- Conductivity lies in the range of 427-476 µmhos/cm and is meeting the criteria.

Dissolved Oxygen: -

- The criteria for DO should be more than 4 mg/l.
- DO lies in the range of 6.6-7.6 mg/l and is meeting the criteria.

Bio chemical Oxygen Demand: -

- The criteria for BOD should be less than 3 mg/l.
- BOD is observed in the range of 0.8-0.9 mg/l and is meeting the criteria.

Faecal Coliform:-

- Faecal Coliform should be less than 2500 MPN/100ml.
- Faecal Coliform ranges from 2-2 MPN/100ml and is meeting the criteria.

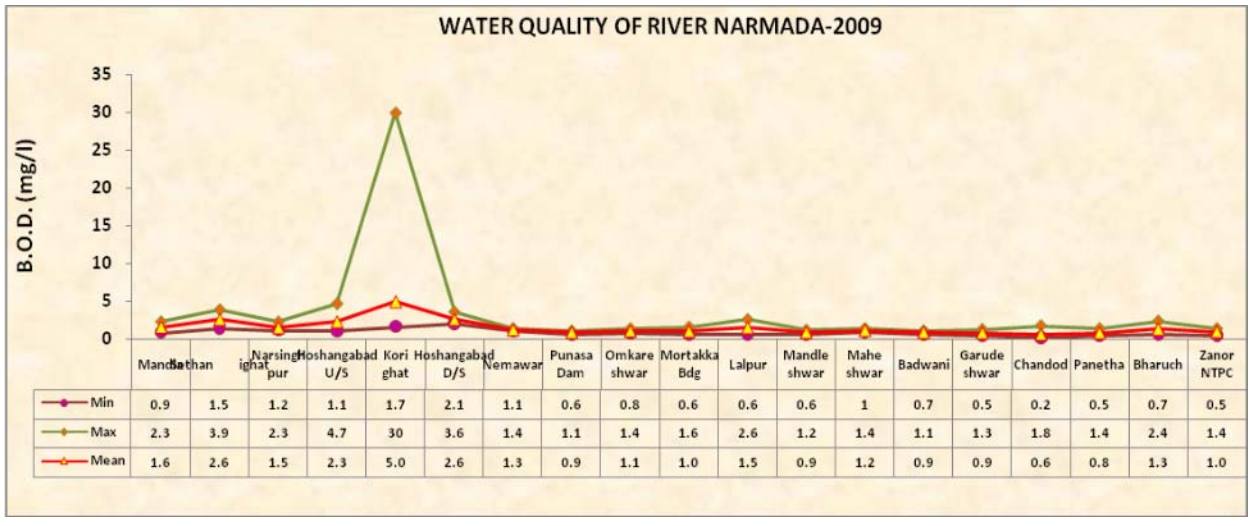
Total Coliform:-

- Total Coliform should be less than 5000 MPN/100ml.
- Total Coliform count ranges from 110-140 MPN/100ml and is meeting the criteria.

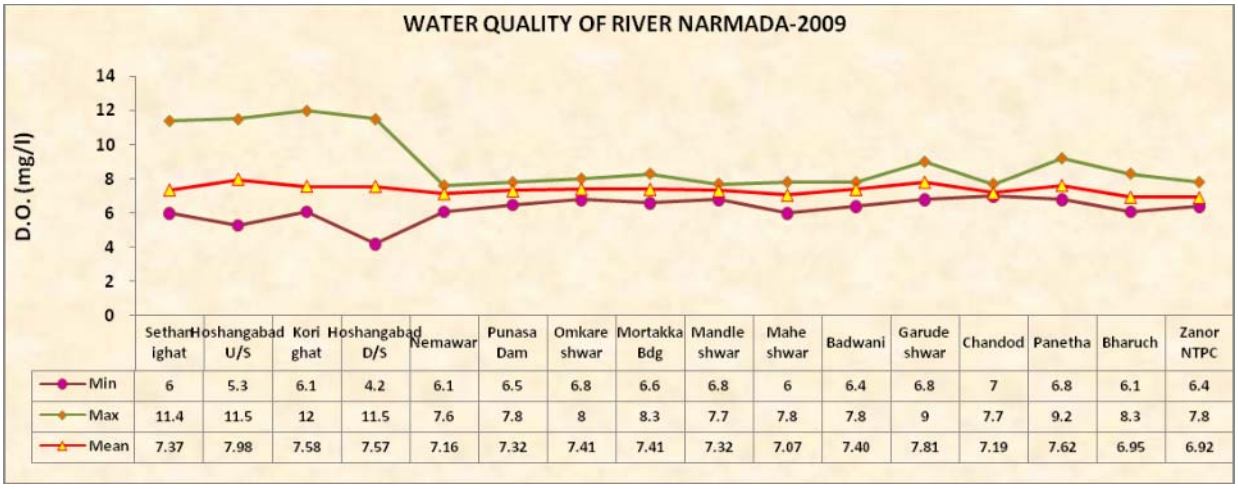
The water quality status of tributary streams Gour, Katni and Kunda is given in Annexure-I Table 10.1.The tributary streams Kunda, Gour and Katni are meeting the desired criteria in all respects.The water quality observation indicates that all the parameters are by and large meeting the water quality criteria at all locations.

The spatial trend of water quality of River Narmada with respect to BOD, DO, Total Coliform, Faecal Coliform and Conductivity is presented in figure 10.1.

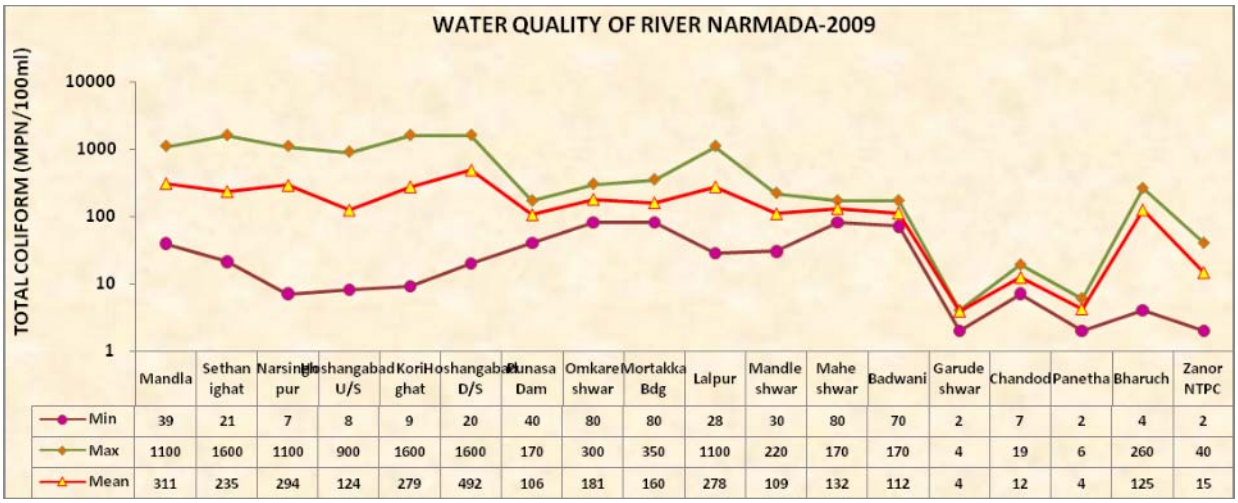
Figure 10.1: Spatial Trend of Water Quality of River Narmada



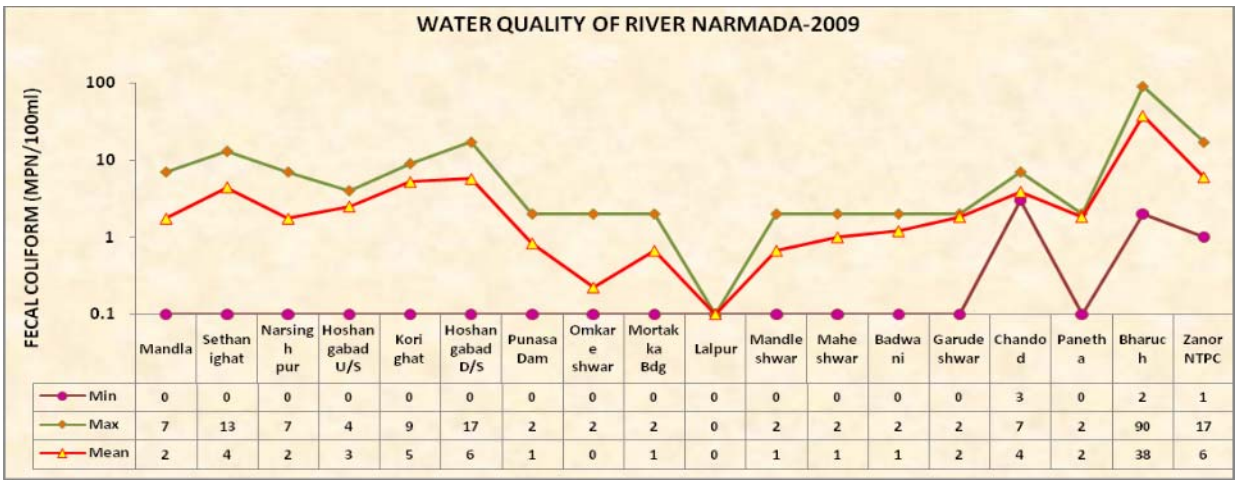
	Mandla	Sathan	ighat	Narsing pur	Hoshangabad U/S	Kori ghat	Hoshangabad D/S	Nemawar	Punasa Dam	Omkare shwar	Mortakka Bdg	Lalpur	Mandle shwar	Mahe shwar	Badwani	Garude shwar	Chandod	Panetha	Bharuch	Zanor NTPC
Min	0.9	1.5		1.2	1.1	1.7	2.1	1.1	0.6	0.8	0.6	0.6	0.6	1	0.7	0.5	0.2	0.5	0.7	0.5
Max	2.3	3.9		2.3	4.7	30	3.6	1.4	1.1	1.4	1.6	2.6	1.2	1.4	1.1	1.3	1.8	1.4	2.4	1.4
Mean	1.6	2.6		1.5	2.3	5.0	2.6	1.3	0.9	1.1	1.0	1.5	0.9	1.2	0.9	0.9	0.6	0.8	1.3	1.0



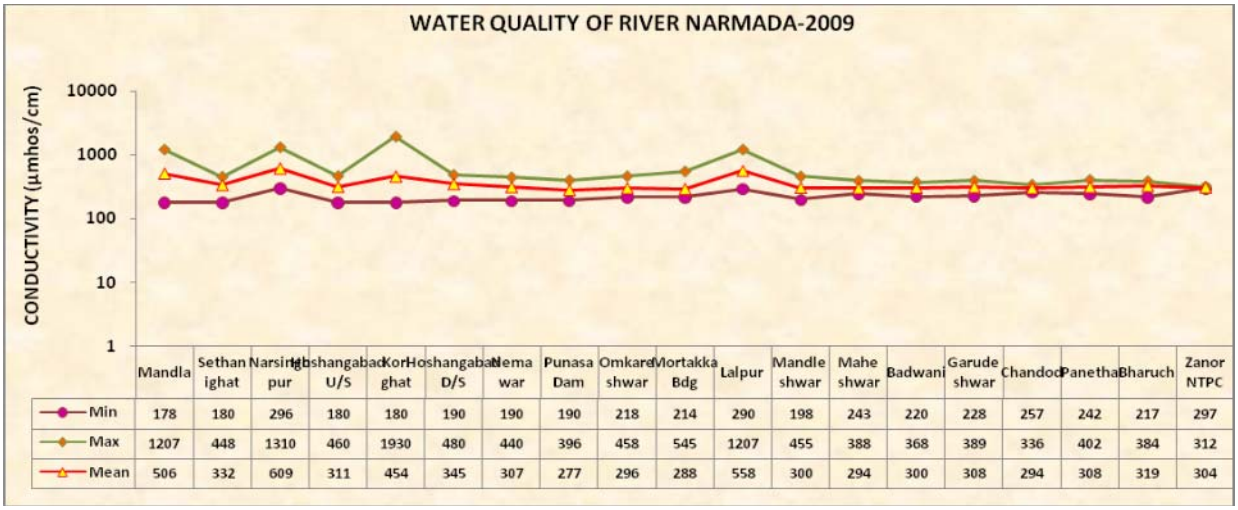
	Sethan ighat	Hoshangabad U/S	Kori ghat	Hoshangabad D/S	Nemawar	Punasa Dam	Omkare shwar	Mortakka Bdg	Mandle shwar	Mahe shwar	Badwani	Garude shwar	Chandod	Panetha	Bharuch	Zanor NTPC
Min	6	5.3	6.1	4.2	6.1	6.5	6.8	6.6	6.8	6	6.4	6.8	7	6.8	6.1	6.4
Max	11.4	11.5	12	11.5	7.6	7.8	8	8.3	7.7	7.8	7.8	9	7.7	9.2	8.3	7.8
Mean	7.37	7.98	7.58	7.57	7.16	7.32	7.41	7.41	7.32	7.07	7.40	7.81	7.19	7.62	6.95	6.92



	Mandla	Sethan ighat	Narsingh pur	Hoshangabad U/S	Kori ghat	Hoshangabad D/S	Punasa Dam	Omkare shwar	Mortakka Bdg	Lalpur	Mandle shwar	Mahe shwar	Badwani	Garude shwar	Chandod	Panetha	Bharuch	Zanor NTPC
Min	39	21	7	8	9	20	40	80	80	28	30	80	70	2	7	2	4	2
Max	1100	1600	1100	900	1600	1600	170	300	350	1100	220	170	170	4	19	6	260	40
Mean	311	235	294	124	279	492	106	181	160	278	109	132	112	4	12	4	125	15

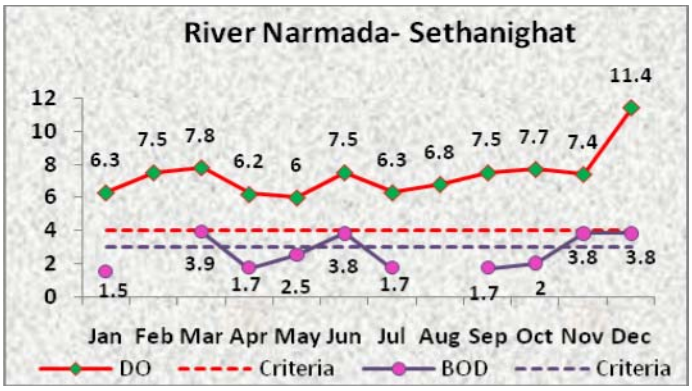


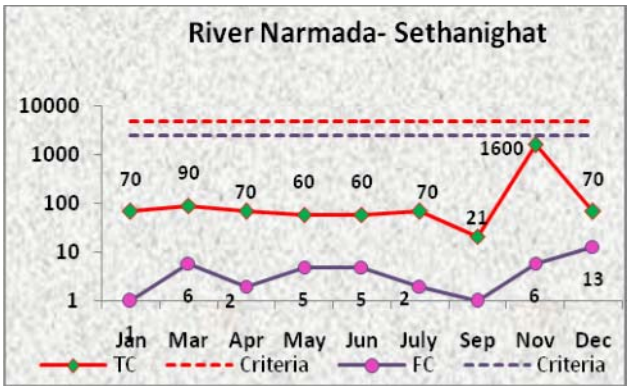
	Mandla	Sethan ighat	Narsingh pur	Hoshangabad U/S	Kori ghat	Hoshangabad D/S	Punasa Dam	Omkare shwar	Mortakka Bdg	Lalpur	Mandle shwar	Mahe shwar	Badwani	Garude shwar	Chandod	Panetha	Bharuch	Zanor NTPC
Min	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	2	1
Max	7	13	7	4	9	17	2	2	2	0	2	2	2	2	7	2	90	17
Mean	2	4	2	3	5	6	1	0	1	0	1	1	1	2	4	2	38	6

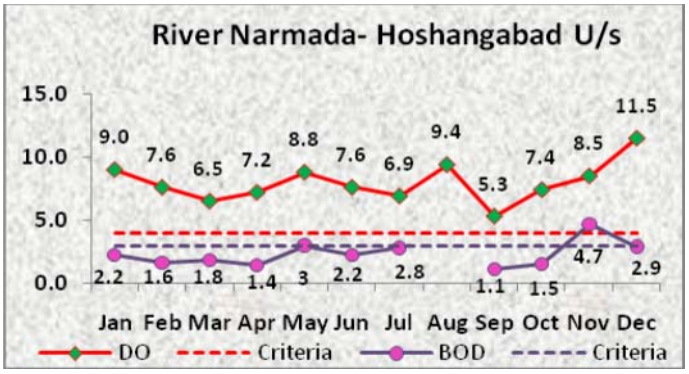


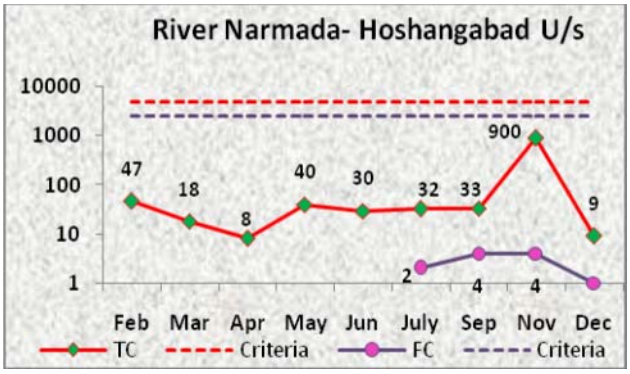
	Mandla	Sethanighat	Narsinghpur	Hoshangabad U/S	Korghat	Hoshangabad D/S	Nemawar	Punasa Dam	Omkareshwar	Mortakka Bdg	Lalpur	Mandleshwar	Maheshwar	Badwani	Garudeshwar	Chandod	Panetha	Bharuch	Zanor NTPC
Min	178	180	296	180	180	190	190	190	218	214	290	198	243	220	228	257	242	217	297
Max	1207	448	1310	460	1930	480	440	396	458	545	1207	455	388	368	389	336	402	384	312
Mean	506	332	609	311	454	345	307	277	296	288	558	300	294	300	308	294	308	319	304

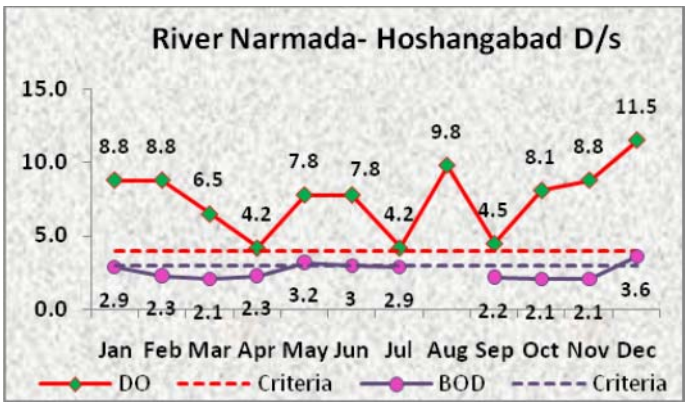
Figure 10.2: Temporal Trend of Water Quality of River Narmada







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0.0
8.8 8.8 6.5 4.2 7.8 7.8 4.2 9.8 4.5 8.1 8.8 11.5
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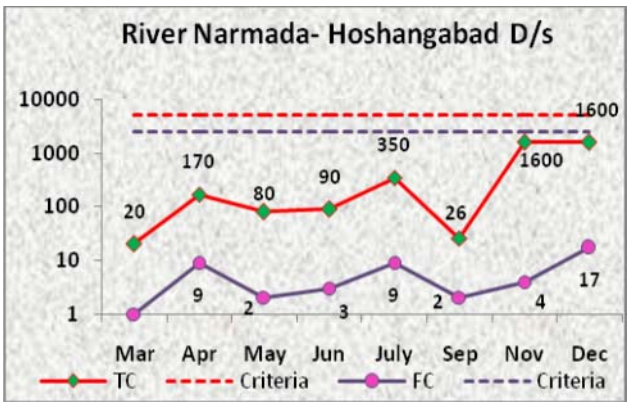
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
DO
Criteria
BOD
Criteria


River Narmada- Hoshangabad D/s
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100
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Mar Apr May Jun July Sep Nov Dec
TC
Criteria
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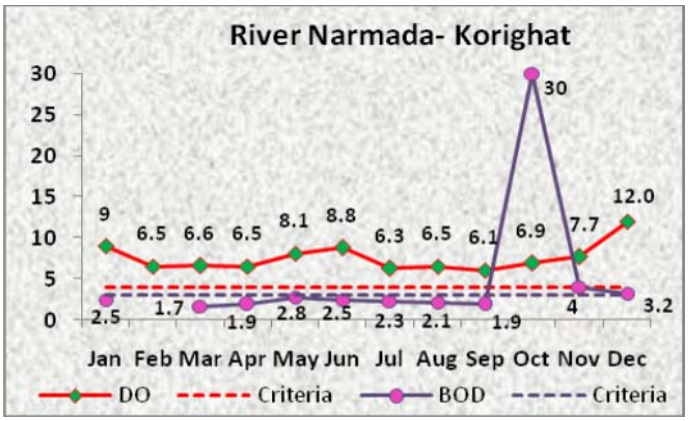
Criteria


River Narmada- Korighat
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25
20
15
10
5
0
9 6.5 6.6 6.5 8.1 8.8 6.3 6.5 6.1 6.9 7.7 12.0
2.5 1.7 1.9 2.8 2.5 2.3 2.1 1.9 30 4 3.2
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
DO
Criteria
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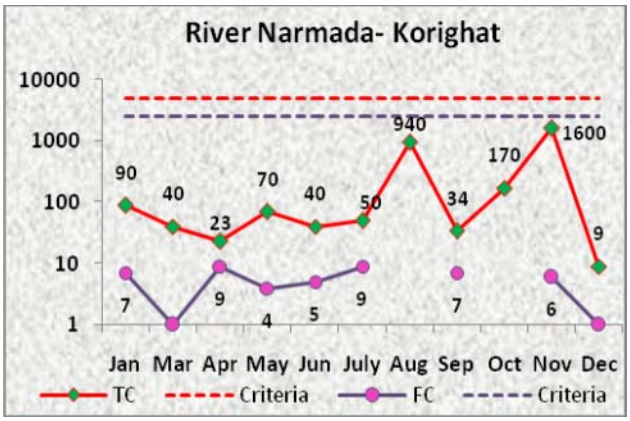
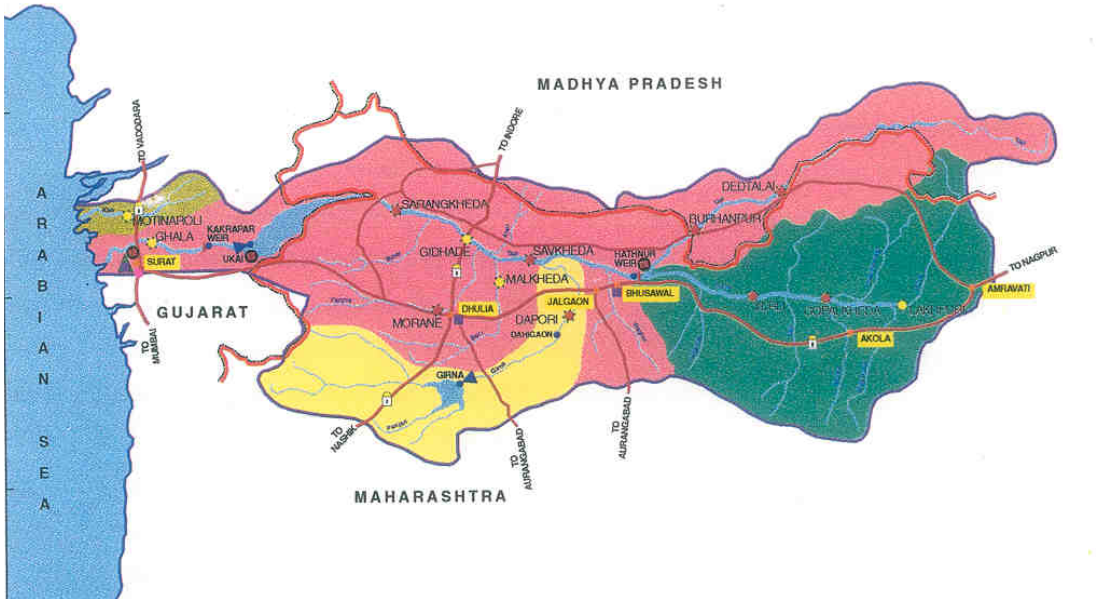

River Narmada- Korighat
10000
1000
100
10
1
90 40 23 70 40 50 940 34 170 1600 9
7 9 4 5 9 7 6
Jan Mar Apr May Jun July Aug Sep Oct Nov Dec
TC
Criteria
FC
Criteria

CHAPTER XI

Water Quality of Rivers in Tapi Basin

11.1 Tapi River System



The Tapi basin extends over an area of 65,145 sq km. Situated in the Deccan plateau, the basin covers large areas in the States of Madhya Pradesh, Maharashtra and Gujarat.

The Tapi basin is bounded on the north by the Satpura range, on the east by the Mahadeo hills, on the south by the Ajanta range and Satmala hills and on the west by the Arabian Sea. The total length of the river from the head to its outfall into the sea is 724 km of which 228 km is in Madhya Pradesh. 228 km in Maharashtra, 214 km in Gujarat and the remaining 54 km from the common boundary between Madhya Pradesh and Maharashtra.

The Tapi receives several tributaries on both its banks. The Bhokar, the Suki, the Mor, the Harki, the Guli, the Aner, the Arunavati, the Gomai, the Gomati and the Valer join it from the right and the Puma, the Bhogvati, the Vaghur, the Girna, the Bori, the Panjhra, the Amarvati, the Shiva, the Rengavati and the Nesu join from the left. The river basin is moderately rain fed and flows through intensively farmed black cotton-soil area.

The urban population has been observed to be higher in the tail reaches of the river compared to the Upper reaches of the basin, although the proportion of the geographical

areas covered to these two reaches are in reverse order. The most populous town in Tapi basin is Surat followed by Amravati and Dhule in Maharashtra.

Major part of the upper Tapi basin is predominantly agricultural but in the lower basin area industrialisation has fairly developed in M.P. the industries are centred only in one district-East Nimar (Khandwa) while in Maharashtra Jalgaon is the most industrialised area. Distillery units contribute the largest share in Maharashtra where as textile occupies the predominant activity in Gujarat followed by food & beverages and chemical industries.

The Tapi receives several tributaries on both its banks. The Bhokar, the Suki, the Mor, the Harki, the Guli, the Aner, the Arunavati, the Gomai, the Gomati and the Valer join it from the right and the Puma, the Bhogvati, the Vaghur, the Girna, the Bori, the Panjhra, the Amarvati, the Shiva, the Rengavati and the Nesu join from the left. The river basin is moderately rain fed and flows through intensively farmed black cotton-soil area.

The basin area of Tapi is covering the States of Madhya Pradesh, Gujarat and Maharashtra. The important urban centres in these States are Burhanpur and Sarni in Madhya Pradesh; Akola, Malegaon, Bhusawal, Jalgon, Amaravati, Dhule, AchalpurAkot Khamgaon Malkapur in Maharashtra; and Surat in Gujarat.

11.2 Water Quality Monitoring in Tapi Basin

The water quality monitoring of the River Tapi and tributary streams Girna, Rangavali, Kim, Denwa and Purna is being done in the basin by the State Pollution Control Boards of Gujarat, Madhya Pradesh and Maharashtra. The ranges of water quality observed in River Tapi and its tributary streams Girna, Rangavali, Kim, Denwa, Amravati, Bori, Burai, Gomai, Hiwara, Mor, Morna, Panzara, Pedhi, Titur, Waghur with respect to pH, Conductivity, DO, BOD, COD, Total Coliform and Faecal Coliform are presented as minimum, maximum and mean value to assess the extent of water quality variation throughout the year. The detail list of Water Quality Monitoring locations in Tapi Basin is given in the Table 11(a).

Table 11(a): Water Quality Monitoring locations in Tapi Basin

Name of Monitoring Station	Statename	Name of Water Body
Amravati River D/s of Dondaicha, Dhule	Maharashtra	Amravati (Tapi)
Bori River D/s of Amalner, Jalgaon	Maharashtra	Bori
Burai River Before Confluece To Tapi River, Mukudas, Dhule	Maharashtra	Burai
Denwa Near Sarni, Road Bridge	Madhya Pradesh	Denwa
Girna at Malegaon (Manmad)	Maharashtra	Girna
Girna at Jalgaon	Maharashtra	Girna
Gomai River D/s of Shahada, Dhule	Maharashtra	Gomai
Hiwara River D/s of Pachora, Jalgaon	Maharashtra	Hiwara
River Kim at Sahol Bridge, Olpad Hansot Road, Dist. Surat	Gujarat	Kim
Mor River Near Padalshe, Jalgaon	Maharashtra	Mor
Morna River at D/s Railway Bridge, Akola	Maharashtra	Morna
Panzara River Near Panzarakan Ssk Ltd, Panzara,Dhule	Maharashtra	Panzara
Pedhi Near Rd Bdg at Dadhi-Pedhi Village, Bhatkuli, Amravati	Maharashtra	Pedhi

Rangavali D/s of Navapur	Maharashtra	Rangavali
Tapi at Ukai, Sherula Bridge	Gujarat	Tapi
Tapi at Mandavi	Gujarat	Tapi
Tapi at Kathore, (Nh-8 Bridge)	Gujarat	Tapi
Tapi at Surat U/s Kathore	Gujarat	Tapi
Tapi at Rander Bridge, Surat	Gujarat	Tapi
River Tapi Near Bardoli (Kapp Bridge) Bardoli	Gujarat	Tapi
River Tapi at Ongc Bridge at Surat, Dist. Surat	Gujarat	Tapi
Tapi at Nepanagar M.P.	Madhya Pradesh	Tapi
Tapi at Burhanpur M.P.	Madhya Pradesh	Tapi
Tapi at Hathnur M.P.	Madhya Pradesh	Tapi
Tapi at Ajnand Village	Maharashtra	Tapi
Tapi at Bhusawal Us	Maharashtra	Tapi
Tapi at Uphad Village	Maharashtra	Tapi
Tapti at Nepa Nagar 100 Metre D/s After Mixing Pandhar Nalla	Madhya Pradesh	Tapti
Titur River D/s of Chalisgaon, Jalgaon	Maharashtra	Titur
Waghur at Sakegaon Before Confluence With Tapi River, Jalgaon	Maharashtra	Waghur

11.2.1 Water Quality of River Tapi & its tributaries Girna, Rangavali, Kim, Denwa and Purna

The ranges of water quality observed in River Tapi with respect to pH, Conductivity, DO, BOD, COD, Total Coliform and Faecal Coliform is given in Annexure-I Table 11.1. The summary of water quality of river Tapi with respect to pH, Conductivity, Dissolved Oxygen (DO), Bio chemical Oxygen Demand (BOD), Total coliform (TC) and Faecal coliform (FC) is given below.

pH:-

- The criteria for pH is 6.5 to 8.5.
- pH is observed in the range of 6.2-8.9 and is not meeting the criteria.
- pH is not meeting the criteria at Ajnand Village, Ukai Sherula Bridge & ONGC Bridge, Surat (8.9), Mandavi, Kathore NH-8 Bridge , Surat U/s Kathore, Rander Bridge and Near Bardoli (Kapp Bridge) Bardoli (8.8).

Conductivity: -

- The criteria of Conductivity for irrigation is 2250 µmhos/cm
- Conductivity lies in the range of 173-45400 µmhos/cm and is not meeting the criteria.
- Conductivity is not meeting the criteria at ONGC Bridge, Surat (45400 µmhos/cm) due to estuarine region.

Dissolved Oxygen: -

- The criteria for DO should be more than 4 mg/l.
- DO lies in the range of 3.7-8.2 mg/l and is not meeting the criteria at ONGC Bridge, Surat (3.7 mg/l).

Bio chemical Oxygen Demand: -

- The criteria for BOD should be less than 3 mg/l.
- BOD was observed in the range of 0.6-12 mg/l.
- BOD was observed maximum at Ajnand Village & Uphad village (12 mg/l), Bhusawal U/s (11 mg/l) in Maharashtra.

- Ukai Sherula Bridge (6.5 mg/l), ONGC Bridge, Surat (4.5 mg/l), Rander Bridge (4.3 mg/l), Surat U/s Kathore & Mandavi (3.7 mg/l) and Kathore NH-8 Bridge (7.0 mg/l) in Gujarat.

Faecal Coliform:-

- Faecal Coliform should be less than 2500 MPN/100ml.
- Faecal Coliform ranges from Nil–14000 MPN/100ml and is not meeting the criteria at
  - Mandavi (4300 MPN/100ml)
  - Kathore NH-8 Bridge (9300 MPN/100ml)
  - Surat U/s Kathore & Rander Bridge (9000 MPN/100ml)
  - ONGC Bridge, Surat (14000 MPN/100ml).

Total Coliform:-

- Total Coliform should be less than 5000 MPN/100ml.
- Total Coliform count ranges from 14-39000 MPN/100ml and is not meeting the criteria at
  - Ukai Sherula Bridge (7500 MPN/100ml)
  - Mandavi (9300 MPN/100ml)
  - Kathore NH-8 Bridge (21000 MPN/100ml)
  - Surat U/s Kathore (23000 MPN/100ml)
  - Rander Bridge (20000 MPN/100ml)
  - ONGC Bridge, Surat (39000 MPN/100ml)

Girna is a river in Maharashtra state of southern India. It originates in the Western Ghats range of Nashik District, and flows east across Nashik and Jalgaon districts, swinging north in Jalgaon District to join the Tapti river.The basin of the Girna lies on the Deccan Plateau, and its valley has fertile soils which are intensively farmed. The ranges of water quality observed in tributary stream Girna with respect to pH, Conductivity, DO, BOD, COD, Total Coliform and Faecal Coliform is given in Annexure-I Table 11.1. The summary of water quality of river Girna with respect to pH, Conductivity, Dissolved Oxygen (DO), Bio chemical Oxygen Demand (BOD), Total coliform (TC) and Faecal coliform (FC) is given below.

pH:-

- The criteria for pH is 6.5 to 8.5.
- pH is observed in the range of 8.1-8.9 and is not meeting the criteria at Malegaon (Manmad) (8.8 mg/l) and Jalgaon (8.9 mg/l).

Conductivity: -

- The criteria of Conductivity for irrigation is 2250 µmhos/cm
- Conductivity lies in the range of 169-312 µmhos/cm and is meeting the criteria.

Dissolved Oxygen:-

- The criteria for DO should be more than 4 mg/l.
- DO lies in the range of 5.4-6.4 mg/l and is meeting the criteria.

Bio chemical Oxygen Demand: -

- The criteria for BOD should be less than 3 mg/l.
- BOD is observed in the range of 4.0-9.0 mg/l.
- BOD is observed maximum at Malegaon (Manmad) (8.0 mg/l) and Jalgaon (9.0 mg/l).

Faecal Coliform:-

- Faecal Coliform should be less than 2500 MPN/100ml.
- Faecal Coliform ranges from 5-14 MPN/100ml and is meeting the criteria.

Total Coliform:-

- Total Coliform should be less than 5000 MPN/100ml.
- Total Coliform count ranges from 14-30 MPN/100ml and is meeting the criteria.

The ranges of water quality observed in tributary stream Rangavali with respect to pH, Conductivity, DO, BOD, COD, Total Coliform and Faecal Coliform is given in Annexure-I Table 11.1. The summary of water quality of river Rangavali with respect to pH, Conductivity, Dissolved Oxygen (DO), Bio chemical Oxygen Demand (BOD), Total coliform (TC) and Faecal coliform (FC) is given below.

pH:-

- The criteria for pH is 6.5 to 8.5.
- pH is observed in the range of 8.1-8.5 and is meeting the criteria.

Conductivity: -

- The criteria of Conductivity for irrigation is 2250 µmhos/cm
- Conductivity lies in the range of 173-465 µmhos/cm and is meeting the criteria.

Dissolved Oxygen:-

- The criteria for DO should be more than 4 mg/l.
- DO lies in the range of 4.9-5.4 mg/l and is meeting the criteria.

Bio chemical Oxygen Demand: -

- The criteria for BOD should be less than 3 mg/l.
- BOD is observed in the range of 8-12 mg/l and is not meeting the criteria.
- BOD is observed maximum at D/s of Navapur (12 mg/l).

Faecal Coliform:-

- Faecal Coliform should be less than 2500 MPN/100ml.
- Faecal Coliform ranges from 4-12 MPN/100ml and is meeting the criteria.

Total Coliform:-

- Total Coliform should be less than 5000 MPN/100ml.
- Total Coliform count ranges from 20-25 MPN/100ml and is meeting the criteria.

The ranges of water quality observed in tributary stream Kim with respect to pH, Conductivity, DO, BOD, COD, Total Coliform and Faecal Coliform is given in Annexure-

I Table 11.1. The summary of water quality of river Kim with respect to pH, Conductivity, Dissolved Oxygen (DO), Bio chemical Oxygen Demand (BOD), Total coliform (TC) and Faecal coliform (FC) is given below.

pH:-

- The criteria for pH is 6.5 to 8.5.
- pH is observed in the range of 7.3-8.8 and is not meeting the criteria.

Conductivity: -

- The criteria of Conductivity for irrigation is 2250 µmhos/cm
- Conductivity lies in the range of 378-1120 µmhos/cm and is meeting the criteria.

Dissolved Oxygen:-

- The criteria for DO should be more than 4 mg/l.
- DO lies in the range of 5.1-7.0 mg/l and is meeting the criteria.

Bio chemical Oxygen Demand: -

- The criteria for BOD should be less than 3 mg/l.
- BOD is observed in the range of 1.1-3.7 mg/l and is not meeting the criteria.

Faecal Coliform:-

- Faecal Coliform should be less than 2500 MPN/100ml.
- Faecal Coliform ranges from 900-4300 MPN/100ml and is not meeting the criteria.

Total Coliform:-

- Total Coliform should be less than 5000 MPN/100ml.
- Total Coliform count ranges from 2100-9300 MPN/100ml and is not meeting the criteria.

The ranges of water quality observed in tributary stream Denwa with respect to pH, Conductivity, DO, BOD, COD, Total Coliform and Faecal Coliform is given in Annexure-I Table 11.1. The summary of water quality of tributary stream Denwa with respect to pH, Conductivity, Dissolved Oxygen (DO), Bio chemical Oxygen Demand (BOD), Total coliform (TC) and Faecal coliform (FC) is given below.

pH:-

- The criteria for pH is 6.5 to 8.5.
- pH is observed in the range of 7.0 -8.3 and is meeting the criteria.

Conductivity: -

- The criteria of Conductivity for irrigation is 2250 µmhos/cm
- Conductivity lies in the range of 187-1920 µmhos/cm and is meeting the criteria.

Dissolved Oxygen:-

- The criteria for DO should be more than 4 mg/l.
- DO lies in the range of 6.0-10.3 mg/l and is meeting the criteria.

Bio chemical Oxygen Demand: -

- The criteria for BOD should be less than 3 mg/l.
- BOD is observed in the range of 6-25 mg/l and is not meeting the criteria.

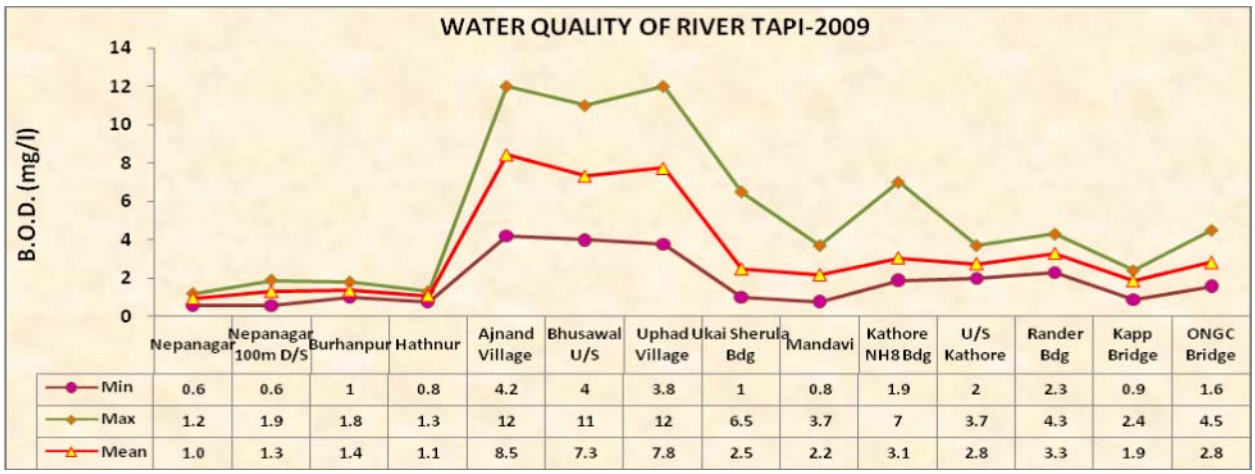
Faecal Coliform:-

- Faecal Coliform should be less than 2500 MPN/100ml.
- Faecal Coliform ranges from 2-11 MPN/100ml and is meeting the criteria.

Total Coliform:-

- Total Coliform should be less than 5000 MPN/100ml.
- Total Coliform count ranges from 9-1600 MPN/100ml and is meeting the criteria.

Figure 11.1: Spatial Trend of Water Quality of River Tapi



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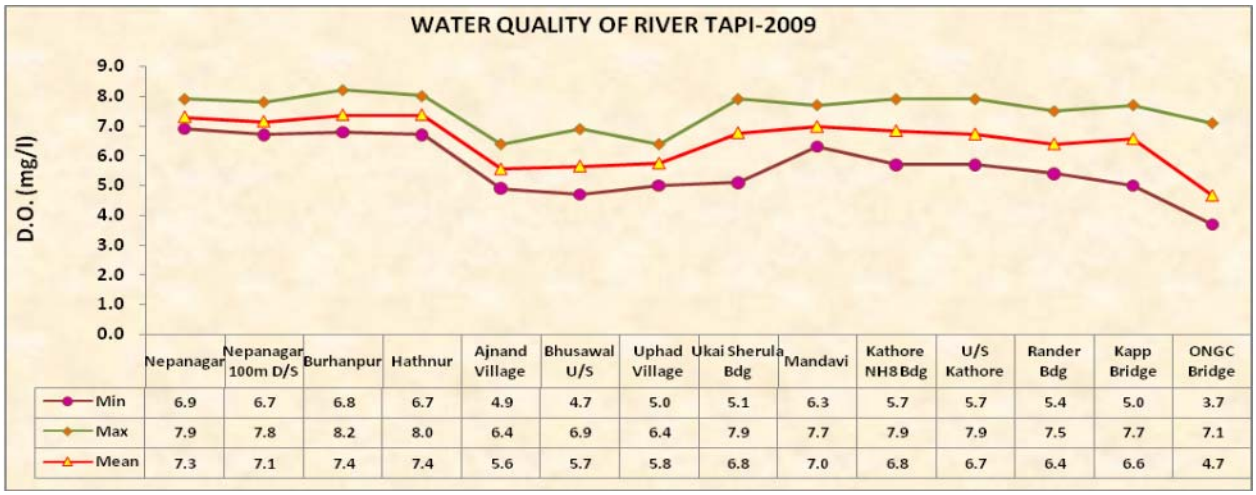
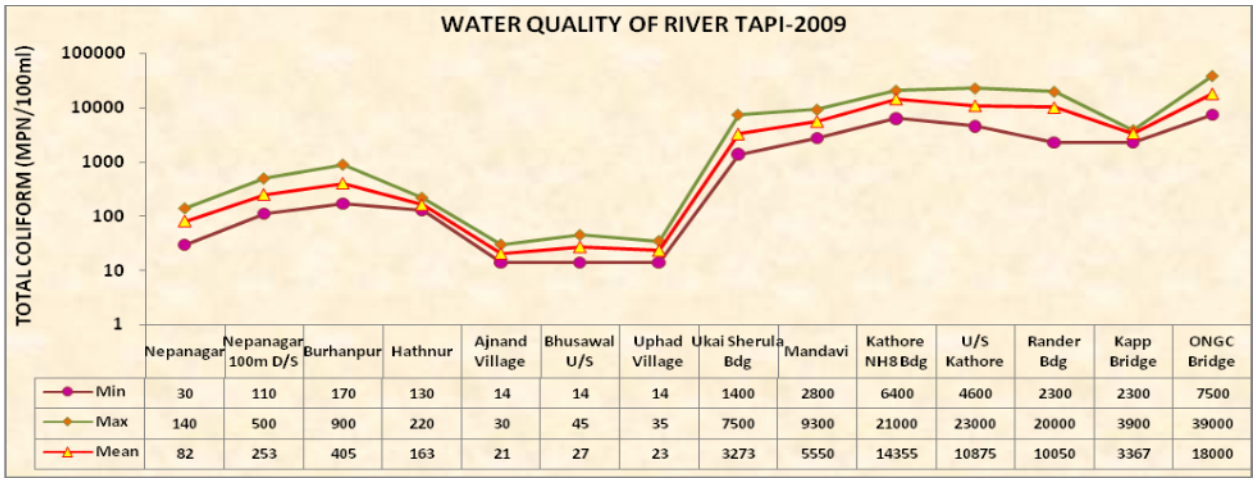
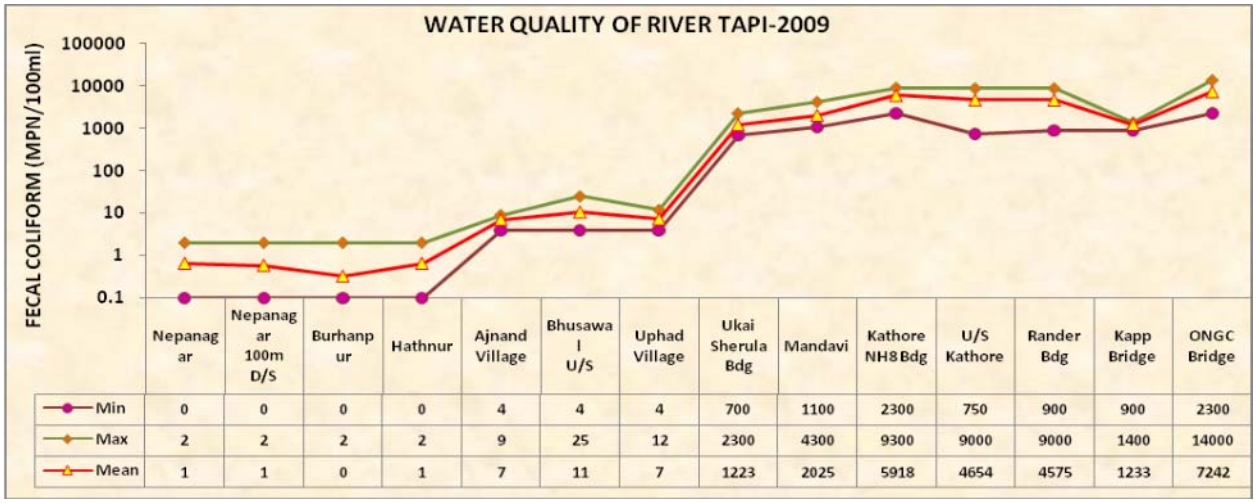
Min	0.6	0.6	1	0.8	4.2	4	3.8	1	0.8	1.9	2	2.3	0.9	1.6
Max	1.2	1.9	1.8	1.3	12	11	12	6.5	3.7	7	3.7	4.3	2.4	4.5
Mean	1.0	1.3	1.4	1.1	8.5	7.3	7.8	2.5	2.2	3.1	2.8	3.3	1.9	2.8



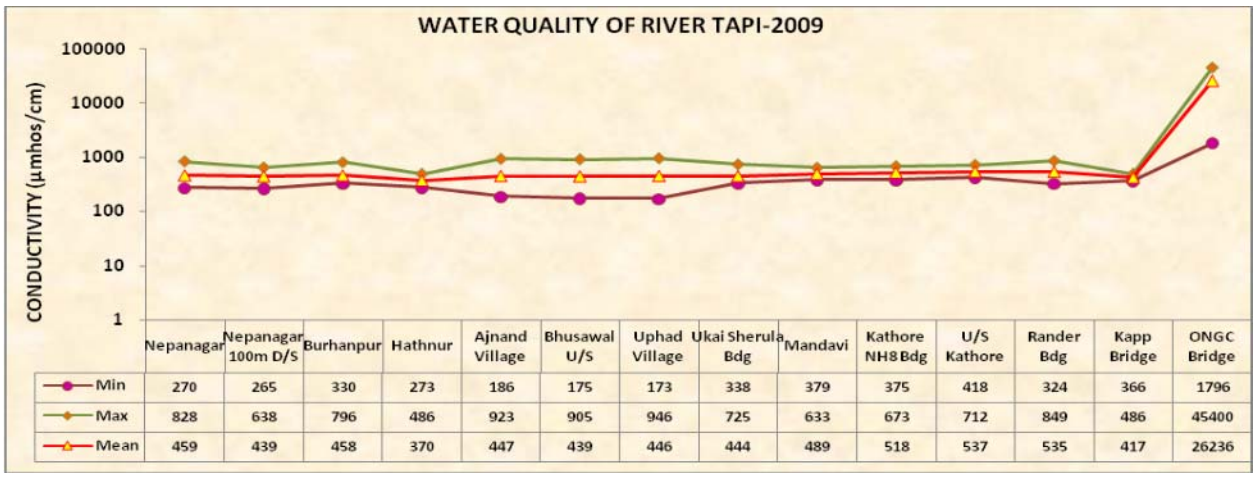
	Nepanagar	Nepanagar 100m D/S	Burhanpur	Hathnur	Ajnand Village	Bhusawal U/S	Uphad Village	Ukai Sherula Bdg	Mandavi	Kathore NH8 Bdg	U/S Kathore	Rander Bdg	Kapp Bridge	ONGC Bridge
Min	6.9	6.7	6.8	6.7	4.9	4.7	5.0	5.1	6.3	5.7	5.7	5.4	5.0	3.7
Max	7.9	7.8	8.2	8.0	6.4	6.9	6.4	7.9	7.7	7.9	7.9	7.5	7.7	7.1
Mean	7.3	7.1	7.4	7.4	5.6	5.7	5.8	6.8	7.0	6.8	6.7	6.4	6.6	4.7



	Nepanagar	Nepanagar 100m D/S	Burhanpur	Hathnur	Ajnand Village	Bhusawal U/S	Uphad Village	Ukai Sherula Bdg	Mandavi	Kathore NH8 Bdg	U/S Kathore	Rander Bdg	Kapp Bridge	ONGC Bridge
Min	30	110	170	130	14	14	14	1400	2800	6400	4600	2300	2300	7500
Max	140	500	900	220	30	45	35	7500	9300	21000	23000	20000	3900	39000
Mean	82	253	405	163	21	27	23	3273	5550	14355	10875	10050	3367	18000

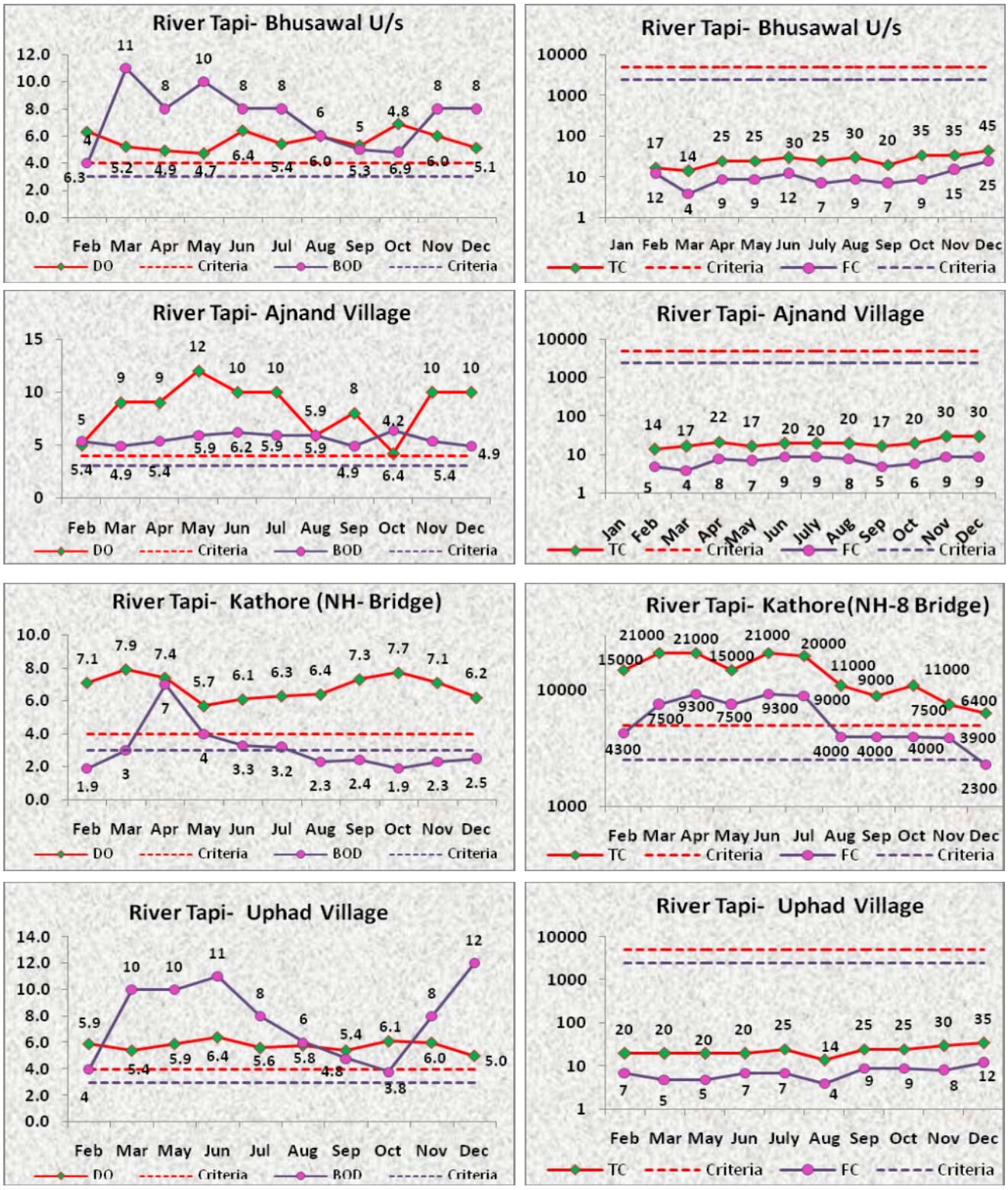


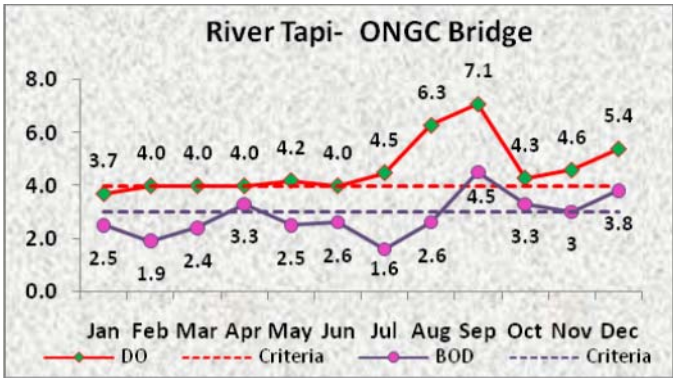
	Nepanagar	Nepanagar 100m D/S	Burhanpur	Hathnur	Ajnand Village	Bhusawal U/S	Uphad Village	Ukai Sherula Bdg	Mandavi	Kathore NH8 Bdg	U/S Kathore	Rander Bdg	Kapp Bridge	ONGC Bridge
Min	0	0	0	0	4	4	4	700	1100	2300	750	900	900	2300
Max	2	2	2	2	9	25	12	2300	4300	9300	9000	9000	1400	14000
Mean	1	1	0	1	7	11	7	1223	2025	5918	4654	4575	1233	7242



	Nepanagar	Nepanagar 100m D/S	Burhanpur	Hathnur	Ajnand Village	Bhusawal U/S	Uphad Village	Ukai Sherula Bdg	Mandavi	Kathore NH8 Bdg	U/S Kathore	Rander Bdg	Kapp Bridge	ONGC Bridge
Min	270	265	330	273	186	175	173	338	379	375	418	324	366	1796
Max	828	638	796	486	923	905	946	725	633	673	712	849	486	45400
Mean	459	439	458	370	447	439	446	444	489	518	537	535	417	26236

Figure 11.2: Temporal Trend of Water Quality of River Tapi




River Tapi- ONGC Bridge
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6.0
4.0
2.0
0.0
3.7 4.0 4.0 4.0 4.2 4.0 4.5 6.3 7.1 4.3 4.6 5.4
2.5 1.9 2.4 3.3 2.5 2.6 1.6 2.6 4.5 3.3 3 3.8
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
DO
Criteria
BOD
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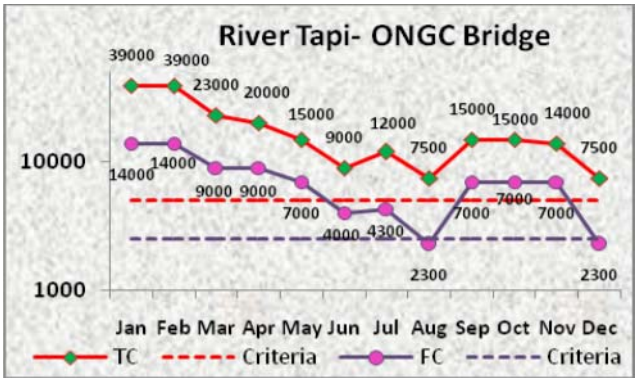
River Tapi- ONGC Bridge
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1000
39000 39000 23000 20000 15000 9000 12000 7500 15000 15000 14000 7500
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Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
TC
Criteria
FC
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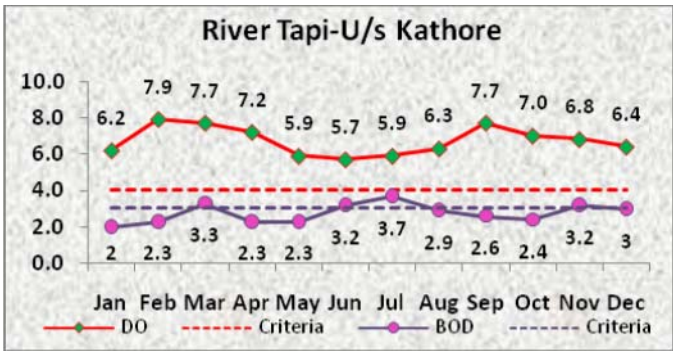
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4.0
2.0
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6.2 7.9 7.7 7.2 5.9 5.7 5.9 6.3 7.7 7.0 6.8 6.4
2 2.3 3.3 2.3 2.3 3.2 3.7 2.9 2.6 2.4 3.2 3
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
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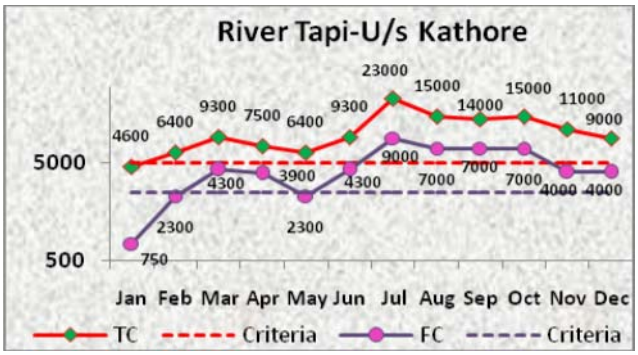
River Tapi-U/s Kathore
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500
4600 6400 9300 7500 6400 9300 23000 15000 14000 15000 11000 9000
750 2300 4300 3900 2300 4300 9000 7000 7000 7000 4000 4000
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
TC
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FC
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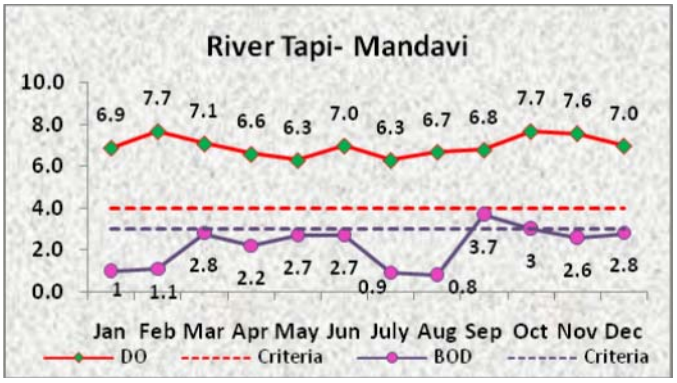
River Tapi- Mandavi
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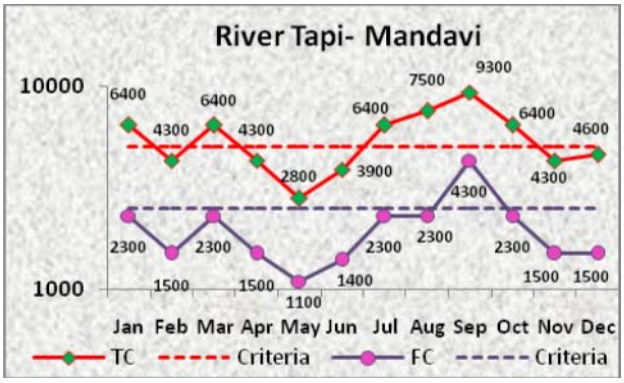
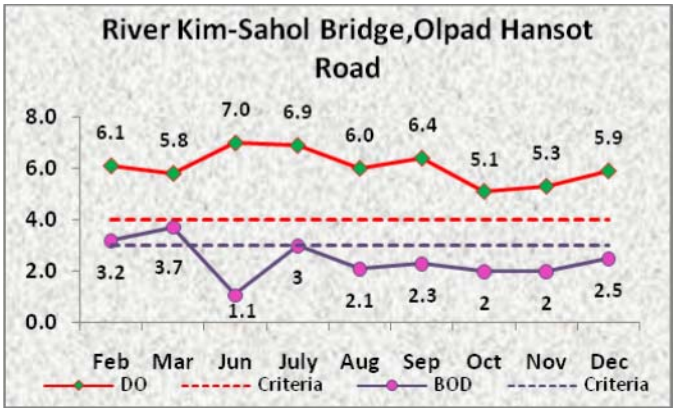
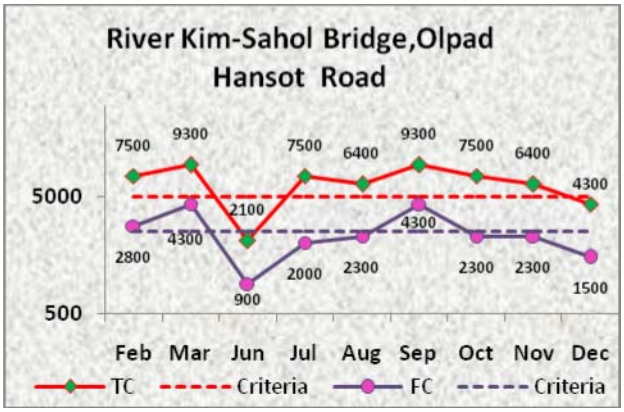
6.0
4.0
2.0
0.0
6.9 7.7 7.1 6.6 6.3 7.0 6.3 6.7 6.8 7.7 7.6 7.0
1 1.1 2.8 2.2 2.7 2.7 0.9 0.8 3.7 3 2.6 2.8
Jan Feb Mar Apr May Jun July Aug Sep Oct Nov Dec
DO
Criteria
BOD
Criteria


River Tapi- Mandavi
10000
1000
6400 4300 6400 4300 2800 3900 6400 7500 9300 6400 4300 4600
2300 1500 2300 1500 1100 1400 2300 2300 4300 2300 1500 1500
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
TC
Criteria
FC
Criteria


River Kim-Sahol Bridge,Olpad Hansot Road
8.0
6.0
4.0
2.0
0.0
6.1 5.8 7.0 6.9 6.0 6.4 5.1 5.3 5.9
3.2 3.7 1.1 3 2.1 2.3 2 2 2.5
Feb Mar Jun July Aug Sep Oct Nov Dec
DO
Criteria
BOD
Criteria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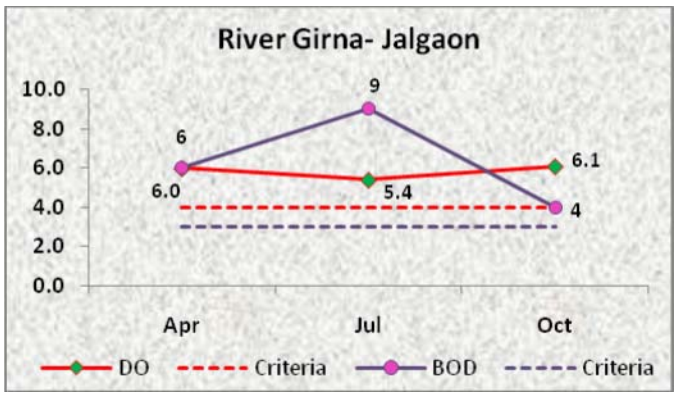
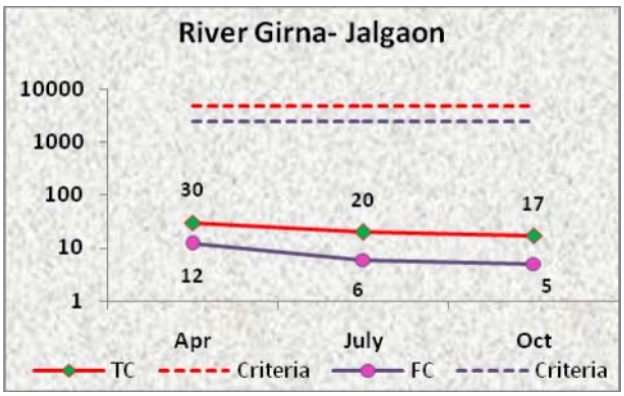
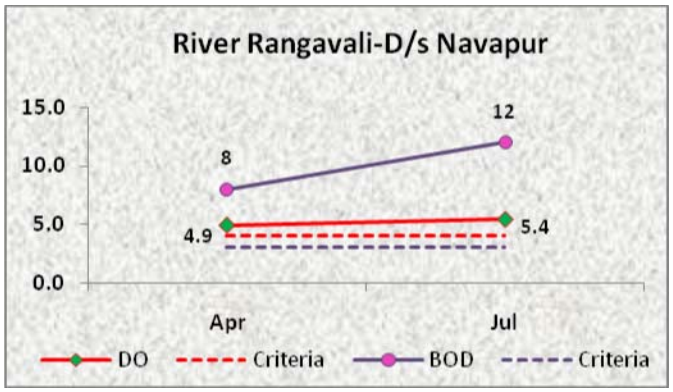
500
7500 9300 7500 6400 9300 7500 6400 4300
2800 4300 2100 900 2000 2300 4300 2300 2300 1500
Feb Mar Jun Jul Aug Sep Oct Nov Dec
TC
Criteria
FC
Criteria


River Girna- Jalgaon
10.0
8.0
6.0
4.0
2.0
0.0
6
9
6.0
5.4
6.1
4
Apr
Jul
Oct
DO
Criteria
BOD
Criteria


River Girna- Jalgaon
10000
1000
100
10
1
30
20
17
12
6
5
Apr
July
Oct
TC
Criteria
FC
Criteria


River Rangavali-D/s Navapur
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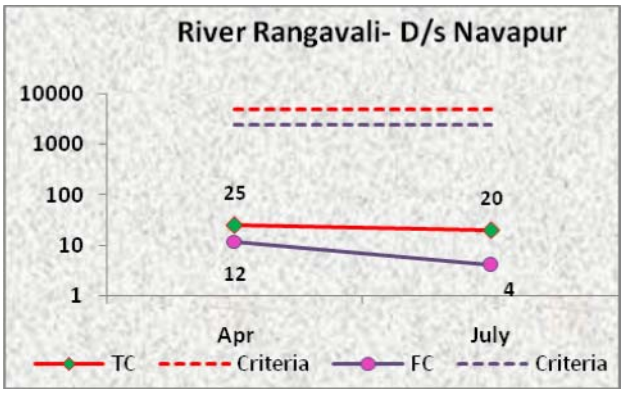
10.0
5.0
0.0
8
12
4.9
5.4
Apr
Jul
DO
Criteria
BOD
Criteria


River Rangavali- D/s Navapur
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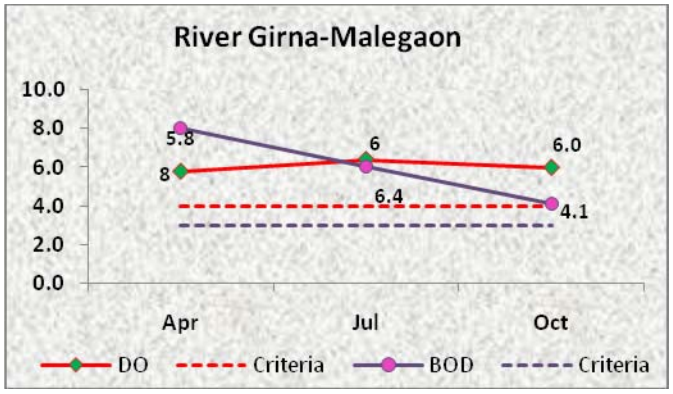
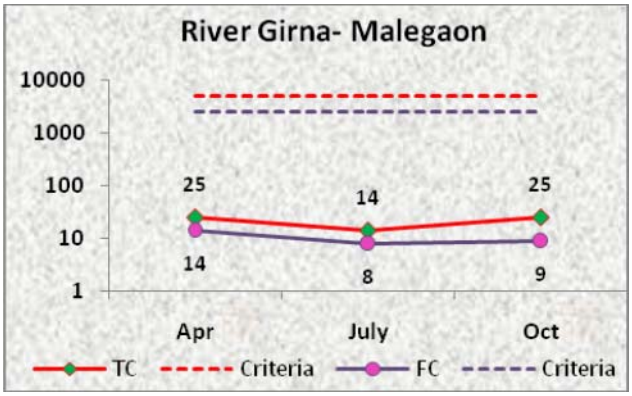
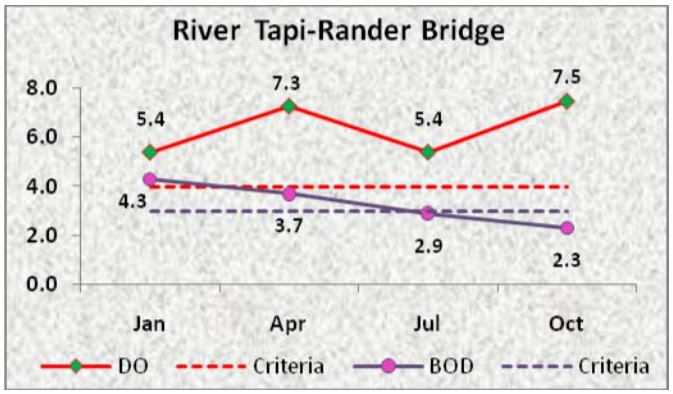
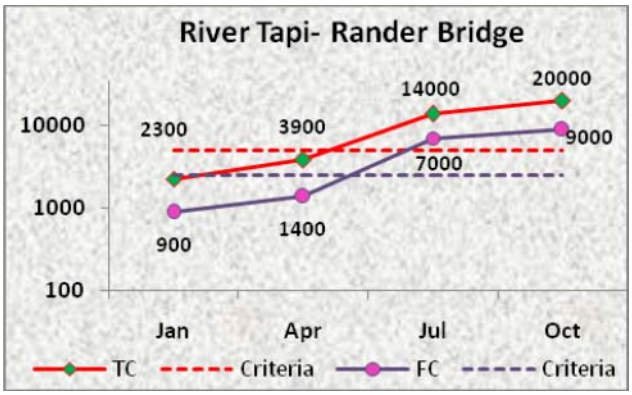
100
10
1
25
20
12
4
Apr
July
TC
Criteria
FC
Criteria


River Girna-Malegaon
10.0
8.0
6.0
4.0
2.0
0.0
5.8
6
6.0
8
6.4
4.1
Apr
Jul
Oct
DO
Criteria
BOD
Criteria


River Girna- Malegaon
10000
1000
100
10
1
25
14
25
14
8
9
Apr
July
Oct
TC
Criteria
FC
Criteria

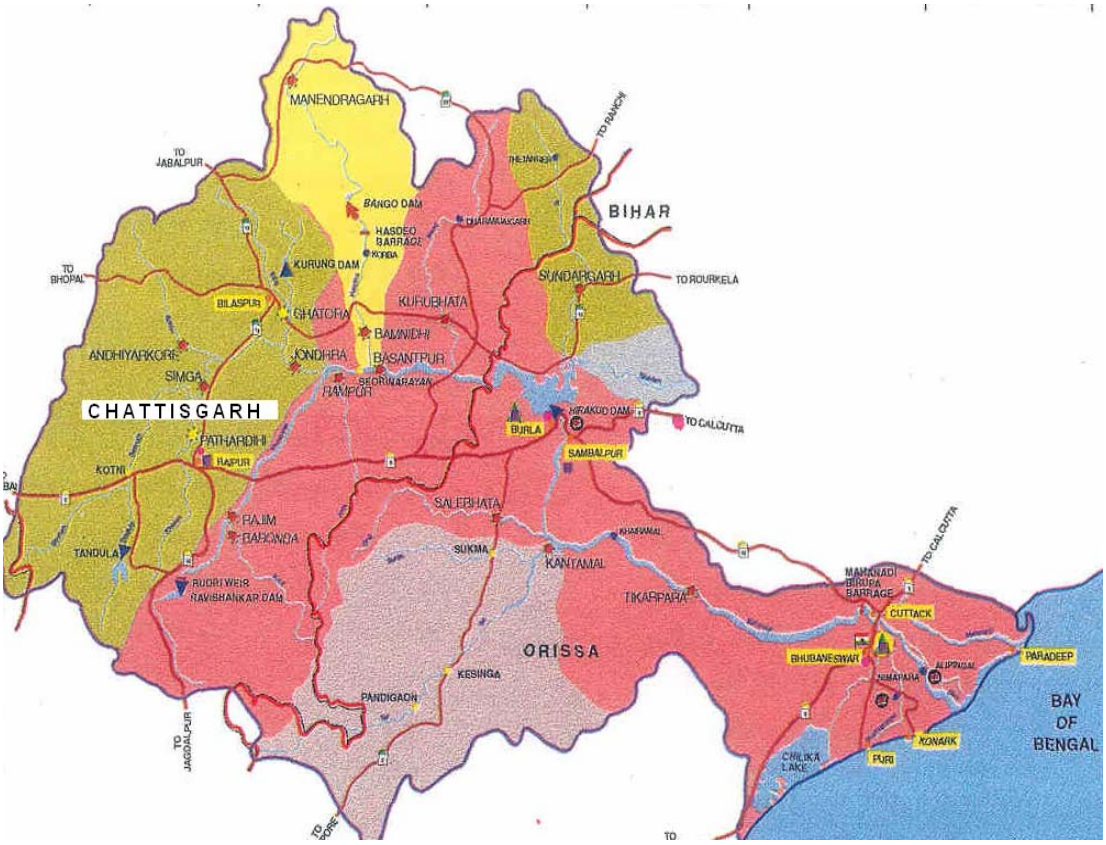

River Tapi-Rander Bridge
8.0
6.0
4.0
2.0
0.0
5.4
7.3
5.4
7.5
4.3
3.7
2.9
2.3
Jan
Apr
Jul
Oct
DO
Criteria
BOD
Criteria


River Tapi- Rander Bridge
10000
1000
100
2300
3900
14000
20000
9000
7000
900
1400
Jan
Apr
Jul
Oct
TC
Criteria
FC
Criteria

CHAPTER XII

Water Quality of Rivers in Mahanadi Basin

12.1 Mahanadi River System



The Mahanadi basin extends over an area of 141 thousands sq km. lying in the north east of the Deccan plateau, the basin covers large areas in the States of Chattisgarh and Orissa, and only small areas in Bihar and Maharashtra. The upper basin is a saucer-shaped depression known as the Chhatisgarh. The Mahanadi rises in a pool, 6 km from Pharsiya village near Nagri town in Raipur district of Chattisgarh, and falls into the Bay of Bengal, near False point about 16 km below the confluence of the Chitarala and the Mahanadi.The total length of the river from the head to its outfall into the sea is 851 km of which 357 km are in Chattisgarh and the balance of 494 km are in Orissa. The Seonath, the Jonk, the Hasdeo, the Mand, the Ib, the Ong and the Tel are the principal tributaries of the Mahanadi river.

The water quality study reveals that the water of Mahanadi is comparatively less polluted compared to the other similar rivers in the country. However, certain stretches like the D/s portion of river Ib at Brajrajnagar, D/s of Sambalpur and Cuttack have comparatively higher degree of pollution. The pollution of Ib river is easily attributable to the discharges from a large paper industry situated in Brajrajnagar. In the majority of the other locations the BOD and the total coliform are the two parameters that are mainly responsible for lowering the water quality. While at places like Tikarapara this could be due to run-off from the areas adjoining the riverbanks that are generally used by the village people for defection. At the urban centres, the high BOD and coliform levels are obviously due to the discharges into the river from domestic sources either directly or indirectly. None of the towns small or large, on the banks of Mahanadi have any regular sewerage system or sewage treatment plants and the domestic wastes find their way mostly through small nullah or storm water drains which join the D/s of the Ib river at Brajrajnagar causing serious depletion of oxygen level along the whole stretch which cause serious threat to the aquatic lives.

Korba has been identified as a critically polluted area in this river basin. The industrial as well as domestic wastewaters are being discharged into the River Hasdeo directly as well as through river Ahiran and Dengur Nala. The major source of pollution in the river is due to Thermal Power Plants, Bharat Aluminium Company, Captive power plant of BALCO, IBP (explosive unit) and coal mining operations. The action plan formulated suggests that the capacity of ash ponds of thermal ponds of BALCO have to be augmented.

The river has often been referred to as the 'Sorrow of Orissa'. The inhabited inner basin Chattisgarh plain suffered frequent droughts whereas the fertile deltaic area has been wrecked by repeated floods.

The basin area of the Mahanadi has a large number of industrial complexes in the Orissa portion of the basin the major industries are paper. textiles and thermal power plants at Choudwar, fertiliser and breweries at Paradeep, Sugar industries of Nayagarh, Badamba, Cement industry at Bargarh, paper industry of Brajrajnagar, coal mining areas of Rampur and lb valley, and an aluminium smelter at Hirakud.

Most of these industries are located on the banks of the river Mahanadi or its tributaries and distributaries, which are used to carry the industrial effluents and wastewater from these industries. From the point of view of significant environmental impacts, the important medium scale industries are the chemical, textile, paper, cement, and leather tanning which consume large quantities of water.

Iron and steel industry at Bhilai, cement industries at Durg and Raipur, textile industry of Rajnandagaon, aluminium and thermal power plants at Korba are the major polluting industries in the State of M.P that falls in the river basin. All these major units are located on the riverbanks of Seonath, Kharoon and Hasdeo. The medium scale industries include

chemical and distilleries of Durg, cement industries of Raipur, Iron and steel of Urla, paper industries of Bilaspur and many other agro based industries.

All the industries are discharging their wastewater either directly or indirectly to river Mahanadi as well as its tributaries. The vast mineral and human resources of the basin besides power generation infrastructure has resulted in a growth of a large variety of industries. The industries using the river bodies as the ultimate sink need to establish effluent treatment plants so that the designated best use of the river is sustained.

The basin area of Mahanadi is covering the States of Chhattisgarh, Madhya Pradesh, Orissa and Jharkhand. The important urban centres in these States are Rajnandgaon, Korba, Bilaspur, Durg, Raipur, Dhamtari, Raigarh, Rajharajharandalli in Madhya Pradesh & Chhattisgarh. And Cuttack, Puri, Sambalpur, Jatani, Balangir, Bargarh, Bhawanipatna, Brajarajnagar and Jharsuguda in Orissa.

12.2 Water Quality Monitoring in Mahanadi Basin

The State Pollution Control Boards of Chhatissgarh and Orissa at 48 locations are doing the water quality monitoring of the River Mahanadi and its several tributaries in the basin. The ranges of water quality observed in River Mahanadi and Tributary streams Seonath, Kharoon, Hasdeo, Ib, Kuakhai, Kathajodi, Birupa, Arpa, Bheden, Daya, Tel, Serua and Kelo with respect to pH, Conductivity, DO, BOD, COD, Total Coliform and Faecal Coliform are presented as minimum, maximum and mean value to assess the extent of water quality variation throughout the year. The detail list of Water Quality Monitoring locations in Mahanadi Basin is given in the Table 12(a).

Table12(a): Water Quality Monitoring locations in Mahanadi Basin

Name of Monitoring Station	Statename	Name of Water Body
Arpa River D/s of Bilaspur	Chhattisgarh	Arpa
Birupa at Choudwar	Orissa	Birupa
Bhubaneswar Fd/S (2 Km A/C of Gangua Nallah With River Daya)	Orissa	Daya
Hasdeo at U/s Korba	Chhattisgarh	Hasdeo
Hasdeo at U/s of Champa	Chhattisgarh	Hasdeo
Ib at Sundargarh	Orissa	Ib
Ib at Jharsuguda (Intake)	Orissa	Ib
Ib at Raj Nagar U/s	Orissa	Ib
Ib at Brajrajnagar (Intake) D/s	Orissa	Ib
Bheden River Before Confluence With Ib River	Orissa	Ib
Kathajodi at Cuttack D/s, Orissa	Orissa	Kathajodi
Kelo River U/s of Raigarh	Chhattisgarh	Kelo
Kelo River D/s of Raigarh	Chhattisgarh	Kelo
Kharoon River A/c Khapri Drain	Chhattisgarh	Kharoon
Kharoon River B/c Khapri Drain, Durg, Raipur Road Bridge	Chhattisgarh	Kharoon
Kharoon River Bundri, Raipur	Chhattisgarh	Kharoon
Kharoon at Raipur U/s, Chhattisgarh	Chhattisgarh	Kharoon
Kuakhai at Bhubaneswar D/s	Orissa	Kuakhai
Kuakhai at Bhubaneswar U/s	Orissa	Kuakhai
Bhubaneswar Fu/S	Orissa	Kuakhai
Mahanadi at Rudri U/s at Dhamtori Reservoir	Chhattisgarh	Mahanadi
Mahanadi at U/s of Rajim	Chhattisgarh	Mahanadi

Mahanadi at Kharad	Chhattisgarh	Mahanadi
Mahanadi at Sheorinarayan Village	Chhattisgarh	Mahanadi
Mahanadi After Confl. With River Mand	Chhattisgarh	Mahanadi
Mahanadi at Interstate Boundry	Chhattisgarh	Mahanadi
Mahanadi at Sihawa	Chhattisgarh	Mahanadi
Mahanadi at Arrang, Raipur	Chhattisgarh	Mahanadi
Mahanadi at Hirakud Reservoir	Orissa	Mahanadi
Mahanadi at Sambalpur U/s	Orissa	Mahanadi
Mahanadi at Sambalpur D/s	Orissa	Mahanadi
Sambhalpur Fds at Huma	Orissa	Mahanadi
Mahanadi D/s (After Confl. With R. Ong Sonepur U/s)	Orissa	Mahanadi
Mahanadi After Confl. With R.Tel (Sonepur D/s)	Orissa	Mahanadi
Mahanadi at Tikarpada	Orissa	Mahanadi
Mahanadi at Narsinghpur	Orissa	Mahanadi
Mahanadi at Cuttack U/s	Orissa	Mahanadi
Mahanadi at Cuttack D/s	Orissa	Mahanadi
Paradeep U/s (Before Industrial Activity at Paradeep)	Orissa	Mahanadi
Mahanadi at Paradeepd/S, Orissa	Orissa	Mahanadi
Power Channel D/s Near Burla	Orissa	Mahanadi
Mundali(Water Intake Point of Bhubaneswar City	Orissa	Mahanadi
Sankha U/s (D/s of Mandira Dam)	Orissa	Sankha
Seonath at U/s Rajnandgaon	Chhattisgarh	Seonath
Seonath at Shimga After Confl. With R. Kharoon	Chhattisgarh	Seonath
Seonath River Water Supply Well, Durg.	Chhattisgarh	Seonath
Cuttack Fds (Serua) at Sankhatrasa	Orissa	Serua
Tel	Orissa	Tel

12.2.1 Water Quality of River Mahanadi

The water quality status observed in River Mahanadi with respect to pH, Conductivity, DO, BOD, Faecal Coliform count and Total Coliform count is given in Annexure-I Table 12.1. The summary of water quality of river Mahanadi with respect to pH, conductivity, Dissolved Oxygen (DO), Bio chemical Oxygen Demand (BOD), Total coliform (TC) and Faecal coliform (FC) is given below.

pH:-

- The criteria for pH is 6.5 to 8.5.
- pH is observed in the range of 6.7- 8.8.
- pH is not meeting the criteria at Kharad (8.7), Sheorinarayan Village (8.8), and A/c. with River Mand(8.6).

Conductivity: -

- The criteria of Conductivity for irrigation is 2250 µmhos/cm
- Conductivity lies in the range of 103- 48830 µmhos/cm.
- Conductivity is not meeting the criteria at Paradeep U/s (26020 µmhos/cm) and Paradeep D/s (48830 µmhos/cm).

Dissolved Oxygen: -

- The criteria for DO should be more than 4 mg/l.
- DO lies in the range of 0.2 -11 mg/l.
- DO is observed low at Rudri U/s, Dhamtori Reservoir (0.2 mg/l).

Bio chemical Oxygen Demand: -

- The criteria for BOD should be less than 3 mg/l.
- BOD is observed in the range of 0.2 -7.1 mg/l.
- BOD is observed maximum at Sambalpur D/s (3.4 mg/l) and Cuttack U/s (7.1 mg/l).

Faecal Coliform:-

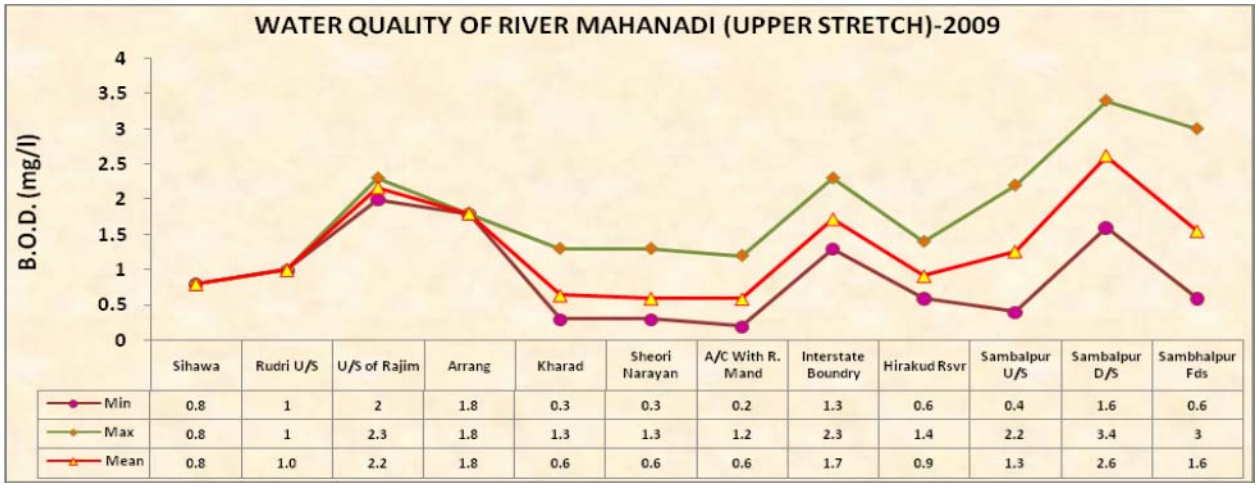
- Faecal Coliform should be less than 2500 MPN/100ml.
- Faecal Coliform ranges 110– 160000 MPN/100ml and is not meeting the criteria at Sambalpur D/s (160000 MPN/100 ml), Sambhalpur Fds at Huma (22000 MPN/100 ml), Cuttack D/s (17000 MPN/100 ml), Paradeep D/s (3100 MPN/100 ml) and Cuttack Fds (Serua) at Sankhatrasa (2800 MPN/100 ml).

Total Coliform:-

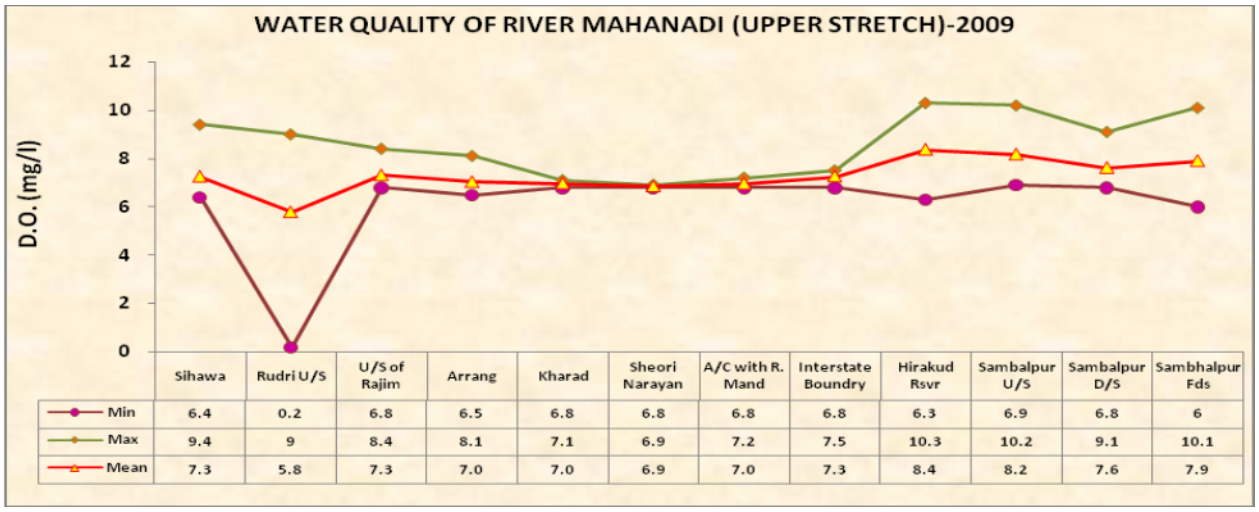
- Total Coliform should be less than 5000 MPN/100ml.
- Total Coliform count ranges from 5- 1600000 MPN/100ml and is not meeting the criteria at
    - Sambalpur D/s (1600000 MPN/100 ml)
    - Sambhalpur Fds at Huma (43000 MPN/100 ml)
    - Cuttack D/s (28000 MPN/100ml)
    - Paradeep D/s (5800 MPN/100 ml).

The spatial trend of water quality of River Mahanadi with respect to BOD, DO, Total Coliform, Faecal Coliform and Conductivity is given in figure 12.1 & 12.2.

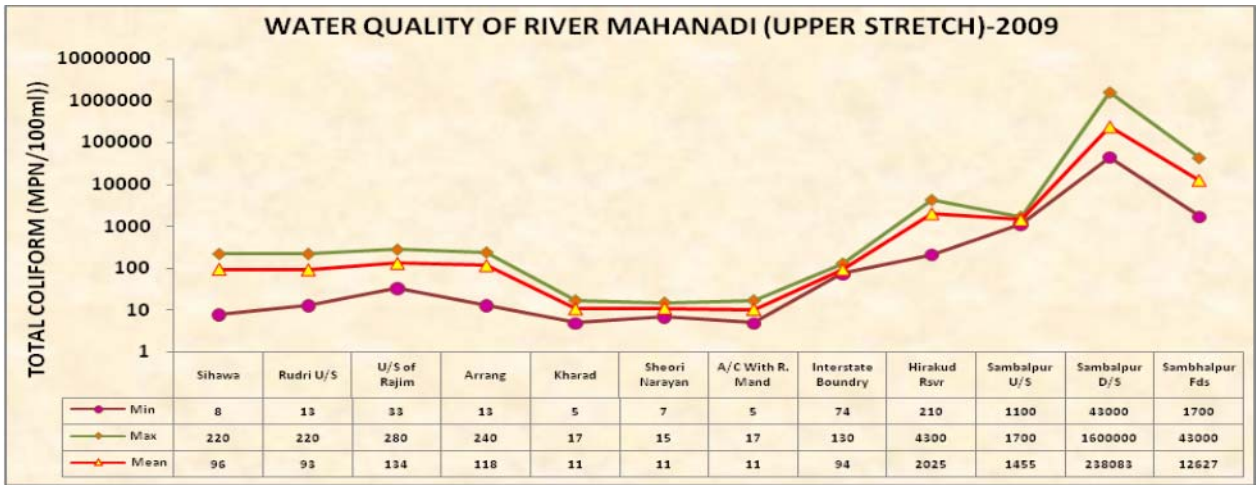
Figure 12.1: Spatial Trend of Water Quality of River Mahanadi (Upper Stretch)



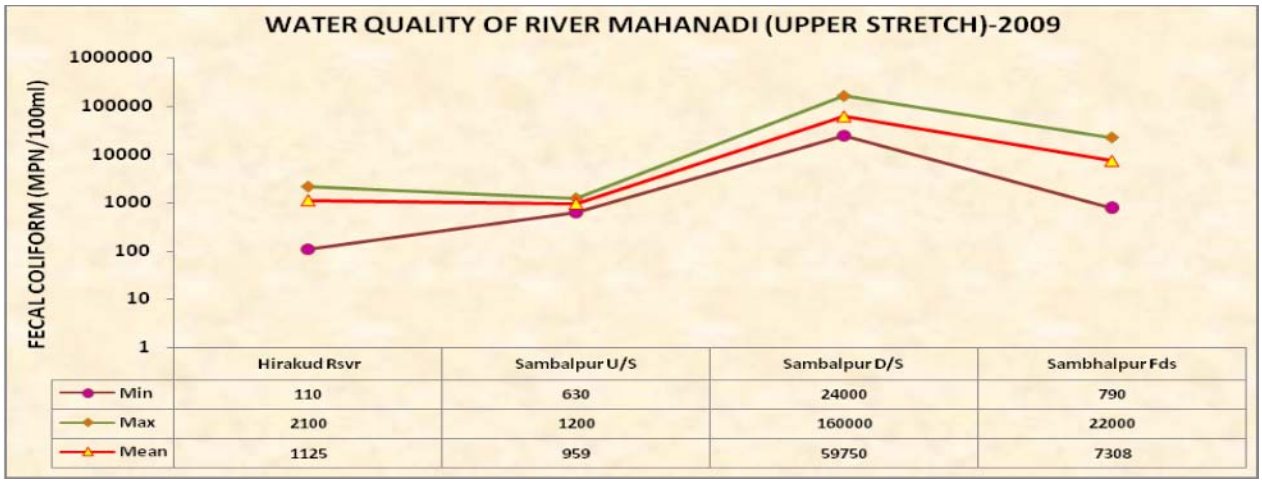
	Sihawa	Rudri U/S	U/S of Rajim	Arrang	Kharad	Sheori Narayan	A/C With R. Mand	Interstate Boundry	Hirakud Rsvr	Sambalpur U/S	Sambalpur D/S	Sambhalpur Fds
Min	0.8	1	2	1.8	0.3	0.3	0.2	1.3	0.6	0.4	1.6	0.6
Max	0.8	1	2.3	1.8	1.3	1.3	1.2	2.3	1.4	2.2	3.4	3
Mean	0.8	1.0	2.2	1.8	0.6	0.6	0.6	1.7	0.9	1.3	2.6	1.6



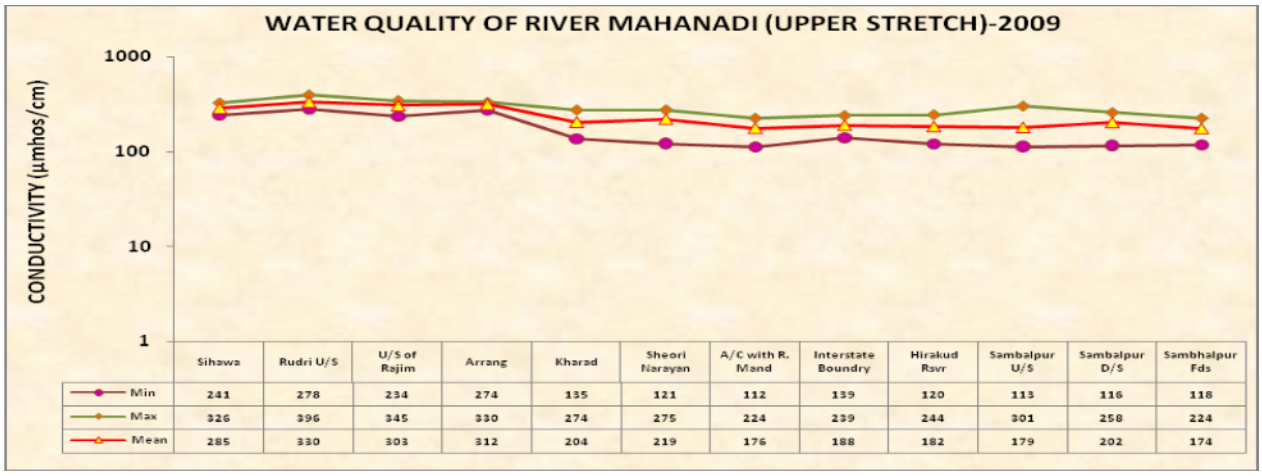
	Sihawa	Rudri U/S	U/S of Rajim	Arrang	Kharad	Sheori Narayan	A/C with R. Mand	Interstate Boundry	Hirakud Rsvr	Sambalpur U/S	Sambalpur D/S	Sambhalpur Fds
Min	6.4	0.2	6.8	6.5	6.8	6.8	6.8	6.8	6.3	6.9	6.8	6
Max	9.4	9	8.4	8.1	7.1	6.9	7.2	7.5	10.3	10.2	9.1	10.1
Mean	7.3	5.8	7.3	7.0	7.0	6.9	7.0	7.3	8.4	8.2	7.6	7.9



	Sihawa	Rudri U/S	U/S of Rajim	Arrang	Kharad	Sheori Narayan	A/C With R. Mand	Interstate Boundry	Hirakud Rsvr	Sambalpur U/S	Sambalpur D/S	Sambhalpur Fds
Min	8	13	33	13	5	7	5	74	210	1100	43000	1700
Max	220	220	280	240	17	15	17	130	4300	1700	1600000	43000
Mean	96	93	134	118	11	11	11	94	2025	1455	238083	12627

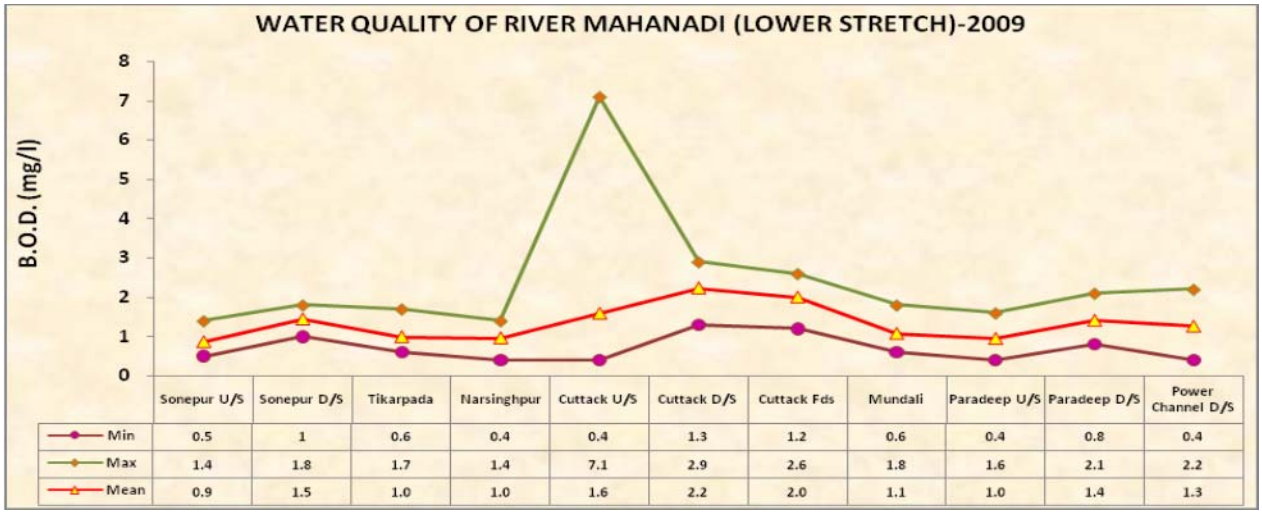


	Hirakud Rsvr	Sambalpur U/S	Sambalpur D/S	Sambhalpur Fds
Min	110	630	24000	790
Max	2100	1200	160000	22000
Mean	1125	959	59750	7308

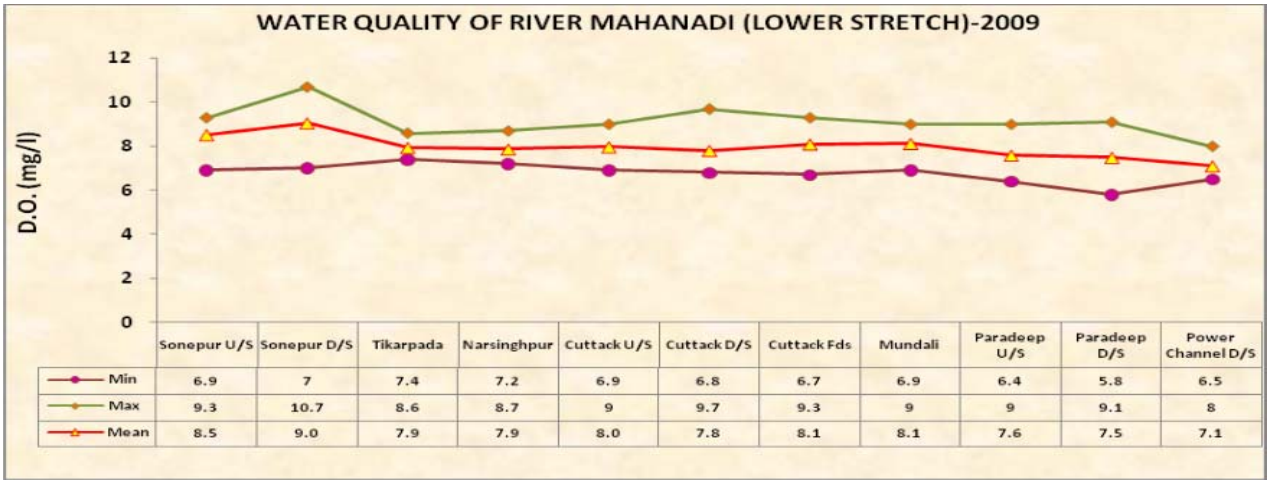


	Sihawa	Rudri U/S	U/S of Rajim	Arrang	Kharad	Sheori Narayan	A/C with R. Mand	Interstate Boundry	Hirakud Rsvr	Sambalpur U/S	Sambalpur D/S	Sambhalpur Fds
Min	241	278	234	274	135	121	112	139	120	113	116	118
Max	326	396	345	330	274	275	224	239	244	301	258	224
Mean	285	330	303	312	204	219	176	188	182	179	202	174

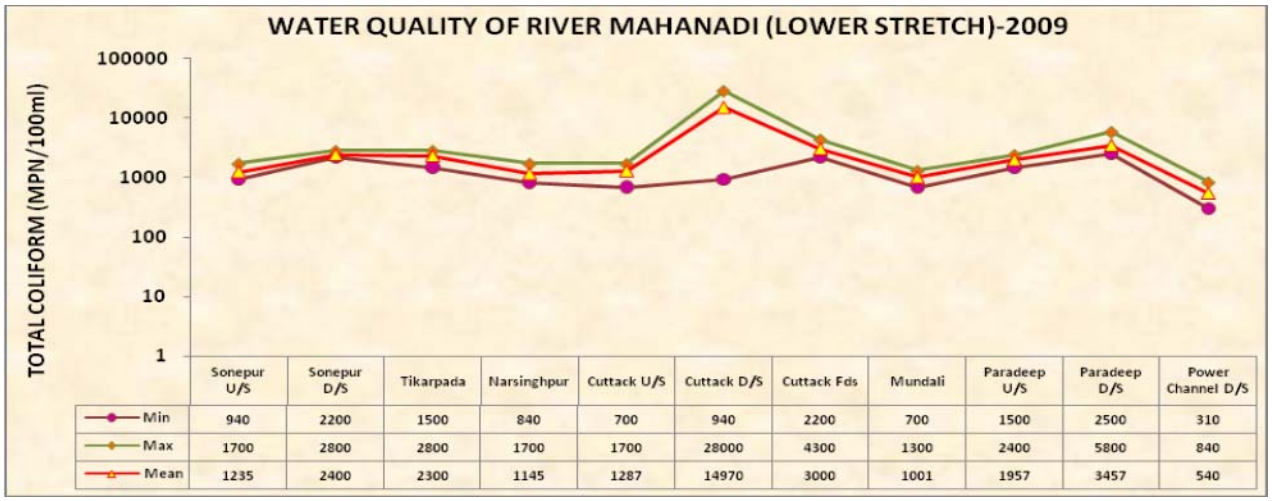
Figure 12.2: Spatial Trend of Water Quality of River Mahanadi (Lower Stretch)



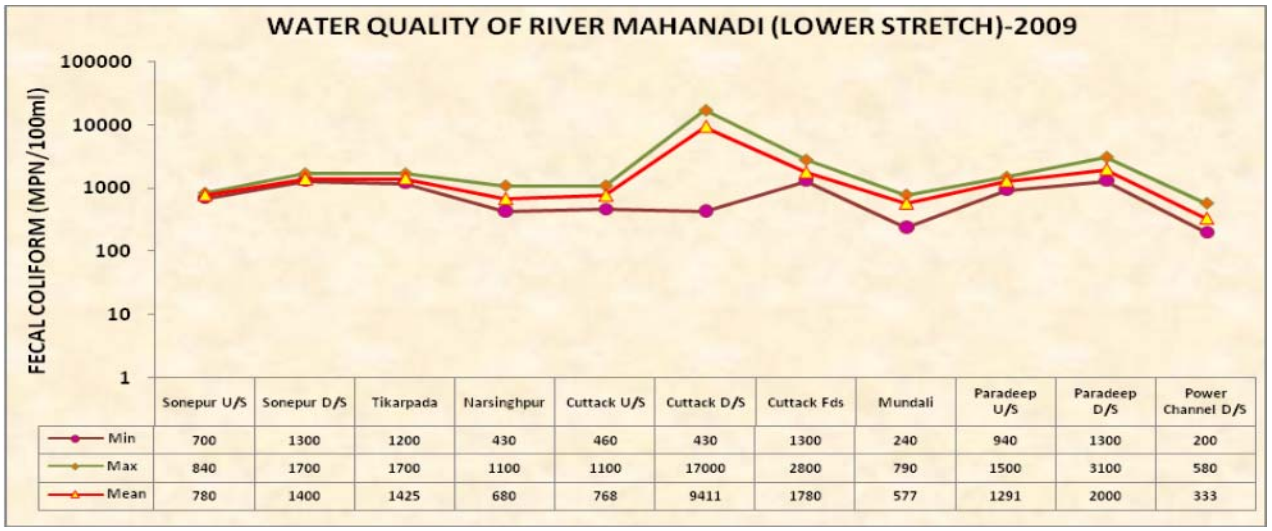
	Sonepur U/S	Sonepur D/S	Tikarpada	Narsinghpur	Cuttack U/S	Cuttack D/S	Cuttack Fds	Mundali	Paradeep U/S	Paradeep D/S	Power Channel D/S
Min	0.5	1	0.6	0.4	0.4	1.3	1.2	0.6	0.4	0.8	0.4
Max	1.4	1.8	1.7	1.4	7.1	2.9	2.6	1.8	1.6	2.1	2.2
Mean	0.9	1.5	1.0	1.0	1.6	2.2	2.0	1.1	1.0	1.4	1.3



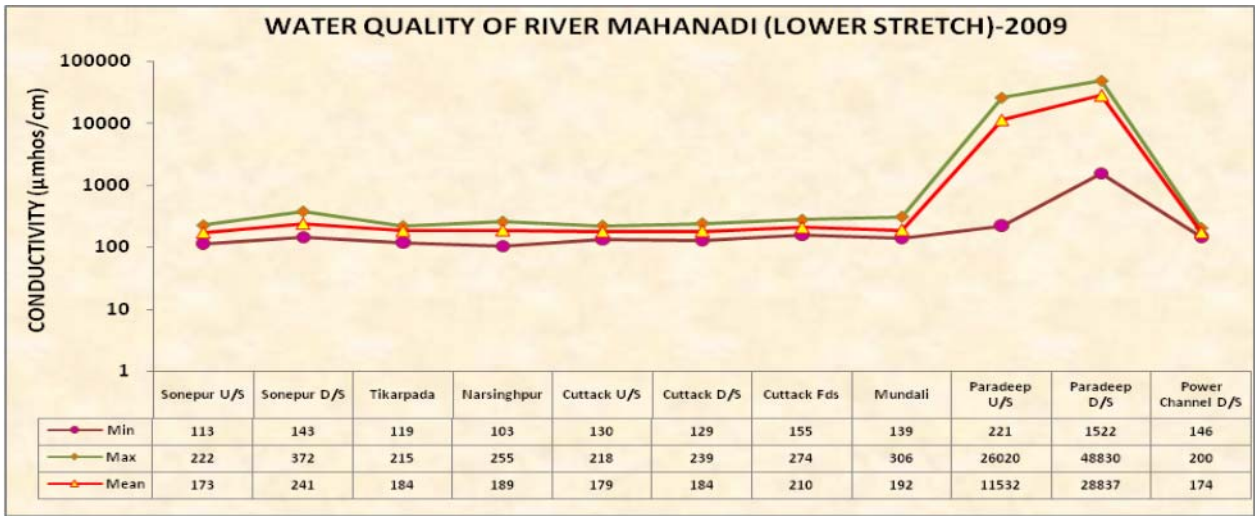
	Sonepur U/S	Sonepur D/S	Tikarpada	Narsinghpur	Cuttack U/S	Cuttack D/S	Cuttack Fds	Mundali	Paradeep U/S	Paradeep D/S	Power Channel D/S
Min	6.9	7	7.4	7.2	6.9	6.8	6.7	6.9	6.4	5.8	6.5
Max	9.3	10.7	8.6	8.7	9	9.7	9.3	9	9	9.1	8
Mean	8.5	9.0	7.9	7.9	8.0	7.8	8.1	8.1	7.6	7.5	7.1



	Sonepur U/S	Sonepur D/S	Tikarpada	Narsinghpur	Cuttack U/S	Cuttack D/S	Cuttack Fds	Mundali	Paradeep U/S	Paradeep D/S	Power Channel D/S
Min	940	2200	1500	840	700	940	2200	700	1500	2500	310
Max	1700	2800	2800	1700	1700	28000	4300	1300	2400	5800	840
Mean	1235	2400	2300	1145	1287	14970	3000	1001	1957	3457	540

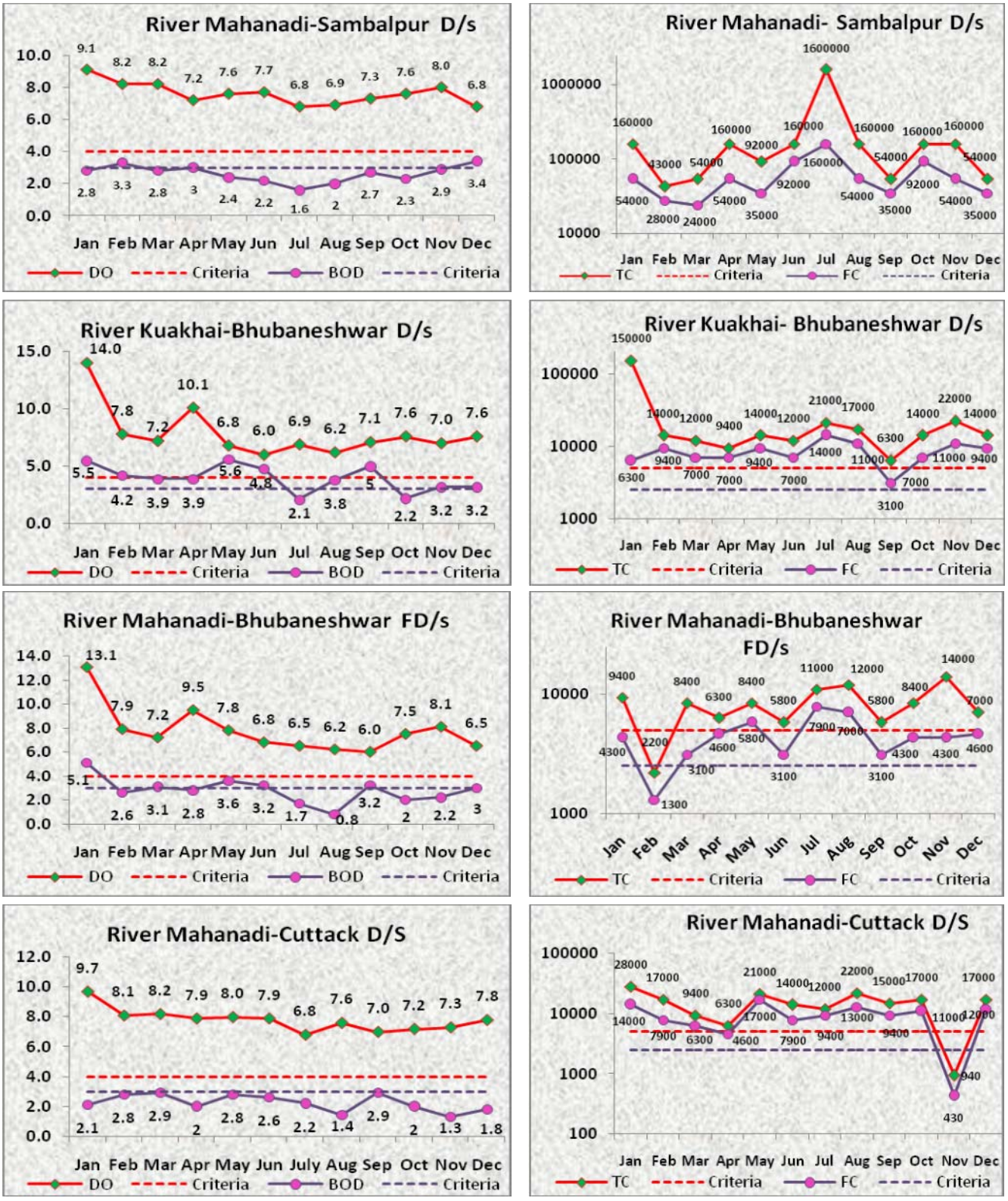


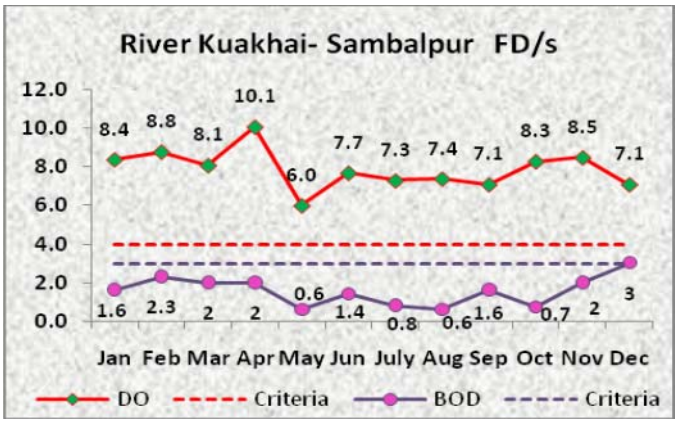
	Sonepur U/S	Sonepur D/S	Tikarpada	Narsinghpur	Cuttack U/S	Cuttack D/S	Cuttack Fds	Mundali	Paradeep U/S	Paradeep D/S	Power Channel D/S
Min	700	1300	1200	430	460	430	1300	240	940	1300	200
Max	840	1700	1700	1100	1100	17000	2800	790	1500	3100	580
Mean	780	1400	1425	680	768	9411	1780	577	1291	2000	333

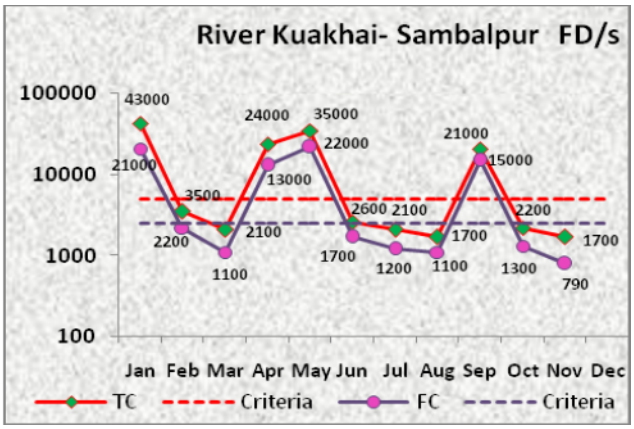


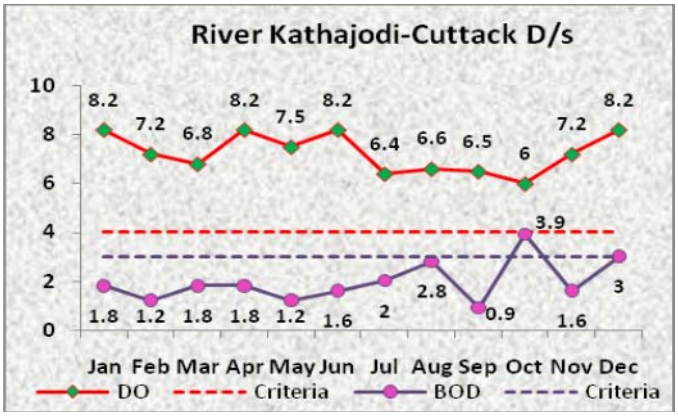
	Sonepur U/S	Sonepur D/S	Tikarpada	Narsinghpur	Cuttack U/S	Cuttack D/S	Cuttack Fds	Mundali	Paradeep U/S	Paradeep D/S	Power Channel D/S
Min	113	143	119	103	130	129	155	139	221	1522	146
Max	222	372	215	255	218	239	274	306	26020	48830	200
Mean	173	241	184	189	179	184	210	192	11532	28837	174

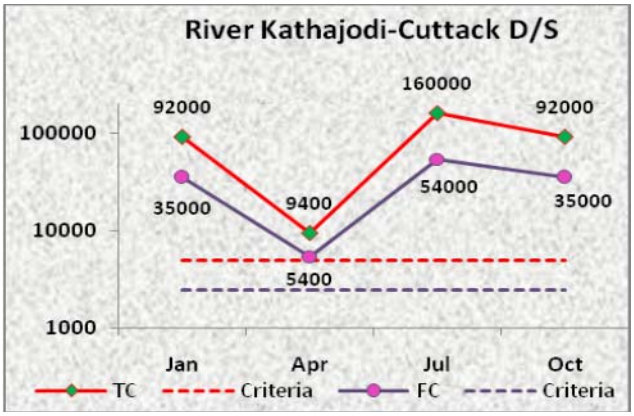
Figure 12.3: Temporal Trend of Water Quality of River Mahanadi

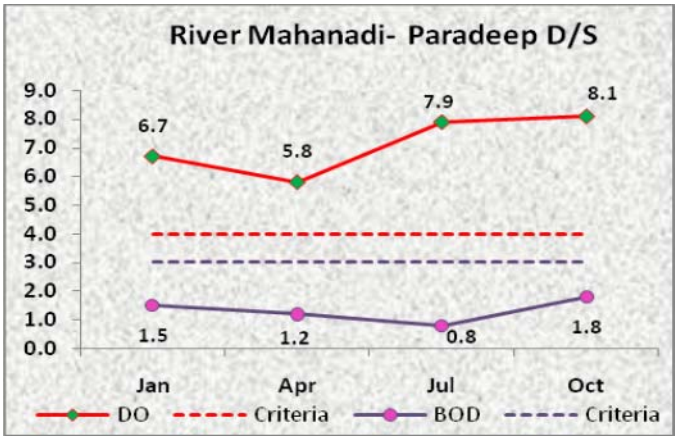


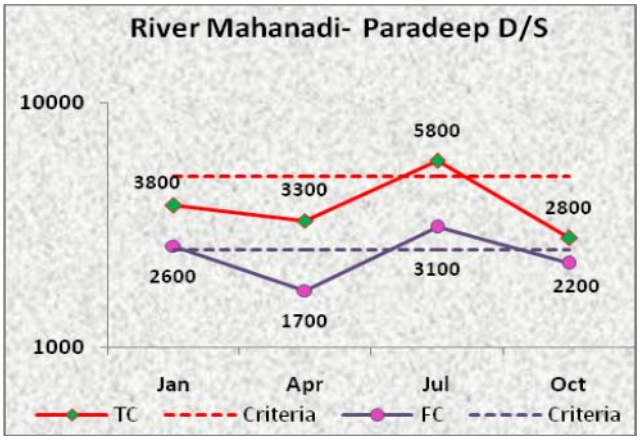












12.2.2 Water Quality of tributaries - Seonath, Kharoon, Hasdeo, Arpa, Kelo, Ib, Bheden, Kuakhai, Kathajodi, Tel and Birupa

Seonath River originates near village Panabaras in the Rajnandgaon district. The Basin is located between latitude 20^0 16' N to 22^0 41' N and Longitude 80^0 25' E to $82^0$35' E. The Basin area of river up to confluence with the Mahanadi river is 30,860 Sq Km. The river traverses a length 380 Km. The main tributaries of Seonath river are Tandula, Kharun, Arpa, Hamp, Agar and Maniyari Rivers.The mean annual rainfall in the basin varies from 1005 mm to 1255 mm. The water quality data of River Seonath is presented in Annexure-I

Table 12.2.The summary of water quality of river Seonath with respect to pH, conductivity, Dissolved Oxygen (DO), Bio chemical Oxygen Demand (BOD), Total coliform (TC) and Faecal coliform (FC) is given below.

pH:-

- The criteria for pH is 6.5 to 8.5.
- pH is observed in the range of 7.3-8.4 and is meeting the criteria.

Conductivity: -

- The criteria of Conductivity for irrigation is 2250 µmhos/cm
- Conductivity lies in the range of 310-365 µmhos/cm and is meeting the criteria.

Dissolved Oxygen: -

- The criteria for DO should be more than 4 mg/l.
- DO lies in the range of 6.3 -8.3 mg/l and is meeting the criteria.

Bio chemical Oxygen Demand: -

- The criteria for BOD should be less than 3 mg/l.
- BOD was observed in the range of 1.0-1.9 mg/l and is meeting the criteria.

Total Coliform:-

- Total Coliform should be less than 5000 MPN/100ml.
- Total Coliform count ranges from 33-2400 MPN/100ml and is meeting the criteria.

River Kharoon, a tributary of Seonath is meeting the desired water quality criteria with respect to DO, pH and conductivity. The water quality data of River Kharoon is presented in Annexure-I Table 12.2.The summary of water quality of river Kharoon with respect to pH, conductivity, Dissolved Oxygen (DO), Bio chemical Oxygen Demand (BOD), Total coliform (TC) and Faecal coliform (FC) is given below.

pH:-

- The criteria for pH is 6.5 to 8.5.
- pH is observed in the range of 7.4-8.5 and is meeting the criteria.

Conductivity: -

- The criteria of Conductivity for irrigation is 2250 µmhos/cm
- Conductivity lies in the range of 279-346 µmhos/cm and is meeting the criteria.

Dissolved Oxygen: -

- The criteria for DO should be more than 4 mg/l.
- DO lies in the range of 6.4-8.3 mg/l and is meeting the criteria.

Bio chemical Oxygen Demand: -

- The criteria for BOD should be less than 3 mg/l.
- BOD was observed in the range of 1.1-2.1 mg/l and is meeting the criteria.

Total Coliform:-

- Total Coliform should be less than 5000 MPN/100ml.
- Total Coliform count ranges from 8-1100 MPN/100 ml and is meeting the criteria.

Hasdeo is a tributary of Mahandi river. The river flows in the state of Chattisgarh. It joins Mahanadi river at Bilaigarh. The river originates about 910 m above sea level in a place about 10 km from Sonhat in Sarguja district of Chhattisgarh. The total length of the river is 333 km and drainage area is 9856 km^2. Hasdeo Bango Dam is constructed across this river. River Hasdeo is flowing along Korba and Champa townships. River Hasdeo is meeting the desired water quality criteria in respect of all parameters. The water quality data of River Hasdeo is presented in Annexure-I Table 12.2. The summary of water quality of river Hasdeo with respect to pH, conductivity, Dissolved Oxygen (DO), Bio chemical Oxygen Demand (BOD), Total coliform (TC) and Faecal coliform (FC) is given below.

pH:-

- The criteria for pH is 6.5 to 8.5.
- pH is observed in the range of 7.3-8.7.
- pH is not meeting the criteria at U/s of Champa (8.7).

Conductivity: -

- The criteria of Conductivity for irrigation is 2250 µmhos/cm
- Conductivity lies in the range of 120-256 µmhos/cm and is meeting the criteria.

Dissolved Oxygen: -

- The criteria for DO should be more than 4 mg/l.
- DO lies in the range of 6.7-7.6 mg/l and is meeting the criteria.

Bio chemical Oxygen Demand: -

- The criteria for BOD should be less than 3 mg/l.
- BOD is observed in the range of 0.3-1.6 mg/l and is meeting the criteria.

Total Coliform:-

- Total Coliform should be less than 5000 MPN/100ml.
- Total Coliform count ranges from 10-254 MPN/100 ml and is meeting the criteria.

Ib is a tributary of Mahanadi river located in central India. It joins Mahanadi River flowing directly into the Hirakud dam. The river originates in hills near Pandrapet at an elevation of 762 m. It is located in Raigarh district of Chhattisgarh. The river runs for a distance of about 252 km and drains an area of 12,447 km. The water quality data of River Ib is presented in Annexure-I Table 12.2. The summary of water quality of river Ib with respect to pH, conductivity, Dissolved Oxygen (DO), Bio chemical Oxygen Demand (BOD), Total coliform (TC) and Faecal coliform (FC) is given below.

pH:-

- The criteria for pH is 6.5 to 8.5.

- pH is observed in the range of 6.7-8.4 and is meeting the criteria.

Conductivity: -
- The criteria of Conductivity for irrigation is 2250 µmhos/cm
- Conductivity lies in the range of 66-600 µmhos/cm and is meeting the criteria.

Dissolved Oxygen: -
- The criteria for DO should be more than 4 mg/l.
- DO lies in the range of 6.0-9.3 mg/l and is meeting the criteria. .

Bio chemical Oxygen Demand: -
- The criteria for BOD should be less than 3 mg/l.
- BOD was observed in the range of 0.3-2.4 mg/l and is meeting the criteria.

Faecal Coliform:-
- Faecal Coliform should be less than 2500 MPN/100ml
- Faecal Coliform ranges from 700-2100 MPN/100ml and is meeting the criteria.

Total Coliform:-
- Total Coliform should be less than 5000 MPN/100ml.
- Total Coliform count ranges from 940-3500 MPN/100ml and is meeting the criteria.

Kelo is very important drinking water source for the entire Raigarh district and also a critical tributary to the river Mahanadi. The river is already facing impacts of pollution at points closer to Raigarh city where a lot of the industrial effluent is disposed. The water quality data of River Kelo is presented in Annexure-I Table 12.2. The summary of water quality of river Kelo with respect to pH, conductivity, Dissolved Oxygen (DO), Bio chemical Oxygen Demand (BOD), Total coliform (TC) and Faecal coliform (FC) is given below.

pH:-
- The criteria for pH is 6.5 to 8.5.
- pH is observed in the range of 7.1-8.4 and is meeting the criteria.

Conductivity: -
- The criteria of Conductivity for irrigation is 2250 µmhos/cm
- Conductivity lies in the range of 164-218 µmhos/cm and is meeting the criteria.

Dissolved Oxygen: -
- The criteria for DO should be more than 4 mg/l.
- DO lies in the range of 6.6-7.8 mg/l and is meeting the criteria.

Bio chemical Oxygen Demand: -
- The criteria for BOD should be less than 3 mg/l.
- BOD was observed in the range of 0.9-2.9 mg/l and is meeting the criteria.

Total Coliform:-

- Total Coliform should be less than 5000 MPN/100ml.
- Total Coliform count ranges from 79-240 MPN/100ml and is meeting the criteria.

Kuakhai enters the Bhubaneswar block area from the north near Jhinkardiha and Marichia villages of Dadha gram panchayat and flows touching the eastern boundaries of Kalyanpur, Barimund, Basuaghai and Sisupal gram panchayat passing Mancheswar. During floods, the flood waters submerge Jhinkardiha, Marichia and some parts of Gandarpur village. If the flooding is severe it even affects the paddy field of Mancheswar and Baramunda gram panchayats and maroons Singada, Rokata and Krushnaranapur villages. The water quality data of River Kuakhai is presented in Annexure-I Table 12.2.The summary of water quality of river Kuakhai with respect to pH, conductivity, Dissolved Oxygen (DO), Bio chemical Oxygen Demand (BOD), Total coliform (TC) and Faecal coliform (FC) is given below.

pH:-

- The criteria for pH is 6.5 to 8.5.
- pH is observed in the range of 6.8-8.4 and is meeting the criteria.

Conductivity: -

- The criteria of Conductivity for irrigation is 2250 µmhos/cm
- Conductivity lies in the range of 117-358 µmhos/cm and is meeting the criteria.

Dissolved Oxygen: -

- The criteria for DO should be more than 4 mg/l.
- DO lies in the range of 6.0-15 mg/l and is meeting the criteria.

Bio chemical Oxygen Demand: -

- The criteria for BOD should be less than 3 mg/l.
- BOD was observed in the range of 0.4-5.6 mg/l.
- BOD was observed maximum at Bhubaneswar FU/s (4.0 mg/l), Bhubaneshwar D/s (5.6 mg/l) and Bhubaneswar FD/s (5.1 mg/l).

Faecal Coliform:-

- Faecal Coliform should be less than 2500 MPN/100ml.
- Faecal Coliform ranges from 240-14000 MPN/100ml.
- Faecal Coliform is not meeting the criteria at Bhubaneshwar D/s (14000 MPN/100ml) and Bhubaneswar FD/s (7900 MPN/100ml).

Total Coliform:-

- Total Coliform should be less than 5000 MPN/100ml.
- Total Coliform count ranges from 700- 150000 MPN/100ml.
- Total Coliform is not meeting the criteria at Bhubaneshwar D/s (150000 MPN/100ml) and Bhubaneswar FD/s (14000 MPN/100ml).

The water quality status observed in rivers Kathajodi, Birupa, Arpa and Tel with respect to pH, Conductivity, DO, BOD, Faecal coliform count and Total Coliform count is given in Annexure-I Table 12.2.The summary of water quality of river Kathajodi, Birupa, Arpa and Tel with respect to pH, conductivity, Dissolved Oxygen (DO), Bio chemical Oxygen Demand (BOD), Total coliform (TC) and Faecal coliform (FC) is given below.

pH:-

- The criteria for pH is 6.5 to 8.5.
- pH is observed in the range of 6.7-8.5 and is meeting the criteria.

Conductivity: -

- The criteria of Conductivity for irrigation is 2250 μmhos/cm.
- Conductivity lies in the range of 91-309 μmhos/cm and is meeting the criteria.

Dissolved Oxygen: -

- The criteria for DO should be more than 4 mg/l.
- DO lies in the range of 5.5-10 mg/l and is meeting the criteria.

Bio chemical Oxygen Demand: -

- The criteria for BOD should be less than 3 mg/l.
- BOD was observed in the range of 0.4-4.8 mg/l and is not meeting the criteria.
- The BOD is observed maximum in river Kathajodi at Cuttak D/s (4.8 mg/l).

Faecal Coliform:-

- Faecal Coliform should be less than 2500 MPN/100ml
- Faecal Coliform ranges from 580- 92000 MPN/100ml and is not meeting the criteria.
- The highest value of Faecal Coliform is observed in river Kathajodi at Cuttak D/s (92000 MPN/100ml) in Orissa.

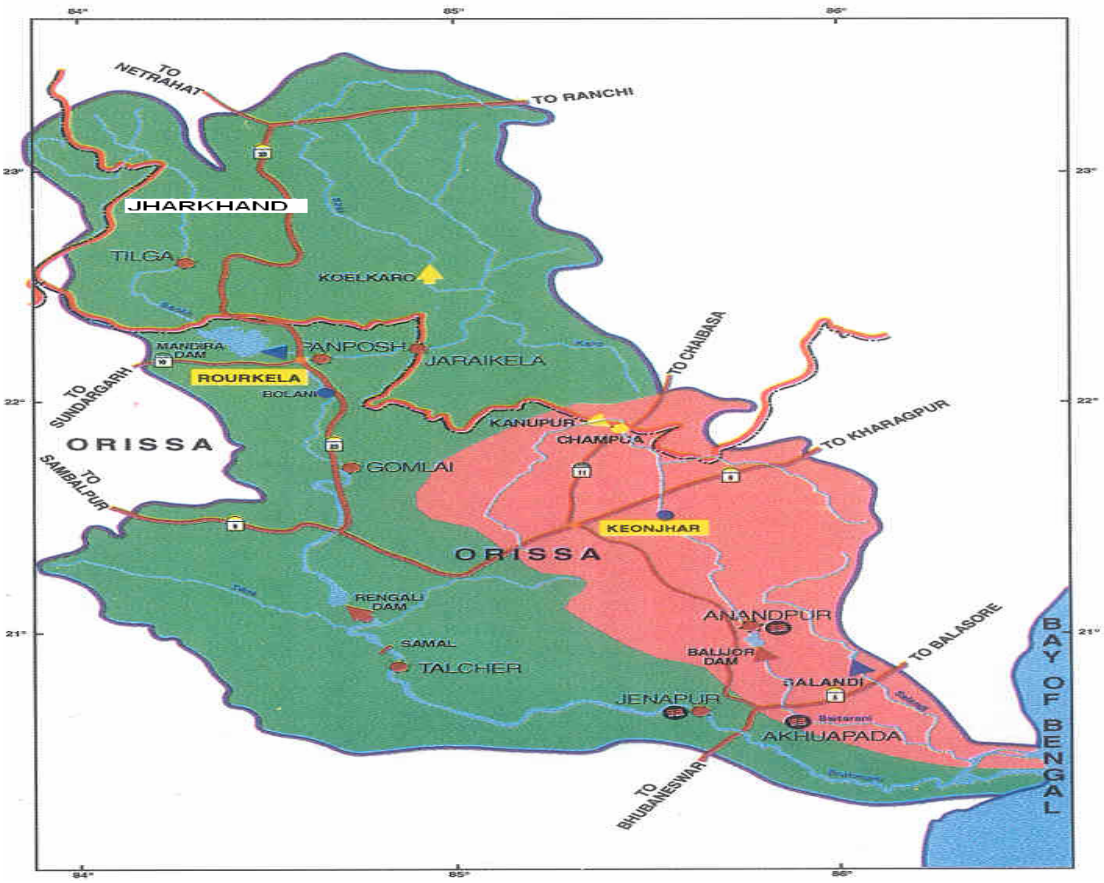
Total Coliform:-

- Total Coliform should be less than 5000 MPN/100ml.
- Total Coliform count ranges from 48- 160000 MPN/100ml and is not meeting the criteria.
- The highest value of Total Coliform is observed in river Kathajodi at Cuttak D/s (160000 MPN/100ml) in Orissa.

CHAPTER XIII

Water Quality of Rivers in Brahmani & Baitarni Basin

13.1 Brahmani and Baitarni River System



The Brahmani-Baitarani basin extends over an area of 51,822 sq km. Lying in the northeast of the Deccan Plateau, the basin covers large areas in the States of Orissa and Jharkhand and a small area in Chattisgarh. The Chhotanagpur Plateau on the west and south bound the basin on the north by the ridge separating it from the Mahanadi basin, and on the east by the Bay of Bengal. The Brahmani sub-basin covers an area of 39,033 sq km while the Baitarani sub-basin covers an area of 12,789 sq km. The Brahmani known as the South Koel, in the upper reaches, rises near Nagri village in the Ranchi district of Jharkhand State. The total length of the river from the head to its outfall into the Bay of Bengal is 799 km of which 258 km is in Jharkhand and 541 km is in Orissa. The Baitarni river rises in the hill ranges of Keonjhar district of Orissa at an elevation of about 900 meters and has a length of about 355 km. Both the rivers outfall in the Bay of Bengal, forming a common delta. The important tributaries of Brahmani are, the Karo, the Sankh and the Tirka and those of Baitarni are the Salandi and the Matai.

The industrial complex of Angul Talcher has been identified as a critically polluted area in the Brahmani basin. The wastewaters generated from the industries Viz, NALCO, TTPS

etc. and mining operations are primarily responsible for deterioration of water quality of Nandira River which is a tributary stream of Brahmani river. Detailed survey of this stretch has been carried out and the action plans have been formulated to improve the water quality of this stretch.

The basin area of Brahmani and Baitarni is covering the States of Jharkhand, and Orissa.The important urban centres in these States are Rourkela in Orissa and Gumia in Jharkhand

13.2 Water Quality Monitoring in Brahmani and Baitarni Basin

The water quality monitoring of the River Brahmani and Baitarni & its tributaries is being done by the State Pollution Control Boards of Jharkhand and Orissa at 31 locations. There are sixteen (16) monitoring locations on the main stream of River Brahmani, five on Baitarni, one each on tributaries Karo, Kusei & Sankh, two on Kharasrota and five on Koel. The ranges of water quality observed in River Brahmani and its tributaries with respect to pH, Conductivity, DO, BOD, COD, Total Coliform and Faecal Coliform are presented as minimum, maximum and mean value to assess the extent of water quality variation throughout the year. The detail list of Water Quality Monitoring locations in Brahmani Basin is given in the Table 13(a).

Table 13(a): Water Quality Monitoring locations in Brahmani Basin

Name of Monitoring Station	State Name	Name of Water Body
Koel at Basia,Dam U/s	Jharkhand	Brahmani
Brahmani at U/s Panposh	Orissa	Brahmani
Brahmani at D/s Panposh	Orissa	Brahmani
Brahmani at Rourkela D/s, Orissa	Orissa	Brahmani
Rourkela Fds at Biritola	Orissa	Brahmani
Brahmani at Bonaigarh	Orissa	Brahmani
Brahmani at Rengali	Orissa	Brahmani
Brahmani at Samal	Orissa	Brahmani
Brahmani at Talcher U/s	Orissa	Brahmani
Talcher Fu/S (Intake Well of MCL, Talcher)	Orissa	Brahmani
Talcher Fd/S	Orissa	Brahmani
Brahmani at Kamalanga	Orissa	Brahmani
Brahmani at Bhuban	Orissa	Brahmani
Brahmani at Dharmashala	Orissa	Brahmani
Brahmani at Pattamundai	Orissa	Brahmani
Kabatabandha (Before Impact of Industrial Activity In Kalinganagar Area)	Orissa	Brahmani
Dhenkanal D/s, Dhenkanal Town	Orissa	Brahmani
Karo at Lohojimi U/s, Jharkand	Jharkhand	Karo
Khanditara (D/s of Industrial Activities at Kalinga Nagar)	Orissa	Kharasrota
Aul	Orissa	Kharasrota
North Koel U/s Daltanganj	Jharkhand	Koel
North Koel D/s BCCL, Rehla	Jharkhand	Koel
Koel at Manoharpur After Meeting Koina River D/s	Jharkhand	Koel
Koel U/s (After Confl of River Karo)	Orissa	Koel
Sankh at Bolba, Jharkand	Jharkhand	Sank

13.3 Water Quality of River Brahmani and its tributaries

The water quality of mainstream of Brahmani & its tributaries is given in Annexure-I Table 13.1. The summary of water quality of river Brahmani with respect to pH, conductivity, Dissolved Oxygen (DO), Bio chemical Oxygen Demand (BOD), Total coliform (TC) and Faecal coliform (FC) is given below

pH:-

- The criteria for pH is 6.5 to 8.5.
- pH is observed in the range of 6.6-8.5 and is meeting the criteria.

Conductivity: -

- The criteria of Conductivity for irrigation is 2250 µmhos/cm
- Conductivity lies in the range of 70-431µmhos/cm and is meeting the criteria.

Dissolved Oxygen: -

- The criteria for DO should be more than 4 mg/l.
- DO lies in the range of 4.5-18.3 mg/l and is meeting the criteria.

Bio chemical Oxygen Demand: -

- The criteria for BOD should be less than 3 mg/l.
- BOD was observed in the range of 0.2 to 5.8 mg/l and is not meeting the criteria.
- BOD was observed maximum at Panposh D/s (5.8 mg/l), Rourkela D/s (5.4 mg/l) and Rourkela Fds at Biritola (4.0 mg/l) in Orissa.

Faecal Coliform:-

- Faecal Coliform should be less than 2500 MPN/100ml
- Faecal Coliform ranges from 460 – 13000 MPN/100ml and is not meeting the criteria.
- The highest value of Faecal Coliform is observed at D/s Panposh (13000 MPN/100ml), D/s Rourkela (11000 MPN/100ml), Rourkela Fds at Biritola (9400 MPN/100ml) and Kamalanga (7000 MPN/100ml) in Orissa.

Total Coliform:-

- Total Coliform should be less than 5000 MPN/100ml.
- Total Coliform count ranges from 940- 22000 MPN/100ml and is not meeting the criteria.
- The highest value of Total Coliform is observed at
    - D/s Panposh (22000 MPN/100ml)
    - D/s Rourkela (17000 MPN/100ml)
    - Rourkela Fds at Biritola (15000 MPN/100ml)
    - Kamalanga (11000 MPN/100ml) in Orissa.

South Koel River runs across Jharkhand and Orissa states in India. It originates from Ranchi plateau a few miles east of Ranchi, and conjoins the Belsiangar and Singbum Rivers. The Koel is fed by three streams in Jharkhand, namely the North Karo, South Karo and Koina. The South Koel enters Orissa and joins with Sankh River at Vedavyas near

Rourkela from where it is named as Brahmani. The water quality of tributary stream Koel is given in Annexure-I Table 13.1. The summary of water quality of tributary stream Koel with respect to pH, conductivity, Dissolved Oxygen (DO), Bio chemical Oxygen Demand (BOD), Total coliform (TC) and Faecal coliform (FC) is given below

pH:-

- The criteria for pH is 6.5 to 8.5.
- pH is observed in the range of 6.2-8.3 and is meeting the criteria.

Conductivity: -

- The criteria of Conductivity for irrigation is 2250 µmhos/cm.
- Conductivity lies in the range of 140-389 µmhos/cm and is meeting the criteria.

Dissolved Oxygen: -

- The criteria for DO should be more than 4 mg/l.
- DO lies in the range of 6.0-11.3 mg/l and is meeting the criteria.

Bio chemical Oxygen Demand: -

- The criteria for BOD should be less than 3 mg/l.
- BOD was observed in the range of 0.6-12 mg/l.
- BOD was observed maximum at U/s -A/c of river Karo (12 mg/l), Basia Dam U/s (4.8 mg/l), North Koel at D/s BCCL, Rehla (4.2 mg/l) and U/s Daltanganj (3.6 mg/l).

Faecal Coliform:-

- Faecal Coliform should be less than 2500 MPN/100ml.
- Faecal Coliform ranges from 200-1300 MPN/100ml and is meeting the criteria.

Total Coliform:-

- Total Coliform should be less than 5000 MPN/100ml.
- Total Coliform count ranges from 750- 2600 MPN/100ml and is meeting the criteria.

The Sankh River flows across Jharkhand, Chattisgarh and Orissa states in India. The river flows for a distance of 240 km before it meets the Koel river in Orissa.The river starts 1000 m above sea level in Lupungpat village in Gumla district in Jharkhand and flows 67.5 km in the state before entering Chattisgarh. It runs a distance of about 50 km in Chattisgarh and enters Jharkhand again to flow for another 78 km. The river finally enters Orissa and travels a distance of 45 km before merging with the Koel. The South Koel enters Orissa and joins the Sankh River at Vedavyas near Rourkela from where it is called the Brahmani. The water quality of tributary streams Karo, Sankh, Kharasrota and Aul is given in Annexure-I Table 13.1.The summary of water quality of tributary streams Karo, Sankh, Kharasrota and Aul with respect to pH, conductivity, Dissolved Oxygen (DO), Bio chemical Oxygen Demand (BOD), Total coliform (TC) and Faecal coliform (FC) is given below.

pH:-

- The criteria for pH is 6.5 to 8.5.

- pH is observed in the range of 6.0-8.2 and is not meeting the criteria.

Conductivity: -

- The criteria of Conductivity for irrigation is 2250 µmhos/cm
- Conductivity lies in the range of 97-293 µmhos/cm and is meeting the criteria.

Dissolved Oxygen: -

- The criteria for DO should be more than 4 mg/l.
- DO lies in the range of 6.7-9.6 mg/l and is meeting the criteria.

Bio chemical Oxygen Demand: -

- The criteria for BOD should be less than 3 mg/l.
- BOD was observed in the range of 0.8-4.9 mg/l.
- BOD was observed maximum in River Sankh at Bolba (4.9 mg/l) and river Karo at Lohojimi U/s (4.8 mg/l) in Jharkhand.

Faecal Coliform:-

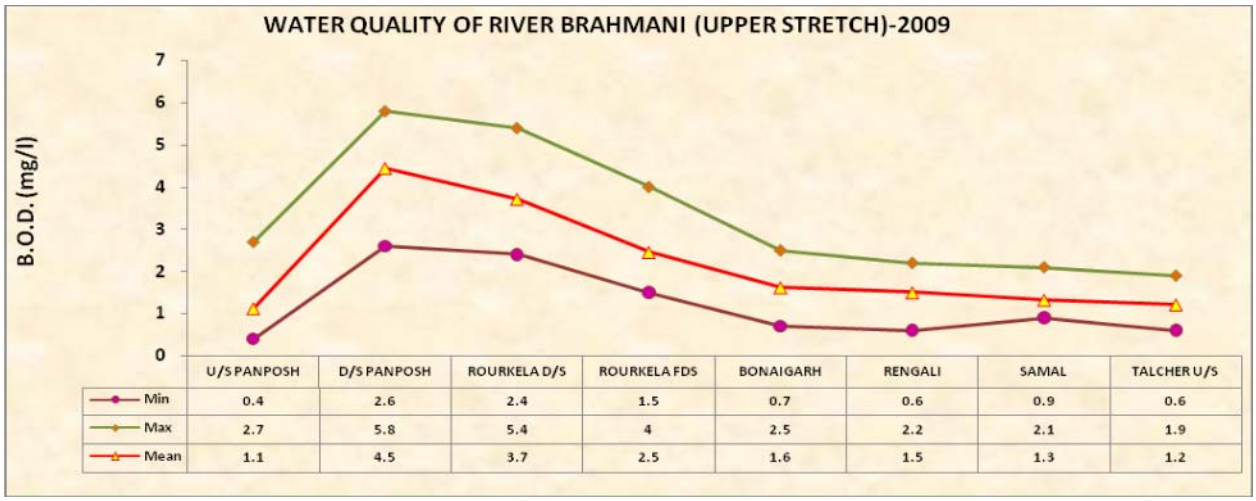
- Faecal Coliform should be less than 2500 MPN/100ml.
- Faecal Coliform ranges from 110-3500 MPN/100ml and is not meeting the criteria.
- The highest value of Faecal Coliform is observed at Aul (3500 MPN/100ml).

Total Coliform:-

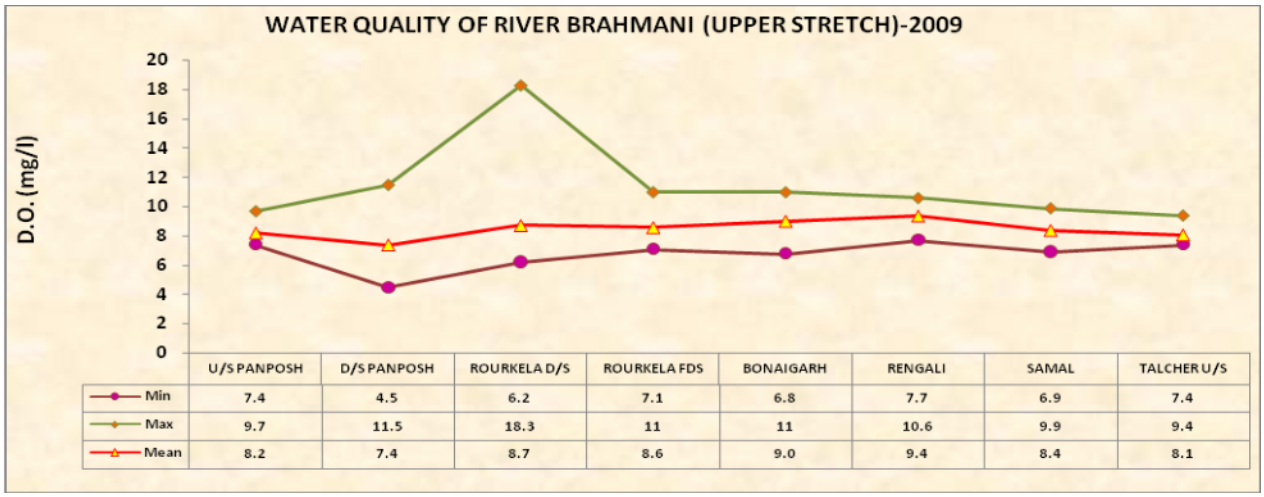
- Total Coliform should be less than 5000 MPN/100ml.
- Total Coliform count ranges from 750- 5400 MPN/100ml and is not meeting the criteria.
- The highest value of Total Coliform is observed at Aul (5400 MPN/100ml).

The spatial trend of water quality of River Brahmani with respect to BOD, DO, Total Coliform, Faecal Coliform and Conductivity is given in figure 13.1 & 13.2.

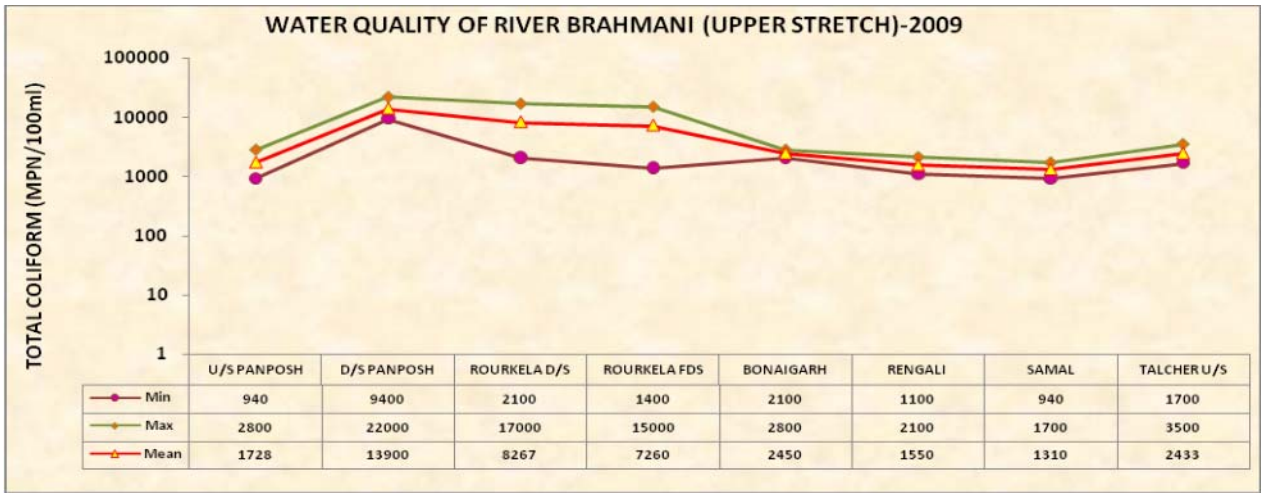
Figure 13.1: Spatial Trend of Water Quality of River Brahmani (Upper Stretch)



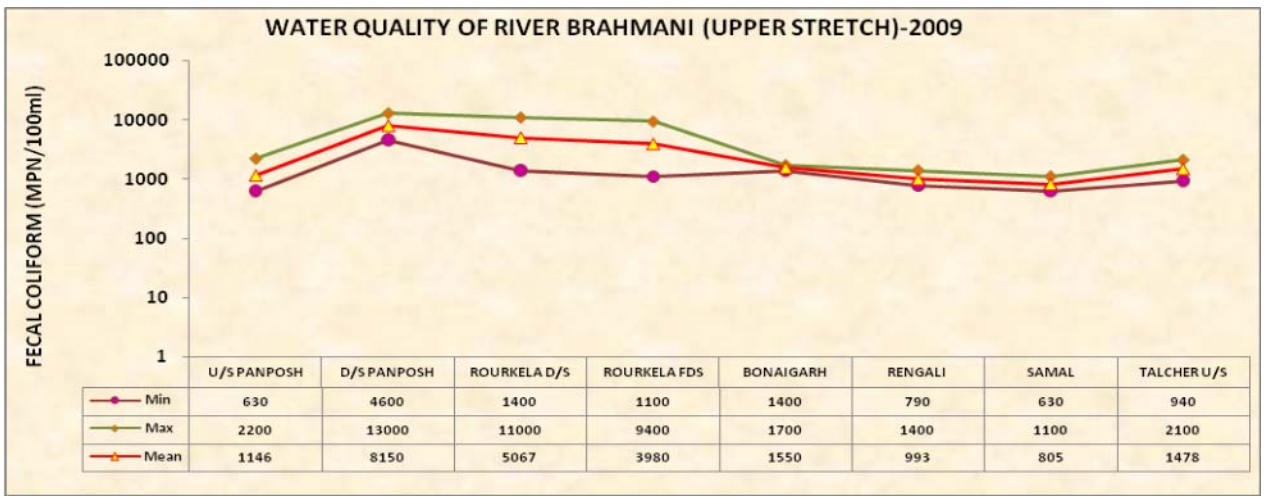
	U/S PANPOSH	D/S PANPOSH	ROURKELA D/S	ROURKELA FDS	BONAIGARH	RENGALI	SAMAL	TALCHER U/S
Min	0.4	2.6	2.4	1.5	0.7	0.6	0.9	0.6
Max	2.7	5.8	5.4	4	2.5	2.2	2.1	1.9
Mean	1.1	4.5	3.7	2.5	1.6	1.5	1.3	1.2



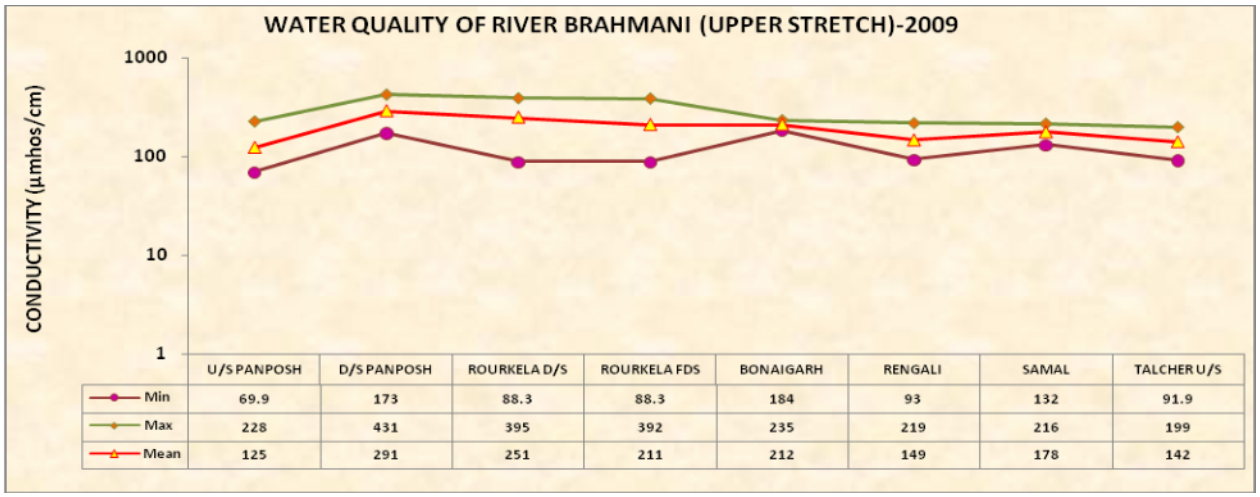
	U/S PANPOSH	D/S PANPOSH	ROURKELA D/S	ROURKELA FDS	BONAIGARH	RENGALI	SAMAL	TALCHER U/S
Min	7.4	4.5	6.2	7.1	6.8	7.7	6.9	7.4
Max	9.7	11.5	18.3	11	11	10.6	9.9	9.4
Mean	8.2	7.4	8.7	8.6	9.0	9.4	8.4	8.1



	U/S PANPOSH	D/S PANPOSH	ROURKELA D/S	ROURKELA FDS	BONAIGARH	RENGALI	SAMAL	TALCHER U/S
Min	940	9400	2100	1400	2100	1100	940	1700
Max	2800	22000	17000	15000	2800	2100	1700	3500
Mean	1728	13900	8267	7260	2450	1550	1310	2433

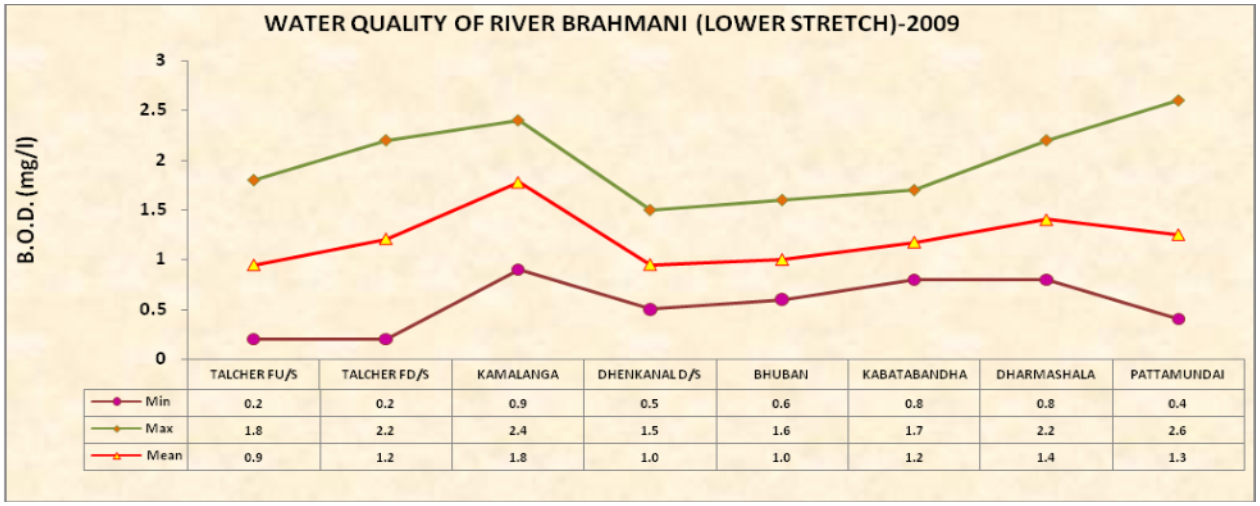


	U/S PANPOSH	D/S PANPOSH	ROURKELA D/S	ROURKELA FDS	BONAIGARH	RENGALI	SAMAL	TALCHER U/S
Min	630	4600	1400	1100	1400	790	630	940
Max	2200	13000	11000	9400	1700	1400	1100	2100
Mean	1146	8150	5067	3980	1550	993	805	1478

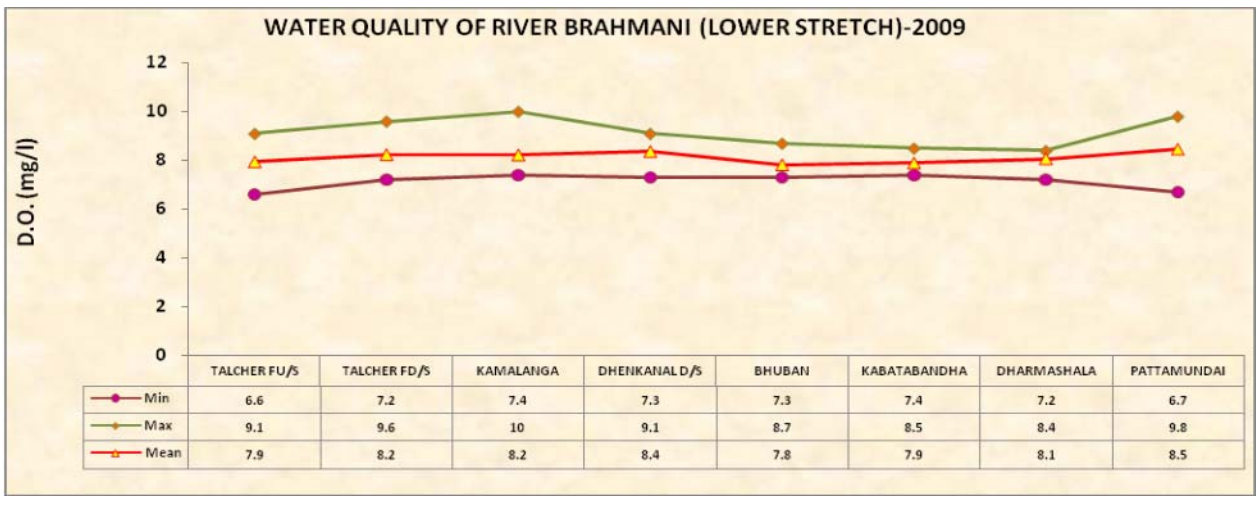


	U/S PANPOSH	D/S PANPOSH	ROURKELA D/S	ROURKELA FDS	BONAIGARH	RENGALI	SAMAL	TALCHER U/S
Min	69.9	173	88.3	88.3	184	93	132	91.9
Max	228	431	395	392	235	219	216	199
Mean	125	291	251	211	212	149	178	142

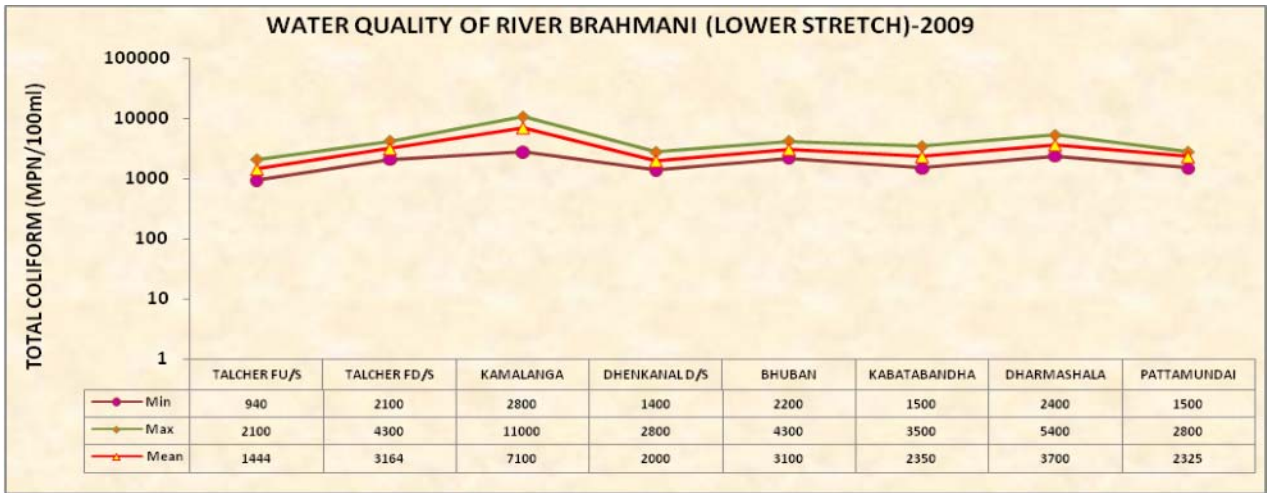
Figure 13.2: Spatial Trend of Water Quality of River Brahmani (Lower Stretch)



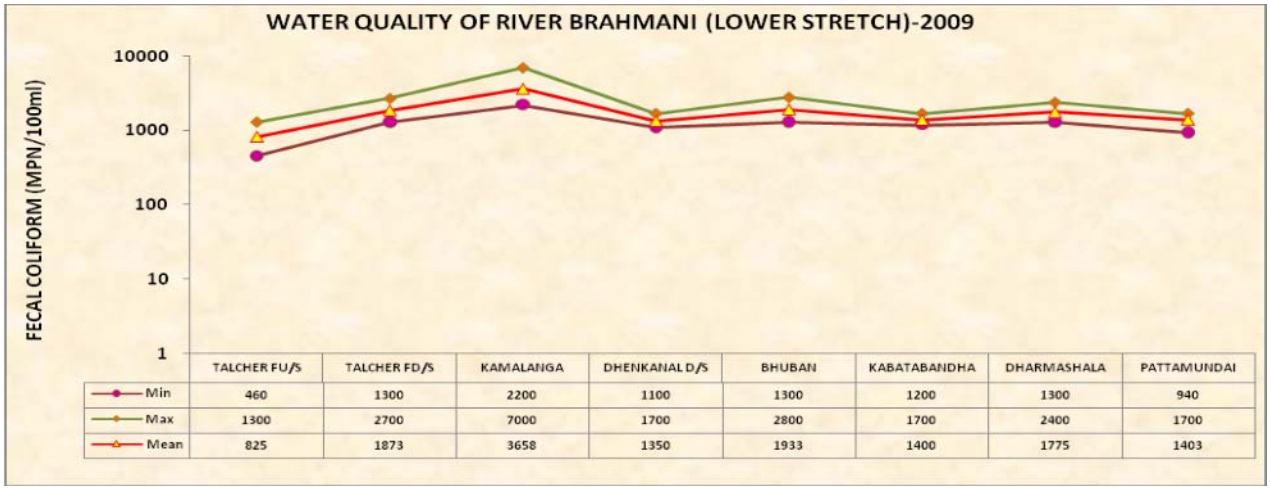
	TALCHER FU/S	TALCHER FD/S	KAMALANGA	DHENKANAL D/S	BHUBAN	KABATABANDHA	DHARMASHALA	PATTAMUNDAI
Min	0.2	0.2	0.9	0.5	0.6	0.8	0.8	0.4
Max	1.8	2.2	2.4	1.5	1.6	1.7	2.2	2.6
Mean	0.9	1.2	1.8	1.0	1.0	1.2	1.4	1.3



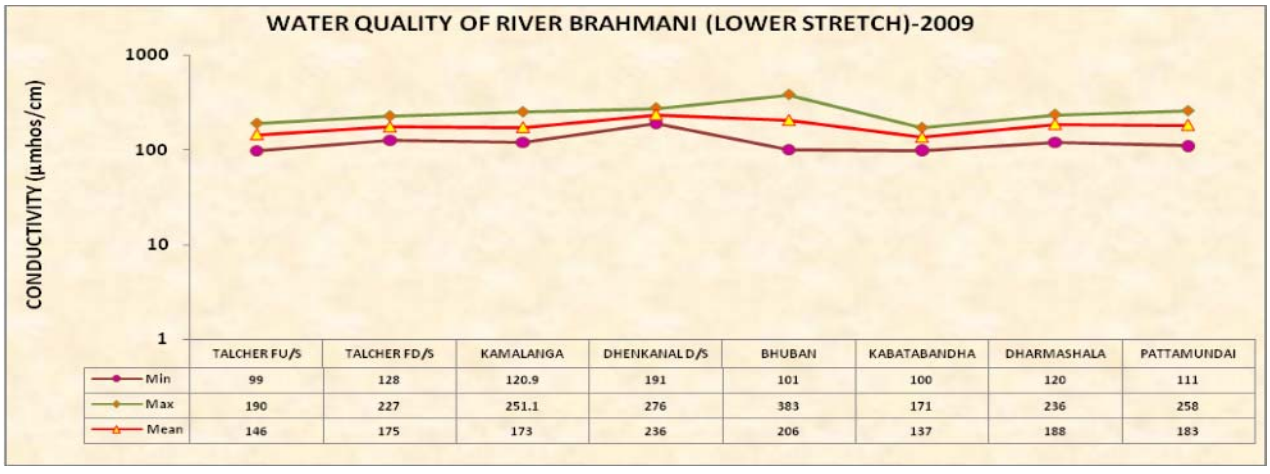
	TALCHER FU/S	TALCHER FD/S	KAMALANGA	DHENKANAL D/S	BHUBAN	KABATABANDHA	DHARMASHALA	PATTAMUNDAI
Min	6.6	7.2	7.4	7.3	7.3	7.4	7.2	6.7
Max	9.1	9.6	10	9.1	8.7	8.5	8.4	9.8
Mean	7.9	8.2	8.2	8.4	7.8	7.9	8.1	8.5



	TALCHER FU/S	TALCHER FD/S	KAMALANGA	DHENKANAL D/S	BHUBAN	KABATABANDHA	DHARMASHALA	PATTAMUNDAI
Min	940	2100	2800	1400	2200	1500	2400	1500
Max	2100	4300	11000	2800	4300	3500	5400	2800
Mean	1444	3164	7100	2000	3100	2350	3700	2325



	TALCHER FU/S	TALCHER FD/S	KAMALANGA	DHENKANAL D/S	BHUBAN	KABATABANDHA	DHARMASHALA	PATTAMUNDAI
Min	460	1300	2200	1100	1300	1200	1300	940
Max	1300	2700	7000	1700	2800	1700	2400	1700
Mean	825	1873	3658	1350	1933	1400	1775	1403



	TALCHER FU/S	TALCHER FD/S	KAMALANGA	DHENKANAL D/S	BHUBAN	KABATABANDHA	DHARMASHALA	PATTAMUNDAI
Min	99	128	120.9	191	101	100	120	111
Max	190	227	251.1	276	383	171	236	258
Mean	146	175	173	236	206	137	188	183

13.4 Water Quality of River Baitarni and its tributaries

The water quality of mainstream of Baitarni is observed at 5 locations and tributary stream kusei at one location. The water quality of River Baitarni and tributary stream Kusei is

given in Annexure-I Table 13.2.The summary of water quality of River Baitarni and tributary stream kusei with respect to pH, conductivity, Dissolved Oxygen (DO), Bio chemical Oxygen Demand (BOD), Total coliform (TC) and Faecal coliform (FC) is given below. The detail list of Water Quality Monitoring locations in Baitarni Basin is given in the Table13 (b).

Table13 (b): Water Quality Monitoring locations on River Baitarni

Name of Monitoring Station	State Name	Name of Water Body
Baitarni at Joda	Orissa	Baitarni
Baitarni at Anandpur	Orissa	Baitarni
Baitarni at Jajpur	Orissa	Baitarni
Baitarni at Chandbali	Orissa	Baitarni
Baitarni at Dhamra	Orissa	Baitarni

pH:-

- The criteria for pH is 6.5 to 8.5.
- pH is observed in the range of 6.7-8.4 and is meeting the criteria.

Conductivity: -

- The criteria of Conductivity for irrigation is 2250 µmhos/cm
- Conductivity lies in the range of 69-28400 µmhos/cm and is meeting the criteria.
- The higher values of conductivity are observed at Dhamra (28400 µmhos/cm) and Chandbali (13220 µmhos/cm) due to estuarine region of the river.

Dissolved Oxygen: -

- The criteria for DO should be more than 4 mg/l.
- DO lies in the range of 6.1-9.0 mg/l and is meeting the criteria.

Bio chemical Oxygen Demand: -

- The criteria for BOD should be less than 3 mg/l.
- BOD is observed in the range of 0.6-3.4 mg/l and is not meeting the criteria.
- BOD is observed maximum at Dhamra (3.4 mg/l).

Faecal Coliform:-

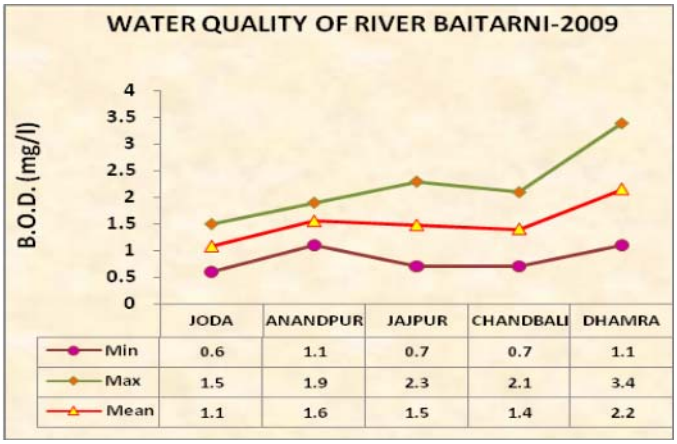
- Faecal Coliform should be less than 2500 MPN/100ml.
- Faecal Coliform ranges from 230 to 2800 MPN/100ml and is not meeting the criteria.
- The highest value of Faecal Coliform is observed at Jajpur (2800 MPN/100ml).

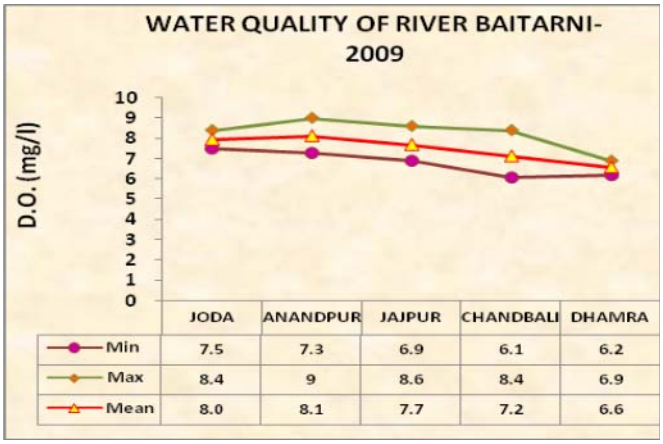
Total Coliform:-

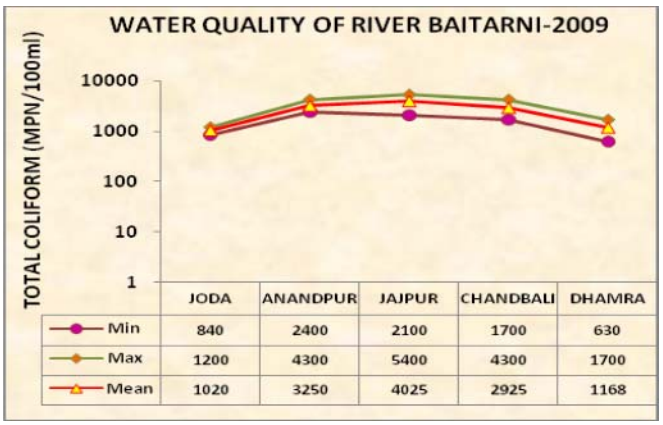
- Total Coliform should be less than 5000 MPN/100ml.
- Total Coliform count ranges from 630 to 5400 MPN/100ml and is not meeting the criteria.
- The highest value of Total Coliform is observed at Jajpur (5400 MPN/100ml).

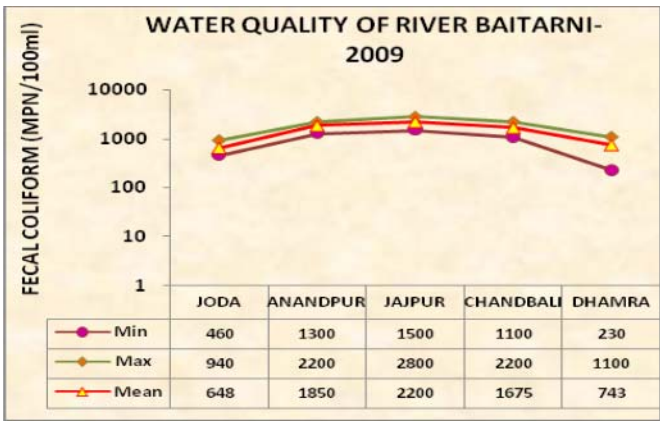
The spatial trend of water quality of River Baitarni with respect to BOD, DO, Total Coliform, Faecal Coliform and Conductivity is given in figure 13.3.

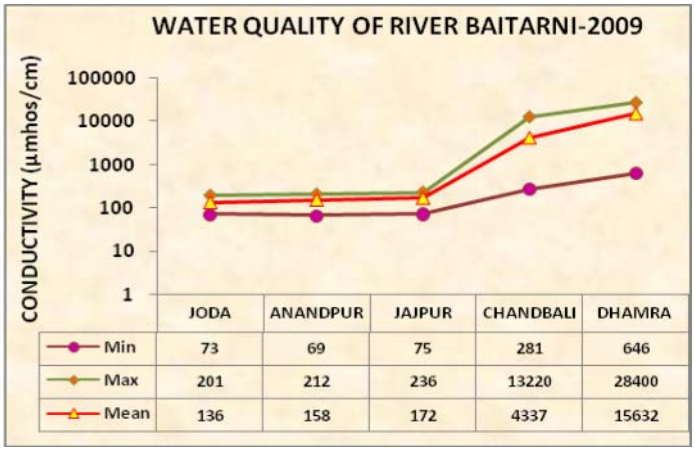
Figure 13.3: Spatial Trend of Water Quality of River Baitarni











CHAPTER XIV

Water Quality of Rivers in Subarnarekha Basin

14.1 Subarnarekha River System

The Subarnarekha rises near Nagri village in the Ranchi district. of its total length 269 km are in Jharkhand and 64 km in West Bengal and 62 in Orissa. The river drains a total area of 19,296 sq km. The Subarnarekha is the smallest of the basins and is falling short only marginally to be called a 'major basin'. It has virtually no significant tributary; the tiny Kharkai has gained a name only because of its support to the Jamshedpur steel city. The river Subarnarekha passes through an important industrial belt of Jharkhand.

The river is basically a rainfed peninsular river with the wet months being June to September. The river in its upper and middle reaches remains more or less as a stagnant pool, often highly charged with pollutants, particularly during dry periods. The largest concentration of population is located in the Singbhum and Ranchi districts of Jharkhand. The river and its tributaries are the main sources of urban water supply with the ground water resources still under utilized. Nearly 60 percent of the water supplies eventually find their way to surface water systems. Some of the important towns are also significant industrial centres. None of the towns except partly for Jamshedpur and Tatanagar railway colony have wastewater treatment facility worth mentioning.

The Subarnarekha being a mineral rich area, it is natural that mining activity would always be an important element in the pollution control programme. The possibility of contamination of surface and ground water derived from the ore dumps and radioactive waste materials in the uranium mines at Jaduguda is very great

The basin area of Subarnerekha is covering the States of Jharkhand and Orissa. The important urban centres in these states are Jamshedpur, Chaibasa and Ranchi in Jharkhand; and Bhadrak in Orissa.

14.2 Water Quality Monitoring in Subarnarekha Basin

The water quality monitoring of the River Subarnarekha and its tributary Jumar is being done in the basin by the State Pollution Control Boards of Jharkhand, Orissa and West Bengal at 13 locations. The ranges of water quality observed in River Subarnarekha with respect to pH, Conductivity, DO, BOD, COD, Total Coliform (TC) and Faecal Coliform (FC) are presented as minimum, maximum and mean value to assess the extent of water quality variation throughout the year. The detail list of water Quality Monitoring locations on River Subarnarekha and its tributary is given in the Table14 (a).

Table 14(a): Water Quality Monitoring locations on Subarnarekha Basin

Name of Monitoring Station	State Name	Name of Water Body
Jumar at Kanke Dam	Jharkhand	Jumar
Subarnarekha at Ranchi, (Tatisilwai)	Jharkhand	Subarnarekha
Subarnarekha at Jamshedpur	Jharkhand	Subarnarekha

Subarnarekha at Chandil Bridge	Jharkhand	Subarnarekha
Subarnarekha at D/s Jamshedpur,(Tata Nagar)	Jharkhand	Subarnarekha
Subarnarekha at Namkum Road Bridge	Jharkhand	Subarnarekha
Subarnarekha at Muri Road Bridge	Jharkhand	Subarnarekha
Subarekha at Ghatisla Road Bridge	Jharkhand	Subarnarekha
Subarnarekha at Hatia Dam	Jharkhand	Subarnarekha
Subarnarekha at Gatalsud Dam	Jharkhand	Subarnarekha
Subarnarekha at Chandil Dam	Jharkhand	Subarnarekha
Subarnarekha at Rajghat Near Bihar Border	Orissa	Subarnarekha
Subarnarekha at Bihar - West Bengal Border	West Bengal	Subarnarekha

14.3 Water Quality Status of River Subarnarekha

The Water Quality of River Subarnarekha and its tributarary Jumar for year 2009 is given in Annexure-I (Table 14.1). The summary of water quality of river Subarnarekha and its tributarary Jumar with respect to pH, conductivity, Dissolved Oxygen (DO), Bio chemical Oxygen Demand (BOD), Total coliform (TC) and Faecal coliform (FC) is given below.

pH:-

- The criteria for pH is 6.5 to 8.5.
- pH is observed in the range of 6.4-8.4.
- pH is not meeting the desired criteria at
    - Muri Road Bridge (6.4)
    - Bihar - West Bengal Border (6.4)

Conductivity: -

- The criteria of Conductivity for irrigation is 2250 µmhos/cm.
- Conductivity lies in the range of 164-717 µmhos/cm and is meeting the criteria.

Dissolved Oxygen: -

- The criteria for DO should be more than 4 mg/l.
- DO lies in the range of 4.0-8.5 mg/l and is meeting the criteria.

Bio chemical Oxygen Demand: -

- The criteria for BOD should be less than 3 mg/l.
- BOD was observed in the range of 0.4-6.3 mg/l.
- BOD is not meeting the desired criteria at
    - Ranchi (Tatisilwai) (6.3 mg/l)
    - Namkum Road Bridge (6.3 mg/l)
    - Gatalsud Dam (5.5 mg/l)
    - Muri Road Bridge (3.4 mg/l)
    - Hatia Dam (3.2 mg/l)

Faecal Coliform

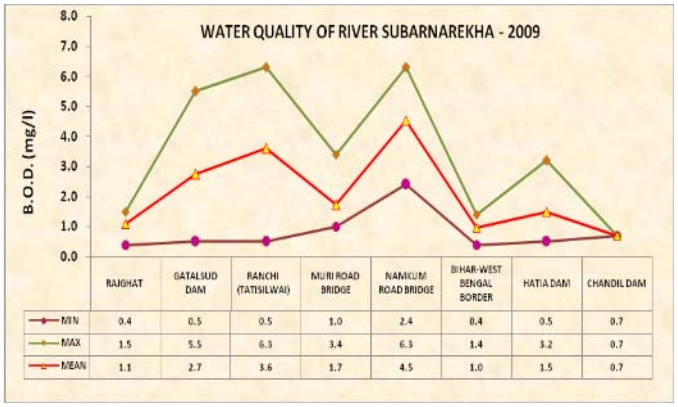
- Faecal Coliform should be less than 2500 MPN/100ml.
- Faecal Coliform ranges from 70-1300 MPN/100ml and is meeting the criteria.

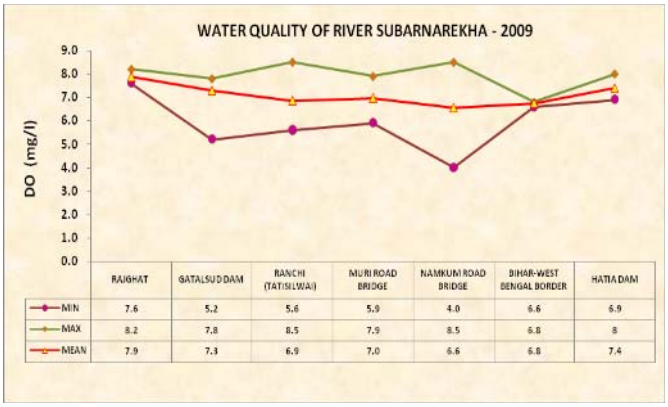
Total Coliform

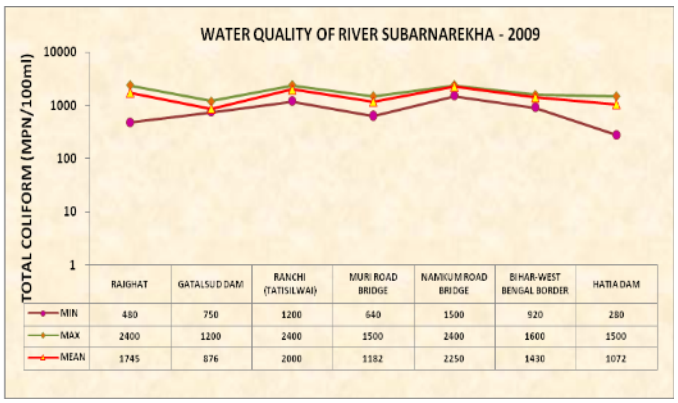
- Total Coliform should be less than 5000 MPN/100ml
- Total Coliform is in the range of 280-2400 MPN/100ml and is meeting the criteria.

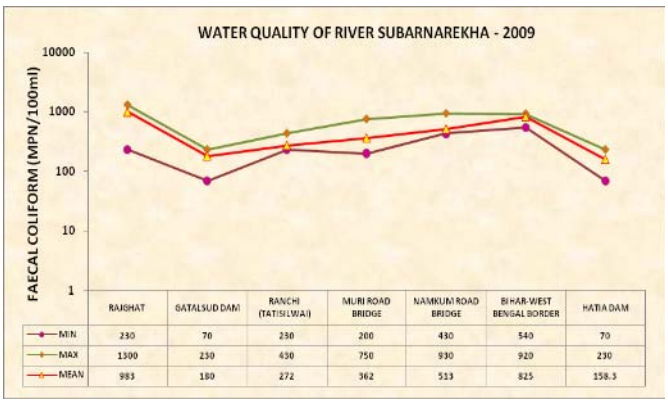
The water quality of the River Subarnarekha during the period is given in Annexure-I Table 14.1. The water quality status of River Subarnarekha with respect to BOD, DO, Total Coliform, Faecal Coliform and Conductivity is given in figure 14.1.

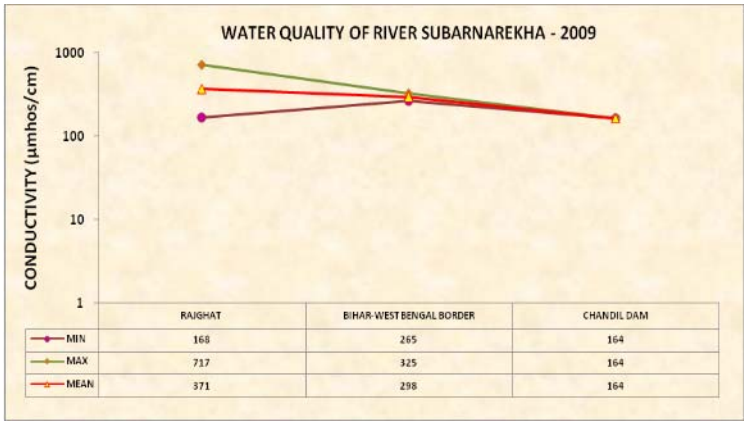
Figure 14.1: Spatial Trend of Water Quality of River Subarnarekha







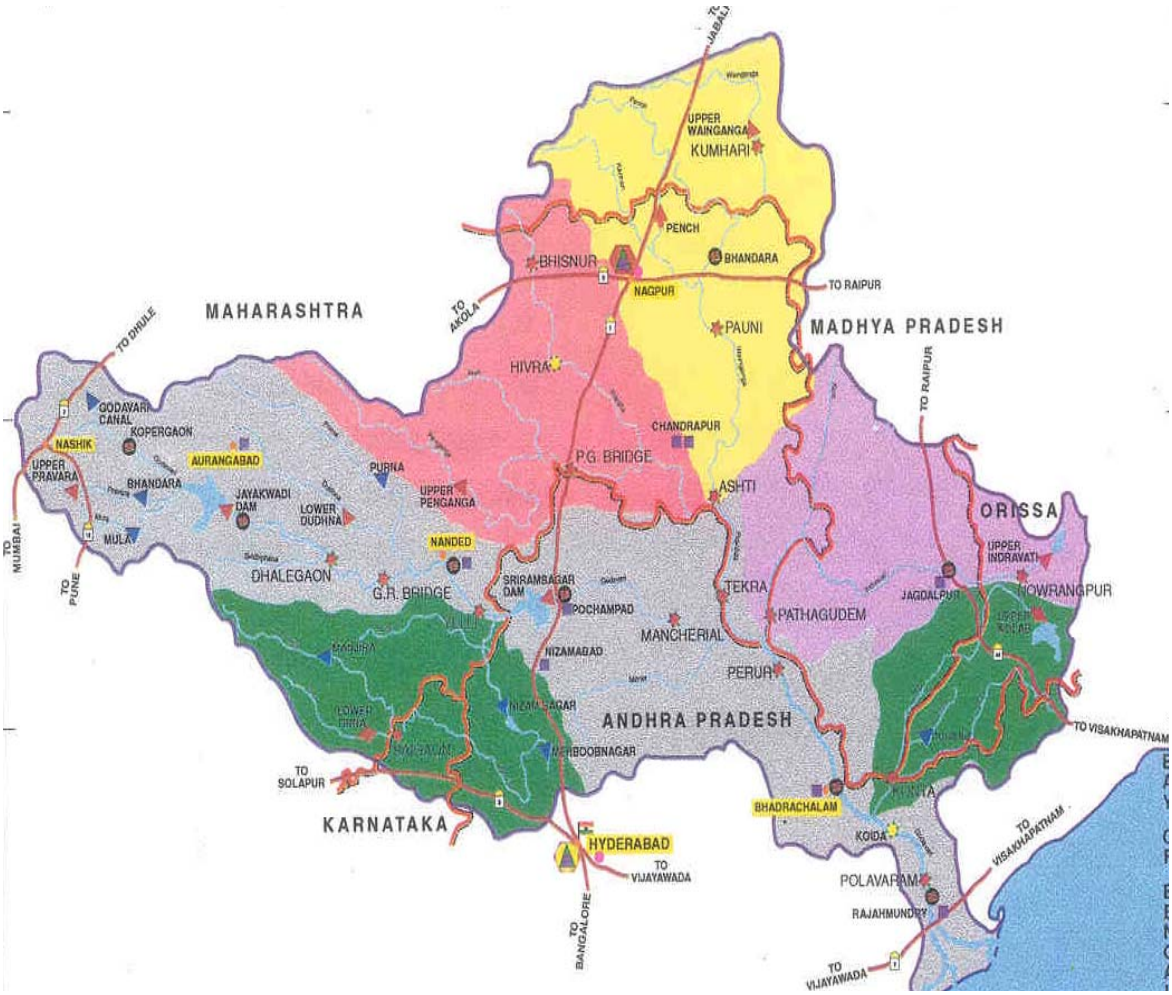




CHAPTER XV

Water Quality of Rivers in Godavari Basin

15.1 Godavari River System



The Godavari basin extends over an area of 3, 12,812 sq km which is nearly 10 percent of the total geographical area of the country. The basin lies in the Deccan plateau, and covers large areas in the States of Andhra Pradesh, Madhya Pradesh, Chattisgarh and Maharashtra, in addition to smaller areas in Karnataka and Orissa.

The Satmala Hills, the Ajanta Range and the Mahadeo Hills, on the south and east by the Eastern Ghats and on the west by the Western Ghats, bound the Godavari basin on the north. The Godavari is the largest river of the Peninsular India, inspite of its massive catchment area; the discharge is not very impressive because of moderate annual average rainfall in the basin. Its four important tributaries are the Manjira, the Pranhita, the Indravati and the Sabari. The wastewater generation from domestic (both rural and urban) and the industrial sector are the main sources of pollution in the river basin. Amongst the

five states Orissa State is least industrialized followed by Chhitisgarh and Karnataka, with Maharashtra having the high urban industrial pockets. Most of the industrial activities are centred mainly at Aurangabad & Nasik in Maharashtra, East & West Godavari Distt. in Andhra Pradesh. Sugar and distillery units are large in number in Maharashtra followed by pharmaceuticals, leather, pulp and paper and pesticide units.In Andhra Pradesh sugar and distillery units are large in number followed by Pulp & Paper and fertilizer industries. The above-mentioned industries are massive water consuming by nature and the deterioration in water quality in the river cannot be ruled out particularly from Nashik to Nanded in Maharashtra and at Baster, in Chattisgarh and Burganpad in Andhra Pradesh.

The important urban centers in this basin are Nagpur, Ambejogai, Ballarpur, Bhandara, Buldhana, Chalisgaon, Hinganghat, Hingoli, Manmad, Nandurbar, Osmandabad, Parli, Pusad, Shrirampur, Udgir, Latur, Kamptee, Ahmadnagar, Parbhani, Aurangabad, Wardha, Bid, Nashik, Chandrapur, Jalna, Nanded Yavatmal, Amalner and Gondiya in Maharashtra; Jagdalpur in Chhatisgarh, Chiklikalan Parasia ,Chindwara Seoni Balaghat in Madhya Pradesh, Rajahmundry Nizamabad Ramagundam Eluru Warangal Khammam Kothagudem Karimnagar Bhimavaram Kakinada Adilabad , Bellampalle Bodhan Jagtial Kagaznagar Mancherial Mandamarri Narsapur Nirmal Palacole Palwancha Sangareddy Siddipet Siricilla Tadepalligudem and Tanuku in Andhra Pradesh; Bidar in Karnataka; and Jeypur in Orissa

15.2 Water Quality Monitoring in Godavari Basin

The water quality monitoring of the River Godavari are being done in the basin by the State Pollution Control Boards of Maharashtra, Andhra Pradesh, Madhya Pradesh and Orissa at 83 locations. The monitoring locations are on main stream of Godavari (35) and on tributaries are Manjara (Manjira) (6), Maner (2), Nira (1), Wainganga (8), Wardha (6), Kolar (1), Kanhan (3), Purna (3), Indravati (2), Sankhani (1), Nakkavagu (1), Vamsadhara (1), Darna (5), Bindusar (1), Penganga (3), Kinnersani (1), Sabari (1) and Wena (2). The ranges of water quality observed in Godavari basin with respect to pH, Conductivity, DO, BOD, COD, Total Coliform (TC) and Faecal Coliform (FC) are presented as minimum, maximum and mean value to assess the extent of water quality variation throughout the year. The detail list of water Quality Monitoring locations on River Godavari and its tributary is given in the Table15 (a).

Table 15 (a): Water Quality Monitoring locations on River Godavari

Name of Monitoring Station	Statename	Nameofwaterbody
Bindusara at Beed Near Intake Water Pump House, Paligaon, Beed	Maharashtra	Bindusar
Darna at Chehedi Pumping Station, Chehedi, Nashik	Maharashtra	Darna
Darna River at Aswali (Darna Dam), Lgatpuri, Nashik	Maharashtra	Darna
Darna at MES Site Pumping Station, Bhagur, Nashik	Maharashtra	Darna
Darna at Bhagur Pumping Stn Near Pandhurli Bridge, Bhagur, Nashik	Maharashtra	Darna
Darna River at Sansari , Nashik	Maharashtra	Darna
Godavari at Mancherial	Andhra Pradesh	Godavari
Godavari at Polavaram	Andhra Pradesh	Godavari
Godavari at Rajahmundry U/s	Andhra Pradesh	Godavari
Godavari at Rajahmundry D/s	Andhra Pradesh	Godavari
Godavari, D/s of Ramanugundam	Andhra Pradesh	Godavari

Godavari at Basara, Adilabad	Andhra Pradesh	Godavari
Godavari at Mancherial, Near Rly Bdg B/c of Rallavagu	Andhra Pradesh	Godavari
Godavari at Ramagundam D/s, Near FCI Intake Well, Karimnagar	Andhra Pradesh	Godavari
Godavari at Godavarikhani, Near Bathing Ghat, Karimnagar	Andhra Pradesh	Godavari
Godavari at Ramagundam U/s , Karimnagar	Andhra Pradesh	Godavari
Godavari at Kamalpur U/s M/S AP Rayons Ltd. Well, Warangal	Andhra Pradesh	Godavari
Godavari at Kamalpur D/s,M/SAP Rayons Ltd.Discharge Pt,Warangal	Andhra Pradesh	Godavari
Godavari at Bhadrachalam U/s Bathing Ghat, Khammam	Andhra Pradesh	Godavari
Godavari at Bhadrachalam D/s Bathing Ghat, Khammam	Andhra Pradesh	Godavari
Godavari at Burgampahad, Khammam	Andhra Pradesh	Godavari
Godavari at Rajamundry U/s of Nalla Channel	Andhra Pradesh	Godavari
Godavari at Rajamundry D/s of Nalla Channel	Andhra Pradesh	Godavari
Godavari at Dhalegaon	Maharashtra	Godavari
Godavari at U/s of Gangapur Dam,Nasikra	Maharashtra	Godavari
Godavari at Panchavati at Ramkund	Maharashtra	Godavari
Godavari at Raher	Maharashtra	Godavari
Godavari at Nanded	Maharashtra	Godavari
Godavari at Nasik D/s	Maharashtra	Godavari
Godavari at Jayakwadi Dam, Aurnagabad	Maharashtra	Godavari
Godavari at Latur Water Intake Near Pump House at Dhamegaon	Maharashtra	Godavari
Godavari at U/s of Paithan at Paithan Intake Pump House, Jayakwadi	Maharashtra	Godavari
Godavari River at D/s of Paithan at Pathegaon Bridge.	Maharashtra	Godavari
Godavari at U/s of Aurangabad Reservoir, Kaigaon Tokka Nr Kaigaon Bdg	Maharashtra	Godavari
Godavari River at Jalna Intake Water Pump House, Shahabad.	Maharashtra	Godavari
Godavari River Near Someshwar Temple.	Maharashtra	Godavari
Godavari River at Hanuman Ghat, Nashik City.	Maharashtra	Godavari
Godavari River Near Tapovan.	Maharashtra	Godavari
Godavari at Kapila- Godavari Confluence Pt, Tapovan.	Maharashtra	Godavari
Godavari River at Saikheda.	Maharashtra	Godavari
Godavari River at Nandur- Madmeshwar Dam.	Maharashtra	Godavari
Indravati A/c Dantewada River, Nelsonnar, Dantewada.	Chhattisgarh	Indravati
Indravati B/c Godavari at Bhopalpatnam, Dantewada	Chhattisgarh	Indravati
Kanhan D/s of Nagpur	Maharashtra	Kanhan
Kanhan River U/s of M/S Vidharbha Paper Mill, Sinora.	Maharashtra	Kanhan
Kanhan River D/s of M/S Vidharbha Paper Mill, Sinora.	Maharashtra	Kanhan
Kinnerasani A/c of KTPS Ash Pond Effluents, Khammam	Andhra Pradesh	Kinnersani
Kolar Before Confluence To Kanhan at Kamptee	Maharashtra	Kolar
Maner at Somnapalli	Andhra Pradesh	Maner
Maner at Warangal U/s	Andhra Pradesh	Maner
Manjera at Raipallu	Andhra Pradesh	Manjeera
Manjeera River - Near Ganapathi Sugars , Medak Dist	Andhra Pradesh	Manjeera
River Manjeera at Gowdicharla B/c With Nakkavagu	Andhra Pradesh	Manjeera
River Manjeera at Gowdicharla A/c With Nakkavagu	Andhra Pradesh	Manjeera
Manjra at D/s In Intake Point To Bidar City	Karnataka	Manjeera
Manjra at D/s of Latur Near Latur-Nanded Bridge, Bhatkheda, Latur	Maharashtra	Manjeera
River Nakkavagu, Bachugudem,Medak	Andhra Pradesh	Nakkavagu
Nira at Pulgaon Cotton Mill, Wardha	Maharashtra	Nira
Penganga Near Water Supply Scheme of Umarkhed MC Belkhed, Umarkhed, Yavatmal	Maharashtra	Penganga
Penganga D/s of Isapur Dam, Isapur, Pusad, Yavatmal	Maharashtra	Penganga
Penganga River at Mehkar-Buldana Road Bridge, Mehkar, Buldana	Maharashtra	Penganga
Purna at Dhupeshwar	Maharashtra	Purna
Purna River A/c of Morna, Nandura Village	Maharashtra	Purna
Purna Nr Achalpur-Amravati Rd Bdg,Asegaon,Chandur Bazar,Amravati	Maharashtra	Purna (Godavari)
Sabari at Kunavaram, Khammam	Andhra Pradesh	Sabari
Shankni River A/c Dankani River Dantewada.	Chhattisgarh	Shankni
River Vamshadhara, Kalingapatnam,Vizianagaram	Andhra Pradesh	Vamshadhara
Wainganga at Balaghat	Madhya Pradesh	Wainganga
Wainganga at Chindwara	Madhya Pradesh	Wainganga

Wainganga at Ashti	Maharashtra	Wainganga
Wainganga After Conluence With Kanhan	Maharashtra	Wainganga
Wainganga River D/s of Ellora Paper Mill.	Maharashtra	Wainganga
Wainganga River U/s of Ellora Paper Mill.	Maharashtra	Wainganga
Wainganga U/s of Gaurav Paper Mills, Near Jackwell.	Maharashtra	Wainganga
Wainganga D/s of Gaurav Paper Mills, Near Jackwell.	Maharashtra	Wainganga
Wardha at Rajura Bridge	Maharashtra	Wardha
Wardha at Confluence Point of Penganga & Wardha at Juad.	Maharashtra	Wardha
Wardha River D/s of ACC Ghuggus.	Maharashtra	Wardha
Wardha River at D/s of Erai River, Hadasti, Chandrapur	Maharashtra	Wardha
Wardha River at U/s of Erai River Hadasti,Chandrapur	Maharashtra	Wardha
Wardha River at U/s of Acc Ghuggus. ,Chandrapur	Maharashtra	Wardha
Wena River at U/s of Mohata Mills, Near Railway Bridge, Hinganghat	Maharashtra	Wena
Wena at D/s of Mohata Mills, Nr Rd Brg On Hinganghat-Wadner Road	Maharashtra	Wena

15.2.1 Water Quality of River Godavari

Water quality of River Godavari is presented in Annexure-I Table 15.1. The summary of water quality of River Godavari with respect to pH, Conductivity, Dissolved oxygen (DO), Biochemical Oxygen Demand (BOD), Total Coliform (TC) and Faecal Coliform (FC) is given below:

pH: -

- The criteria for pH is 6.5 to 8.5.
- pH is observed in the range of 6.0 to 9.2.
- Lower values of pH are found at
  - Rajahmundary U/s & D/s Nalla Channel (6.0)
  - Rajahmundary D/s (6.3) in Andhra Pradesh
  - Near Tapovan (6.2) in Maharashtra
- Higher values of pH are found at
  - D/s of Paithan (9.2)
  - Nashik D/s, Hunuman Ghat at Nashik and Near Tapovan (8.9)
  - Kapila Godavari Confluence Point at Tapovan (8.8)
  - U/s of Gangapur Dam at Nashik (8.7) in Maharashtra
  - D/s of Ramagundam and Ramagundam D/s near FCI Intake well at Karimnagar (8.9)
  - Mancherial and Ramagundam U/s (8.8)
  - Mancherial near Rly Bdg B/c of Rallavagu (8.7)
  - Bhadrachalam U/s (8.6) in Andhra Pradesh

Conductivity: -

- The criteria of conductivity for irrigation is 2250 µmhos/cm.
- Conductivity varies from 115 to 3169 µmhos/cm.
- Highest value of conductivity is observed at Jalna Intake Water Pump House, Shahabad in Maharashtra.

Dissolved Oxygen: -

- The criteria for DO should be more than 4 mg/l.
- DO ranges from 3.2 to 12.3 mg/l.

- The minimum value of DO (3.2 mg/l) is observed at Raher in Maharashtra and Burgampahad, Khammam in Andhra Pradesh.
- Other location having low DO are
    - Dhalegaon (3.3 mg/l)
    - Jayakwadi Dam, Aurangabad (3.4 mg/l)
    - U/s & D/s of Paithan (3.7 mg/l)
    - Latur Water Intake at Jayakwadi & Jalna Intake Water Pump House (3.8 mg/l)
    - Kapila-Godavari Confluence point at Tapovan and U/s of Aurangabad at Kaigaon Tokka (3.9 mg/l) in Maharashtra
    - Godavarikhani (3.5 mg/l)
    - Basara at Adilabad (3.9 mg/l) in Andhra Pradesh

Biochemical Oxygen Demand: -

- The criteria for BOD should be less than 3 mg/l.
- BOD ranges from 0.0 to 26 mg/l.
- High values of BOD are observed at
    - Tapovan (26.0 mg/l)
    - Kapila-Godavari confluence point at Tapovan (22.0 mg/l)
    - Panchavati at Ramkund (16 mg/l)
    - Nasik D/s and Hanumanghat at Nashik (14 mg/l)
    - U/s of Gangapur Dam at Nasik (12.0 mg/l)
    - Near Someshwar Temple (10 mg/l)
    - Saikheda (8.0 mg/l)
    - Dhalegaon (7.2 mg/l)
    - Nandur at Madmeshwar Dam (7.0 mg/l)
    - Paithan U/s and Jayakwadi Dam at Aurangabad (5.4 mg/l)
    - Paithan D/s, Jalna at Shahabad and U/s Aurangabad at Kaigaon Tokka (5.2 mg/l)
    - Latur (5.0 mg/l) in Maharashtra
    - Godavarikhani (7.0 mg/l)
    - Mancherial B/c to Raghavallu (6.4 mg/l)
    - Ramagundam U/s (6.3 mg/l)
    - Burgampahad (6.2 mg/l)
    - Mancherial (5.8 mg/l)
    - Ramagundam D/s (5.1 mg/l)
    - Bhadrachalam (5.0 mg/l) in Andhra Pradesh

Faecal Coliform: -

- Faecal Coliform should be less than 2500 MPN/100ml.
- Faecal Coliform (FC) ranges from Nil to 340MPN/100 ml and is confirming with the water quality criteria.

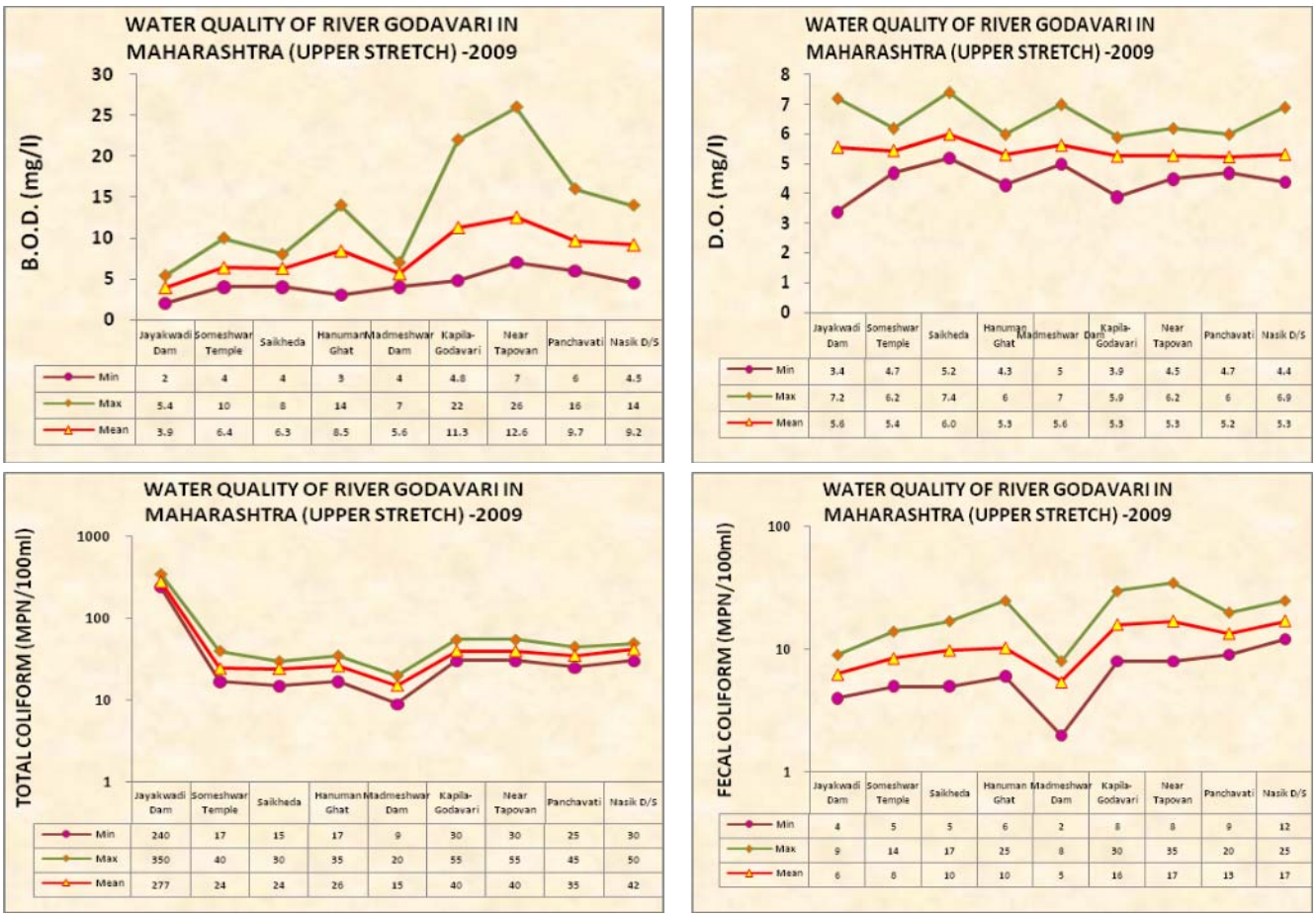
Total Coliform: -

- Total Coliform should be less than 5000 MPN/100ml.
- The Total Coliform count varies from 5 to 16,000 MPN/100 ml.
- High values are observed at

- Mancherial (16,000 MPN/100 ml)
- Bhadrachalam D/s (9000 MPN/100 ml) in Andhra Pradesh.

The sources of pollution are domestic and industrial wastewater from the large cities in Maharashtra and Mancherial, Ramgundam, Rajahmundry, Godavarikhani, Burgampahad and Bhadrachalam cities in Andhra Pradesh. Depletion of dissolved oxygen has been reported due to addition of sewage into the river besides bacteriological pollution.To maintain the desired water quality uses of the River Godavari in these stretches, the municipalities need to treat their wastewater and the industries to install effluent treatment plants (ETP) before discharging into the rivers for sustaining the desired level of water quality. The spatial trend of River Godavari with respect to BOD, DO, Total Coliform, Faecal Coliform and Conductivity is presented in Figure 15.1 to 15.4.

Figure 15.1: Spatial Trend of River Godavari in Maharashtra (Upper Stretch)



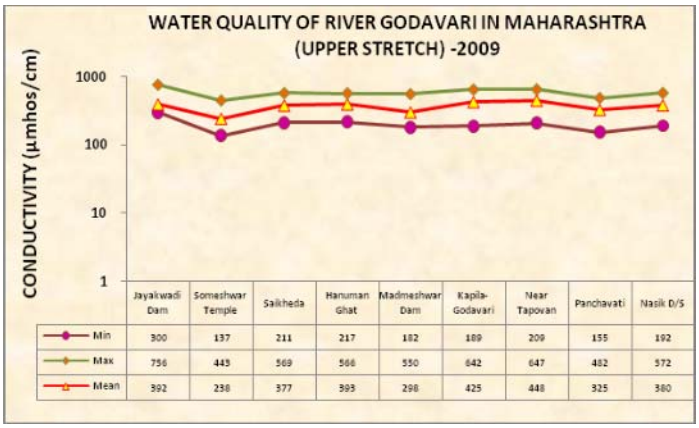
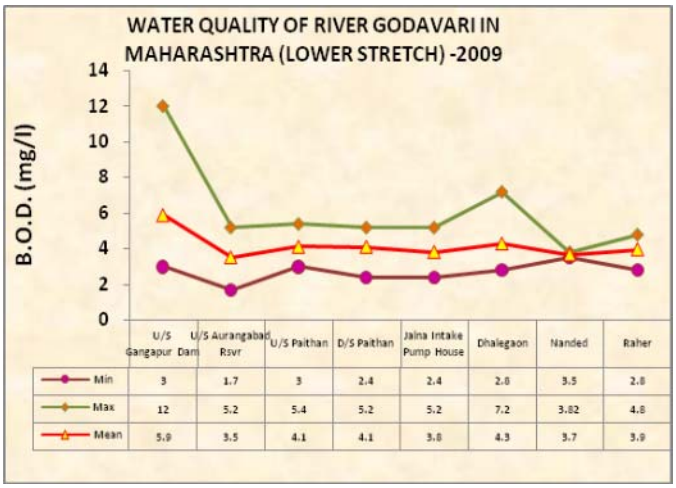
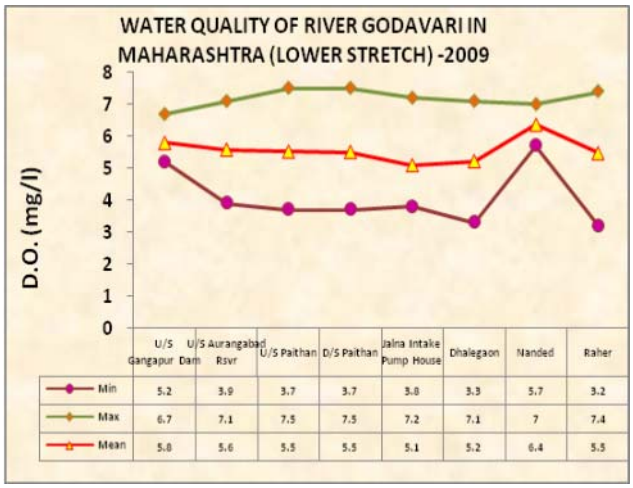
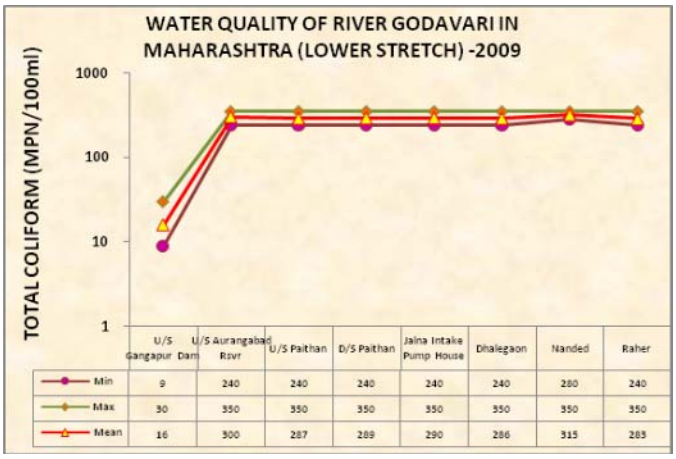
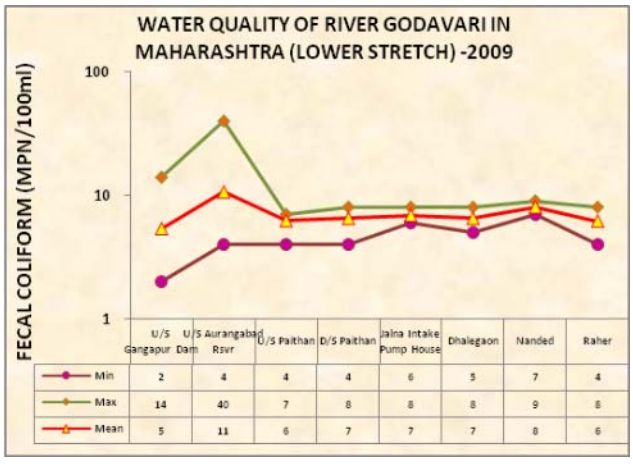


Figure 15.2: Spatial Trend of River Godavari in Maharashtra (Lower Stretch)









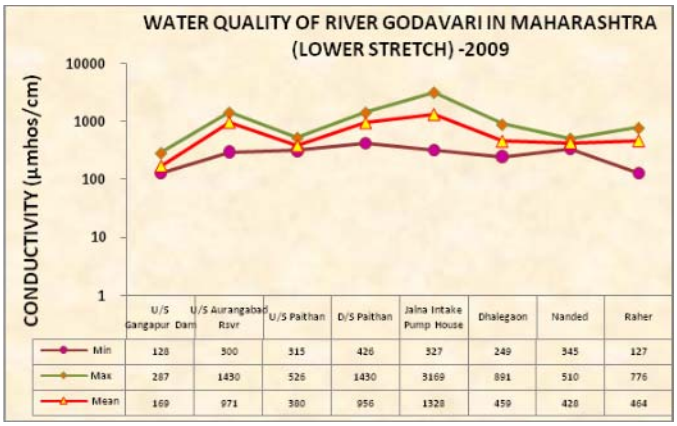
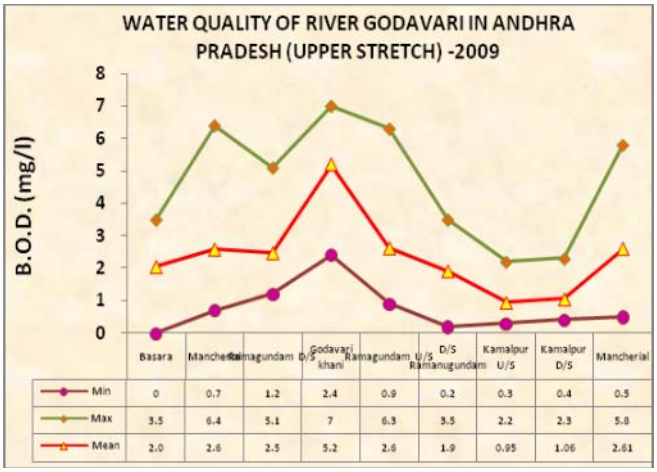
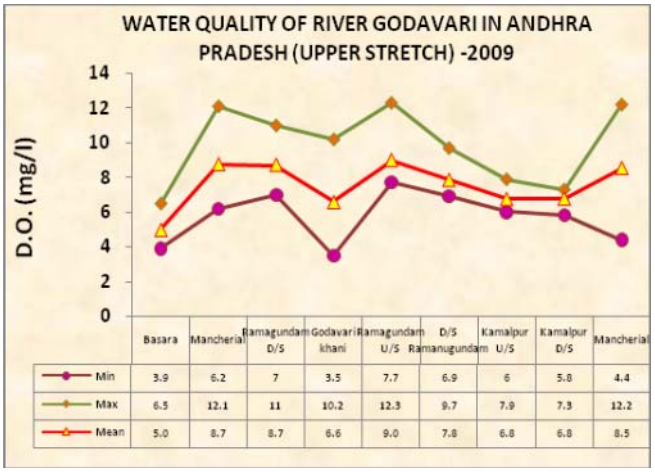
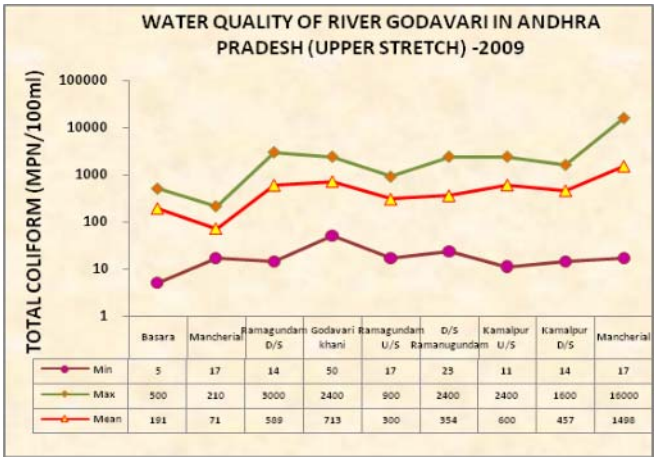
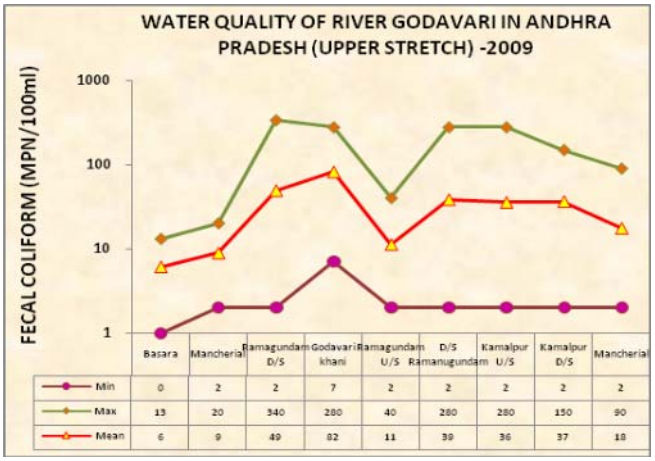


Figure 15.3: Spatial Trend of River Godavari in Andhra Pradesh (Upper Stretch)









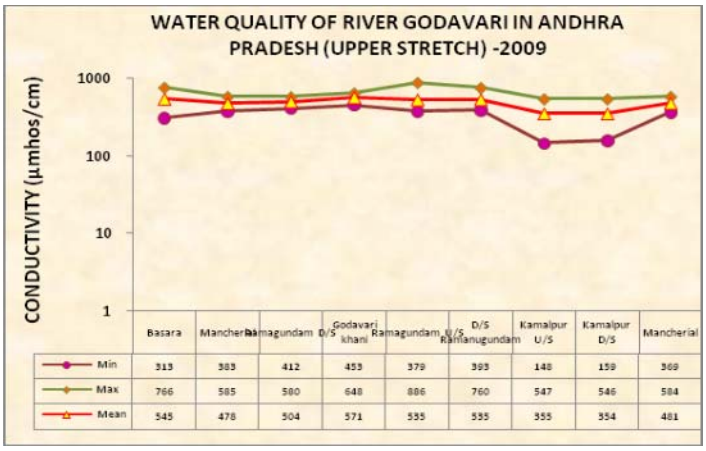
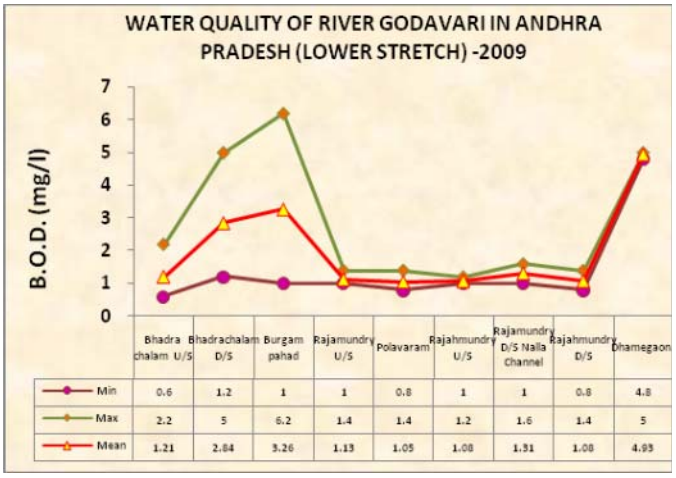
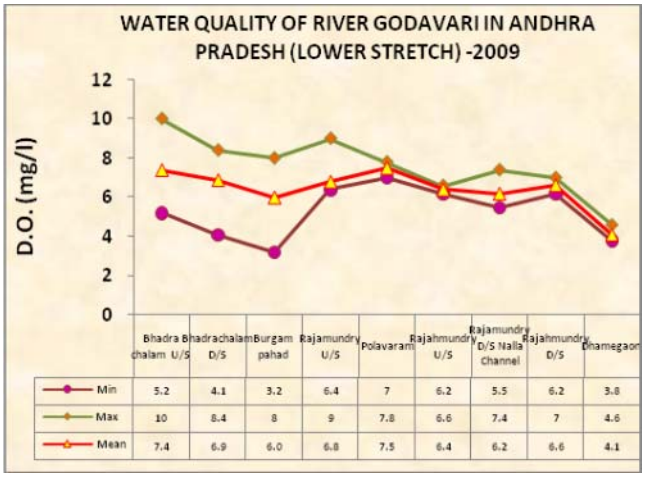
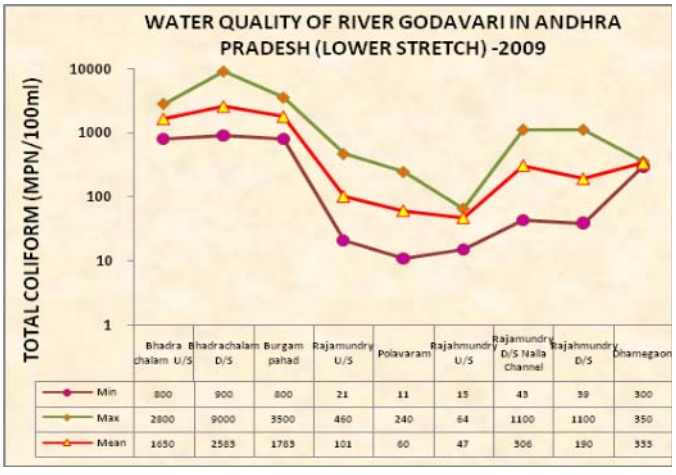
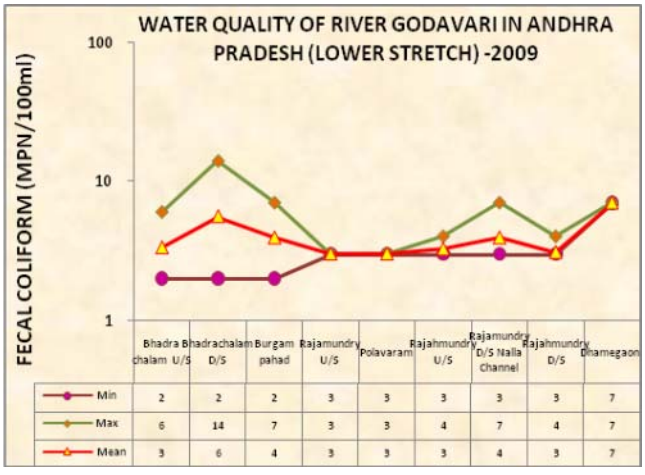


Figure 15.4: Spatial Trend of River Godavari in Andhra Pradesh (Lower Stretch)









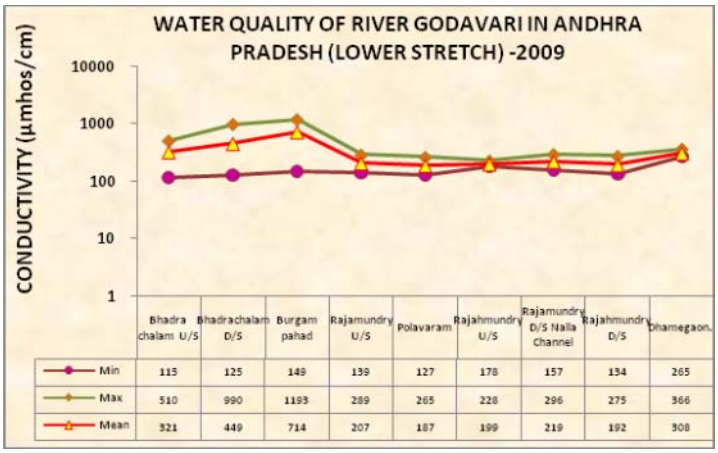
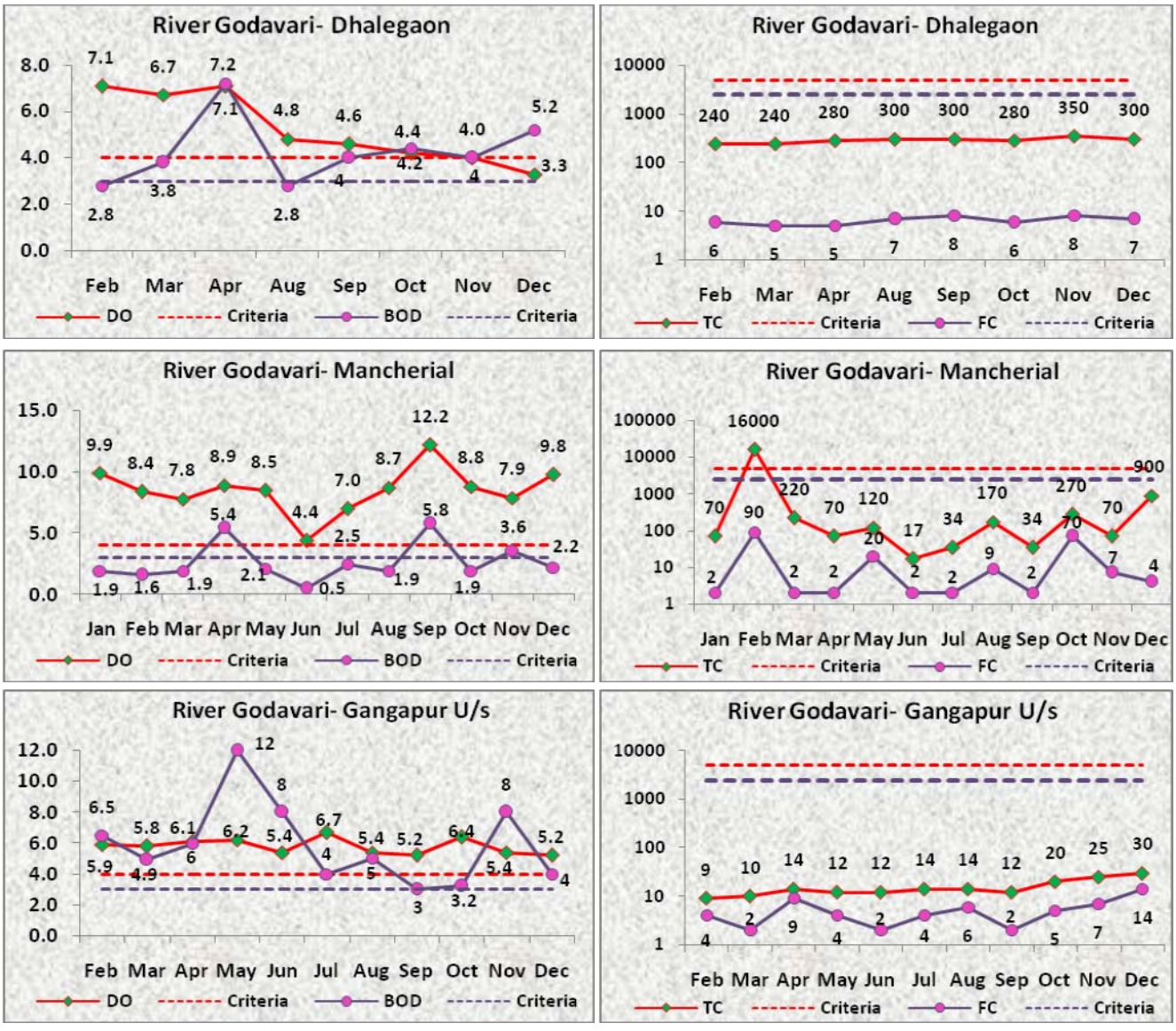
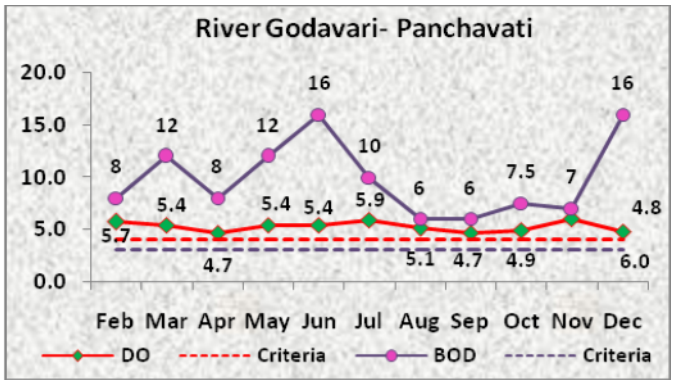
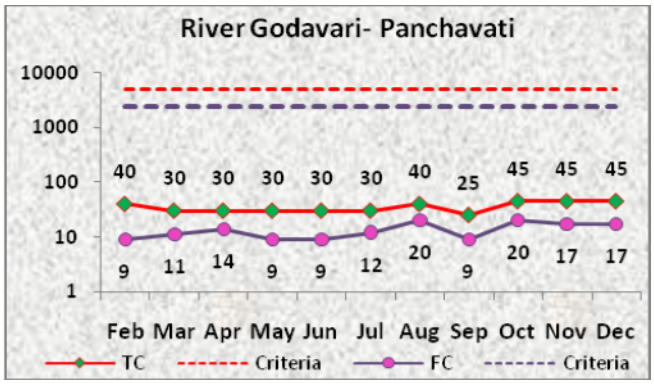


Figure 15.5: Temporal Trend of Water Quality of River Godavari




River Godavari- Panchavati
20.0
15.0
10.0
5.0
0.0
8 12 8 12 16 10 6 6 7.5 7 16
5.7 5.4 4.7 5.4 5.4 5.9 5.1 4.7 4.9 6.0 4.8
Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
DO
Criteria
BOD
Criteria


River Godavari- Panchavati
10000
1000
100
10
1
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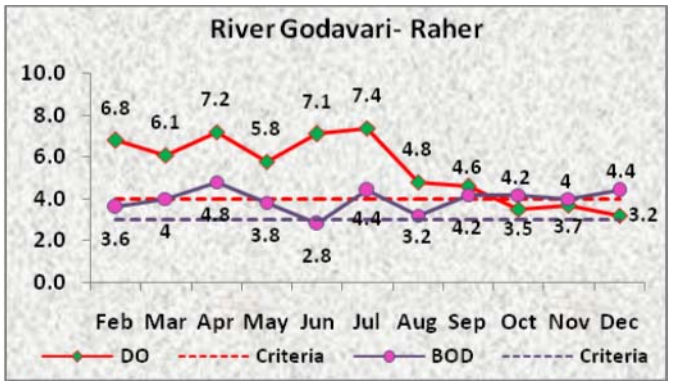
9 11 14 9 9 12 20 9 20 17 17
Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
TC
Criteria
FC
Criteria


River Godavari- Raher
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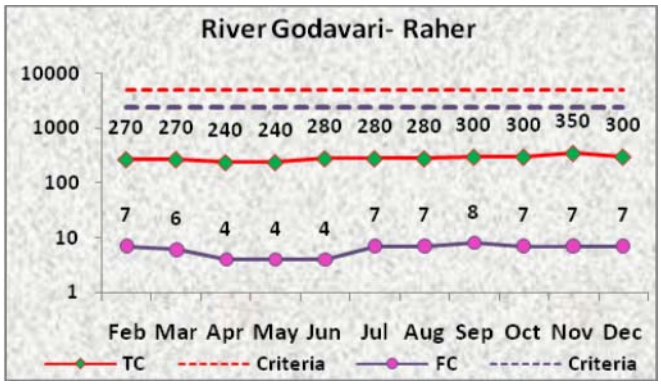
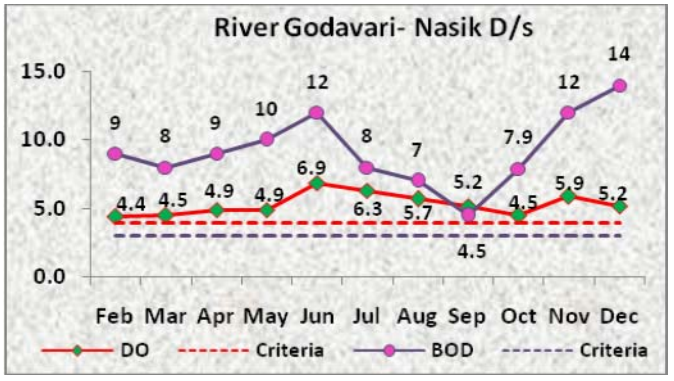
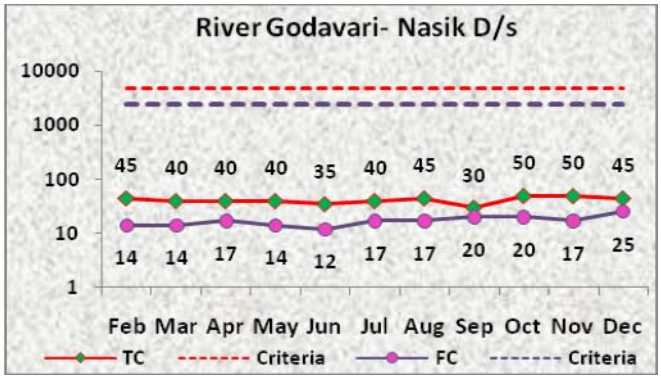
8.0
6.0
4.0
2.0
0.0
6.8 6.1 7.2 5.8 7.1 7.4 4.8 4.6 4.2 4 4.4
3.6 4 4.8 3.8 2.8 4.4 3.2 4.2 3.5 3.7 3.2
Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
DO
Criteria
BOD
Criteria


River Godavari- Raher
10000
1000
100
10
1
270 270 240 240 280 280 280 300 300 350 300
7 6 4 4 4 7 7 8 7 7 7
Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
TC
Criteria
FC
Criteria


River Godavari- Nasik D/s
15.0
10.0
5.0
0.0
9 8 9 10 12 8 7 5.2 7.9 12 14
4.4 4.5 4.9 4.9 6.9 6.3 5.7 4.5 4.5 5.9 5.2
Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
DO
Criteria
BOD
Criteria


River Godavari- Nasik D/s
10000
1000
100
10
1
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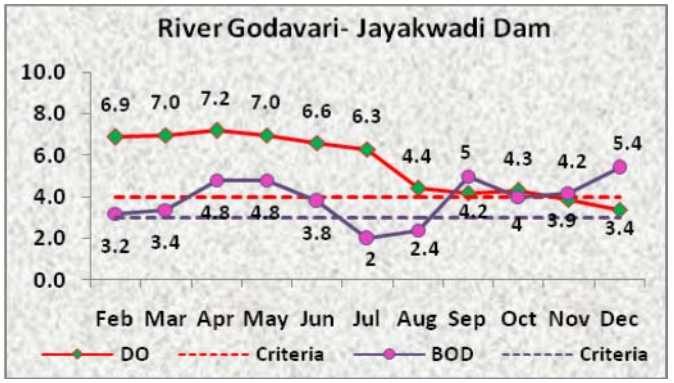
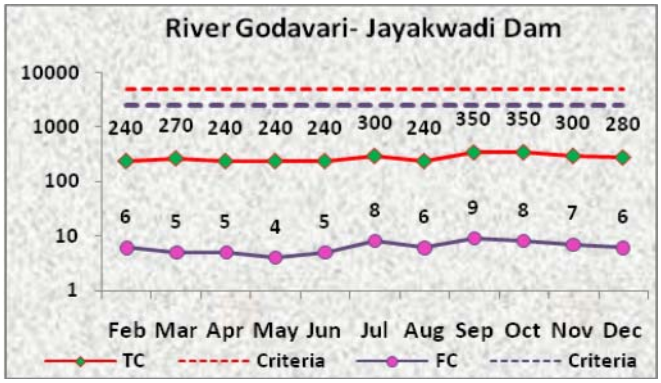
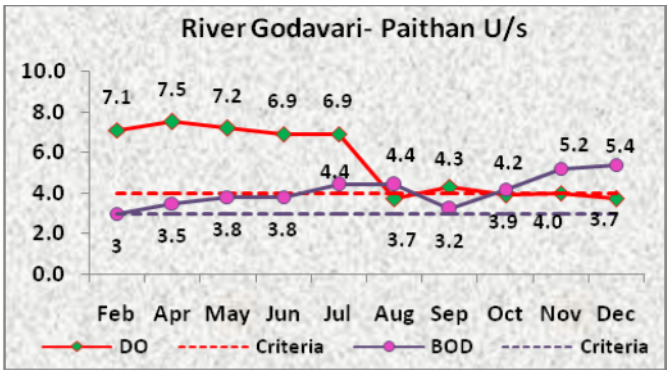
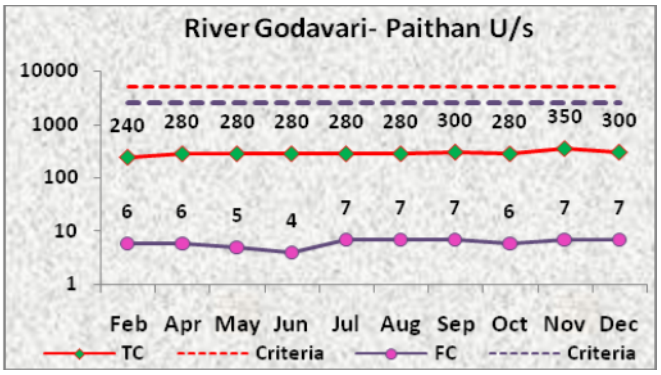
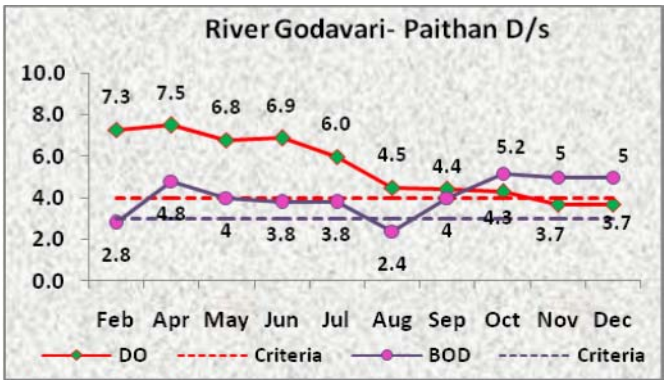
14 14 17 14 12 17 17 20 20 17 25
Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
TC
Criteria
FC
Criteria

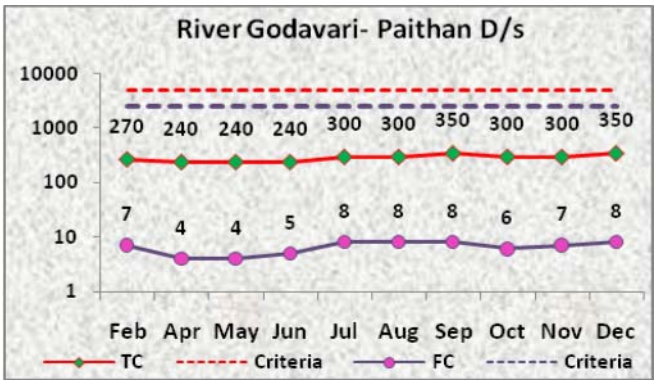

River Godavari- Jayakwadi Dam
10.0
8.0
6.0
4.0
2.0
0.0
6.9 7.0 7.2 7.0 6.6 6.3 4.4 5 4.3 4.2 5.4
3.2 3.4 4.8 4.8 3.8 2 2.4 4.2 4 3.9 3.4
Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
DO
Criteria
BOD
Criteria

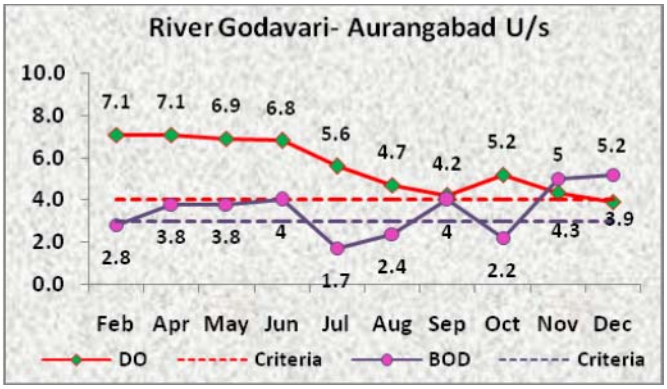

River Godavari- Jayakwadi Dam
10000
1000
100
10
1
240 270 240 240 240 300 240 350 350 300 280
6 5 5 4 5 8 6 9 8 7 6
Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
TC
Criteria
FC
Criteria

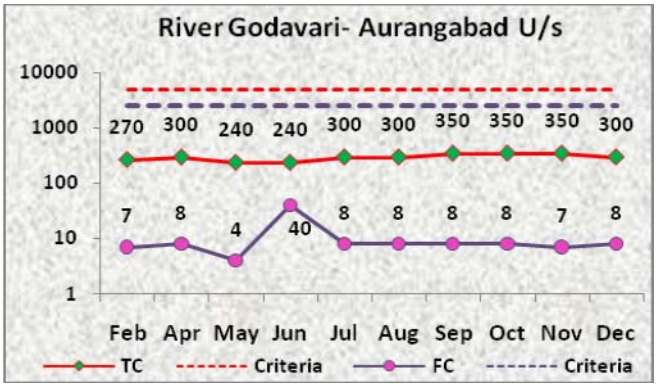

River Godavari- Paithan U/s
10.0
8.0
6.0
4.0
2.0
0.0
7.1 7.5 7.2 6.9 6.9 4.4 4.3 4.2 5.2 5.4
3 3.5 3.8 3.8 4.4 3.7 3.2 3.9 4.0 3.7
Feb Apr May Jun Jul Aug Sep Oct Nov Dec
DO
Criteria
BOD
Criteria

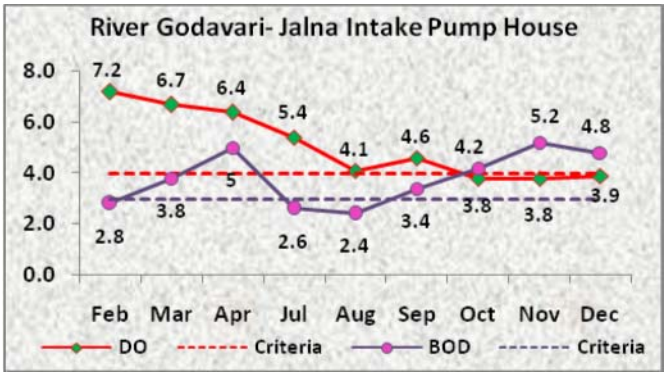

River Godavari- Paithan U/s
10000
1000
100
10
1
240 280 280 280 280 280 300 280 350 300
6 6 5 4 7 7 7 6 7 7
Feb Apr May Jun Jul Aug Sep Oct Nov Dec
TC
Criteria
FC
Criteria

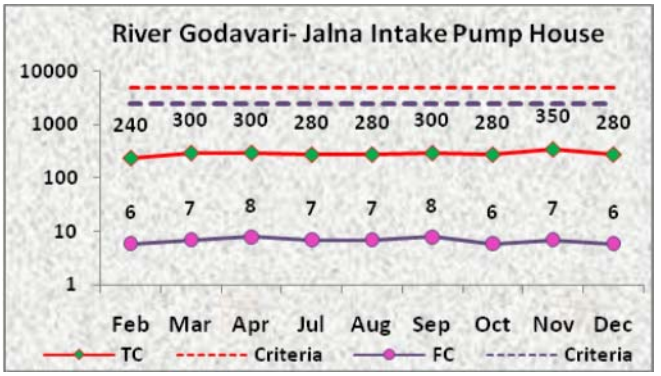

River Godavari- Paithan D/s
10.0
8.0
6.0
4.0
2.0
0.0
7.3 7.5 6.8 6.9 6.0 4.5 4.4 5.2 5 5
2.8 4.8 4 3.8 3.8 2.4 4 4.3 3.7 3.7
Feb Apr May Jun Jul Aug Sep Oct Nov Dec
DO
Criteria
BOD
Criteria

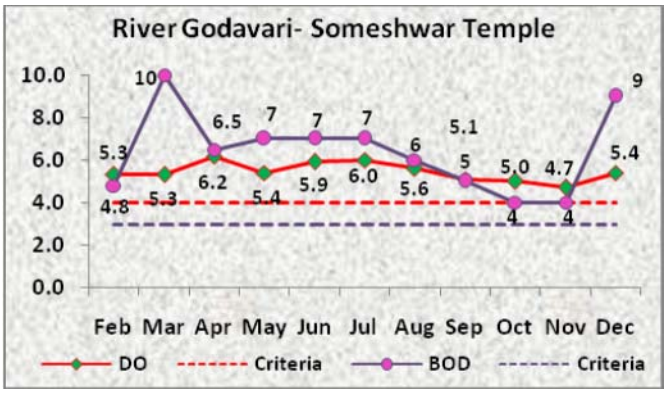

River Godavari- Paithan D/s
10000
1000
100
10
1
270 240 240 240 300 300 350 300 300 350
7 4 4 5 8 8 8 6 7 8
Feb Apr May Jun Jul Aug Sep Oct Nov Dec
TC
Criteria
FC
Criteria

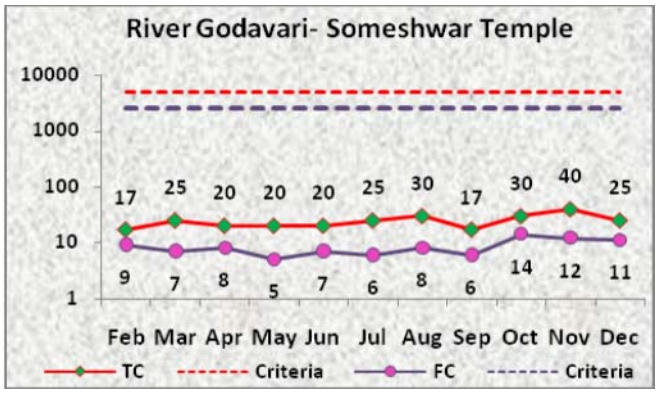

River Godavari- Aurangabad U/s
10.0
8.0
6.0
4.0
2.0
0.0
7.1 7.1 6.9 6.8 5.6 4.7 4.2 5.2 5 5.2
2.8 3.8 3.8 4 1.7 2.4 4 2.2 4.3 3.9
Feb Apr May Jun Jul Aug Sep Oct Nov Dec
DO
Criteria
BOD
Criteria

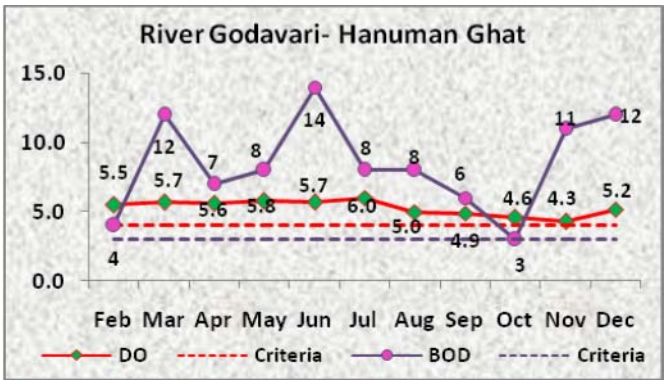

River Godavari- Aurangabad U/s
10000
1000
100
10
1
270 300 240 240 300 300 350 350 350 300
7 8 4 40 8 8 8 8 7 8
Feb Apr May Jun Jul Aug Sep Oct Nov Dec
TC
Criteria
FC
Criteria

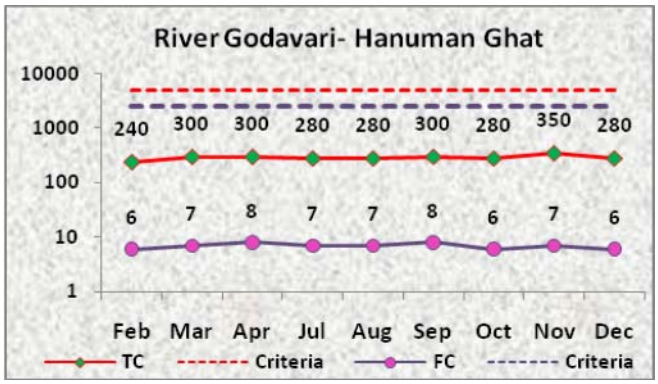

River Godavari- Jalna Intake Pump House
8.0
6.0
4.0
2.0
0.0
7.2 6.7 6.4 5.4 4.1 4.6 4.2 5.2 4.8
2.8 3.8 5 2.6 2.4 3.4 3.8 3.8 3.9
Feb Mar Apr Jul Aug Sep Oct Nov Dec
DO
Criteria
BOD
Criteria

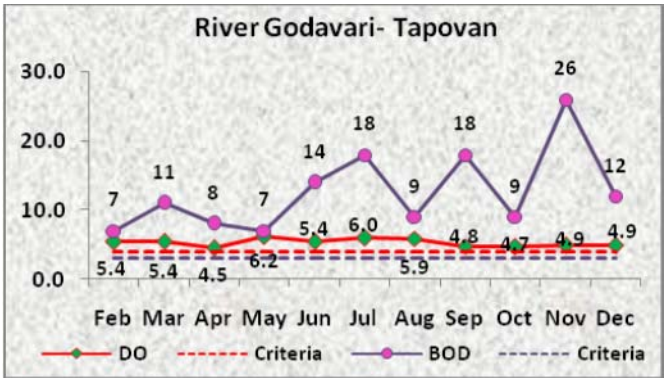

River Godavari- Jalna Intake Pump House
10000
1000
100
10
1
240 300 300 280 280 300 280 350 280
6 7 8 7 7 8 6 7 6
Feb Mar Apr Jul Aug Sep Oct Nov Dec
TC
Criteria
FC
Criteria

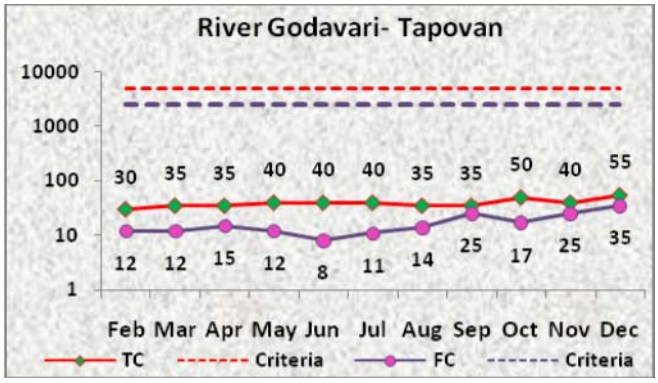

River Godavari- Someshwar Temple
10.0
8.0
6.0
4.0
2.0
0.0
Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
DO
Criteria
BOD
Criteria

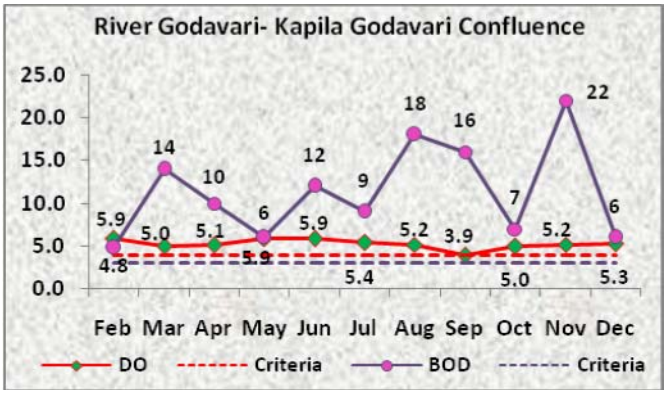

River Godavari- Someshwar Temple
10000
1000
100
10
1
Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
TC
Criteria
FC
Criteria

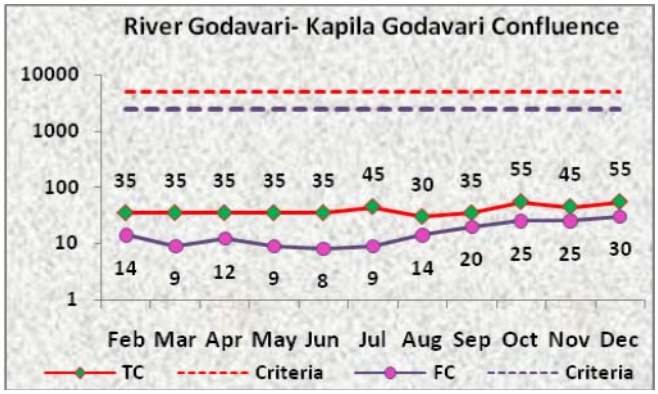

River Godavari- Hanuman Ghat
15.0
10.0
5.0
0.0
Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
DO
Criteria
BOD
Criteria

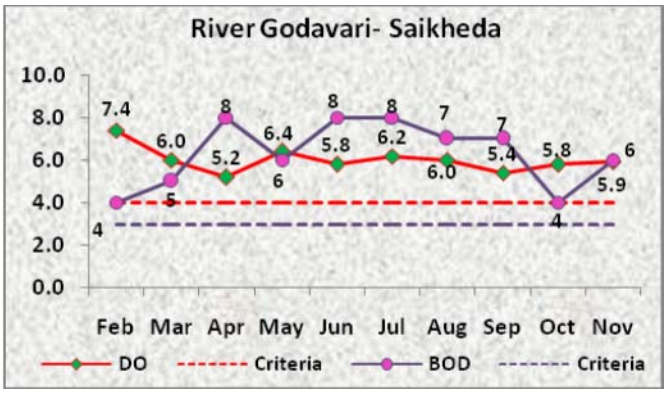

River Godavari- Hanuman Ghat
10000
1000
100
10
1
Feb Mar Apr Jul Aug Sep Oct Nov Dec
TC
Criteria
FC
Criteria

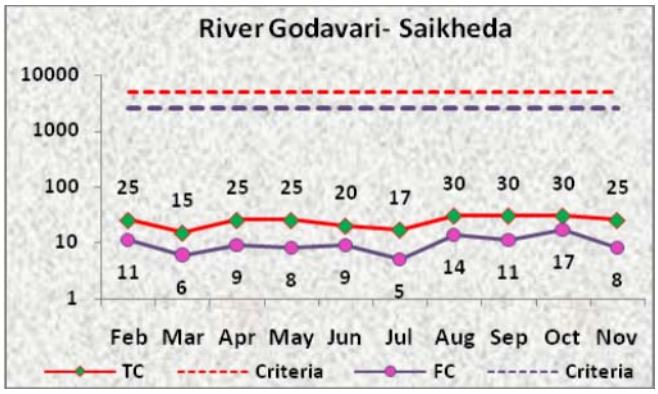

River Godavari- Tapovan
30.0
20.0
10.0
0.0
Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
DO
Criteria
BOD
Criteria

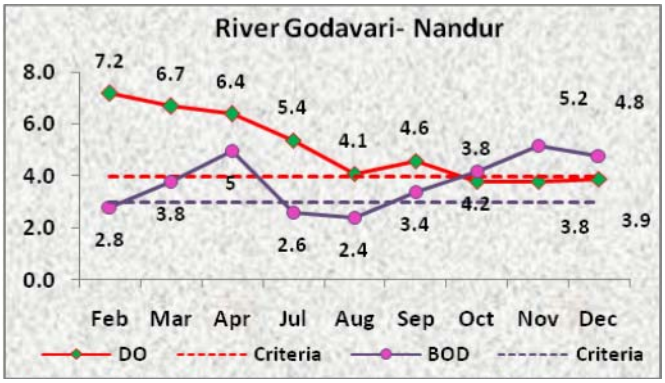

River Godavari- Tapovan
10000
1000
100
10
1
Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
TC
Criteria
FC
Criteria

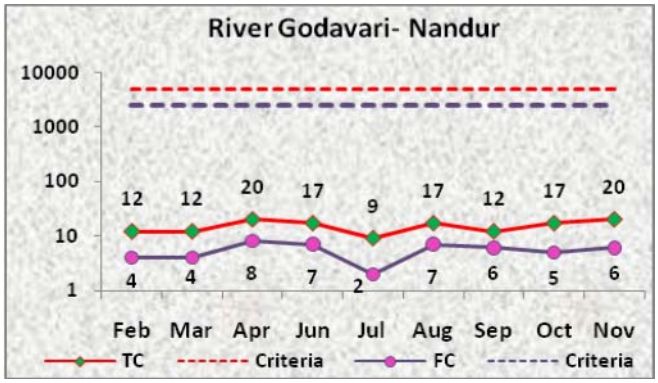

River Godavari- Kapila Godavari Confluence
25.0
20.0
15.0
10.0
5.0
0.0
Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
DO
Criteria
BOD
Criteria

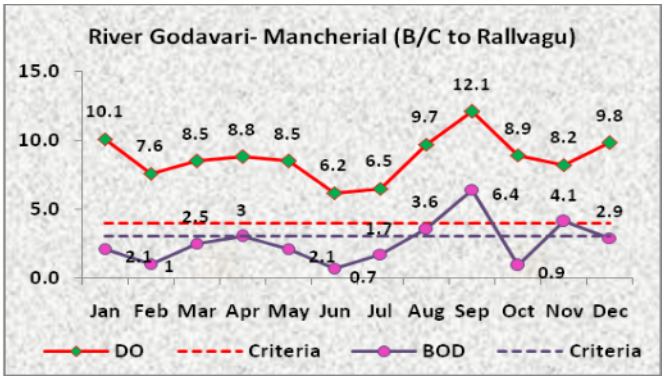

River Godavari- Kapila Godavari Confluence
10000
1000
100
10
1
Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
TC
Criteria
FC
Criteria

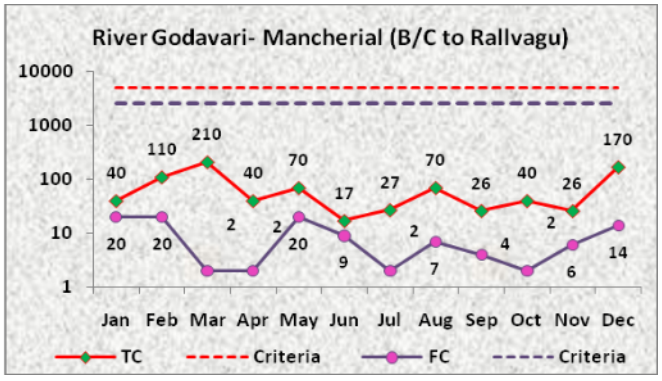

River Godavari- Saikheda
10.0
8.0
6.0
4.0
2.0
0.0
7.4
6.0
5.2
6.4
5.8
6.2
6.0
5.4
5.8
5.9
8
5
6
8
8
7
7
4
4
Feb Mar Apr May Jun Jul Aug Sep Oct Nov
DO
Criteria
BOD
Criteria

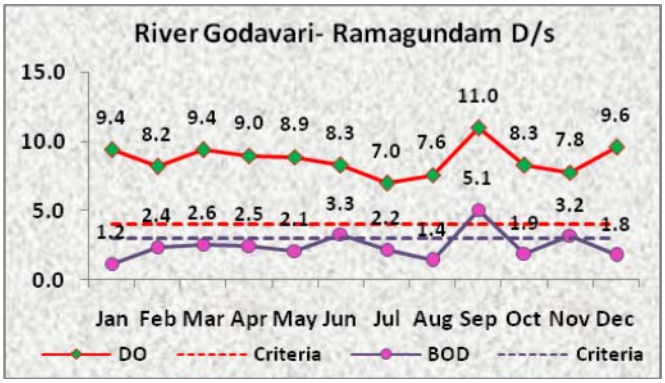

River Godavari- Saikheda
10000
1000
100
10
1
25
15
25
25
20
17
30
30
30
25
11
6
9
8
9
5
14
11
17
8
Feb Mar Apr May Jun Jul Aug Sep Oct Nov
TC
Criteria
FC
Criteria

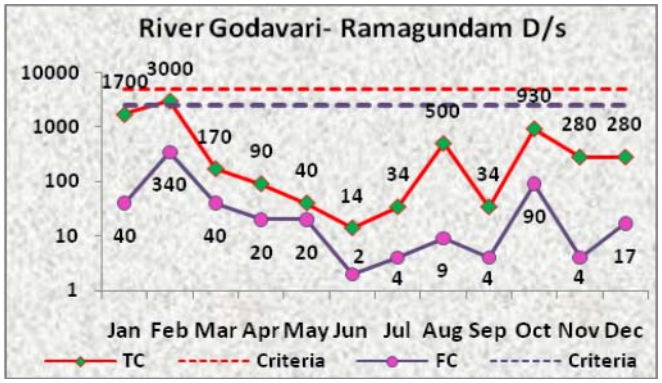

River Godavari- Nandur
8.0
6.0
4.0
2.0
0.0
7.2
6.7
6.4
5.4
4.1
4.6
3.8
5.2
4.8
3.9
2.8
3.8
5
2.6
2.4
3.4
4.2
3.8
Feb Mar Apr Jul Aug Sep Oct Nov Dec
DO
Criteria
BOD
Criteria

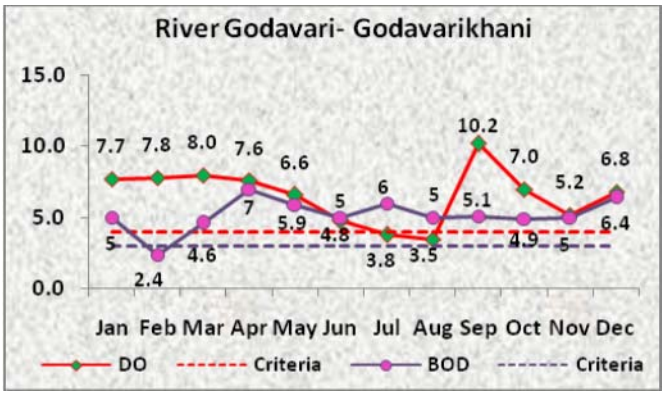

River Godavari- Nandur
10000
1000
100
10
1
12
12
20
17
9
17
12
17
20
4
4
8
7
2
7
6
5
6
Feb Mar Apr Jun Jul Aug Sep Oct Nov
TC
Criteria
FC
Criteria

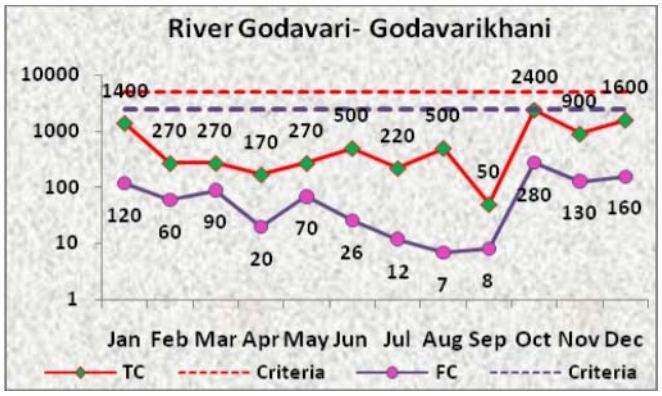

River Godavari- Mancherial (B/C to Rallvagu)
15.0
10.0
5.0
0.0
10.1
7.6
8.5
8.8
8.5
6.2
6.5
9.7
12.1
8.9
8.2
9.8
2.1
1
2.5
3
2.1
0.7
1.7
3.6
6.4
0.9
4.1
2.9
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
DO
Criteria
BOD
Criteria

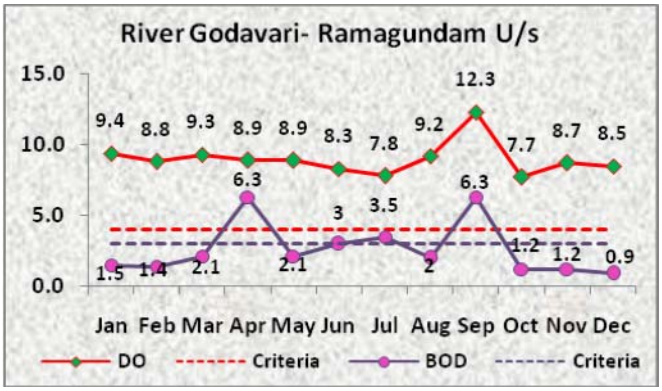

River Godavari- Mancherial (B/C to Rallvagu)
10000
1000
100
10
1
40
110
210
40
70
17
27
70
26
40
26
170
20
20
2
2
20
9
2
7
4
2
6
14
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
TC
Criteria
FC
Criteria

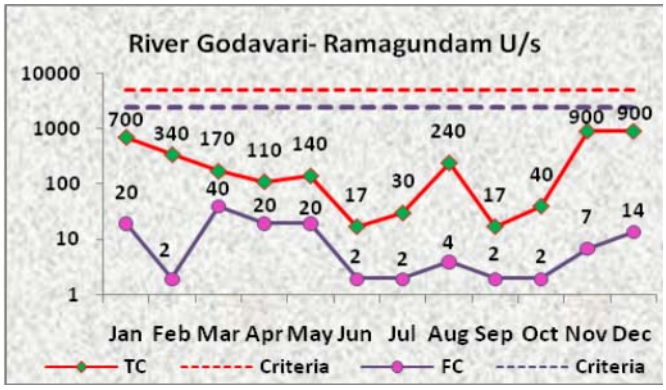

River Godavari- Ramagundam D/s
15.0
10.0
5.0
0.0
9.4
8.2
9.4
9.0
8.9
8.3
7.0
7.6
11.0
8.3
7.8
9.6
1.2
2.4
2.6
2.5
2.1
3.3
2.2
1.4
5.1
1.9
3.2
1.8
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
DO
Criteria
BOD
Criteria

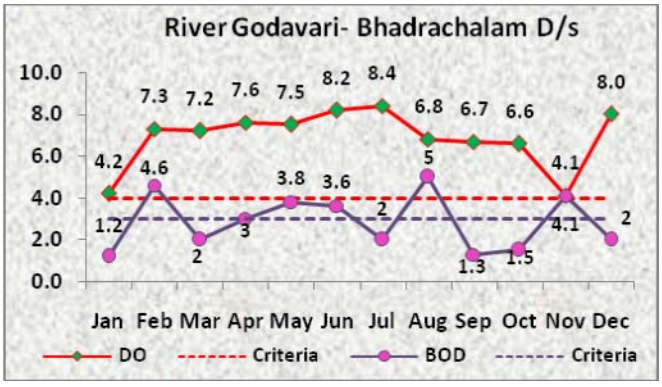

River Godavari- Ramagundam D/s
10000
1000
100
10
1
1700
3000
170
90
40
14
34
500
34
930
280
280
40
340
40
20
20
2
4
9
4
90
4
17
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
TC
Criteria
FC
Criteria

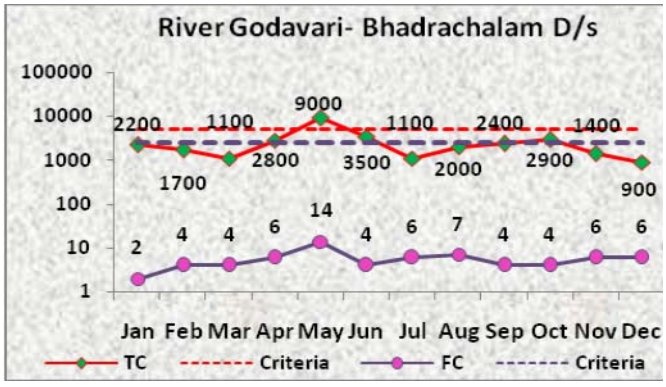

River Godavari- Godavarikhani
15.0
10.0
5.0
0.0
7.7 7.8 8.0 7.6 6.6 5 6 5 10.2 7.0 5.2 6.8
5 2.4 4.6 7 5.9 4.8 3.8 3.5 5.1 4.9 5 6.4
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
DO
Criteria
BOD
Criteria

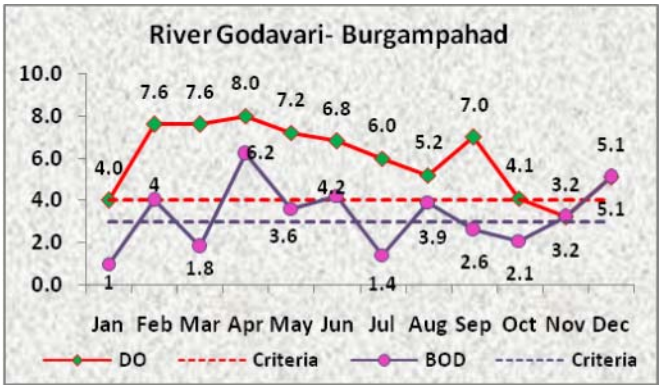

River Godavari- Godavarikhani
10000
1000
100
10
1
1400 270 270 170 270 500 220 500 50 2400 900 1600
120 60 90 20 70 26 12 7 8 280 130 160
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
TC
Criteria
FC
Criteria

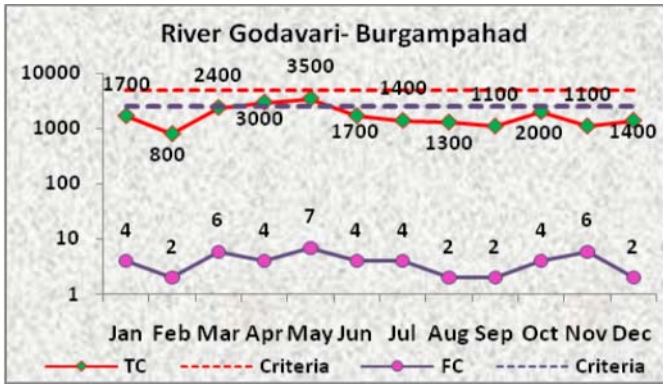

River Godavari- Ramagundam U/s
15.0
10.0
5.0
0.0
9.4 8.8 9.3 8.9 8.9 8.3 7.8 9.2 12.3 7.7 8.7 8.5
1.5 1.4 2.1 6.3 2.1 3 3.5 2 6.3 1.2 1.2 0.9
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
DO
Criteria
BOD
Criteria


River Godavari- Ramagundam U/s
10000
1000
100
10
1
700 340 170 110 140 17 30 240 17 40 900 900
20 2 40 20 20 2 2 4 2 2 7 14
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
TC
Criteria
FC
Criteria


River Godavari- Bhadrachalam D/s
10.0
8.0
6.0
4.0
2.0
0.0
4.2 7.3 7.2 7.6 7.5 8.2 8.4 6.8 6.7 6.6 4.1 8.0
1.2 4.6 2 3 3.8 3.6 2 5 1.3 1.5 4.1 2
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
DO
Criteria
BOD
Criteria


River Godavari- Bhadrachalam D/s
100000
10000
1000
100
10
1
2200 1100 9000 1100 2400 1400
1700 2800 3500 2000 2900 900
2 4 4 6 14 4 6 7 4 4 6 6
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
TC
Criteria
FC
Criteria


River Godavari- Burgampahad
10.0
8.0
6.0
4.0
2.0
0.0
4.0 7.6 7.6 8.0 7.2 6.8 6.0 5.2 7.0 4.1 3.2 5.1
1 4 1.8 6.2 3.6 4.2 1.4 3.9 2.6 2.1 3.2 5.1
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
DO
Criteria
BOD
Criteria


River Godavari- Burgampahad
10000
1000
100
10
1
1700 2400 3500 1400 1100 1100
800 3000 1700 1300 2000 1400
4 2 6 4 7 4 4 2 2 4 6 2
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
TC
Criteria
FC
Criteria

15.2.2 Water Quality of tributary streams Indravati, Shankini, Manjeera, Maner, Wardha, Wainganga, Kolar, Kanhan, Purna & Nira

Manjira is a tributary of Godavari River. Nizam Sagar was constructed across the Manjira River between Achampeta and Banjapalle villages of the Nizamabad district in Andhra Pradesh, India. The most outstanding feature of the project is the gigantic masonry dam sprawling across the river for 3 kilometers. Singur Reservoir on Manjira River in Medak District is a sustained drinking water source of Hyderabad, India. The Manjira river is the main drinking water source for the Medak and Nizamabad districts as well as the adjoining twin cities of Hyderabad and Secunderabad.

The Wardha River is one of the biggest rivers in Vidarbha region in India. Wardha originates at an altitude of 777 meters Satpura Range near Multai in Betul District of Madhya Pradesh. From the origin it flows 32 km in Madhya pradesh and then enters into Maharastra. After traversing 528 km, it joins Wainganga together called Pranhita, which ultimately flows into the Godavari River.

The Wainganga originates about 12 km from Mundara village of Seoni district in the southern slopes of the Satpura Range of Madhya Pradesh, and flows south through Madhya Pradesh and Maharashtra in a very winding course of approximatedly 576 kilometers. After joining the Wardha, the united stream, known as the Pranahita, ultimately falls into the River Godavari. The river has developed extensive flood plains with sweeping graceful meanders and low alluvial flats and meander terraces. The river has high banks 10 to 15 m on either side. The Wainganga river receives numerous tributaries on either bank and drains the western, central and eastern regions of the Chandrapur, Gadchiroli, Bhandara, Gondia and Nagpur districts of Maharashtra. The chief tributaries of the Wainganga are the Garhavi, Khobragadi, Kathani and Potphondi on the western bank and Andhari on the eastern bank.

Water quality of tributary streams Indravati, Shankini, Manjeera, Maner, Wardha, Wainganga, Kolar, Kanhan, Purna & Nira is presented in Annexure-I Table 15.2. The summary of water quality of tributary streams Indravati, Shankini, Manjeera, Maner, Wardha, Wainganga, Kolar, Kanhan, Purna & Nira with respect to pH, Conductivity, Dissolved oxygen (DO), Biochemical Oxygen Demand (BOD), Total Coliform (TC) and Faecal Coliform (FC) is given below:

pH: -

- The criteria for pH is 6.5 to 8.5.
- pH is observed in the range of 6.7 to 8.9.
- Higher values of pH are found in
    - Nira at Pulgaon Cotton Mill (8.9)
    - River wainganga at Asthi (8.8)
    - Purna at Dhupeshwar (8.7)
    - Kanhan at U/s of M/s Vidarbha Paper Mills in Sinora and Wainganga at U/s of Gaurav Paper Mills near Jackwell & U/s of ACC Ghuggus (8.6) in Maharashtra

- River Manjeera at Ganapathy Sugars in Medak (8.9) and Raipallu (8.6) in Andhra Pradesh

Conductivity: -

- The criteria of conductivity for irrigation is 2250 µmhos/cm.
- Conductivity varies from 163 to 3087 µmhos/cm and is meeting the criteria.
- Conductivity is not meeting the desired criteria in River Purna A/c of Morna, Nandura Village in Maharashtra.

Dissolved Oxygen: -

- The criteria for DO should be more than 4 mg/l.
- DO ranges from 2.9 to 9.5 mg/l.
- The lower value of DO is observed in
  - River Manjeera at Ganapathy Sugars in Medak & Gowdicharla B/c to Nakkavagu (2.9 mg/l), Raipallu & Gowdicharla A/c to Nakkavagu (3.0 mg/l) in Andhra Pradesh
  - Kanhan at U/s of M/s Vidarbha Paper Mills in Sinora (3.0 mg/l)
  - Wainganga A/c with Kanhan and Wardha at Confluence point of Penganga & Wardha at Juad (3.4 mg/l) in Maharashtra

Biochemical Oxygen Demand: -

- The criteria for BOD should be less than 3 mg/l.
- BOD ranges from 0.0 to 32 mg/l.
- High values of BOD are observed in
  - River Wainganga A/c with Kanhan (32 mg/l)
  - Kanhan at Sinora D/s of M/S Vidharbha Paper Mills (27 mg/l)
  - Nira at Pulgaon Cotton Mills, Wardha (23 mg/l)
  - Wainganga D/s of Ellora Paper Mills (18 mg/l)
  - Kolar B/c Kanhan at Kamptee and Purna A/c of Morna at Nandura (16 mg/l)
  - Kanhan D/s of Nagpur (15 mg/l)
  - Wardha at D/s of ACC Ghuggus (14.4 mg/l)
  - Wainganga D/s of Gaurav Paper Mills near Jackwell (14 mg/l)
  - Wardha at Rajura Bridge (13.0 mg/l)
  - Kanhan at Sinora U/s of M/s Vidharbha Paper Mills (12 mg/l)
  - Kanhan U/s of Gaurav Paper Mills near Jackwell (10 mg/l)
  - Wainganga at Asthi (10 mg/l)
  - Wardha at confl. pt. of Penganga & Wardha at Juad (9.8 mg/l)
  - Purna at Dhupeshwar (7.0 mg/l)
  - Wainganga U/s of Ellora Paper Mills (6.8 mg/l)

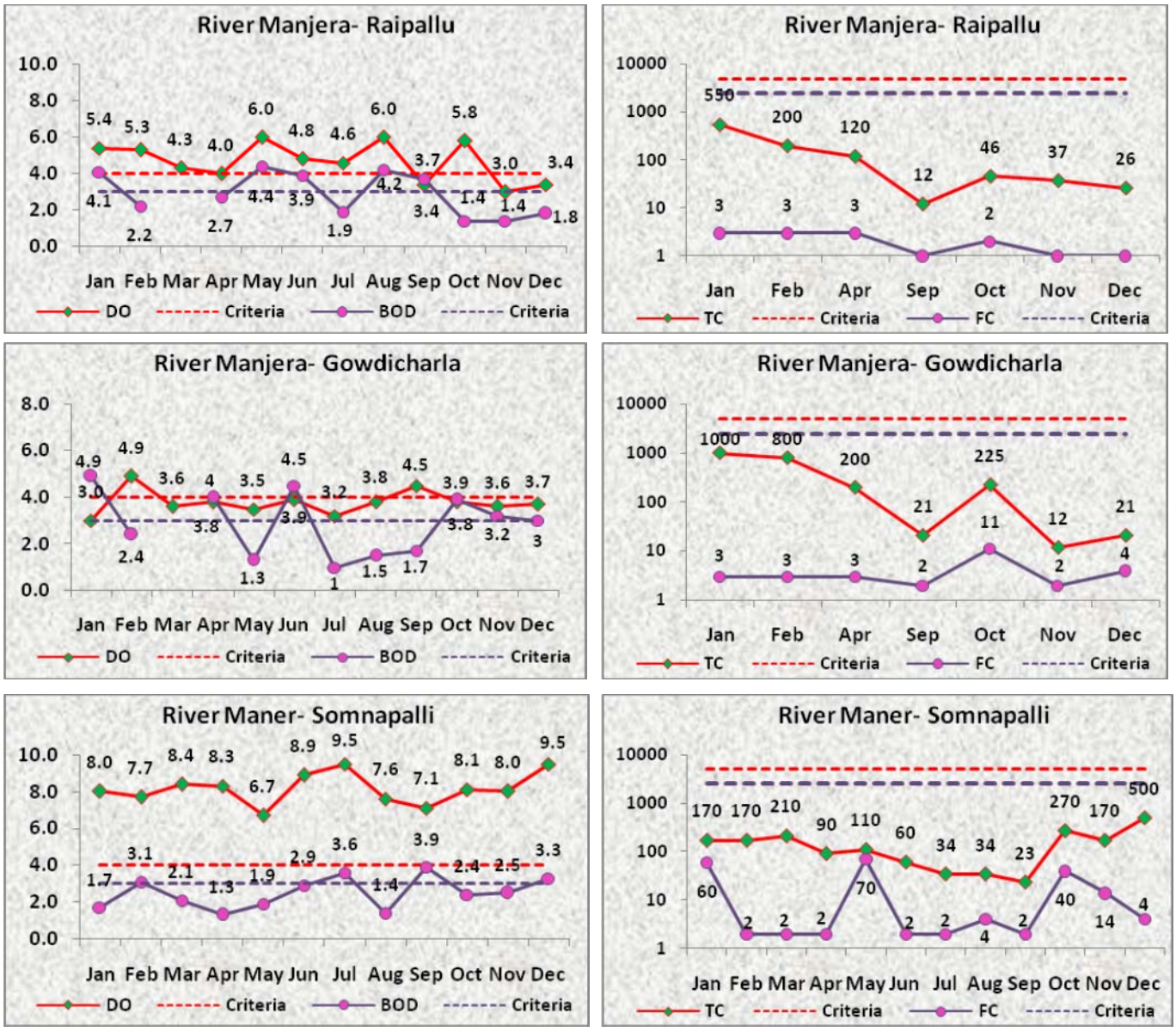
Faecal Coliform: -

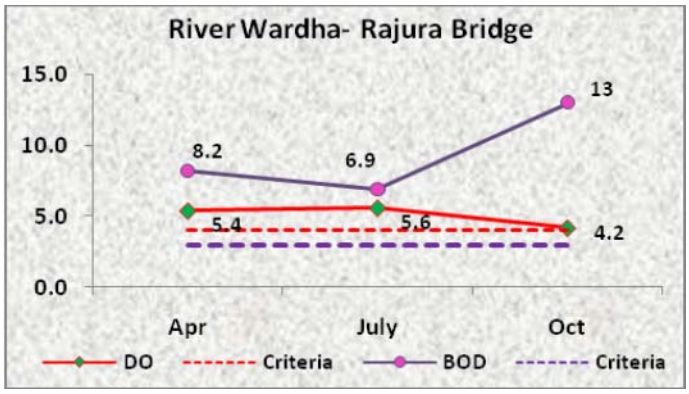
- Faecal Coliform should be less than 2500 MPN/100ml.
- Faecal Coliform (FC) ranges from Nil to 1100 MPN/100 ml and is confirming the water quality criteria.

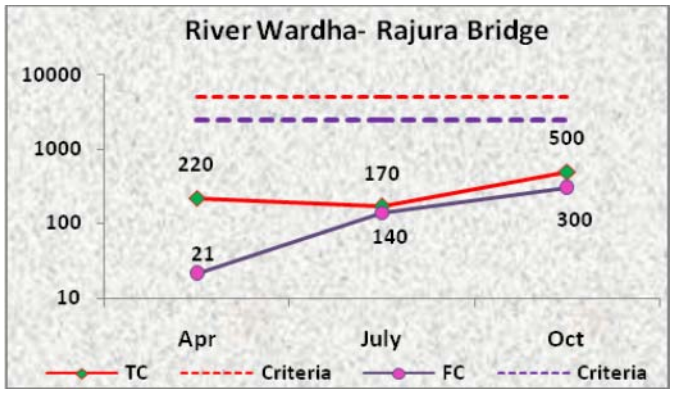
Total Coliform: -

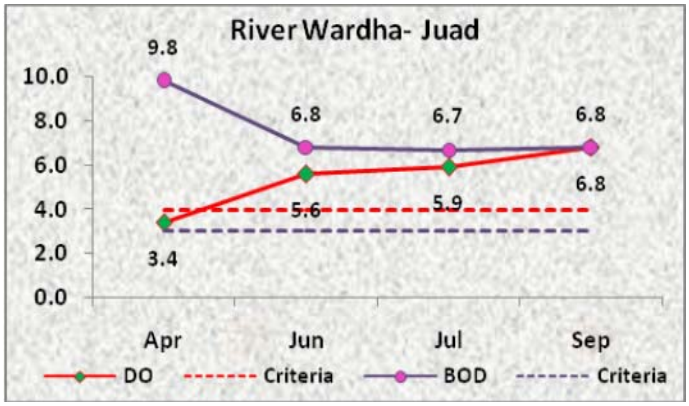
- Total Coliform should be less than 5000 MPN/100ml.
- The Total Coliform count varies from 2 to 2400 MPN/100 ml is confirming the water quality criteria.

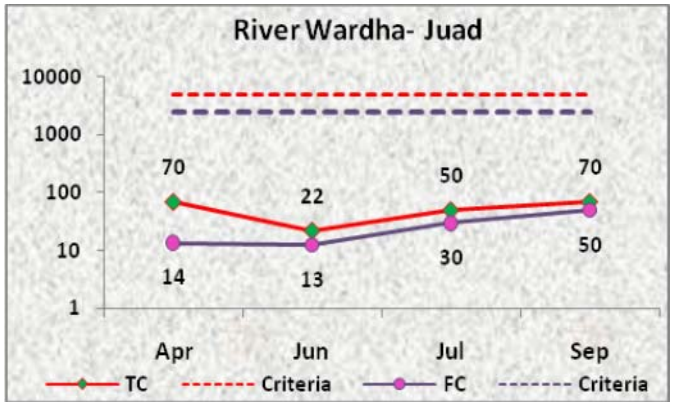
Figure 15.6: Temporal Trend of Water Quality of tributary streams Manjeera, Maner, Wardha, Wainganga, Kolar, Kanhan, Purna & Nira

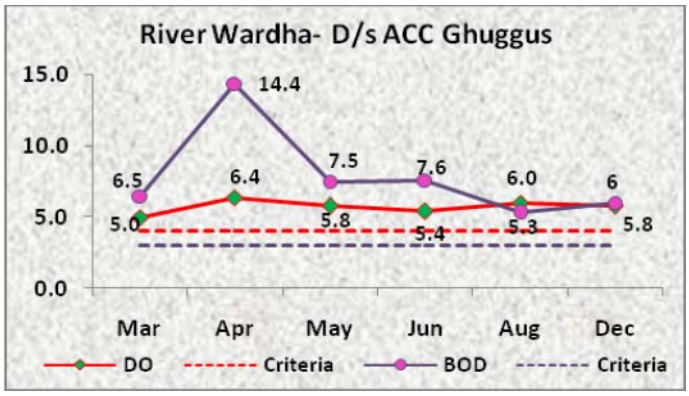


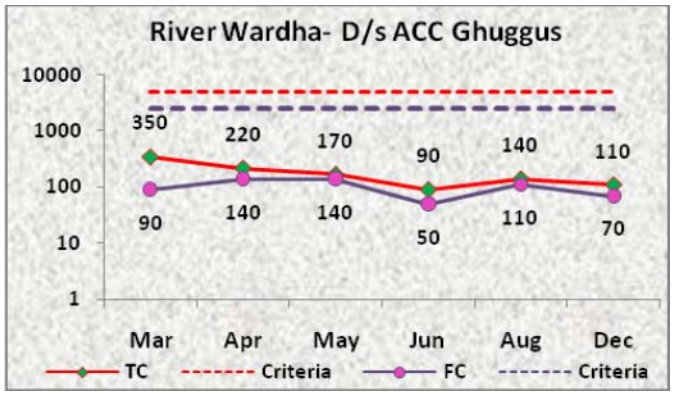

River Wardha- Rajura Bridge
15.0
10.0
5.0
0.0
8.2
6.9
13
5.4
5.6
4.2
Apr
July
Oct
DO
Criteria
BOD
Criteria

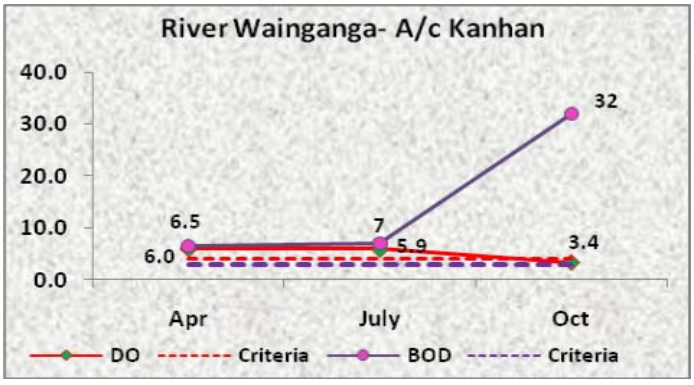

River Wardha- Rajura Bridge
10000
1000
100
10
220
170
500
21
140
300
Apr
July
Oct
TC
Criteria
FC
Criteria

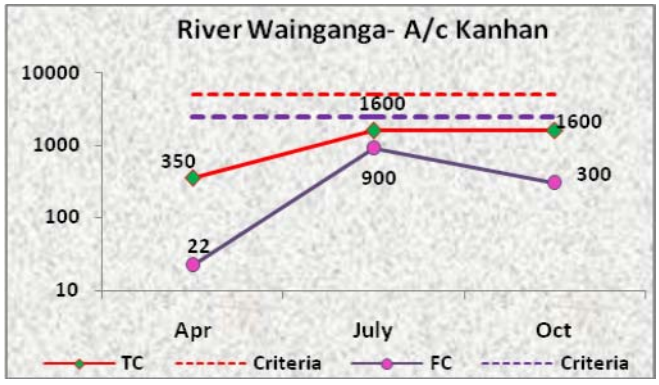

River Wardha- Juad
10.0
8.0
6.0
4.0
2.0
0.0
9.8
6.8
6.7
6.8
3.4
5.6
5.9
6.8
Apr
Jun
Jul
Sep
DO
Criteria
BOD
Criteria

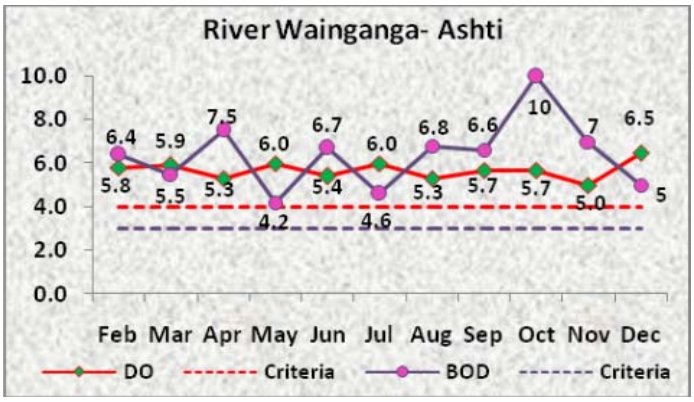

River Wardha- Juad
10000
1000
100
10
1
70
22
50
70
14
13
30
50
Apr
Jun
Jul
Sep
TC
Criteria
FC
Criteria

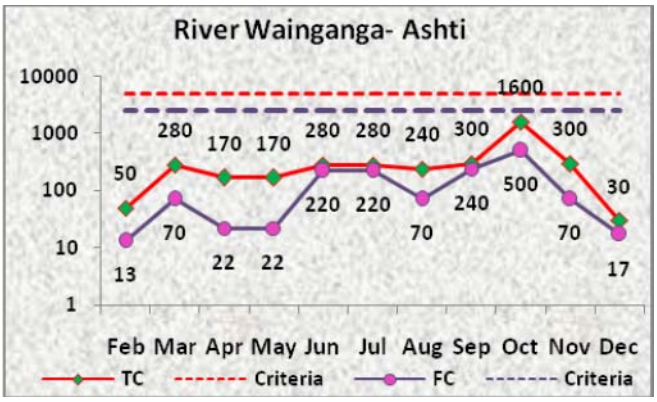

River Wardha- D/s ACC Ghuggus
15.0
10.0
5.0
0.0
14.4
6.5
6.4
7.5
7.6
6.0
6
5.0
5.8
5.4
5.3
5.8
Mar
Apr
May
Jun
Aug
Dec
DO
Criteria
BOD
Criteria

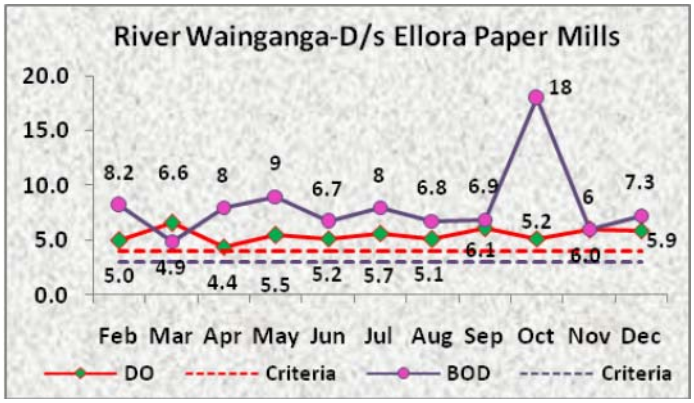

River Wardha- D/s ACC Ghuggus
10000
1000
100
10
1
350
220
170
90
140
110
90
140
140
50
110
70
Mar
Apr
May
Jun
Aug
Dec
TC
Criteria
FC
Criteria

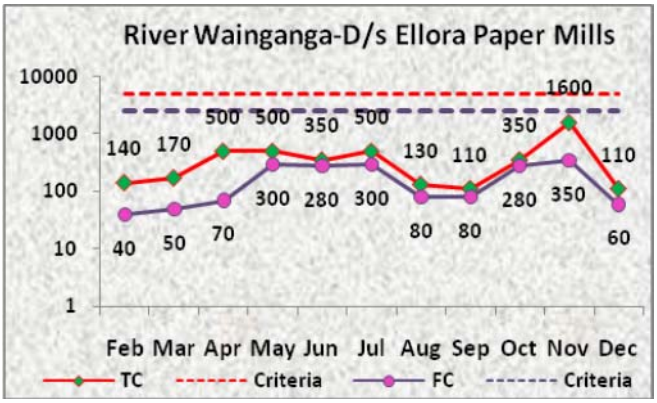

River Wainganga- A/c Kanhan
40.0
30.0
20.0
10.0
0.0
32
6.5
7
6.0
5.9
3.4
Apr
July
Oct
DO
Criteria
BOD
Criteria

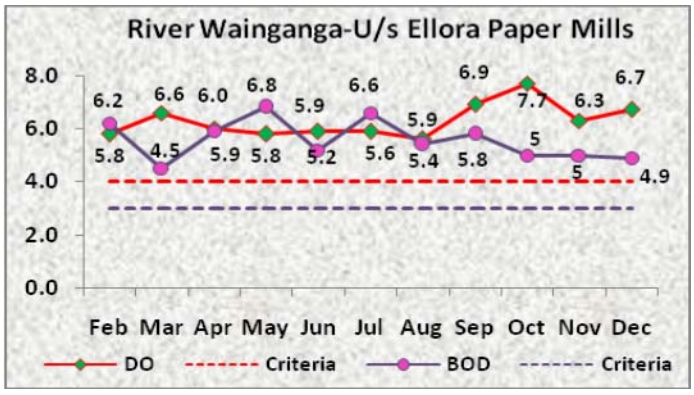

River Wainganga- A/c Kanhan
10000
1000
100
10
1600
1600
350
900
300
22
Apr
July
Oct
TC
Criteria
FC
Criteria

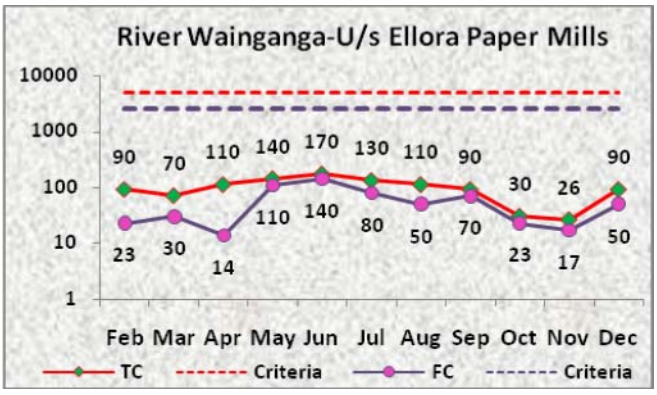

River Wainganga- Ashti
10.0
8.0
6.0
4.0
2.0
0.0
6.4 5.9 7.5 6.0 6.7 6.0 6.8 6.6 10 7 6.5
5.8 5.5 5.3 4.2 5.4 4.6 5.3 5.7 5.7 5.0 5
Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
DO
Criteria
BOD
Criteria

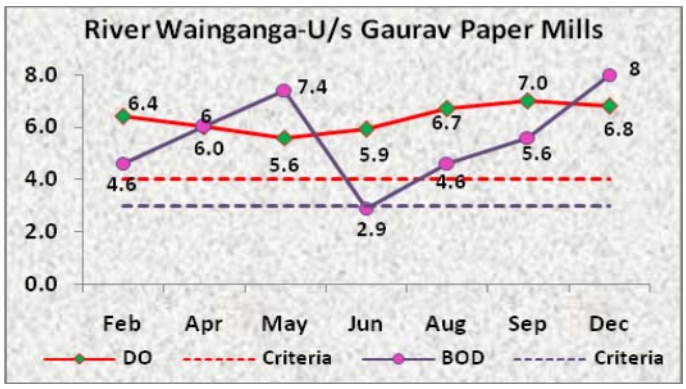

River Wainganga- Ashti
10000
1000
100
10
1
50 280 170 170 280 280 240 300 1600 300 30
13 70 22 22 220 220 70 240 500 70 17
Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
TC
Criteria
FC
Criteria

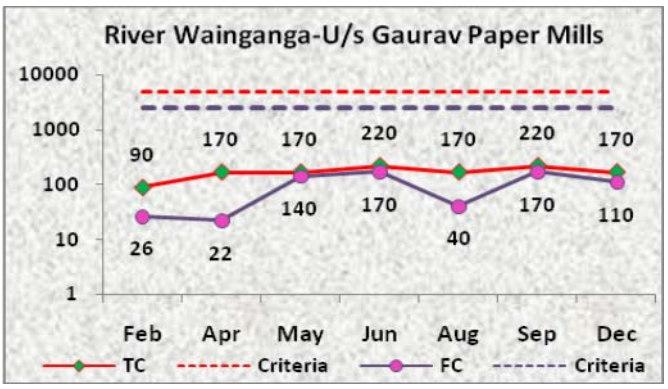

River Wainganga-D/s Ellora Paper Mills
20.0
15.0
10.0
5.0
0.0
8.2 6.6 8 9 6.7 8 6.8 6.9 18 6 7.3
5.0 4.9 4.4 5.5 5.2 5.7 5.1 6.1 5.2 6.0 5.9
Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
DO
Criteria
BOD
Criteria

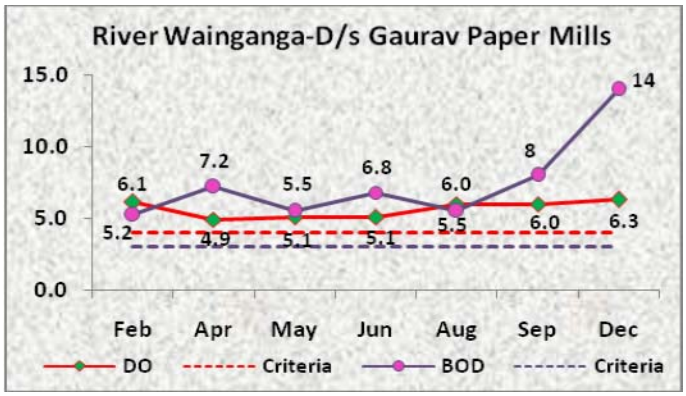

River Wainganga-D/s Ellora Paper Mills
10000
1000
100
10
1
140 170 500 500 350 500 130 110 350 1600 110
40 50 70 300 280 300 80 80 280 350 60
Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
TC
Criteria
FC
Criteria

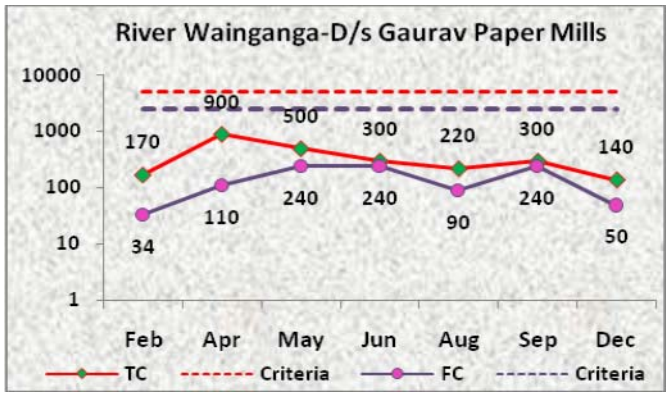

River Wainganga-U/s Ellora Paper Mills
8.0
6.0
4.0
2.0
0.0
6.2 6.6 6.0 6.8 5.9 6.6 5.9 6.9 7.7 6.3 6.7
5.8 4.5 5.9 5.8 5.2 5.6 5.4 5.8 5 5 4.9
Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
DO
Criteria
BOD
Criteria

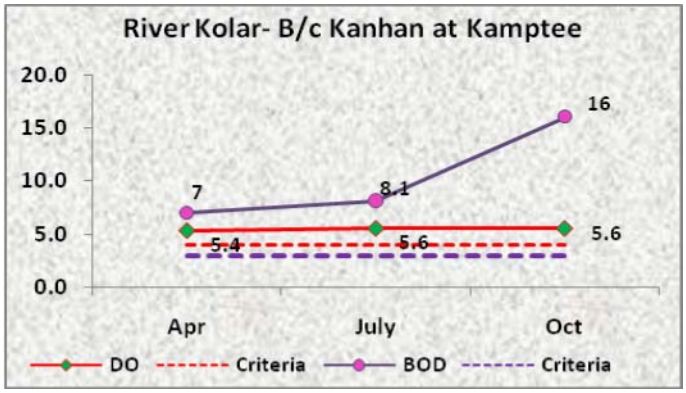

River Wainganga-U/s Ellora Paper Mills
10000
1000
100
10
1
90 70 110 140 170 130 110 90 30 26 90
23 30 14 110 140 80 50 70 23 17 50
Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
TC
Criteria
FC
Criteria

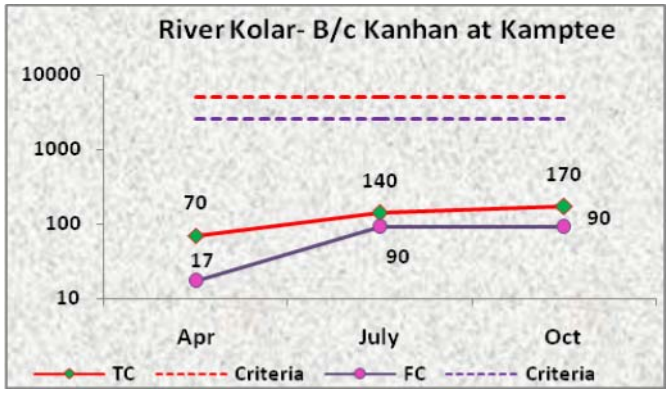

River Wainganga-U/s Gaurav Paper Mills
8.0
6.0
4.0
2.0
0.0
6.4 6 7.4 5.9 6.7 7.0 8
6.0 5.6 6.8
4.6 4.6 2.9 5.6
Feb Apr May Jun Aug Sep Dec
DO
Criteria
BOD
Criteria

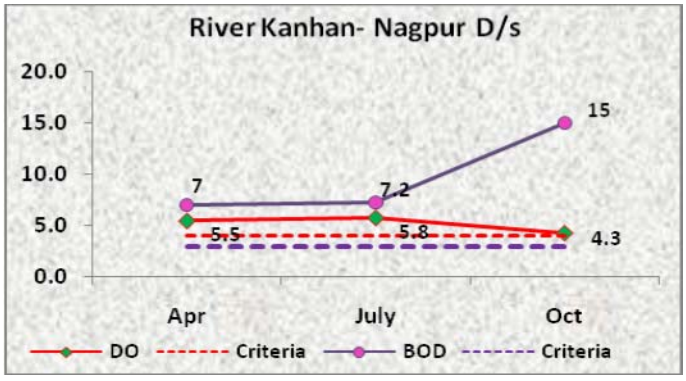

River Wainganga-U/s Gaurav Paper Mills
10000
1000
100
10
1
90 170 170 220 170 220 170
26 22 140 170 40 170 110
Feb Apr May Jun Aug Sep Dec
TC
Criteria
FC
Criteria

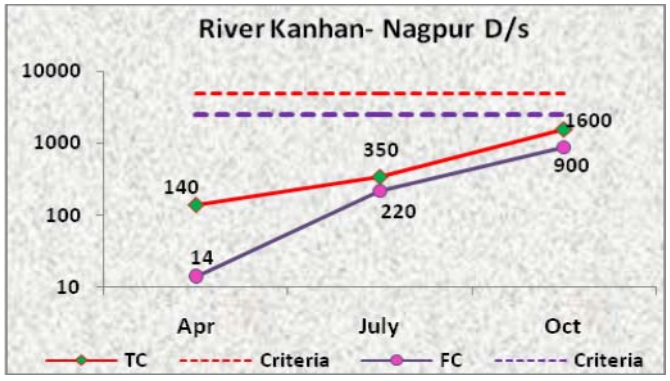

River Wainganga-D/s Gaurav Paper Mills
15.0
10.0
5.0
0.0
6.1
7.2
5.5
6.8
6.0
8
14
5.2
4.9
5.1
5.1
5.5
6.0
6.3
Feb
Apr
May
Jun
Aug
Sep
Dec
DO
Criteria
BOD
Criteria

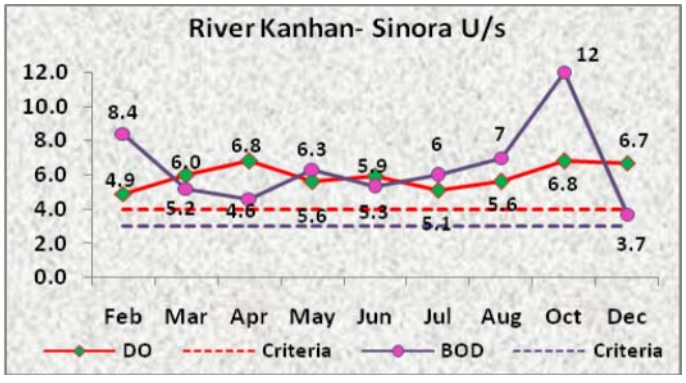

River Wainganga-D/s Gaurav Paper Mills
10000
1000
100
10
1
170
900
500
300
220
300
140
34
110
240
240
90
240
50
Feb
Apr
May
Jun
Aug
Sep
Dec
TC
Criteria
FC
Criteria

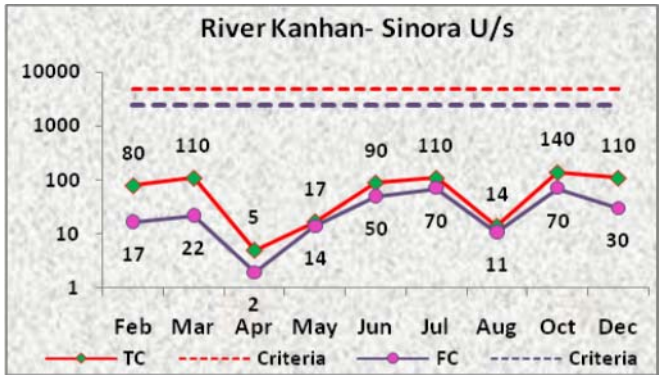

River Kolar- B/c Kanhan at Kamptee
20.0
15.0
10.0
5.0
0.0
7
8.1
16
5.4
5.6
5.6
Apr
July
Oct
DO
Criteria
BOD
Criteria

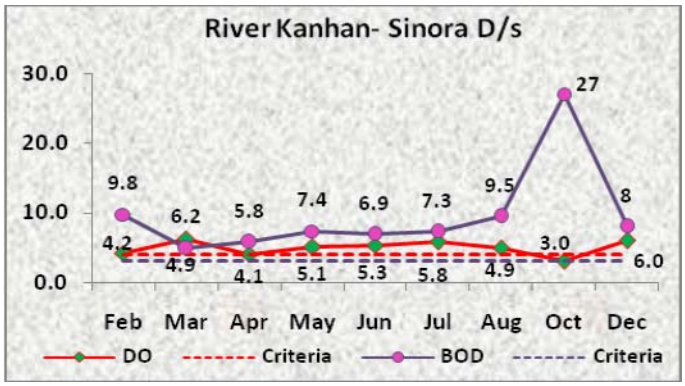

River Kolar- B/c Kanhan at Kamptee
10000
1000
100
10
70
140
170
90
17
90
Apr
July
Oct
TC
Criteria
FC
Criteria

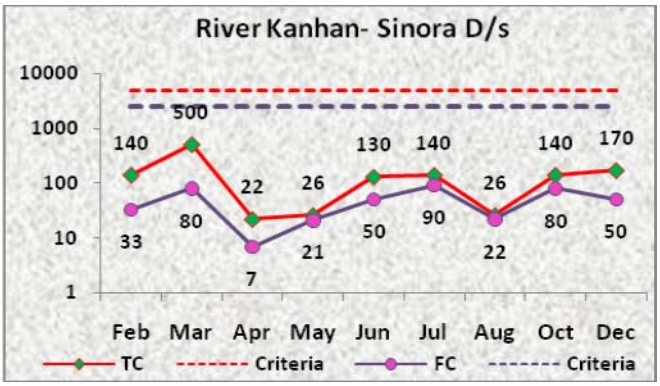

River Kanhan- Nagpur D/s
20.0
15.0
10.0
5.0
0.0
7
7.2
15
5.5
5.8
4.3
Apr
July
Oct
DO
Criteria
BOD
Criteria

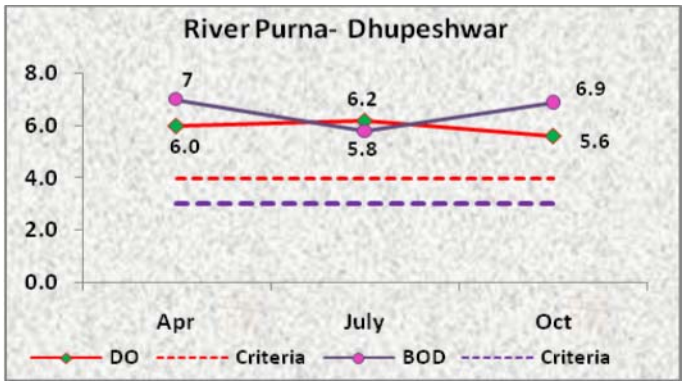

River Kanhan- Nagpur D/s
10000
1000
100
10
140
350
1600
900
14
220
Apr
July
Oct
TC
Criteria
FC
Criteria

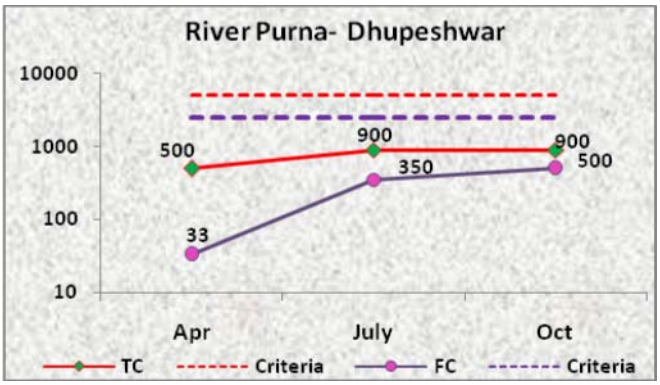

River Kanhan- Sinora U/s
12.0
10.0
8.0
6.0
4.0
2.0
0.0
8.4
6.0
6.8
6.3
5.9
6
7
12
6.7
4.9
5.2
4.6
5.6
5.3
5.1
5.6
6.8
3.7
Feb
Mar
Apr
May
Jun
Jul
Aug
Oct
Dec
DO
Criteria
BOD
Criteria

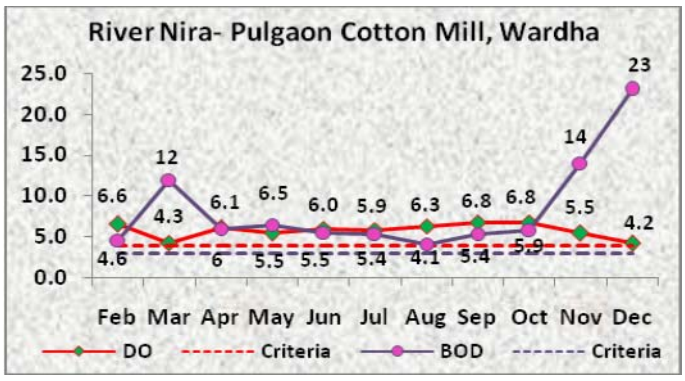

River Kanhan- Sinora U/s
10000
1000
100
10
1
80
110
5
17
90
110
14
140
110
17
22
2
14
50
70
11
70
30
Feb
Mar
Apr
May
Jun
Jul
Aug
Oct
Dec
TC
Criteria
FC
Criteria

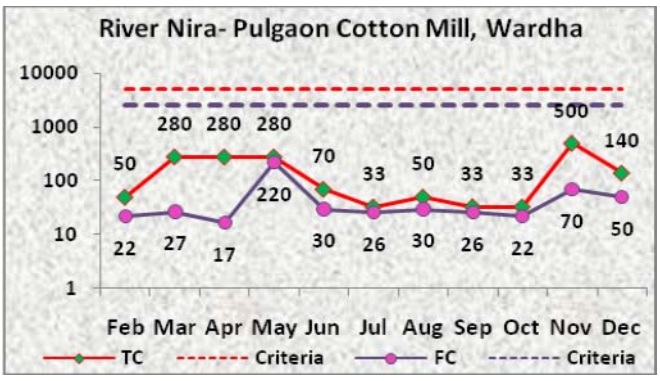

River Kanhan- Sinora D/s
30.0
20.0
10.0
0.0
9.8
6.2
5.8
7.4
6.9
7.3
9.5
27
8
4.2
4.9
4.1
5.1
5.3
5.8
4.9
3.0
6.0
Feb Mar Apr May Jun Jul Aug Oct Dec
DO
Criteria
BOD
Criteria


River Kanhan- Sinora D/s
10000
1000
100
10
1
140
500
22
26
130
140
26
140
170
33
80
7
21
50
90
22
80
50
Feb Mar Apr May Jun Jul Aug Oct Dec
TC
Criteria
FC
Criteria


River Purna- Dhupeshwar
8.0
6.0
4.0
2.0
0.0
7
6.2
6.9
6.0
5.8
5.6
Apr July Oct
DO
Criteria
BOD
Criteria


River Purna- Dhupeshwar
10000
1000
100
10
500
900
900
350
500
33
Apr July Oct
TC
Criteria
FC
Criteria


River Nira- Pulgaon Cotton Mill, Wardha
25.0
20.0
15.0
10.0
5.0
0.0
6.6
12
6.1
6.5
6.0
5.9
6.3
6.8
6.8
14
23
5.5
4.2
4.3
4.6
6
5.5
5.5
5.4
4.1
5.4
5.9
Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
DO
Criteria
BOD
Criteria


River Nira- Pulgaon Cotton Mill, Wardha
10000
1000
100
10
1
280 280 280
500
140
50
70
33
50
33
33
220
70
22
27
17
30
26
30
26
22
50
Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
TC
Criteria
FC
Criteria

CHAPTER XVI

Water Quality of Rivers in Krishna Basin

16.1 Krishna River System

The Krishna basin extends over an area of 2, 58,948 sq km which is nearly 8% of the total geographical area of the country. Lying in the Deccan plateau, it covers large areas in the States of Maharashtra, Karnataka and Andhra Pradesh. All the major tributaries draining the base of the triangle fall into the river in the upper two-thirds of its length. The Krishna rises in the Western Ghats at an altitude of 1,337 meter just north of Mahabaleshwar, about 64 km from the Arabian Sea and flows from west to east through the States of Maharashtra, Karnataka and Andhra Pradesh to join the Bay of Bengal. The total length of the river from the source to its outfall into the sea is about 1,400 km. Together with its tributaries, the river drains about 708 km of the Western Ghats which is its chief source of supply. The Krishna is the third longest river within India, yet it has a rather poor water wealth because of fairly low rainfall in the basin. The river has two large tributaries - the Bhima and the Tungabhadra and four smaller tributaries - the Ghataprabha, the Malprabha the Musi and the Muneru. The river basin survey report communicates that the most populous cities in the basin are Hyderabad Aggomeration in A.P. Pune aggomeration in

Maharashtra and Bhadravati complex in Karnataka. Bhadravati in Karnataka and Patancheru- Bolaram in Andhra Pradesh are the critically polluted areas identified in the basin area of Krishna. For Bhadravati the major source of water pollution is the wastewater generated from industries besides the untreated sewage of the town, which is being discharged into Bhadra. It is suggested that sewage treatment plant may be provided for the sewage of the town and ETPs of the existing industries need modifications to comply with prescribed standards for restoration of water quality of the Bhadra river.In the Patancheru - Bolaram area in Andhra Pradesh the effluent generated by industries is the main sources of water pollution in the rivers Manpera and Nakkvagu. Industries are polluting ground water in the region.

The basin area of Krishna is covering the States of Maharashtra, Andhra Pradesh, and Karnataka. The important urban centres in Andhra Pradesh are Guntakal, Guntur, Hyderabad, Kurnool, Gudivada, Tenali, Machilipatnam, Vijayawada, Adoni, Mahaboob-Nagar, Bapatla, Chilakaluripet, Gudur, Kavali, Miryalguda, Nalgonda, Suryapet, Yemmiganur, Chikmagalur, Gangawati, Gokak, Harihar, Nipani, Rabkavi-Banhatti, Ranibennur, Shahabad; in Karnataka are Gadag-betagiri, Raichur, Hubli-Dharwad, Shimoga, Bijapur, Bellary, Gulbarga, Bhadravati, Hosepet, Davangere, Belgaum, Chitradurga, Bagalkot; and in Maharashtra are Karad, Pandharpur, Panvel, Satara, Kolhapur, Solapur, Pune, Ichalkaranji, Sangli and Barshi.

16.2 Water Quality Monitoring in Krishna Basin

The water quality monitoring of the River Krishna are being done in the basin by the State Pollution Control Boards of Maharashtra, Karnataka and Andhra Pradesh at 93 locations. The monitoring locations are on mainstream of River Krishna (22) and tributaries- Bhadra (3), Bhima (12), Ghataprabha (2), Malprabha (3), Muneru (1), Musi (3), Nira (5), Paleru (1), Tunga (1), Tungabhadra (6), Panchganga (4), Chandrabhaga (2), Kagina (1), Koyna (1), Mula (2), Mutha (4), Mula-Mutha (2), Venna (3), Pawana (6), Indrayani (3), Hundri (1), Kundu (1), Ghod (1), Sina (1), Urmodi(1) and Vel (1). The ranges of water quality observed in River Krishna and its tributaries with respect to pH, Conductivity, DO, BOD, COD, Total Coliform (TC) and Faecal Coliform (FC) are presented as minimum, maximum and mean value to assess the extent of water quality variation throughout the year. The detail list of Water Quality Monitoring locations in Krishna Basin is given in the Table 16(a).

Table 16(a): Water Quality Monitoring locations in Krishna Basin

Name of Monitoring Station	State Name	Name of Water Body
Bhadra at Malleswaram D/s of KIOCL	Karnataka	Bhadra
Bhadra at D/s Of Bhadravathi	Karnataka	Bhadra
Bhadra at D/s Of Kiocl Road Bridge, Near Holehunnur	Karnataka	Bhadra
Bhima at D/s Of Road Bridge at Gangapur Village	Karnataka	Bhima
Bhima at Ferozabad Village (D/s)	Karnataka	Bhima
Bhima at D/s Of Bdg. Near Yadgi	Karnataka	Bhima
Bhima River at Confluence of Jewargi Town Sewage Disposal Point	Karnataka	Bhima
Bhima at Pune U/s Vithalwadi	Maharashtra	Bhima
Bhima at Pune, D/s Of Bundgarden	Maharashtra	Bhima

Bhima at Pargaon (After Confl.With Mule Martha)	Maharashtra	Bhima
Bhima After Conf. With Daunt	Maharashtra	Bhima
Bhima at Narsinghpur,(D/s Af.Confl.With R.Nira)	Maharashtra	Bhima
Bhima at Takli	Maharashtra	Bhima
Bhima River at Koregaon Near Koregaon Bridge, Shirur, Pune	Maharashtra	Bhima
Bhima River-Backwater Of Ujani Dam Near Raw Water Pump House, Kumbargaon, Indapur, Pune	Maharashtra	Bhima
Chandrabhaga U/s Of Pandharpur Town	Maharashtra	Chandrabhaga
Chandrabhaga D/s Of Pandharpur Town	Maharashtra	Chandrabhaga
Ghatprabha at W.A. Point To Gokak Town	Karnataka	Ghatprabha
Ghatprabha at D/s Of Mudhol Rd. Cross Bdg.	Karnataka	Ghatprabha
Ghod River at Shirur, Pune	Maharashtra	Ghod
River Hundri, Joharpur(V), Near Temple, Kurnool	Andhra Pradesh	Hundri
Indrayani River at D/s Of Alandigaon, Pune	Maharashtra	Indrayani
Indrayani River at D/s Of Moshigaon, Haweli, Pune	Maharashtra	Indrayani
Indrayani River at U/s Of Moshigaon, Haweli, Pune	Maharashtra	Indrayani
Kagina D/s Of Sewage Disposal Point	Karnataka	Kagina
Koyna River at Karad.	Maharashtra	Koyna
Thangadi , Mahaboobnagar Dist.	Andhra Pradesh	Krishna
Krishna at Gadwal Bridge	Andhra Pradesh	Krishna
Krishna After Confl. With Tungabhadra, Sangameshwaram	Andhra Pradesh	Krishna
Krishna at Wadapally A/C. With R. Musi, A.P.(Shifted From 1220)	Andhra Pradesh	Krishna
Vedadri , Guntur Dist.	Andhra Pradesh	Krishna
Amaravati , Guntur Dist.	Andhra Pradesh	Krishna
Krishna at Vijaywada	Andhra Pradesh	Krishna
Hamsala Deevi , Guntur Dist	Andhra Pradesh	Krishna
Krishna at U/s Of Ugarkhurd Barrage	Karnataka	Krishna
Krishna at D/s Of Narayanpura Dam	Karnataka	Krishna
Krishna at Tintini Bridge	Karnataka	Krishna
Krishna at D/s Of Devasagar Bdg.	Karnataka	Krishna
Krishna - Ankali Bridge Along Chikkodi Kagwad Road	Karnataka	Krishna
Krishna at Kurundwad In Kolhapur	Maharashtra	Krishna
Krishna at Mahabaleshwar Dhom Dam Near Koina Dam	Maharashtra	Krishna
Krishna at Rajapur Weir	Maharashtra	Krishna
Krishna at Krishna Bridge, Karad	Maharashtra	Krishna
Krishna at Sangli	Maharashtra	Krishna
Krishna D/s Of Islampur	Maharashtra	Krishna
Krishna River at Kshetra Mahuli.	Maharashtra	Krishna
Krishna River at Krishna-Venna Sangam at Mahuli.	Maharashtra	Krishna
Krishna River at Wai.	Maharashtra	Krishna
River Kundu, Nandyal, Near Over Bdg., Kurnool	Andhra Pradesh	Kundu
Malprabha at D/s Of Khanapur Village	Karnataka	Malprabha
Malprabha at Water Abstr. Pt. To Hubli,Dharwar	Karnataka	Malprabha
Malprabha at D/s Of Aihole Town	Karnataka	Malprabha
Mula River at Aundh Bridge, Aundgaon.	Maharashtra	Mula
Mula River at Harrison Bridge Near Mula- Pawana Sangam.	Maharashtra	Mula
Mula-Mutha River at Mundhawa Bridge.	Maharashtra	Mula-Mutha
Mula-Mutha River at D/s Of Theur, Haweli, Pune	Maharashtra	Mula-Mutha
Muneru Before Confl. With Krishna, Nandigama	Andhra Pradesh	Muneru
Musi U/s at Hyderabad	Andhra Pradesh	Musi
Musi D/s at Hyderabad	Andhra Pradesh	Musi
River Musi at Nagole,Rangareddy	Andhra Pradesh	Musi
Mutha River at Sangam Bridge Near Ganapathy Ghat.	Maharashtra	Mutha
Mutha River Near Veer Savarkar Bhavan, Pune	Maharashtra	Mutha
Mutha River at Deccan Bridge, Deccan, Pune	Maharashtra	Mutha
Mutha River at Khadakvasla Dam, Khadakvasla, Haweli, Pune.	Maharashtra	Mutha
Nira River at D/s Of Jubilant Organosis, Pune.	Maharashtra	Nira
Nira River at Sangavi, Phaltan, Satara	Maharashtra	Nira
Nira River at U/s Of Jubilant Organosis (Dattaghat), Baramati, Pune	Maharashtra	Nira

Nira River at Shindewadi. Shirval, Khandala, Satara	Maharashtra	Nira
Nira at Sarole Bdg.On Pune-Banglore Highway	Maharashtra	Nira (Krishna)
Palleru Before Confl. With Krishna, Jaggayyapet	Andhra Pradesh	Palleru
Panchaganga at Ichalkaranji	Maharashtra	Panchaganga
Panchaganga U/s Of Kolhapur Town	Maharashtra	Panchaganga
Panchaganga D/s Of Kolhapur Town	Maharashtra	Panchaganga
Panchaganga River at Shirol Near Shirol Intake Well.	Maharashtra	Panchaganga
Pawana River at Sangavigaon, Pune.	Maharashtra	Pawana
Pawana River at Kasarwadi, Haweli, Pune	Maharashtra	Pawana
Pawana at Dapodi Bdg at Pawana-Mulla Sangam,Dapodi,Haweli, Pune	Maharashtra	Pawana
Pawana River at Ravet Weir, Ravet, Haweli, Pune	Maharashtra	Pawana
Pawana River at Chinchwadgaon, Haweli, Pune	Maharashtra	Pawana
Pawana River at Pimprigaon, Haweli, Pune	Maharashtra	Pawana
Sina River Near Laboti Toll Naka, Laboti, Mohal, Solapur	Maharashtra	Sina
Confluence Point Of Tunga And Bhadra at Kudli	Karnataka	Tungabhadra
Tungha at D/s Of Shimoga Town	Karnataka	Tungha
Manthralayam , Kurnool Dist.	Andhra Pradesh	Tunghabhadra
Tunghabhadra at Kurnool U/s, Bavapuram	Andhra Pradesh	Tunghabhadra
Tunghabhadra at Honnali Bridge	Karnataka	Tunghabhadra
Tunghabhadra at Haralahalli Bridge	Karnataka	Tunghabhadra
Tunghabhadra at Ullanur	Karnataka	Tunghabhadra
Urmodi River, Nagthane, Satara	Maharashtra	Urmodi
Vel River at Shikrapur, Shirur, Pune	Maharashtra	Vel
Venna River at Varye, Satara.	Maharashtra	Venna
Venna River at Mahabaleshwar, Satara	Maharashtra	Venna
Venna River at Mahuli, Satara	Maharashtra	Venna

16.2.1 Water Quality of River Krishna

The water quality of River Krishna is presented in Annexure-I Table 16.1. The summary of water quality of River Krishna with respect to pH, Conductivity, Dissolved oxygen (DO), Biochemical Oxygen Demand (BOD), Total Coliform (TC) and Faecal Coliform (FC) is given below:

pH: -

- The criteria for pH is 6.5 to 8.5.
- pH is observed in the range of 6.7 to 9.0.
- Higher values of pH are found at
    - Gadwal Bridge (9.0), Vijaywada (8.7), Vedadri at Guntoor and Wadapally A/c to river Musi (8.6) in Andhra Pradesh
    - Ankali Bridge along Chikkodi Kagwad Road, U/s of Ugarkhurd Barrage (8.7) and D/s of Devsagar Bridge (8.6) in Karnataka
    - Sangli (8.7) and Islampur (8.6) in Maharashtra

Conductivity: -

- The criteria of conductivity for irrigation is 2250 µmhos/cm.
- Conductivity varies from 75 to 19960 µmhos/cm.
- Conductivity is not meeting the criteria at Hamsala Deevi in Andhra Pradesh due to estuarine region.

Dissolved Oxygen: -

- The criteria for DO should be more than 4 mg/l.

- DO ranges from 0.0 to 12.6 mg/l.
- The lower value of DO is observed at
  - Gadwal Bridge (0.0 mg/l)
  - Wadapalli A/c with Musi (3.1 mg/l) in Andhra Pradesh
  - Kurunwad in Kolhapur (3.6 mg/l)
  - Rajapur Weir (3.8 mg/l) in Maharashtra

Biochemical Oxygen Demand: -

- The criteria for BOD should be less than 3 mg/l.
- BOD ranges from 0.3 to 9.6 mg/l.
- High values of BOD are observed in
  - Kshetra Mahuli (9.6 mg/l)
  - Krishna-Venna Sangam at Mahuli (9.5 mg/l)
  - Wai (9.2 mg/l)
  - Krishna Bridge at Karad (9.1 mg/l)
  - Mahabaleshwar Dhom Dam near Koyna Dam (6.7 mg/l) in Maharashtra
  - Wadapally A/c with Musi (6.8 mg/l)
  - Amravati Guntoor (5.3 mg/l)
  - U/s of Ugarkhurd Barrage (5.1 mg/l) in Andhra Pradesh
  - D/s of Devsagar Bridge (5.8 mg/l) in Karnataka

Faecal Coliform: -

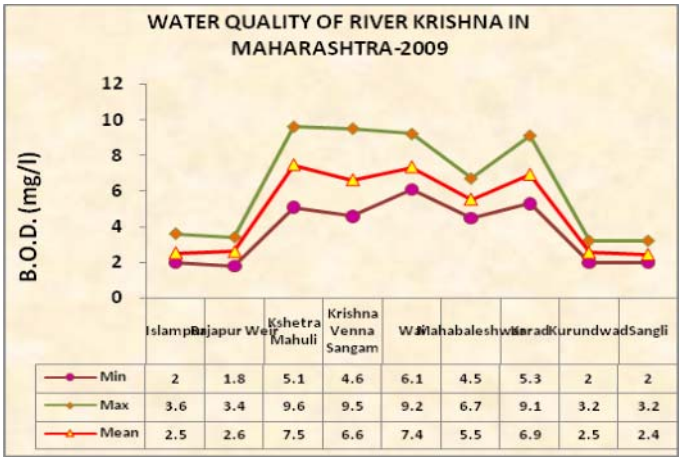
- Faecal Coliform should be less than 2500 MPN/100ml.
- Faecal Coliform (FC) ranges from 0 to 1400 MPN/100 ml and is meeting the criteria.

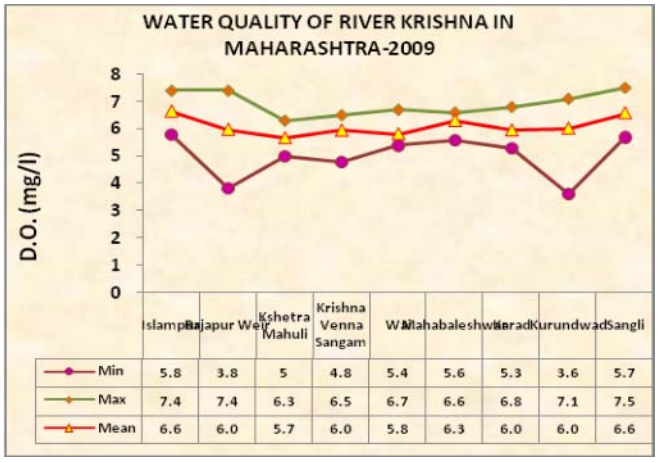
Total Coliform: -

- Total Coliform should be less than 5000 MPN/100ml.
- The Total Coliform count varies from 8 to 1, 70,000 MPN/100 ml.
- High value is observed at A/c of Tungabhadra in Maharashtra

The spatial trend of mainstream of River Krishna with respect to BOD, DO, Total Coliform, Faecal Coliform and Conductivity is given in Figure 16.1 to 16.3.

Figure 16.1: Spatial Trend of Water Quailty of River Krishna in Maharashtra





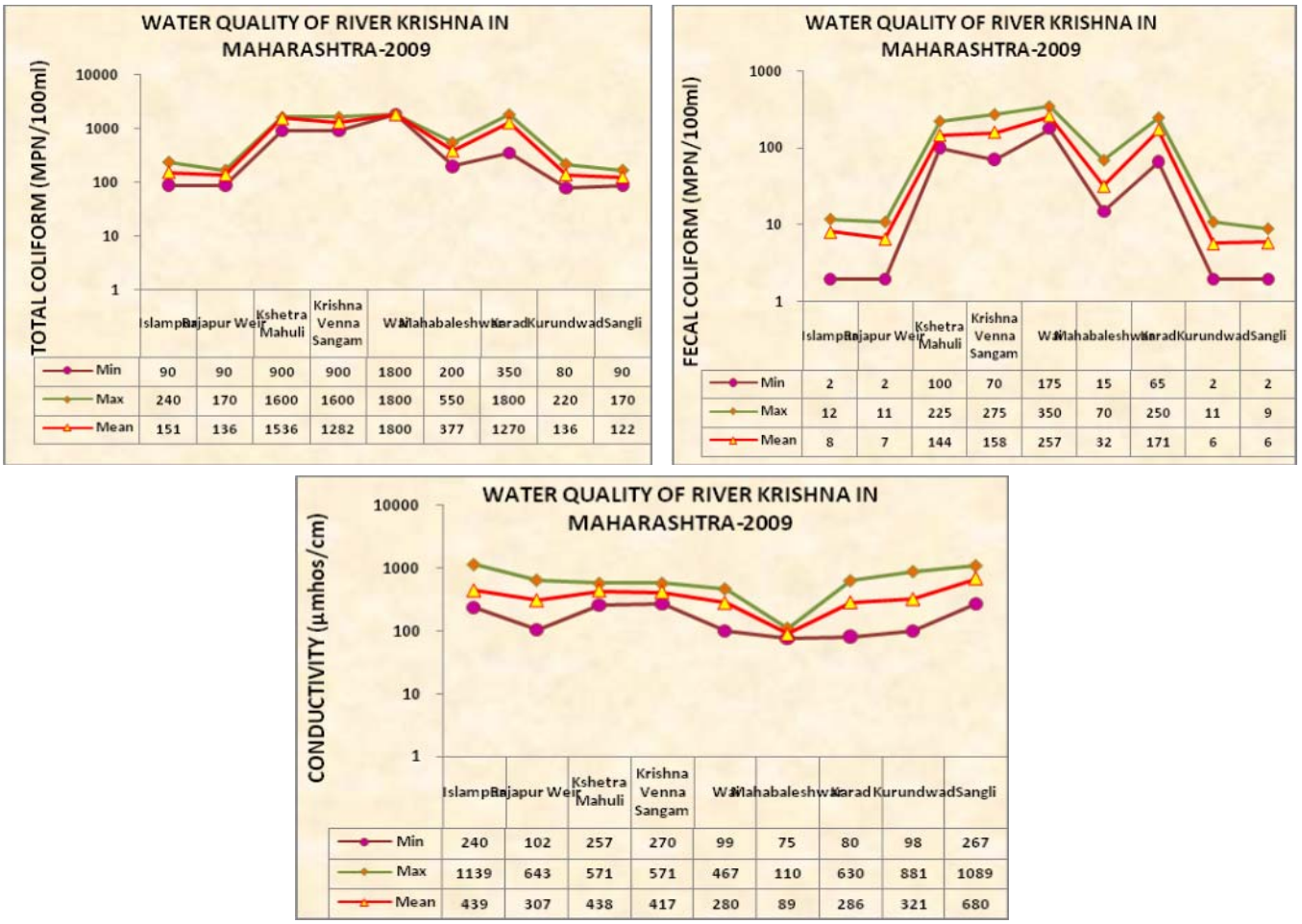
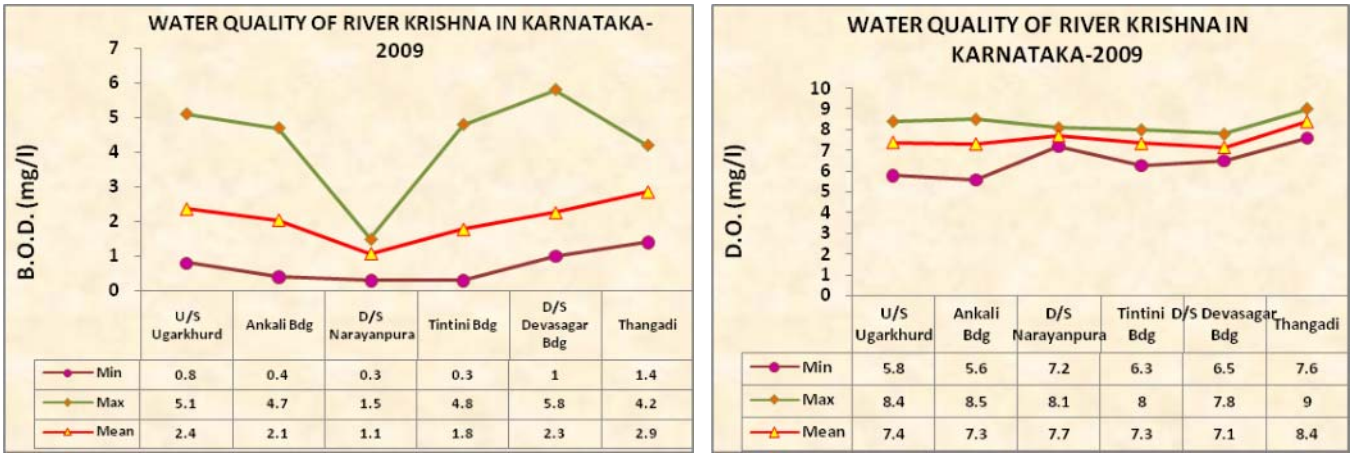


Figure 16.2: Spatial Trend of Water Quailty of River Krishna in Karnataka



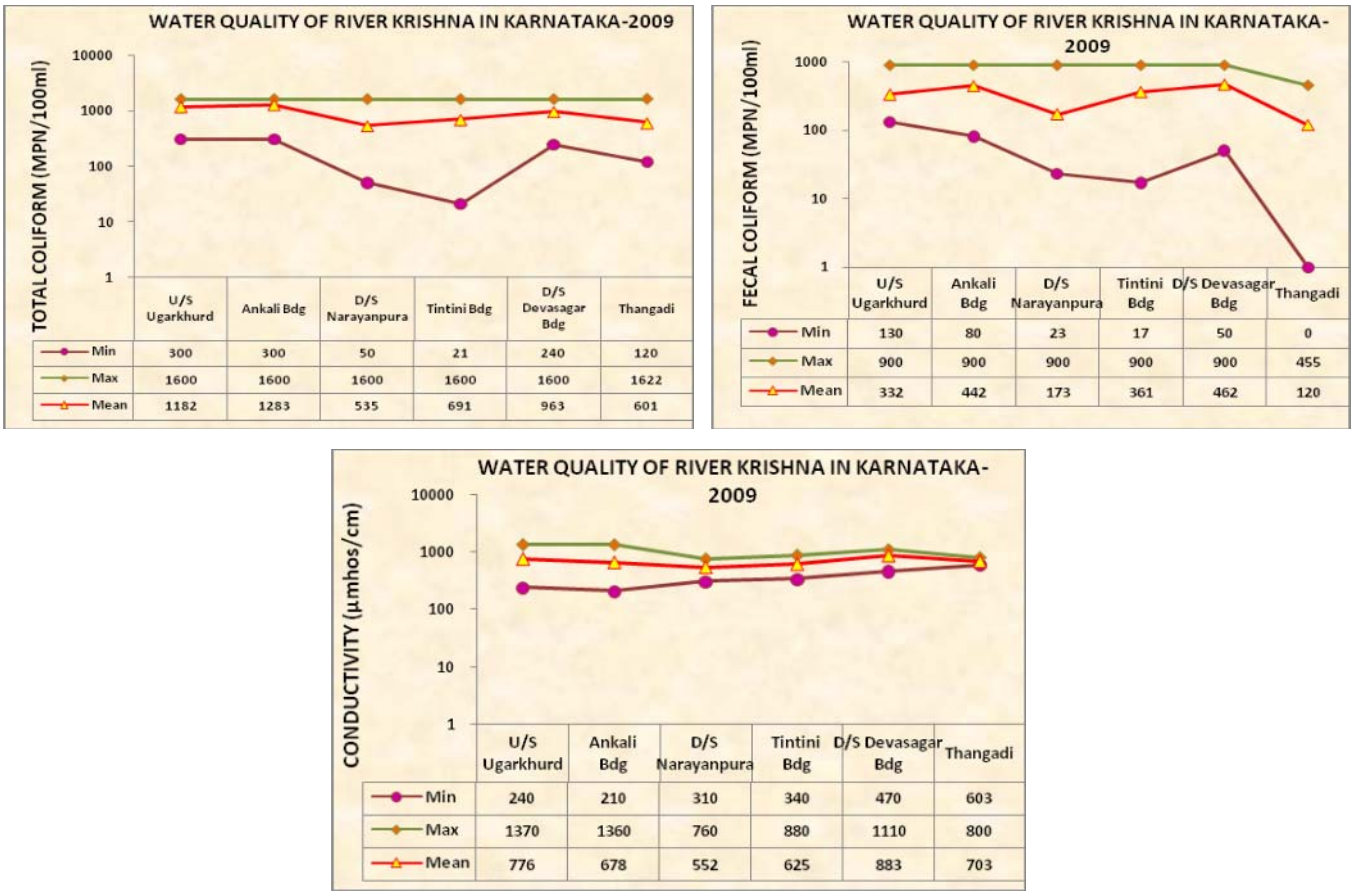
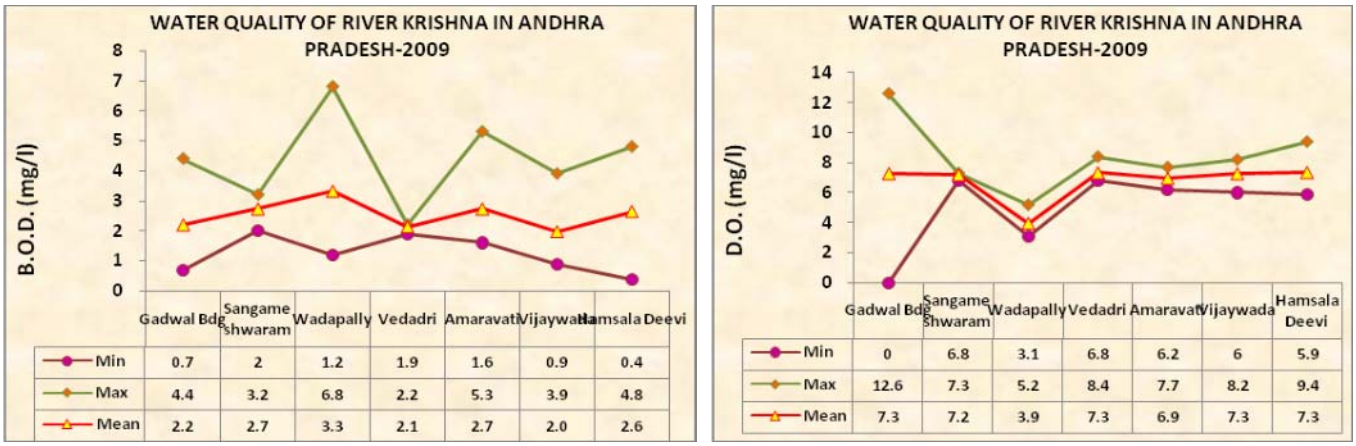
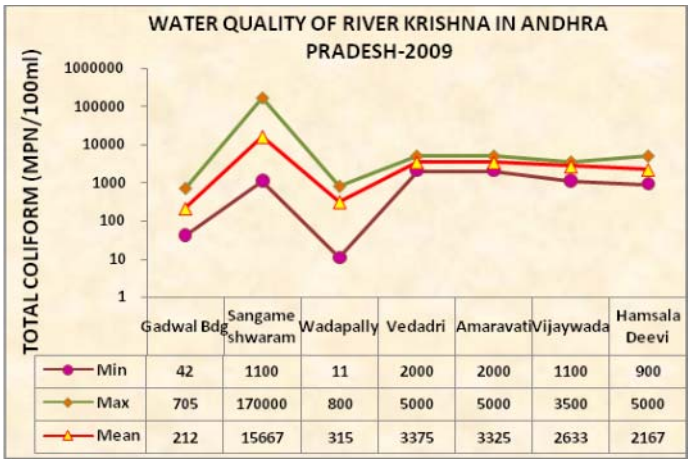
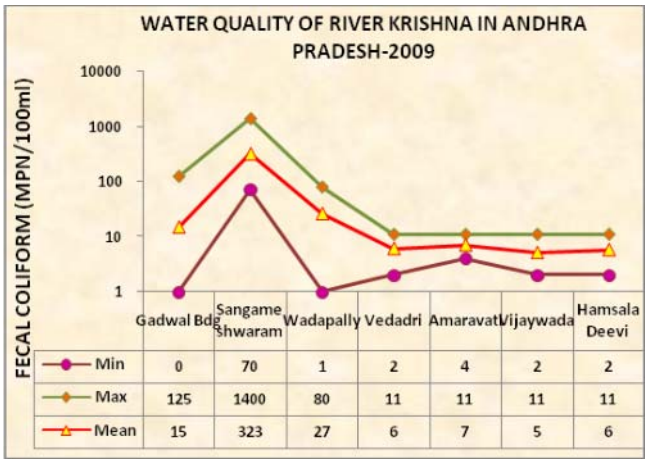


Figure 16.3: Spatial Trend of Water Quailty of River Krishna in Andhra Pradesh

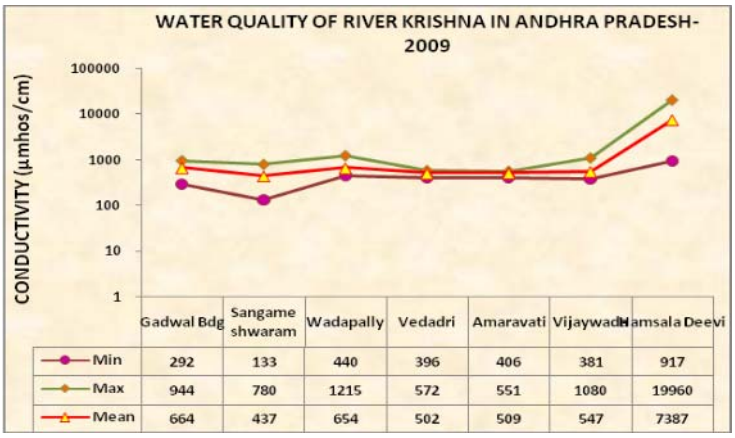




	Gadwal Bdg	Sangameshwaram	Wadapally	Vedadri	Amaravati	Vijaywada	Hamsala Deevi
Min	42	1100	11	2000	2000	1100	900
Max	705	170000	800	5000	5000	3500	5000
Mean	212	15667	315	3375	3325	2633	2167

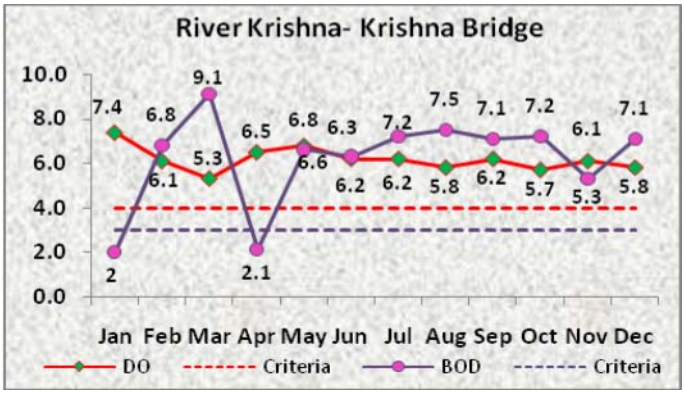


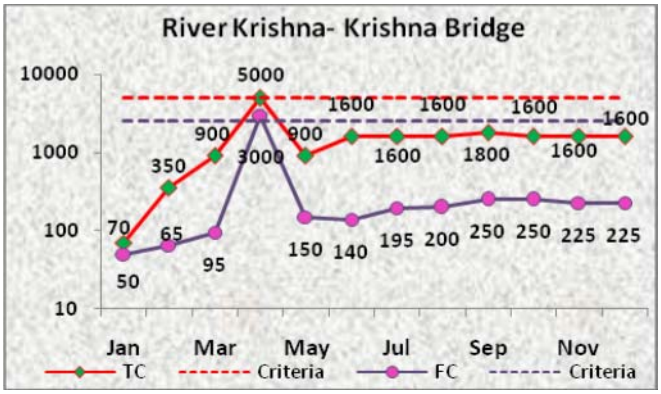
	Gadwal Bdg	Sangameshwaram	Wadapally	Vedadri	Amaravati	Vijaywada	Hamsala Deevi
Min	0	70	1	2	4	2	2
Max	125	1400	80	11	11	11	11
Mean	15	323	27	6	7	5	6

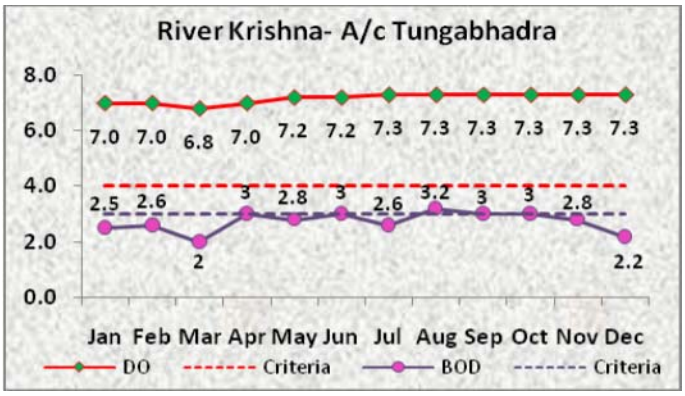


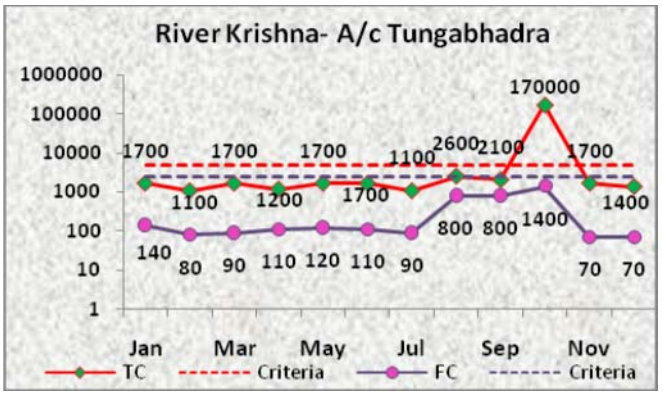
	Gadwal Bdg	Sangameshwaram	Wadapally	Vedadri	Amaravati	Vijaywada	Hamsala Deevi
Min	292	133	440	396	406	381	917
Max	944	780	1215	572	551	1080	19960
Mean	664	437	654	502	509	547	7387

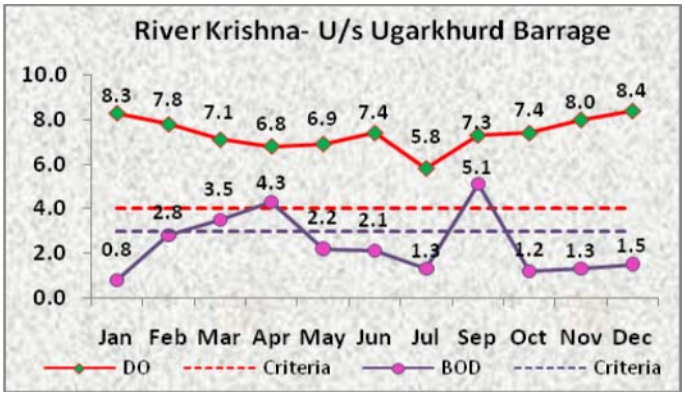
Figure 16.4: Temporal Trend of Water Quality of River Krishna






River Krishna- A/c Tungabhadra
8.0
6.0
4.0
2.0
0.0
7.0 7.0 6.8 7.0 7.2 7.2 7.3 7.3 7.3 7.3 7.3 7.3
2.5 2.6 2 3 2.8 3 2.6 3.2 3 3 2.8 2.2
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
DO
Criteria
BOD
Criteria


River Krishna- A/c Tungabhadra
1000000
100000
10000
1000
100
10
1
1700 1700 1700 1100 2600 2100 170000 1700
1100 1200 1700 800 800 1400 1400
140 80 90 110 120 110 90 70 70
Jan Mar May Jul Sep Nov
TC
Criteria
FC
Criteria


River Krishna- U/s Ugarkhurd Barrage
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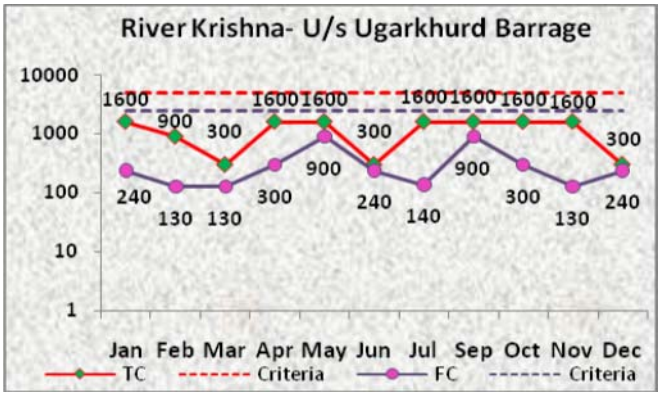
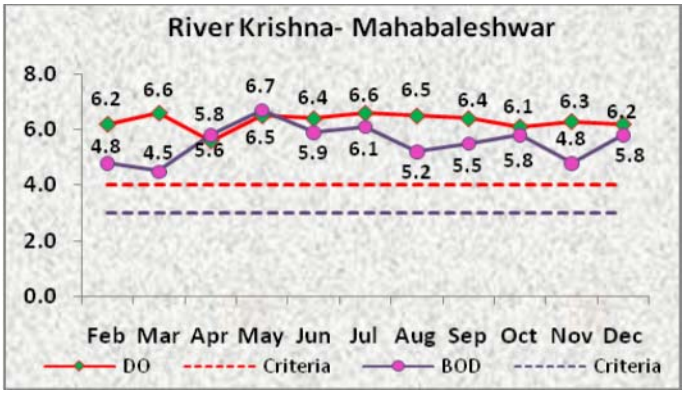
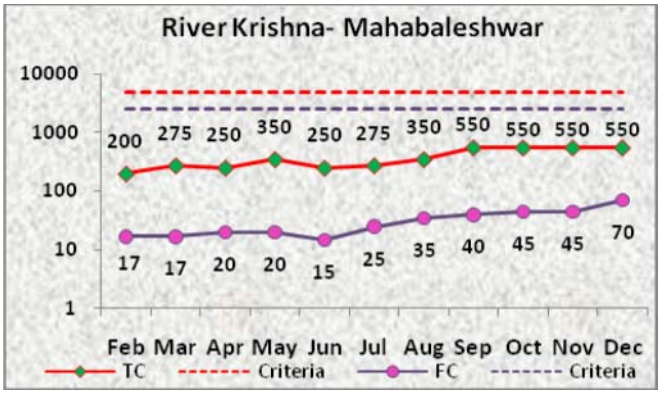
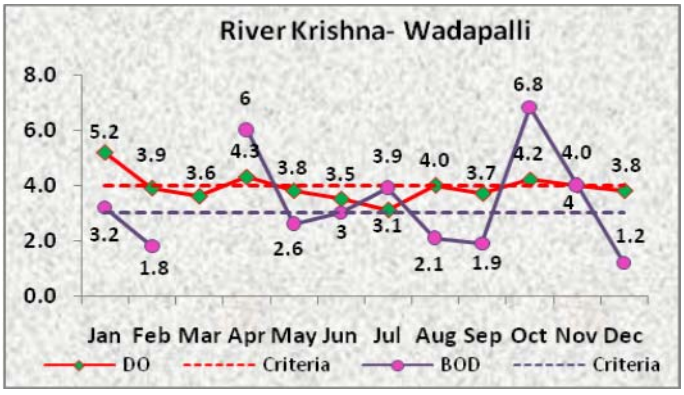
8.0
6.0
4.0
2.0
0.0
8.3 7.8 7.1 6.8 6.9 7.4 5.8 7.3 7.4 8.0 8.4
2.8 3.5 4.3 2.2 2.1 1.3 5.1 1.2 1.3 1.5
0.8
Jan Feb Mar Apr May Jun Jul Sep Oct Nov Dec
DO
Criteria
BOD
Criteria


River Krishna- U/s Ugarkhurd Barrage
10000
1000
100
10
1
1600 1600 1600 1600 1600 1600 1600 1600
900 300 300 900 300 900 300
240 130 130 300 240 140 900 300 130 240
Jan Feb Mar Apr May Jun Jul Sep Oct Nov Dec
TC
Criteria
FC
Criteria


River Krishna- Mahabaleshwar
8.0
6.0
4.0
2.0
0.0
6.2 6.6 5.8 6.7 6.4 6.6 6.5 6.4 6.1 6.3 6.2
4.8 4.5 5.6 6.5 5.9 6.1 5.2 5.5 5.8 4.8 5.8
Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
DO
Criteria
BOD
Criteria


River Krishna- Mahabaleshwar
10000
1000
100
10
1
200 275 250 350 250 275 350 550 550 550 550
17 17 20 20 15 25 35 40 45 45 70
Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
TC
Criteria
FC
Criteria


River Krishna- Wadapalli
8.0
6.0
4.0
2.0
0.0
5.2 3.9 3.6 4.3 3.8 3.5 3.9 4.0 3.7 4.2 4.0 3.8
6 6.8
3.2 1.8 2.6 3 3.1 2.1 1.9 4 1.2
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
DO
Criteria
BOD
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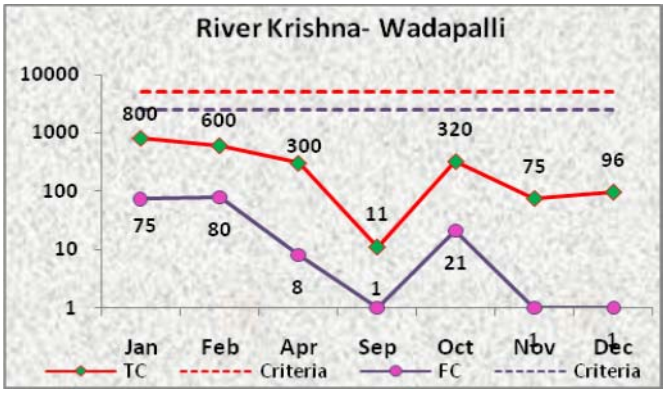
River Krishna- Wadapalli
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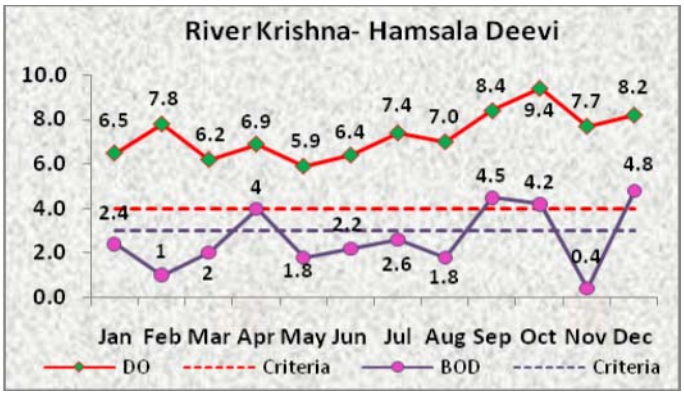
1000
100
10
1
800 600 300 11 320 75 96
75 80 8 1 21 1 1
Jan Feb Apr Sep Oct Nov Dec
TC
Criteria
FC
Criteria


River Krishna- Hamsala Deevi
10.0
8.0
6.0
4.0
2.0
0.0
6.5 7.8 6.2 6.9 5.9 6.4 7.4 7.0 8.4 9.4 7.7 8.2
2.4 1 2 4 1.8 2.2 2.6 1.8 4.5 4.2 0.4 4.8
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DO
Criteria
BOD
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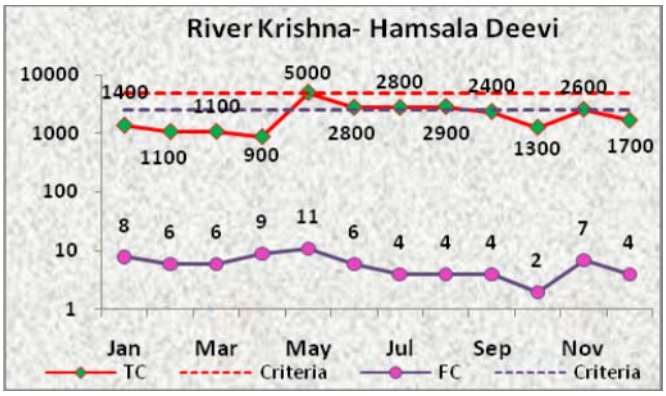
River Krishna- Hamsala Deevi
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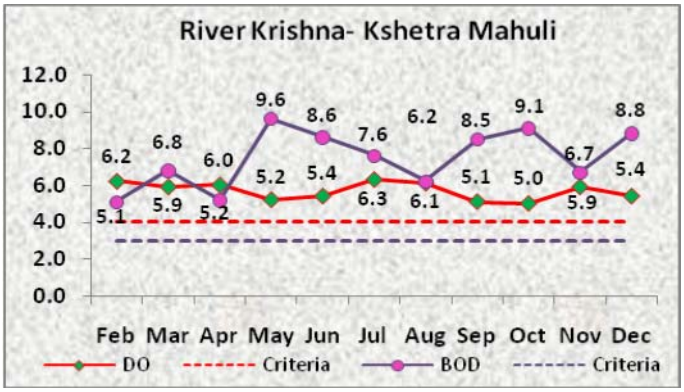
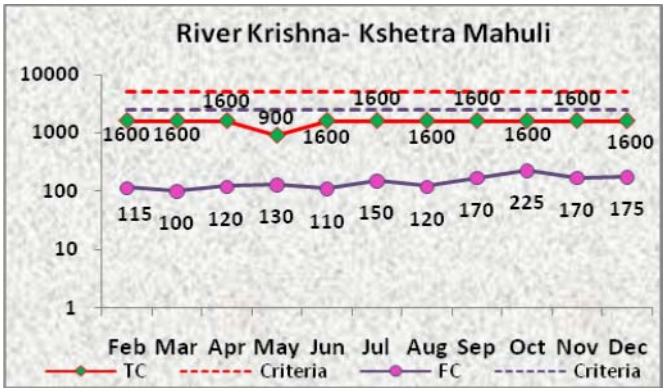
1000
100
10
1
1400 1100 1100 900 5000 2800 2800 2400 2900 2600 1300 1700
8 6 6 9 11 6 4 4 4 2 7 4
Jan Mar May Jul Sep Nov
TC
Criteria
FC
Criteria


River Krishna- Kshetra Mahuli
12.0
10.0
8.0
6.0
4.0
2.0
0.0
6.2 6.8 6.0 5.2 5.4 6.3 6.1 5.1 5.0 5.9 5.4
5.1 5.9 5.2 9.6 8.6 7.6 6.2 8.5 9.1 6.7 8.8
Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
DO
Criteria
BOD
Criteria


River Krishna- Kshetra Mahuli
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1600 1600 1600 900 1600 1600 1600 1600 1600 1600
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Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
TC
Criteria
FC
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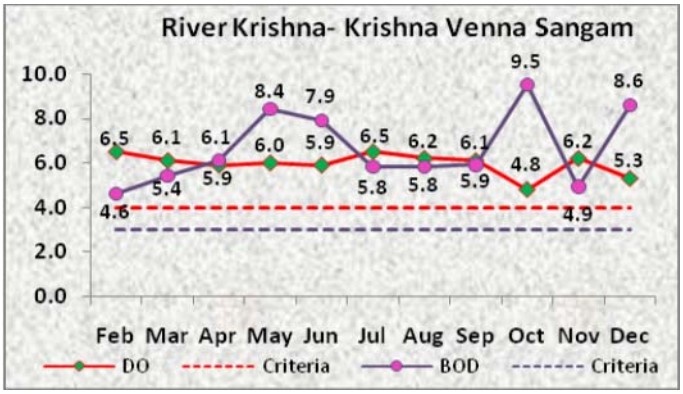
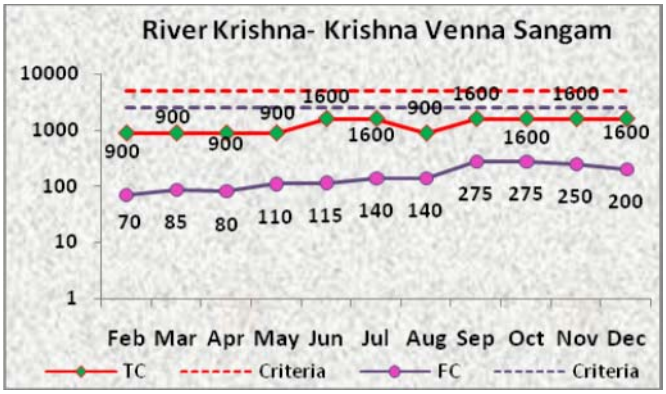
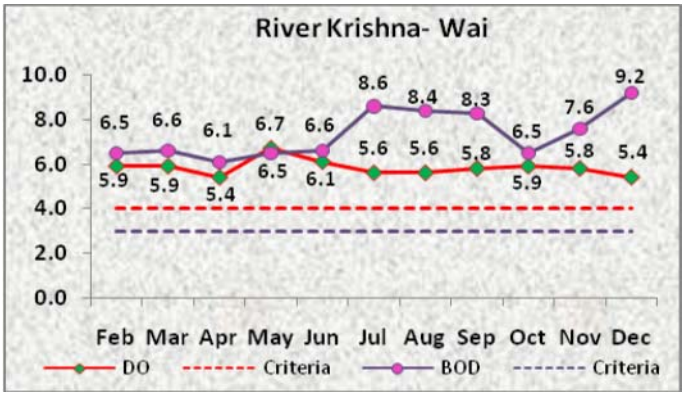
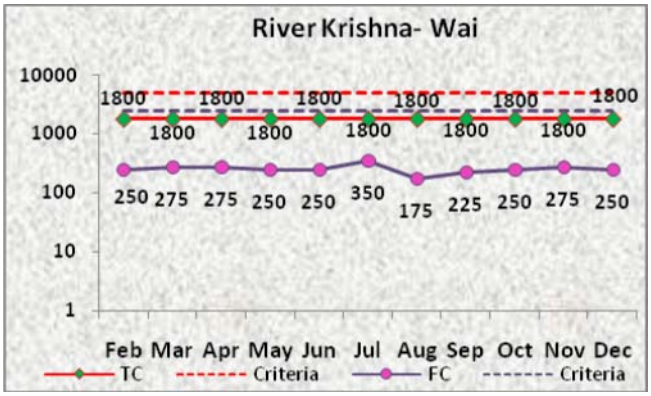

River Krishna- Krishna Venna Sangam
10.0
8.0
6.0
4.0
2.0
0.0
6.5 6.1 6.1 6.0 5.9 6.5 6.2 6.1 4.8 6.2 5.3
4.6 5.4 5.9 8.4 7.9 5.8 5.8 5.9 9.5 4.9 8.6
Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
DO
Criteria
BOD
Criteria


River Krishna- Krishna Venna Sangam
10000
1000
100
10
1
900 900 900 1600 1600 900 1600 1600 1600
900 900 1600 1600 1600
70 85 80 110 115 140 140 275 275 250 200
Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
TC
Criteria
FC
Criteria


River Krishna- Wai
10.0
8.0
6.0
4.0
2.0
0.0
6.5 6.6 6.1 6.7 6.6 5.6 5.6 5.8 5.9 5.8 5.4
5.9 5.9 5.4 6.5 6.1 8.6 8.4 8.3 6.5 7.6 9.2
Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
DO
Criteria
BOD
Criteria


River Krishna- Wai
10000
1000
100
10
1
1800 1800 1800 1800 1800 1800
1800 1800 1800 1800 1800 1800
250 275 275 250 250 350 175 225 250 275 250
Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
TC
Criteria
FC
Criteria

16.2.2 Water quality of tributary streams Panchganga and Bhima

The Bhima River originates in Bhimashankar hills near Karjat on the western side of Western Ghats, known as Sahyadri, in Maharashtra state in India. Bhima flows southeast for 725 km through Maharashtra, Karnataka, Andhra Pradesh states. Bhima is the most important tributary of the Krishna river, which is one of the two majors rivers in Maharastra, the other being Godavari River. Nira confluences with Bhima in Narsingpur, Solapur. Bhima is a major tributary of the Krishna River. Its banks are densely populated and form a fertile agricultural area. The river is prone to flooding due to heavy rainfall during the monsoon season. In 2005 there were severe flood warnings.

During its long journey many smaller rivers confluence in it. Kundali River, Kumandala River, Ghod river, Bhama, Indrayani, Mula River, Mutha River and Pavna River are the major tributories of this river around Pune. Of these Indrayani, Mula, Mutha and Pawana flow through Pune and Pimpri Chinchwad city limits. Chandani, Kamini, Moshi, Bori, Sina, Man, Bhogwati and Nira are the major tributories of the river in Solapur. Of these Nira river confluences with Bhima river Narsingpur, in Malshiras taluka in Solapur district. The total basin area is 48,631 km². The population residing along the banks of Bhima is approximately 12.33 million people (1990) with 30.90 million people expected by 2030. Seventy-five percent of the basin lies in the state of Maharashtra.

The Panchganga River is one of the important rivers in Maharashtra. In English, the name translates as "Five Rivers". The Panchganga River flows through the borders of Kolhapur. It starts from Prayag Sangam (Village: Chikhli, Taluka: Karveer, Dist: Kolhapur). The Panchganga is formed, as has been noted already, by four streams, the Kasari, the Kumbhi, the Tulsi and the Bhogawati. Local tradition believes in an underground stream Saraswati which together with the other four streams make the Panchganga. The Prayag Sangam confluence marks the beginning of the Panchganga river proper which after receiving the waters of the four tributaries continues in a larger pattern with the flow of waters received from the rivers. From North of Kolhapur it has a wide alluvial plain. After developing this plain the river resumes its course eastwards.

From Kolhapur the Panchganga River, as the river is now called, winds east about thirty miles till it falls into the Krishna at Kurundvad. In the thirty miles of its course, to the east of Kolhapur the Panchganga River receives only one considerable stream the Hatkalangale or Kabnur which, rising from the Alta hills and passing Hatkalangale and Korochi joins the Panchganga near Kabnur about fifteen miles below Kolhapur. From Shiroli to its junction with the Krishna near Narsobawadi, it has an extensive alluvial floor bordered by the large worn out stumps of the Alta portion of the Panhala in the north and the Hupari part of the Phonda Sangaon range in the south. A characteristic feature of this basin is the contrast between the rounded worn out features locally known as Mals and the general entrenched nature of all the streams. A further noteworthy aspect is the deeply incised course of the Panchganga itself. From Mangaon, the river flows in a deep bed that is well below 40 feet from the surrounding plain. Further downstream it develops an incised meander-core which includes the Narsobawadi area. The valley of the Panchganga is reckoned the most fertile in Kolhapur and is famous for its hay. The bed of the river is

shallow and its sloping banks yield rich crops during the cold weather. At Kolhapur the Panchganga is crossed by two beautiful bridges one near the Brahmapuri hill on the north side of Kolhapur town on the road leading to the Amba pass, and the other a few miles to the east on the Poona road. The Panchgnaga and its feeders are fordable in the hot season. In the rainy season large and small boats ply at twenty-three fords. The waters of all the streams which join to form the Panchganga are much used for growing sugarcane. In October, towards the close of the south-west rains, a series of fair-weather earthen dams are built across the river beds and the water is raised by lifts worked by bullocks.

The water quality of tributary streams Panchganga & Bhima is presented in Annexure-I Table 16.2. The summary of water quality of tributary streams Panchganga & Bhima with respect to pH, Conductivity, Dissolved oxygen (DO), Biochemical Oxygen Demand (BOD), Total Coliform (TC) and Faecal Coliform (FC) is given below:

pH: -

- The criteria for pH is 6.5 to 8.5.
- pH is observed in the range of 6.8 to 8.5 and is confirming the desired criteria.

Conductivity: -

- The criteria of conductivity for irrigation is 2250 µmhos/cm.
- Conductivity varies from 84 to 2806 µmhos/cm.
- Conductivity is not meeting the criteria in river Bhima at Pune D/s of Bundgarden.

Dissolved Oxygen: -

- The criteria for DO should be more than 4 mg/l.
- DO ranges from 0.0 to 7.7 mg/l.
- The lower value of DO is observed in
    - Bhima at Pune D/s of Bundgarden (0.0 mg/l), Pune U/s of Vithalwadi (1.1 mg/l) and Narsinghpur D/s after confluence with river Nira (3.1 mg/l)
    - Panchganga at D/s of Kolhapur Town (3.6 mg/l) and Shirole (3.7 mg/l)

Biochemical Oxygen Demand: -

- The criteria for BOD should be less than 3 mg/l.
- BOD ranges from 1.0 to 28.5 mg/l.
- High values of BOD are observed in
    - Bhima at Pune D/s, Bundgarden (28.5 mg/l), Pune U/s Vithalwadi (22.4 mg/l), Narsinghpur D/s after confluence with river Nira (15.2 mg/l), Pargaon A/c with Mula- Mutha (11.8 mg/l), Takli (11.3 mg/l) and A/c with Daunt (6.9 mg/l)
    - Panchganga at Shirol (4.2 mg/l) Kolhapur Town D/s (3.8 mg/l) and Kolhapur Town U/s (3.2 mg/l)

Faecal Coliform: -

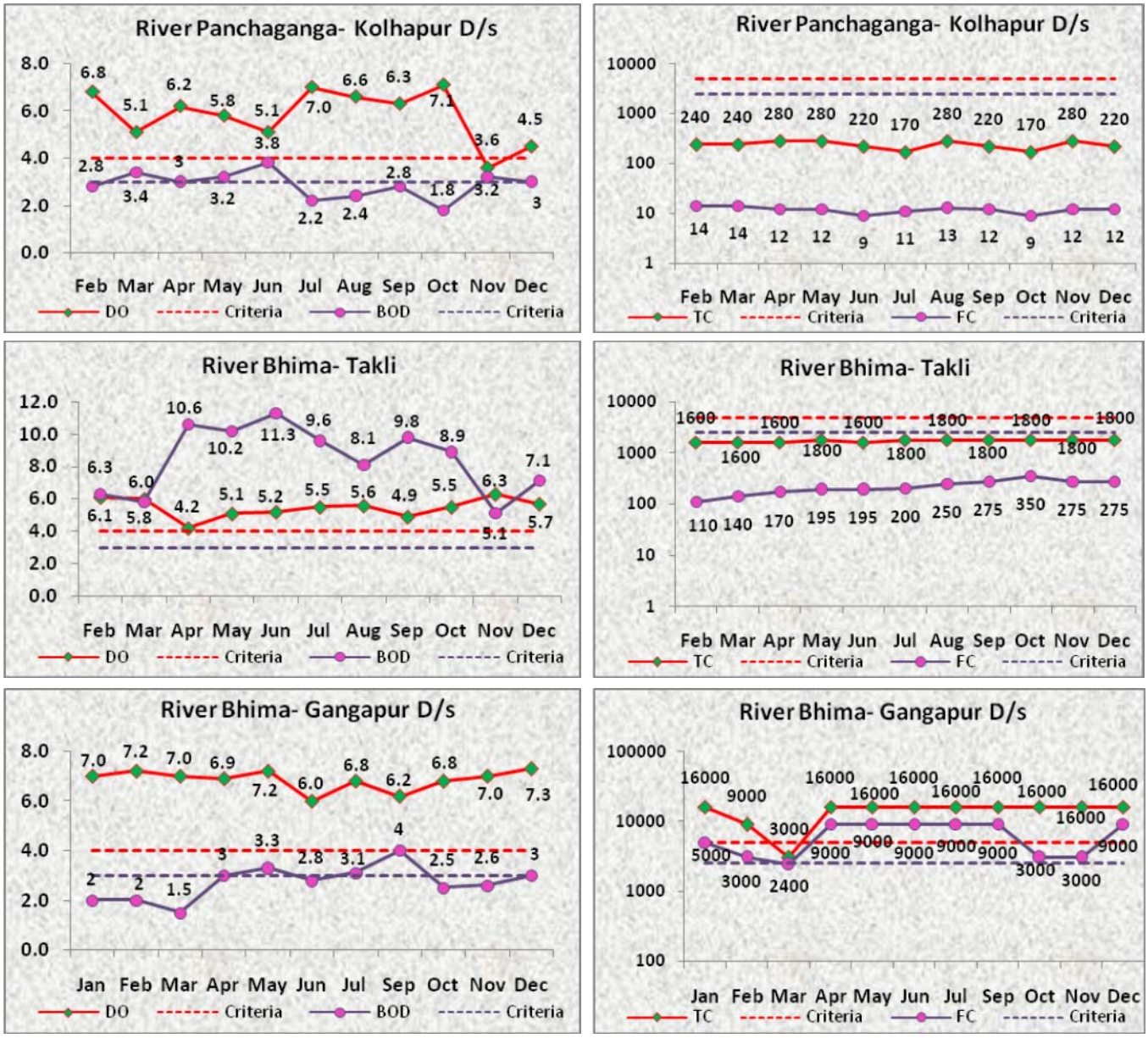
- Faecal Coliform should be less than 2500 MPN/100ml.
- Faecal Coliform (FC) ranges from 2 to 9000 MPN/100 ml.

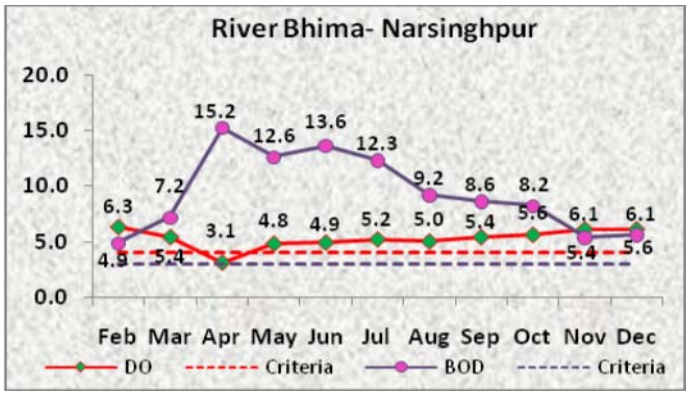
- The maximum number of Faecal Coliform (9000 MPN/100ml) is observed in River Bhima at Ferozabad D/s, D/s of Road Bridge at Gangapur Village, Confluence of Jewargi Town Sewage Disposal Point and D/s of Bdg. near Yadgir in Karnataka.

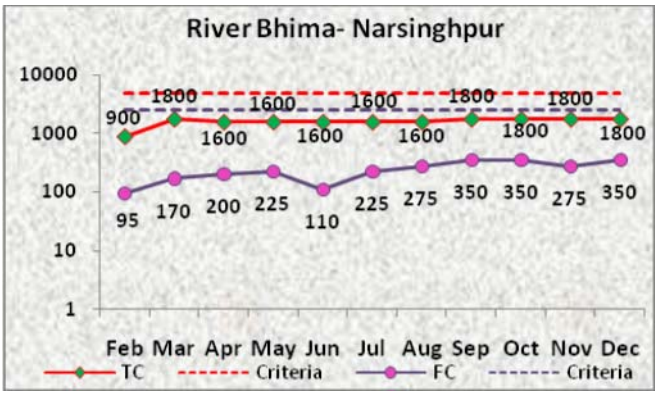
Total Coliform: -

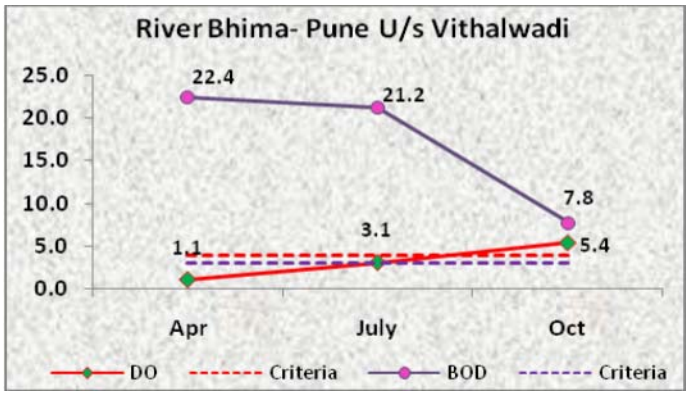
- Total Coliform should be less than 5000 MPN/100ml.
- The Total Coliform count varies from 8 to 16,000 MPN/100 ml.
- Total Coliform is exceeding the criteria in River Bhima at Ferozabad D/s, D/s of Road Bridge at Gangapur Village, Confluence of Jewargi Town Sewage Disposal Point and D/s of Bdg. near Yadgir (16,000 MPN/100 ml) in Karnataka.

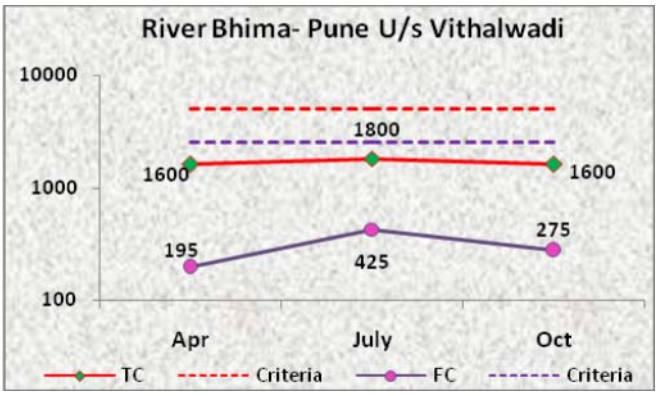
Figure 16.5: Temporal Trend of Water Quality of tributary streams Panchganga & Bhima

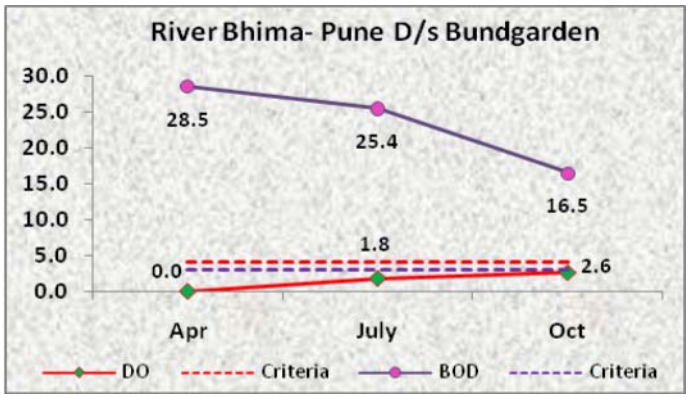


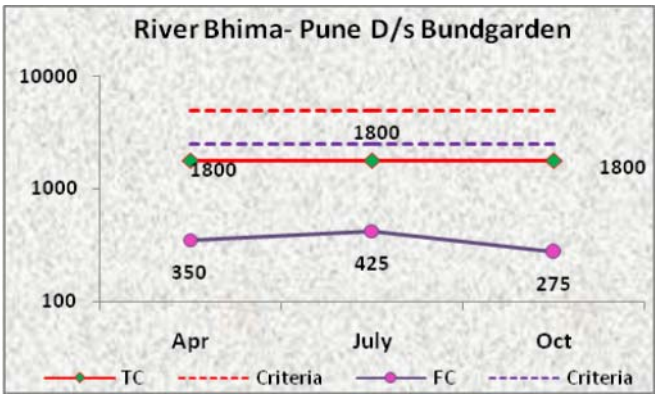

River Bhima- Narsinghpur
20.0
15.0
10.0
5.0
0.0
6.3
4.9
5.4
7.2
15.2
3.1
12.6
4.8
13.6
4.9
12.3
5.2
9.2
5.0
8.6
5.4
8.2
5.6
6.1
5.4
6.1
5.6
Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
DO
Criteria
BOD
Criteria

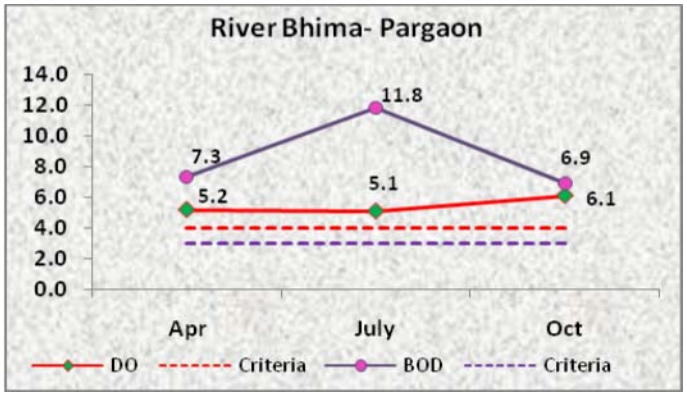

River Bhima- Narsinghpur
10000
1000
100
10
1
900
1800
1600
1600
1600
1600
1600
1800
1800
1800
95
170
200
225
110
225
275
350
350
275
350
Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
TC
Criteria
FC
Criteria

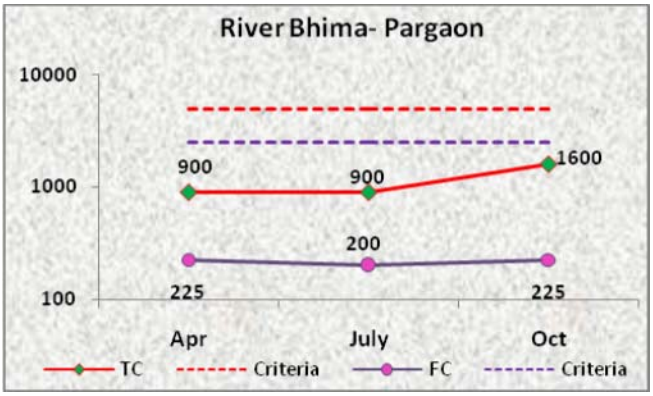

River Bhima- Pune U/s Vithalwadi
25.0
20.0
15.0
10.0
5.0
0.0
22.4
21.2
7.8
1.1
3.1
5.4
Apr
July
Oct
DO
Criteria
BOD
Criteria

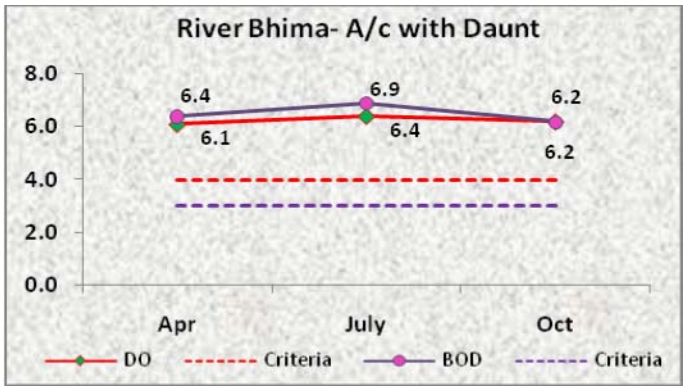

River Bhima- Pune U/s Vithalwadi
10000
1000
100
1800
1600
1600
195
425
275
Apr
July
Oct
TC
Criteria
FC
Criteria

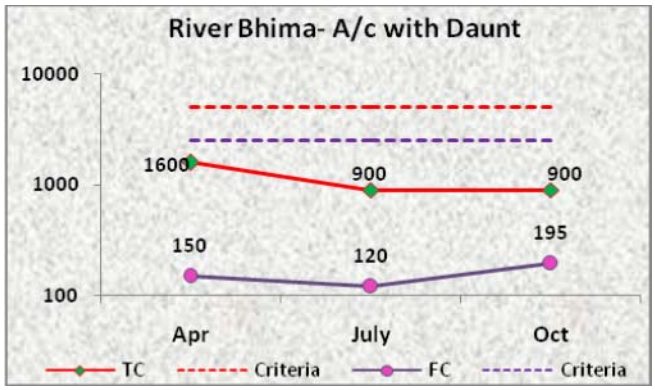

River Bhima- Pune D/s Bundgarden
30.0
25.0
20.0
15.0
10.0
5.0
0.0
28.5
25.4
16.5
1.8
0.0
2.6
Apr
July
Oct
DO
Criteria
BOD
Criteria


River Bhima- Pune D/s Bundgarden
10000
1000
100
1800
1800
1800
350
425
275
Apr
July
Oct
TC
Criteria
FC
Criteria


River Bhima- Pargaon
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0
11.8
7.3
6.9
5.2
5.1
6.1
Apr
July
Oct
DO
Criteria
BOD
Criteria


River Bhima- Pargaon
10000
1000
100
900
900
1600
200
225
225
Apr
July
Oct
TC
Criteria
FC
Criteria





16.2.3 Water Quality of tributary streams Ghatprabha, Malprabha, Nira, Venna, Koyna, Mula, Mula-Mutha, Mutha, Pawana, Indrayani, Tunghabhadra, Tungha, Bhadra, Musi, Chandrabhaga, Kagina, Nakkavagu, Hundri, Kundu, Kinnersani & Sabari

The Tungabhadra River is a sacred river in southern India that flows through the state of Karnataka to Andhra Pradesh, where it serves as the chief tributary of the Krishna River. In the epic Ramayana, the Tungabhadra river was known by the name of Pampa. The Tungabhadra River is formed by the confluence of two rivers, the Tunga River and the Bhadra River, which flow down the eastern slope of the Western Ghats in the state of Karnataka. Along with Nethravathi (west flowing river, joining the Arabian Sea near Mangalore), the Thunga and the Bhadra rie at Gangamoola, in Varaha Parvatha in the Western Ghats forming parts of the world famous Kuduremukh Iron Ore Project, at an elevation of 1198 Mtrs. More than one hundred, tributaries, streams, creeks, rivulets and the like contribute to each of these two rivers. The journey of Thunga and the Bhadra is 147 km and 171 km respectively, till they join at Kudali, at an elevation of about 610 metres near Holehonnur, about 15 km from Shimoga; areca granary of the country. It is a confluence of both the Dwaitha and the Adwaitha philosophies. From there, Thungabhadra meanders through the plains to a disitance of 531 km and mingles with the Krishna at Gondimalla, near the famous Alampur in Mahaboobnagar District of Andhra Pradesh. Varada flowing through Shimoga, Uttara Kannada and Haveri Districts and Hagari in Chitradurga and Bellary Districts in Karnataka and Handri in Kurnool distriict of A.P. are the main tributaries of the Tungabhadra. Many rivulets and streams join these tributaries.

There are many holy places all along the rivers; primarily Temples of Saiva Cult on the banks of the Bhadra and all the cults on the banks of the Thunga. Sringeri, Sarada Petham established by the Adi Shnkarcaharya is the most famous one on the left bank of the Thunga, about 50 km downstream of its origin. Manthralayam Sree Raghavendra Swamy Muth in Kurnool Disitricit and Alampur in Mahaboobnagar Districit, known as Dakshina Kashi are the other important pilgrimage centres. There is a cluster of Nava Brahma temples constructed by the early Chalukyas. Jogulamba is the presiding deity of the place. Another important feature of the river banks is the flood protection walls all along the rivers, constructed by Sri Krishna Devaraya between 1525 and 1527 AD. You find them wherever there is a possibility of land erosion during the floods. It starts at Sringeri and

ends at Kurnool; just few km from its mouth. They are of stone constructions and are still intact. Huge boulders of the size of 3' X 4' X 5' are also used in its construction. It then takes a northeasterly direction through rugged ridges formed by boulders piled on ancient granite outcroppings over the elevated plateau that dominates peninsular India, the Deccan Plateau.

The water quality of tributary streams Ghatprabha, Malprabha, Nira, Venna, Koyna, Mula, Mula-Mutha, Mutha, Pawana, Indrayani, Tunghabhadra, Tungha, Bhadra, Musi, Palleru, Muneru, Chandrabhaga, Kagina, Nakkavagu, Hundri, Kundu, Kinnersani & Sabari is presented in Annexure-I Table 16.3. The summary of water quality of tributary streams Ghatprabha, Malprabha, Nira, Venna, Koyna, Mula, Mula-Mutha, Mutha, Pawana, Indrayani, Tunghabhadra, Tungha, Bhadra, Musi, Palleru, Muneru, Chandrabhaga, Kagina, Nakkavagu, Hundri, Kundu, Kinnersani & Sabari with respect to pH, Conductivity, Dissolved oxygen (DO), Biochemical Oxygen Demand (BOD), Total Coliform (TC) and Faecal Coliform (FC) is given below:

pH: -

- The criteria for pH is 6.5 to 8.5.
- pH is observed in the range of 6.2 to 8.8.
- Low value of pH is observed in Bhadra at Malleswaram D/s of KIOCL in Karnataka.
- Higher values are observed in
    - Ghatprabha at D/s of Mudhol Rd. Cross Bdg. (8.8)
    - Malprabha at D/s of Aihole Town, Tunghabhadra at Haralahalli Bridge and Ghatprabha at W.A. Point to Gokak Town (8.7) in Karnataka
    - Musi U/s at Hyderabad (8.7)
    - Palleru B/c with Krishna, Jaggayyapet (8.6) in Andhra Pradesh

Conductivity: -

- The criteria of conductivity for irrigation is 2250 µmhos/cm.
- Conductivity varies from 66 to 3800 µmhos/cm.
- The higher values of conductivity are observed in
    - River Malprabha at D/s of Aihole Town (3800 µmhos/cm) in Karnataka.
    - River Musi at Nagole (3220 µmhos/cm) and River Nakkavagu at Bachugudem, Medak (2700 µmhos/cm) in Andhra Pradesh.

Dissolved Oxygen: -

- The criteria for DO should be more than 4 mg/l.
- DO ranges from Nil to 10.4 mg/l.
- The lower value of DO is observed in
    - River Musi D/s at Hyderabad & Nagole in Rangareddy, River Pawana at Sangavigaon Pune, River Mula at Harrison Bridge near Mula-Pawana Sangam & Aundh Bridge Aundgaon, River Mula-Mutha at Mundhawa Bridge (Nil)
    - River Nakkavagu at Bachugudem, Medak (1.8 mg/l)
    - Indrayani River at D/s of Alandigaon, Pune (2.8 mg/l)

Biochemical Oxygen Demand: -

- The criteria for BOD should be less than 3 mg/l.
- BOD ranges from 0.0 to 56 mg/l.
- High values of BOD are observed in
    - River Mula at Aundh Bridge, Aundgaon (56 mg/l)
    - River Mutha at Sangam Bridge near Ganapathy Ghat (48.0 mg/l)
    - River Mula-Mutha at Mundhawa Bridge (38.6 mg/l)
    - River Pawana at Sangavigaon, Pune (37.2 mg/l)
    - River Mula at Harrison Bridge (33.6 mg/l)
    - River Indrayani at D/s of Alandigaon, Pune (14.8 mg/l)
    - River Nira at D/s of Jubliant Organosis, Pune (9.6 mg/l) & Sarole bridge on Pune-Bangalore Highway (8.9 mg/l)
    - River Venna at Varye, Satara (9.2 mg/l)
    - River Koyna at Karad (8.8 mg/l in Maharashtra
    - River Musi at Nagole, Rangareddy (48.0 mg/l) & D/s Hyderabad (19.0 mg/l)
    - River Nakkavagu at Bachugudem, Medak & River Kundu at Nandyal near Over Bridge, Kurnool (32.0 mg/l)
    - River Chandrabhaga D/s of Pandharpur Town (12.7 mg/l) & U/s of Pandharpur Town (8.3 mg/l)
    - River Kinnersani A/c of KTPS Ash Pond Effluents, Khmmam (4.8 mg/l)
    - River Sabari at Kunavaram, Khammam (3.7 mgl/l)
    - River Hundri at Joharpur(V) near Temple, Kurnool (3.6 mg/l)
    - River Tungabhadra at Mantralayam, Kurnool & Bavapuram (3.4mg/l) in Andhra Pradesh
    - River Bhadra at Bhadravathi D/s (5.8 mg/l)
    - River Ghatprabha at W.A. Pointto Gokak Town (5.4 mg/l)
    - River Tungabhadra at Ullanur (5.2 mg/l), Haralihalli Bridge (3.7 mg/l) & Honnali Bridge (3.4 mg/l)
    - River Tunga at D/s of Shimoga Town (4.3 mg/l) & D/s of KIOCL Road Bridge, Near Holehunnur (3.4 mg/l)
    - River Malprabha at D/s of Khanapur Town & D/s of Aihole Town (3.4 mg/l) and Confluence point of Tunga & Bhadra at Kudli (3.1 mg/l) in Karnataka

Faecal Coliform: -

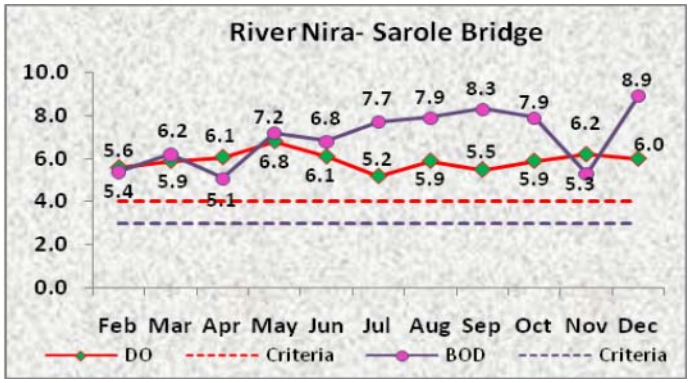
- Faecal Coliform should be less than 2500 MPN/100ml.
- Faecal Coliform (FC) ranges from 0 to 9000 MPN/100 ml.
- The maximum number of Faecal Coliform (9000 MPN/100ml) is observed in River Tunghabhadra at Ullanur in Karnataka & River Kagina at Sewage Disposal Point in Andhra Pradesh.

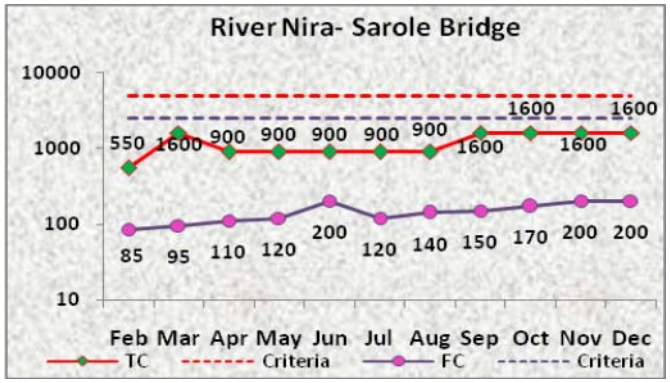
Total Coliform: -

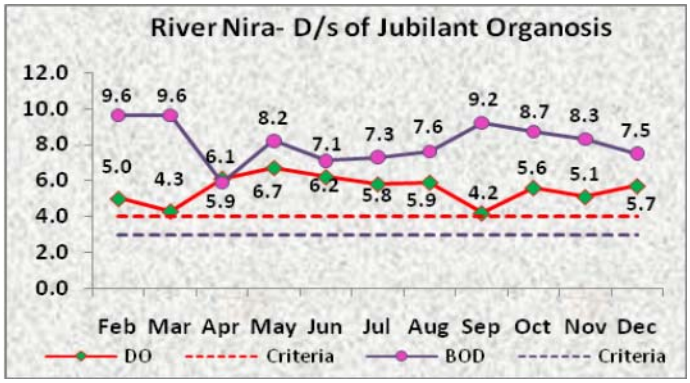
- Total Coliform should be less than 5000 MPN/100ml.
- The Total Coliform count varies from 3 to 1, 70,000 MPN/100 ml.
- Total Coliform is observed higher than the criteria in
    - River Hundri at Joharpur(V) near Temple, Kurnool & river Tungabhadra at Mantralayam (1, 70,000 MPN/100 ml)

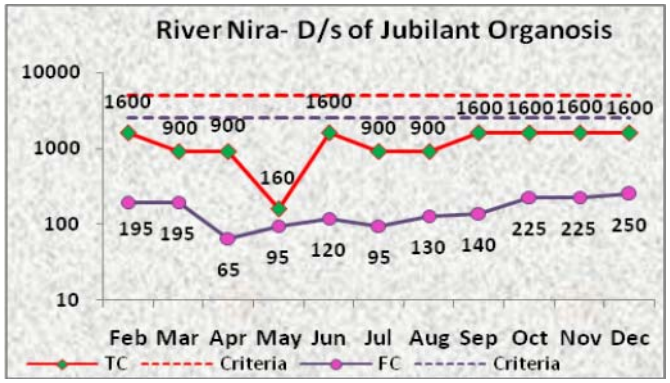
- River Kagina at Sewage Disposal Point (16,000 MPN/100 ml) in Andhra Pradesh
- River Bhadra at Bhadravati and Tungabhadra at Ullanur (16,000 MPN/100 ml)
- Tungha at D/s of Shimoga Town and Bhadra at D/s of KIOCL Bridge near Holehunnur (9000 MPN/100ml) in Karnataka

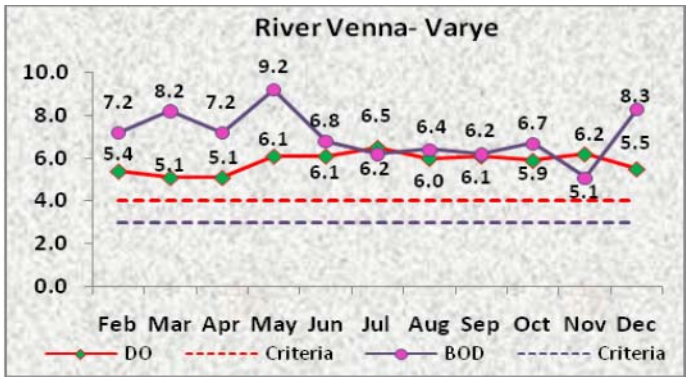
Figure 16.6: Temporal Trend of Water Quality of tributary streams Nira, Venna, Koyna, Mula, Mula-Mutha, Mutha, Pawana, Indrayani, Tunghabhadra, Tungha, Bhadra, Musi, Chandrabhaga, Nakkavagu, Hundri & Kundu

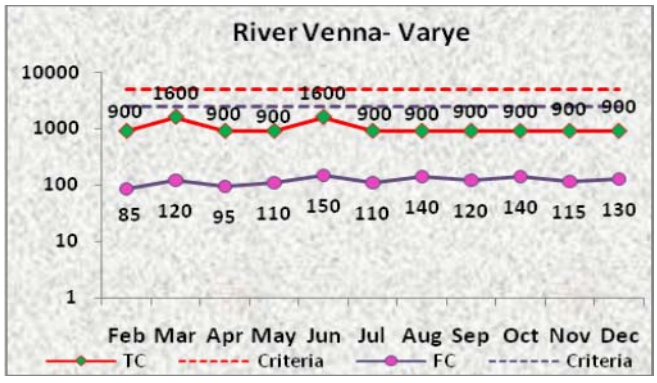


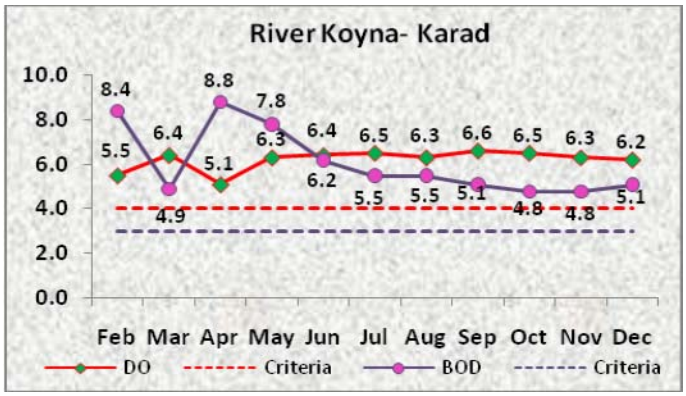


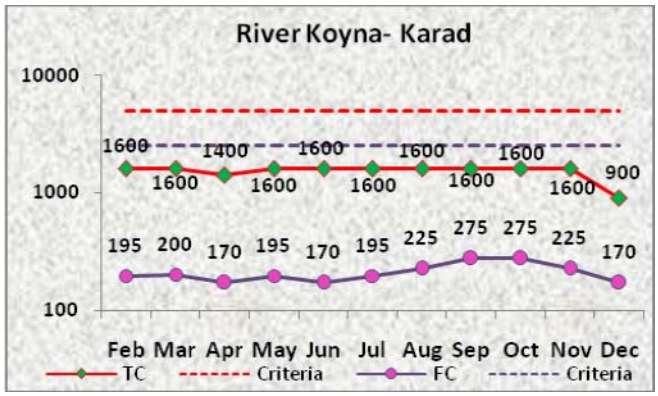


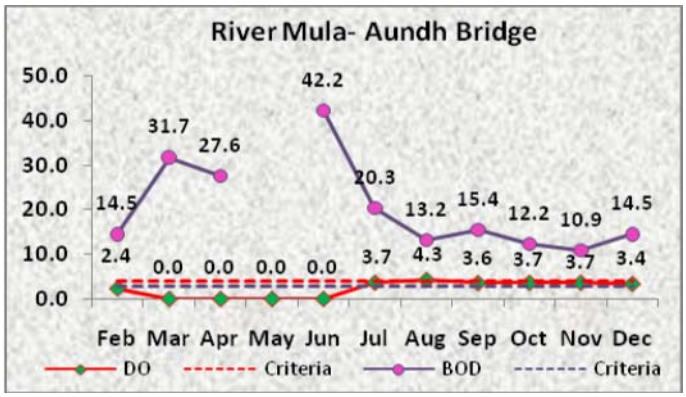


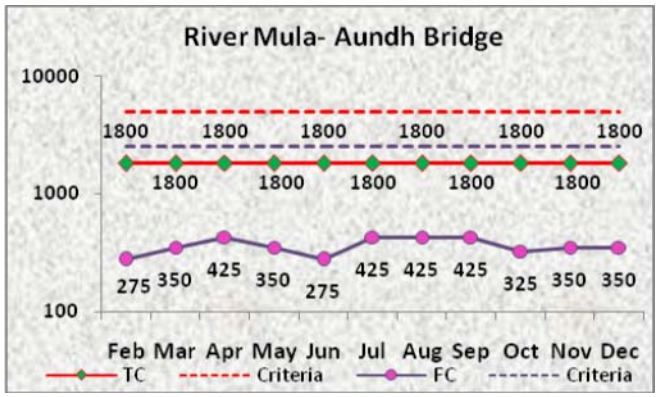


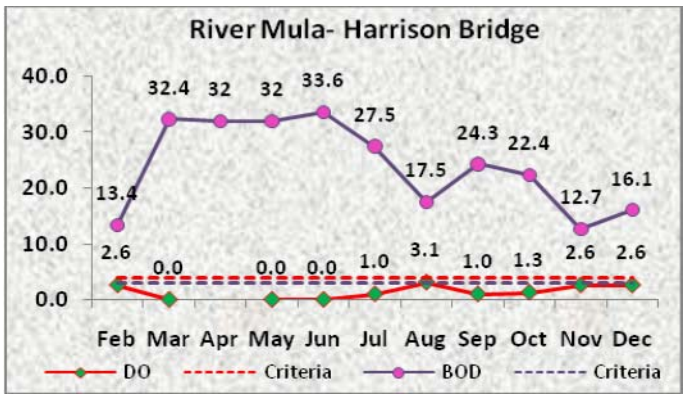


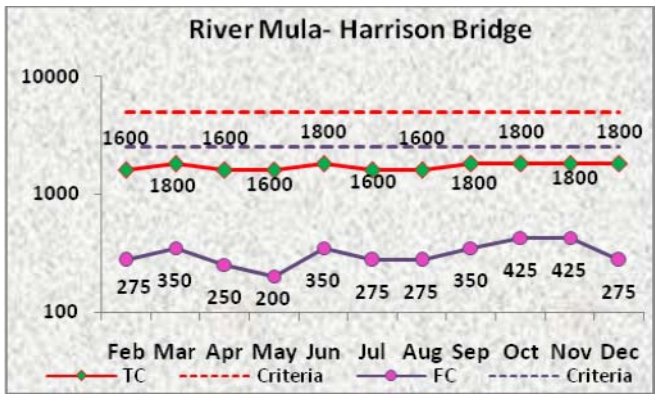

River Koyna- Karad
10.0
8.0
6.0
4.0
2.0
0.0
8.4 6.4 8.8 7.8 6.4 6.5 6.3 6.6 6.5 6.3 6.2
5.5 4.9 5.1 6.3 6.2 5.5 5.5 5.1 4.8 4.8 5.1
Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
DO
Criteria
BOD
Criteria

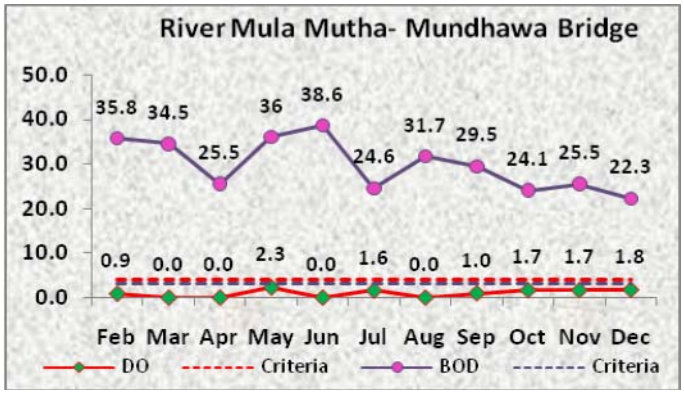

River Koyna- Karad
10000
1000
100
1600 1600 1400 1600 1600 1600 1600 1600 900
195 200 170 195 170 195 225 275 275 225 170
Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
TC
Criteria
FC
Criteria

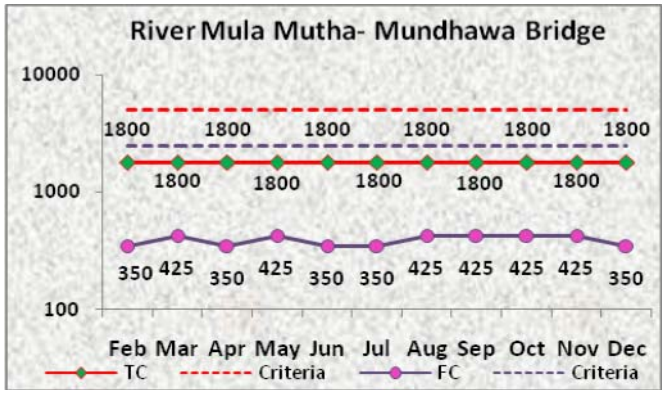

River Mula- Aundh Bridge
50.0
40.0
30.0
20.0
10.0
0.0
14.5 31.7 27.6 42.2 20.3 13.2 15.4 12.2 10.9 14.5
2.4 0.0 0.0 0.0 0.0 3.7 4.3 3.6 3.7 3.7 3.4
Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
DO
Criteria
BOD
Criteria

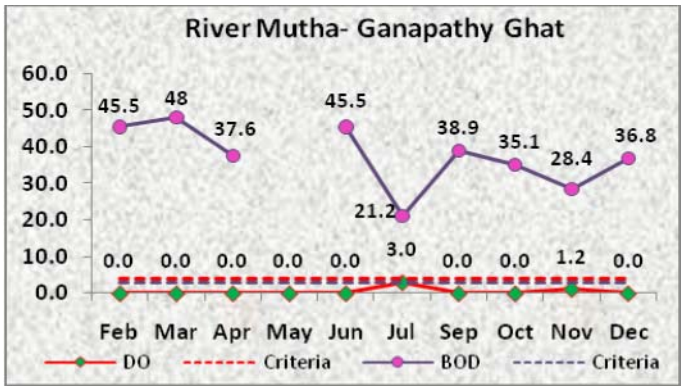

River Mula- Aundh Bridge
10000
1000
100
1800 1800 1800 1800 1800 1800
275 350 425 350 275 425 425 425 325 350 350
Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
TC
Criteria
FC
Criteria

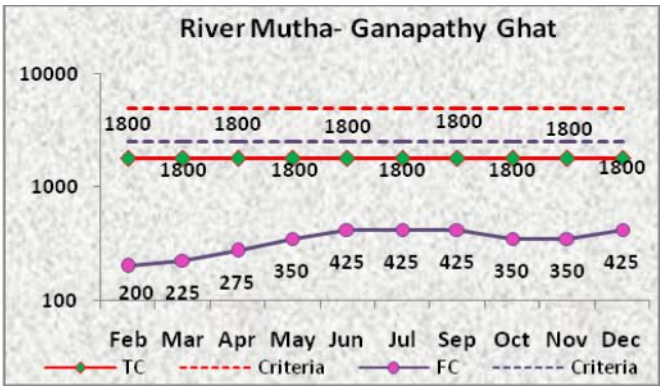

River Mula- Harrison Bridge
40.0
30.0
20.0
10.0
0.0
13.4 32.4 32 32 33.6 27.5 17.5 24.3 22.4 12.7 16.1
2.6 0.0 0.0 0.0 1.0 3.1 1.0 1.3 2.6 2.6
Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
DO
Criteria
BOD
Criteria

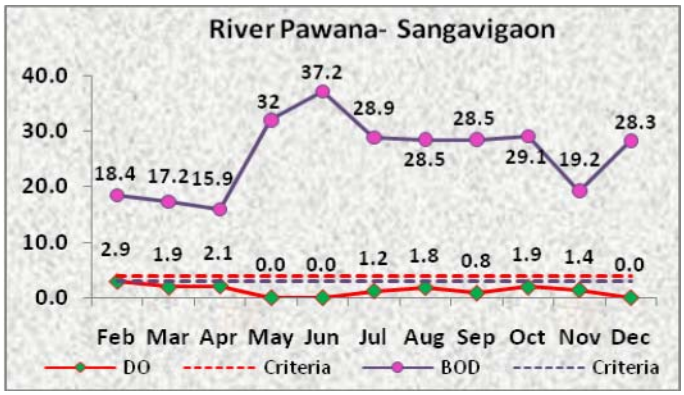

River Mula- Harrison Bridge
10000
1000
100
1600 1800 1800 1800 1800 1800
275 350 250 200 350 275 275 350 425 425 275
Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
TC
Criteria
FC
Criteria

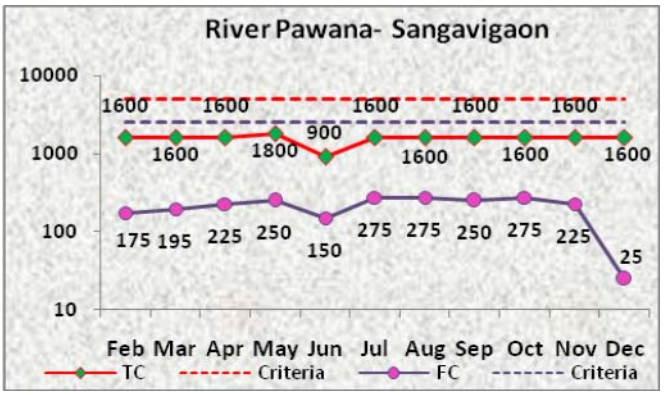

River Mula Mutha- Mundhawa Bridge
50.0
40.0
30.0
20.0
10.0
0.0
35.8 34.5 25.5 36 38.6 24.6 31.7 29.5 24.1 25.5 22.3
0.9 0.0 0.0 2.3 0.0 1.6 0.0 1.0 1.7 1.7 1.8
Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
DO
Criteria
BOD
Criteria

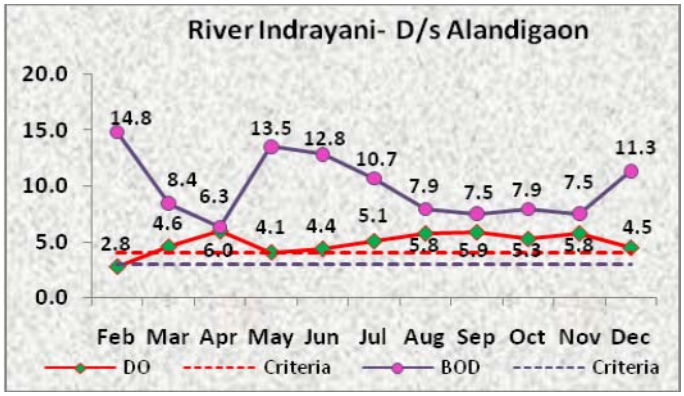

River Mula Mutha- Mundhawa Bridge
10000
1000
100
1800 1800 1800 1800 1800 1800
350 425 350 425 350 350 425 425 425 425 350
Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
TC
Criteria
FC
Criteria

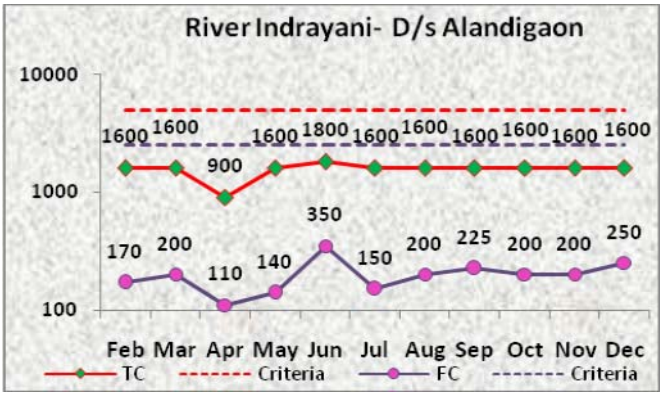

River Mutha- Ganapathy Ghat
60.0
50.0
40.0
30.0
20.0
10.0
0.0
45.5 48 37.6 45.5 21.2 38.9 35.1 28.4 36.8
0.0 0.0 0.0 0.0 0.0 3.0 0.0 0.0 1.2 0.0
Feb Mar Apr May Jun Jul Sep Oct Nov Dec
DO
Criteria
BOD
Criteria

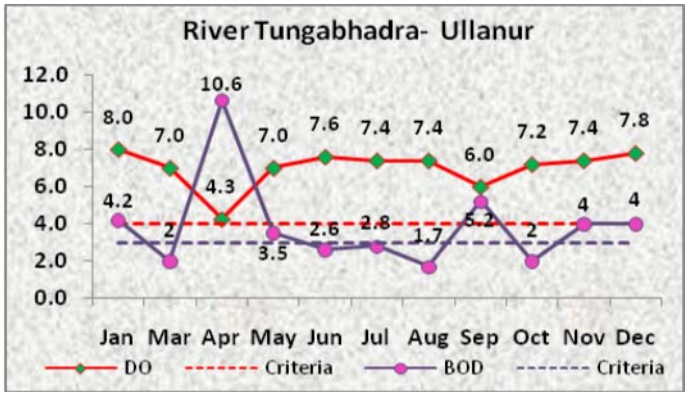

River Mutha- Ganapathy Ghat
10000
1000
100
1800 1800 1800 1800 1800 1800 1800 1800 1800 1800
200 225 275 350 425 425 425 350 350 425
Feb Mar Apr May Jun Jul Sep Oct Nov Dec
TC
Criteria
FC
Criteria

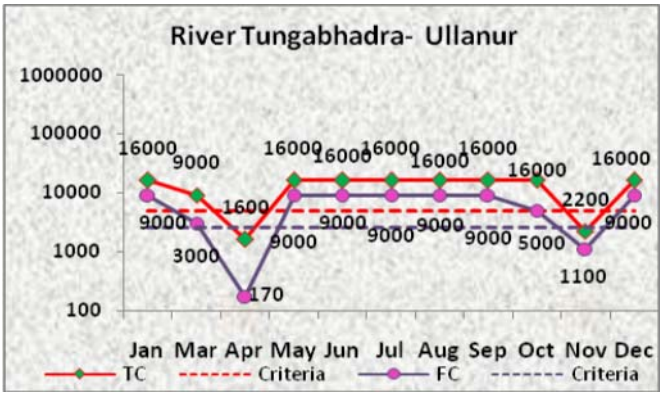

River Pawana- Sangavigaon
40.0
30.0
20.0
10.0
0.0
18.4 17.2 15.9 32 37.2 28.9 28.5 28.5 29.1 19.2 28.3
2.9 1.9 2.1 0.0 0.0 1.2 1.8 0.8 1.9 1.4 0.0
Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
DO
Criteria
BOD
Criteria

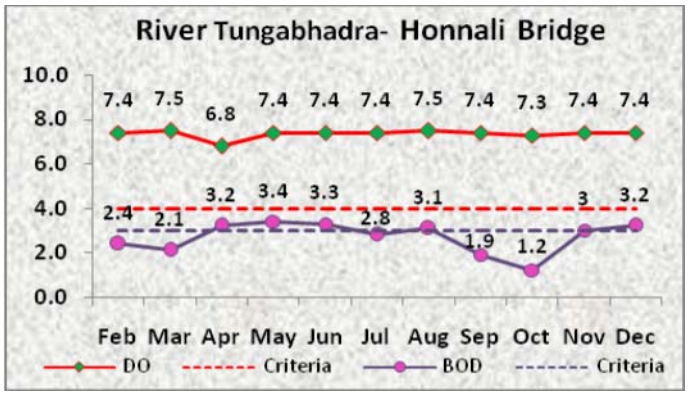

River Pawana- Sangavigaon
10000
1000
100
10
1600 1600 1600 1600 1600 1600 1600 1600 1600 1600
175 195 225 250 150 275 275 250 275 225 25
Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
TC
Criteria
FC
Criteria

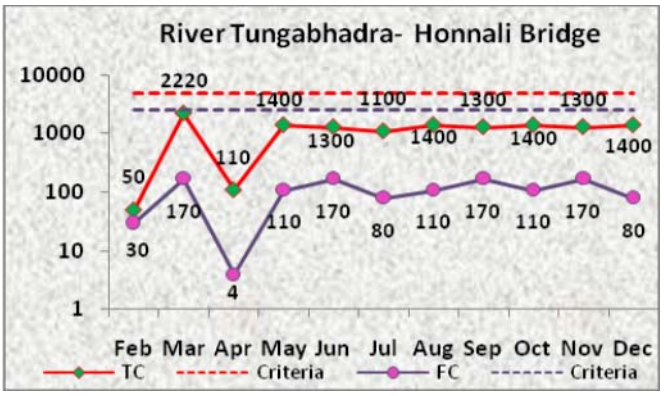

River Indrayani- D/s Alandigaon
20.0
15.0
10.0
5.0
0.0
14.8 8.4 6.3 13.5 12.8 10.7 7.9 7.5 7.9 7.5 11.3
2.8 4.6 6.0 4.1 4.4 5.1 5.8 5.9 5.3 5.8 4.5
Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
DO
Criteria
BOD
Criteria

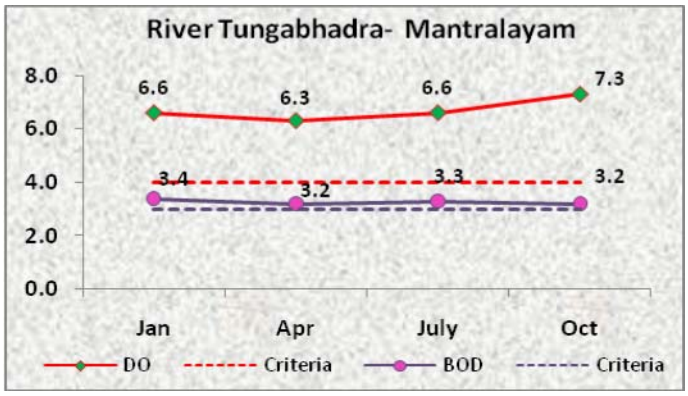

River Indrayani- D/s Alandigaon
10000
1000
100
1600 1600 1600 1800 1600 1600 1600 1600 1600 1600
170 200 110 140 350 150 200 225 200 200 250
Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
TC
Criteria
FC
Criteria

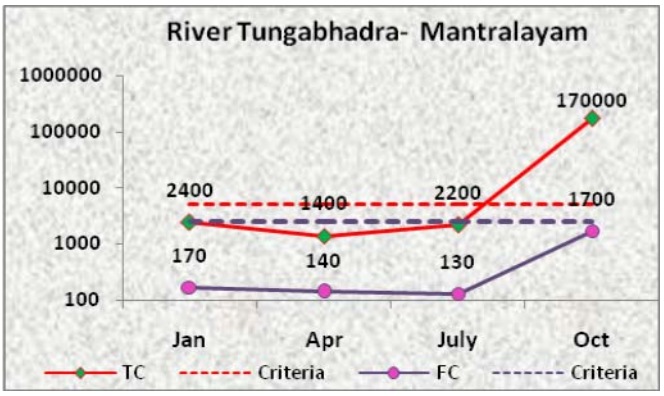

River Tungabhadra- Ullanur
12.0
10.0
8.0
6.0
4.0
2.0
0.0
8.0 7.0 10.6 7.0 7.6 7.4 7.4 6.0 7.2 7.4 7.8
4.2 2 4.3 3.5 2.6 2.8 1.7 5.2 2 4 4
Jan Mar Apr May Jun Jul Aug Sep Oct Nov Dec
DO
Criteria
BOD
Criteria

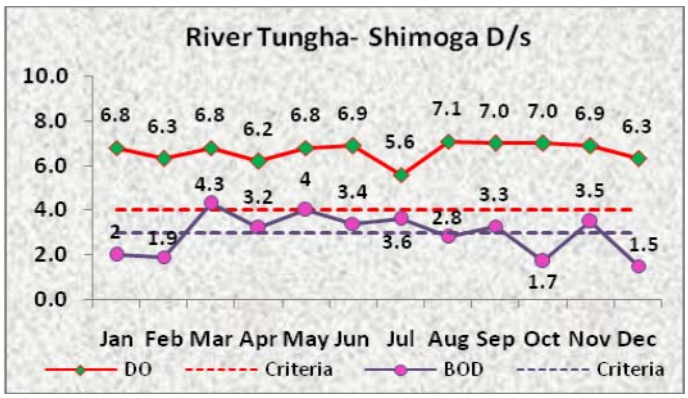

River Tungabhadra- Ullanur
1000000
100000
10000
1000
100
16000 9000 16000 16000 16000 16000 16000 16000 16000 16000 16000
9000 3000 1600 9000 9000 9000 9000 9000 5000 2200 1100 9000
Jan Mar Apr May Jun Jul Aug Sep Oct Nov Dec
TC
Criteria
FC
Criteria

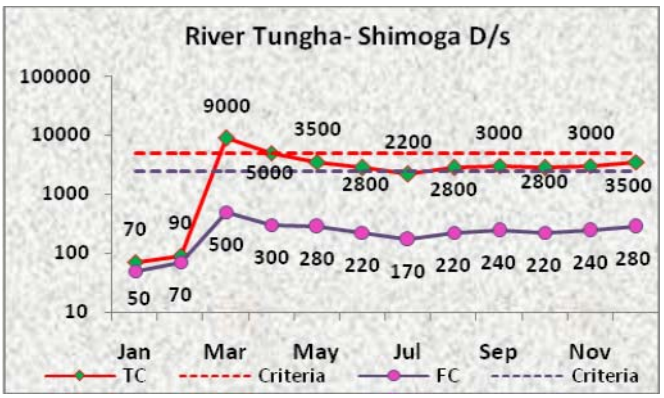

River Tungabhadra- Honnali Bridge
10.0
8.0
6.0
4.0
2.0
0.0
7.4 7.5 6.8 7.4 7.4 7.4 7.5 7.4 7.3 7.4 7.4
2.4 2.1 3.2 3.4 3.3 2.8 3.1 1.9 1.2 3 3.2
Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
DO
Criteria
BOD
Criteria

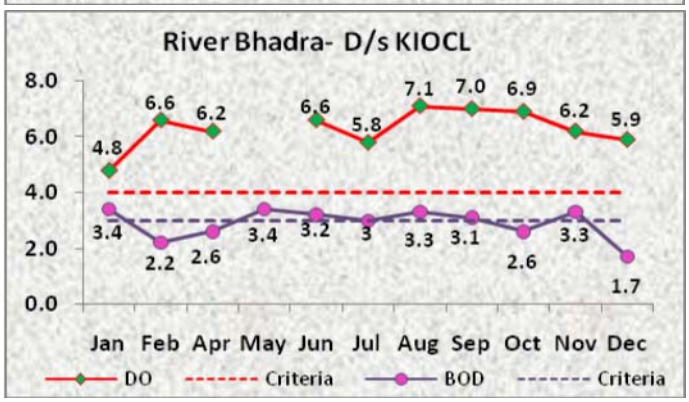

River Tungabhadra- Honnali Bridge
10000
1000
100
10
1
2220 1400 1100 1300 1300
1300 1400 1400 1400
50 110
30 170 4 110 170 80 110 170 110 170 80
Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
TC
Criteria
FC
Criteria

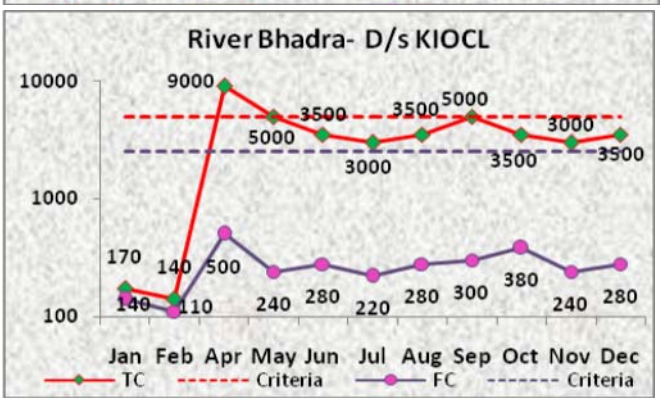

River Tungabhadra- Mantralayam
8.0
6.0
4.0
2.0
0.0
6.6 6.3 6.6 7.3
3.4 3.2 3.3 3.2
Jan
Apr
July
Oct
DO
Criteria
BOD
Criteria

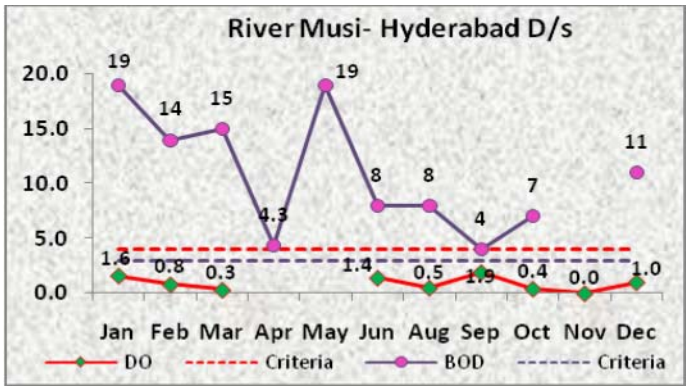

River Tungabhadra- Mantralayam
1000000
100000
10000
1000
100
2400 1400 2200 170000
1700
170 140 130
Jan
Apr
July
Oct
TC
Criteria
FC
Criteria

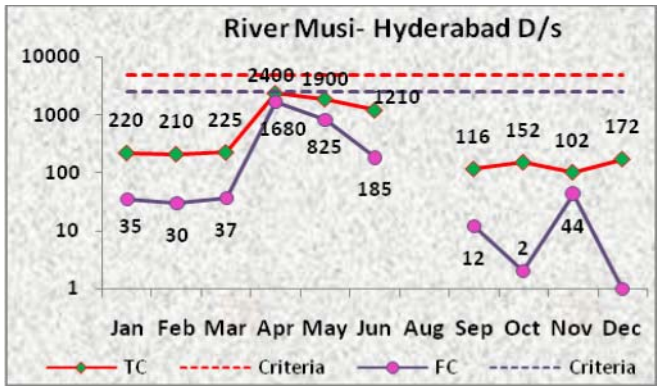

River Tungha- Shimoga D/s
10.0
8.0
6.0
4.0
2.0
0.0
6.8 6.3 6.8 6.2 6.8 6.9 5.6 7.1 7.0 7.0 6.9 6.3
2 1.9 4.3 3.2 4 3.4 3.6 2.8 3.3 1.7 3.5 1.5
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
DO
Criteria
BOD
Criteria

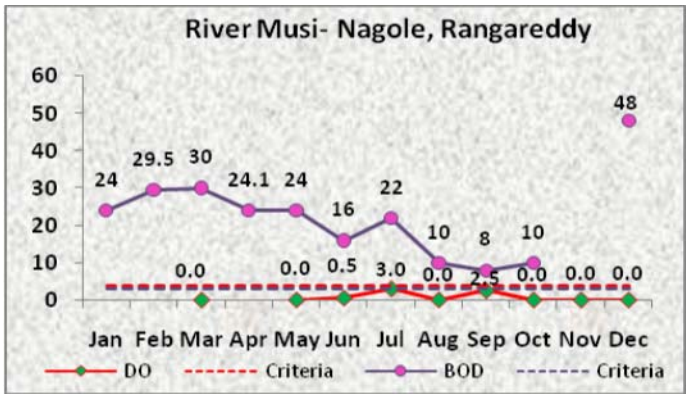

River Tungha- Shimoga D/s
100000
10000
1000
100
10
9000 3500 2200 3000 3000
5000 2800 2800 2800 3500
70 90 500 300 280 220 170 220 240 220 240 280
50 70
Jan
Mar
May
Jul
Sep
Nov
TC
Criteria
FC
Criteria

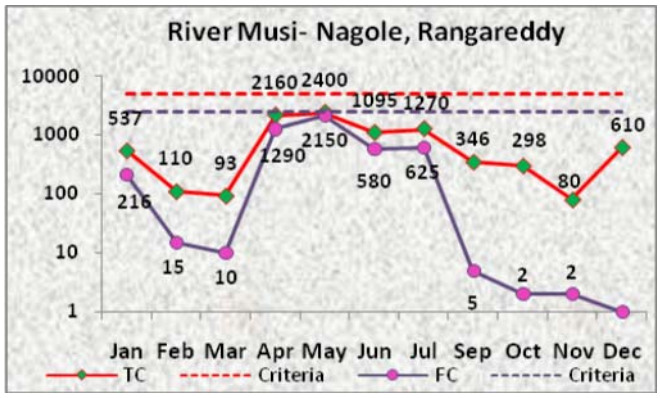

River Bhadra- D/s KIOCL
8.0
6.0
4.0
2.0
0.0
4.8 6.6 6.2 6.6 5.8 7.1 7.0 6.9 6.2 5.9
3.4 2.2 2.6 3.4 3.2 3 3.3 3.1 2.6 3.3 1.7
Jan Feb Apr May Jun Jul Aug Sep Oct Nov Dec
DO
Criteria
BOD
Criteria

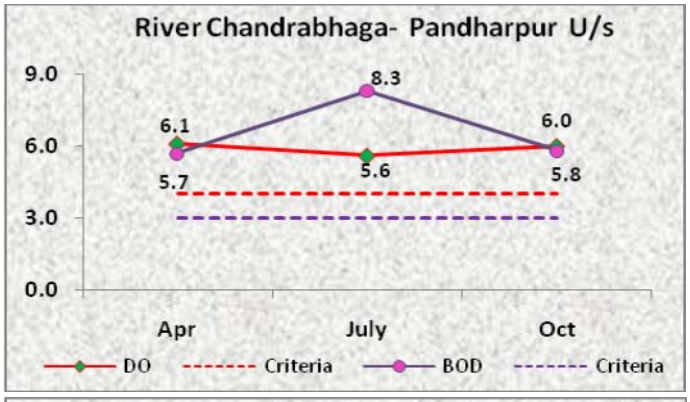

River Bhadra- D/s KIOCL
10000
1000
100
9000 3500 3500 5000
5000 3000 3500 3000 3500
170 140 500 240 280 220 280 300 380 240 280
140 110
Jan Feb Apr May Jun Jul Aug Sep Oct Nov Dec
TC
Criteria
FC
Criteria

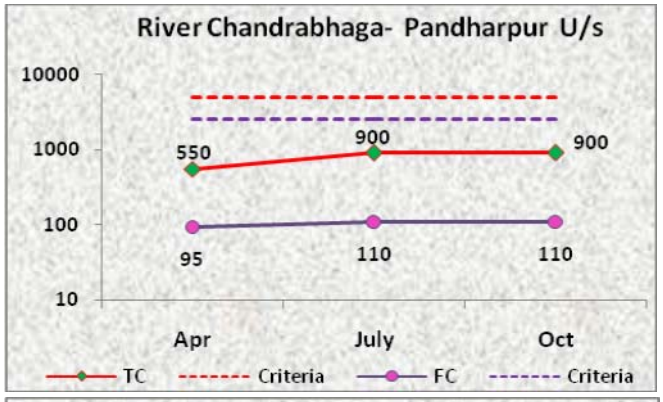

River Musi- Hyderabad D/s
20.0
15.0
10.0
5.0
0.0
19
14
15
4.3
19
8
8
4
7
11
1.6
0.8
0.3
1.4
0.5
1.9
0.4
0.0
1.0
Jan Feb Mar Apr May Jun Aug Sep Oct Nov Dec
DO
Criteria
BOD
Criteria

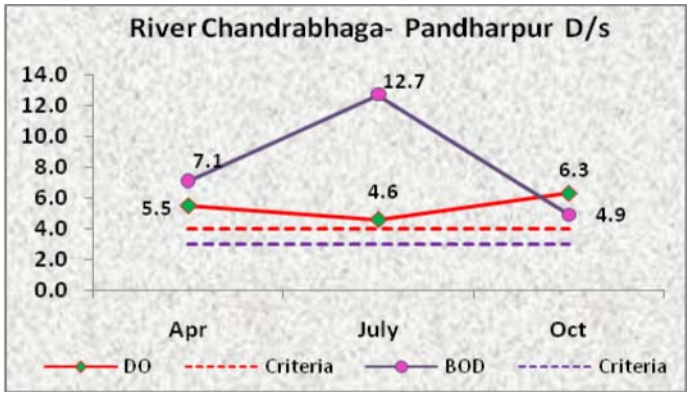

River Musi- Hyderabad D/s
10000
1000
100
10
1
2400
1900
1210
220
210
225
1680
825
185
35
30
37
116
152
102
172
12
2
44
Jan Feb Mar Apr May Jun Aug Sep Oct Nov Dec
TC
Criteria
FC
Criteria

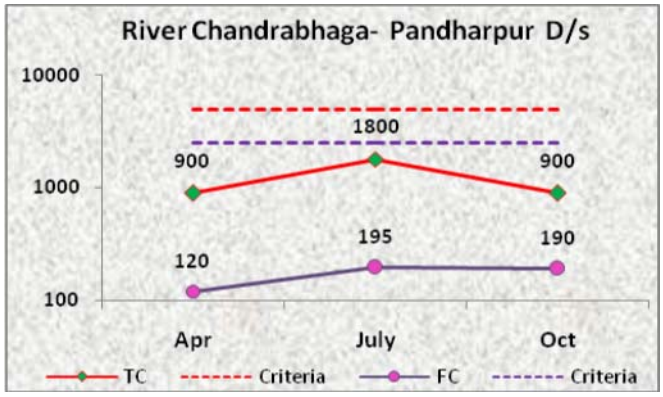

River Musi- Nagole, Rangareddy
60
50
40
30
20
10
0
24
29.5
30
24.1
24
16
22
10
8
10
48
0.0
0.0
0.5
3.0
0.0
2.5
0.0
0.0
0.0
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
DO
Criteria
BOD
Criteria

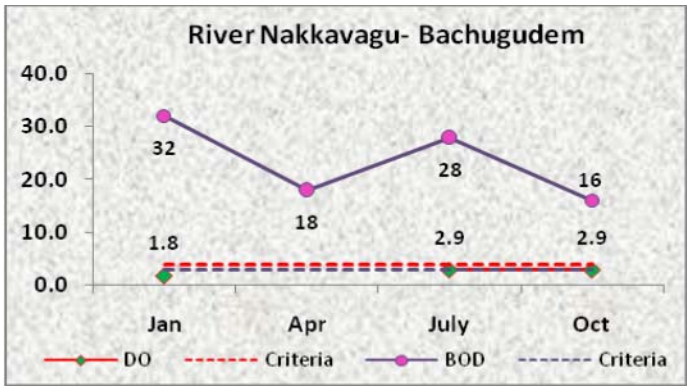

River Musi- Nagole, Rangareddy
10000
1000
100
10
1
2160
2400
1095
1270
537
110
93
1290
2150
580
625
346
298
610
216
80
15
10
5
2
2
Jan Feb Mar Apr May Jun Jul Sep Oct Nov Dec
TC
Criteria
FC
Criteria

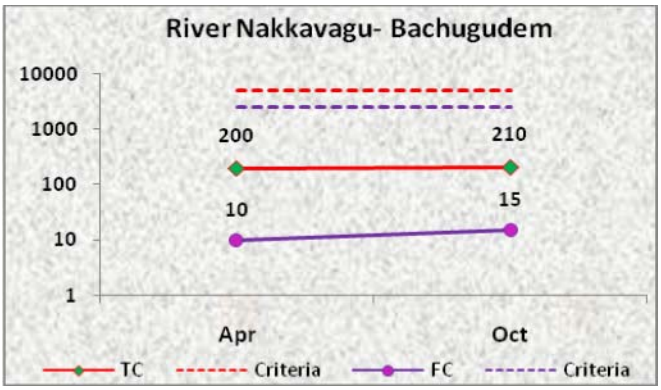

River Chandrabhaga- Pandharpur U/s
9.0
6.0
3.0
0.0
8.3
6.1
6.0
5.7
5.6
5.8
Apr
July
Oct
DO
Criteria
BOD
Criteria

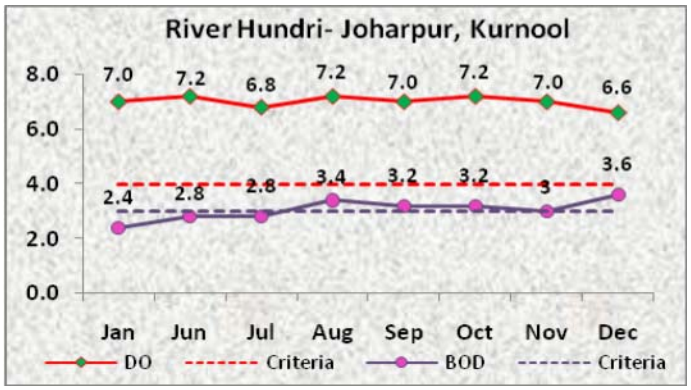

River Chandrabhaga- Pandharpur U/s
10000
1000
100
10
900
550
900
95
110
110
Apr
July
Oct
TC
Criteria
FC
Criteria

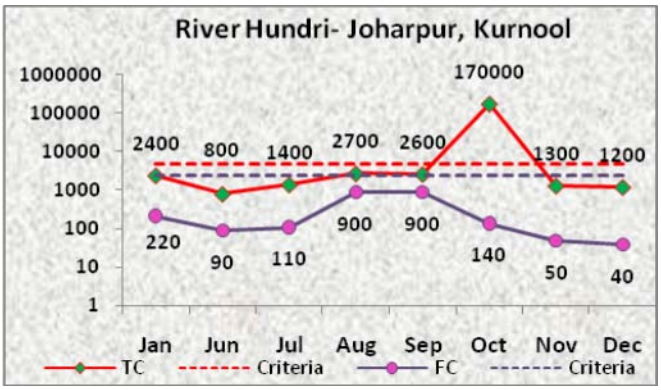

River Chandrabhaga- Pandharpur D/s
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0
12.7
7.1
6.3
5.5
4.6
4.9
Apr
July
Oct
DO
Criteria
BOD
Criteria

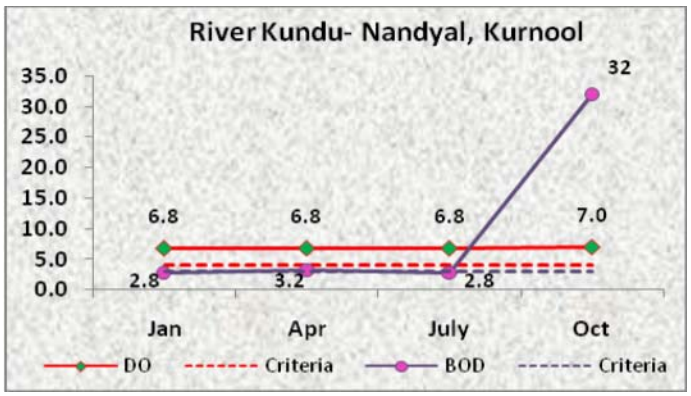

River Chandrabhaga- Pandharpur D/s
10000
1000
100
1800
900
900
195
190
120
Apr
July
Oct
TC
Criteria
FC
Criteria

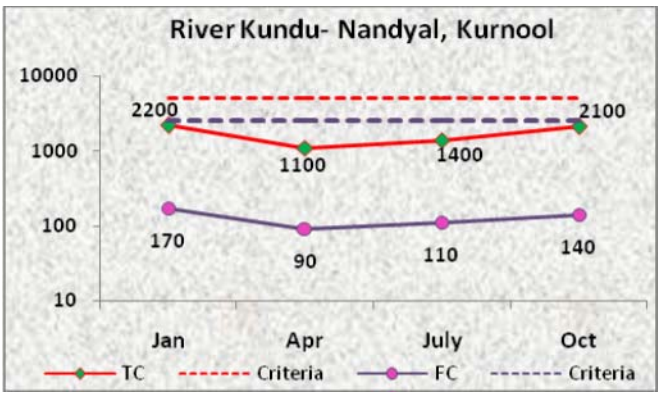

River Nakkavagu- Bachugudem
40.0
30.0
20.0
10.0
0.0
32
18
28
16
1.8
2.9
2.9
Jan
Apr
July
Oct
DO
Criteria
BOD
Criteria


River Nakkavagu- Bachugudem
10000
1000
100
10
1
200
210
10
15
Apr
Oct
TC
Criteria
FC
Criteria


River Hundri- Joharpur, Kurnool
8.0
6.0
4.0
2.0
0.0
7.0
7.2
6.8
7.2
7.0
7.2
7.0
6.6
2.4
2.8
2.8
3.4
3.2
3.2
3
3.6
Jan
Jun
Jul
Aug
Sep
Oct
Nov
Dec
DO
Criteria
BOD
Criteria


River Hundri- Joharpur, Kurnool
1000000
100000
10000
1000
100
10
1
2400
800
1400
2700
2600
170000
1300
1200
220
90
110
900
900
140
50
40
Jan
Jun
Jul
Aug
Sep
Oct
Nov
Dec
TC
Criteria
FC
Criteria

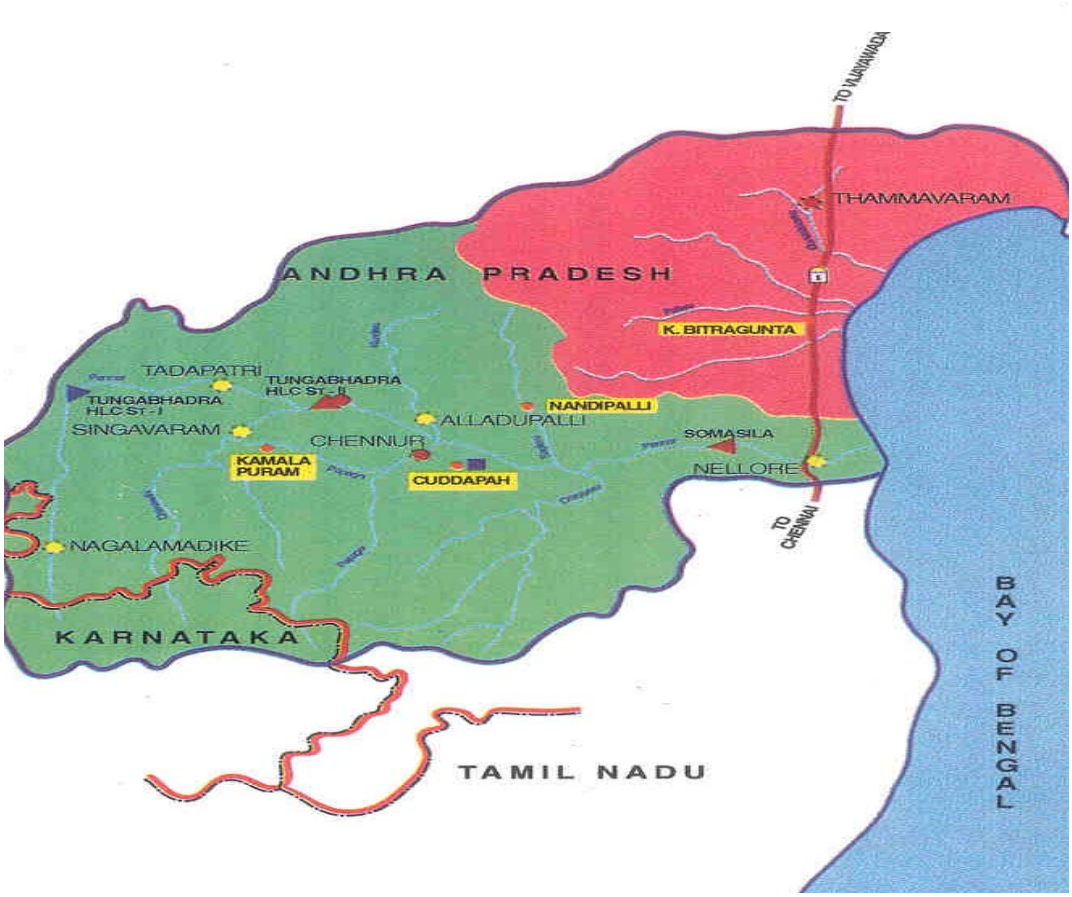

River Kundu- Nandyal, Kurnool
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
6.8
6.8
6.8
7.0
32
2.8
3.2
2.8
Jan
Apr
July
Oct
DO
Criteria
BOD
Criteria


River Kundu- Nandyal, Kurnool
10000
1000
100
10
2200
2100
1100
1400
170
90
110
140
Jan
Apr
July
Oct
TC
Criteria
FC
Criteria

CHAPTER XVII

Water Quality of Rivers in Penneru Basin

17.1 Penneru River System



The Penneru basin extends over an area of 55,213 sq km. Located in Peninsular India, it covers areas in the States of Karnataka and Andhra Pradesh. The total length of the river from the head to its outfall into the sea is 597 km of which about 61 km are in Karnataka and the balance of 536 km is in Andhra Pradesh.

The principal tributaries of the river are the Jayamangali, the Kunderu and the Sagilery from the left and the Chitravati, the Papagni and the Cheyyeru from the right.

The Penneru river has the lowest average flow, due to low annual average rainfall. The meagre water wealth of the basin has been utilized only for limited irrigational use, and additional support had to be obtained from the adjoining R.Krishna through the Kurnool-Cuddapah (K.C.) and Tungabhadra canals. The Penneru and its tributaries do not have enough flow to support direct abstraction for larger towns so; infiltration-wells are used for most of the riverside towns. Only Nandyal town abstracts from the K.C. canal.

Major industries situated on the banks of the Penneru river are Paper Mills, Straw Board and Sugar industry. The pollution abatement measures like sewage treatment plants for treating municipal wastewater and effluent treatment plants for industries should be established so that indiscriminate discharge of raw effluent directly into the river body shall not interfere with the designated best uses of the river Penneru.

The basin area of Penneru is covering the States of Karnataka and Andhra Pradesh. The important urban centres in Andhra Pradesh are Proddatur, Hindupur, Anantapur, Cuddapah, Nellore, Nandyal, Dharmavarm, Kadiri, Madanapalle, Rayachoti and Tadipatri.

17.2 Water Quality Monitoring in Penneru Basin

The water quality monitoring of the River Penneru are being done in the basin by the State Pollution Control Board of Andhra Pradesh at 5 locations. The monitoring locations are on mainstream of River Penneru (5). The ranges of water quality observed in Penneru Basin with respect to pH, Conductivity, DO, BOD, COD, Total Coliform (TC) and Faecal Coliform (FC) are presented as minimum, maximum and mean value to assess the extent of water quality variation throughout the year. The detail list of Water Quality Monitoring locations in Penneru Basin is given in the Table 17(a).

Table 17(a): Water Quality Monitoring locations in Penneru Basin

Name of Monitoring Station	State Name	Name of Water Body
Pennar Before Confl.with Chitravathi,Tadpatri,Unganoor	Andhra Pradesh	Pennar
Pennar after Conf. with Papagni,Puspagini	Andhra Pradesh	Pennar
Pennar after Conf. with Cheyyuru,Somasile	Andhra Pradesh	Pennar
Pennar at Siddvata, Nellore	Andhra Pradesh	Pennar
Down Stream of Pennar at Gauribidanur	Karnataka	Pennar

17.2.1 Water Quality of River Penneru

The water quality of River Penneru is presented in Annexure-I Table 17.1. The summary of water quality of River Penneru with respect to pH, Conductivity, Dissolved oxygen (DO), Biochemical Oxygen Demand (BOD), Total Coliform (TC) and Faecal Coliform (FC) is given below:

pH: -

- The criteria for pH is 6.5 to 8.5.
- pH is observed in the range of 6.6 to 8.6.
- High value of pH is found at A/c Cheyyuru, Somasile and Siddvata, Nellore.

Conductivity: -

- The criteria of conductivity for irrigation is 2250 µmhos/cm.
- Conductivity ranges from 307 to 2450 µmhos/cm.
- Highest value of conductivity is observed at Siddvata, Nellore.

Dissolved Oxygen: -

- The criteria for DO should be more than 4 mg/l.
- DO is observed in the range of 3.3 to 10 mg/l.
- DO does not meet the criteria at Siddvata, Nellore.

Biochemical Oxygen Demand: -

- The criteria for BOD should be less than 3 mg/l.
- The BOD value ranges from 0.7 to 3.9 mg/l.
- BOD observed more than the criteria at all locations.

Faecal Coliform: -

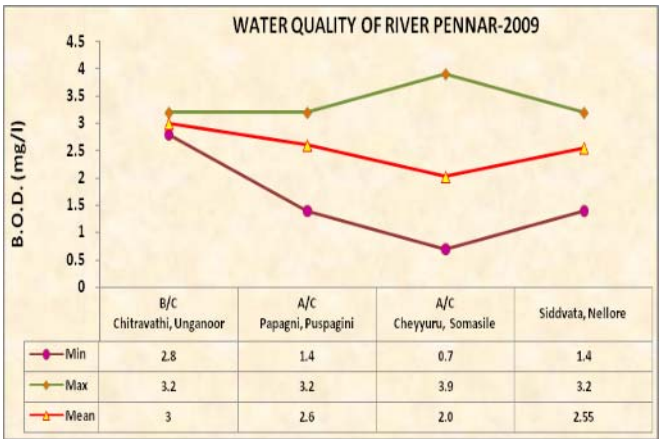
- Faecal Coliform should be less than 2500 MPN/100ml.
- Faecal Coliform (FC) ranges from 2 to 140 MPN/100ml and confirming the desired criteria.

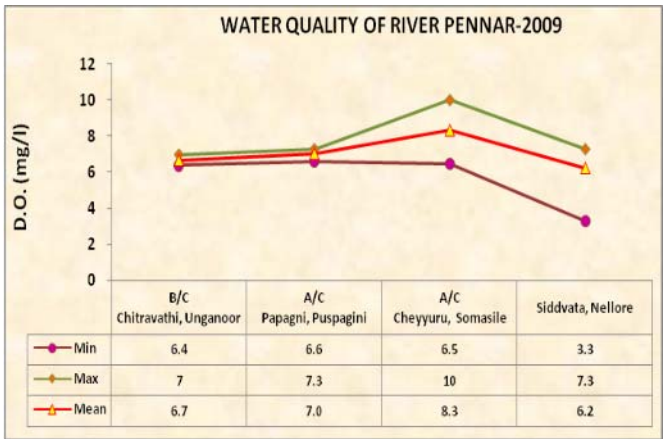
Total Coliform: -

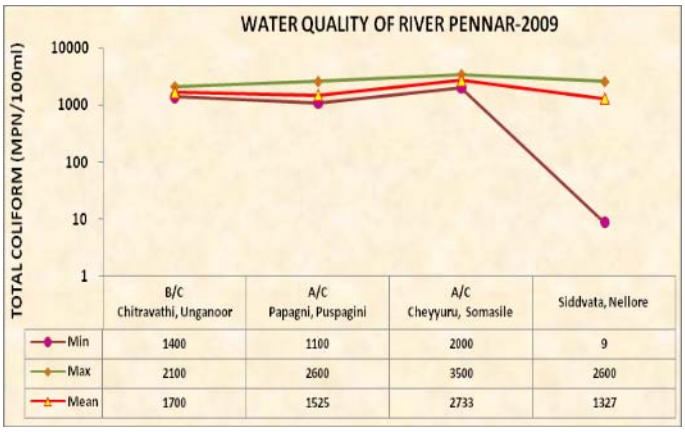
- Total Coliform should be less than 5000 MPN/100ml.
- Total Coliform lies in the range of 9 to 3500 MPN/100ml and is meeting the criteria.

The spatial trend of mainstream of River Penneru with respect to BOD, DO, Total Coliform, Faecal Coliform and Conductivity is given in Figure 17.1.

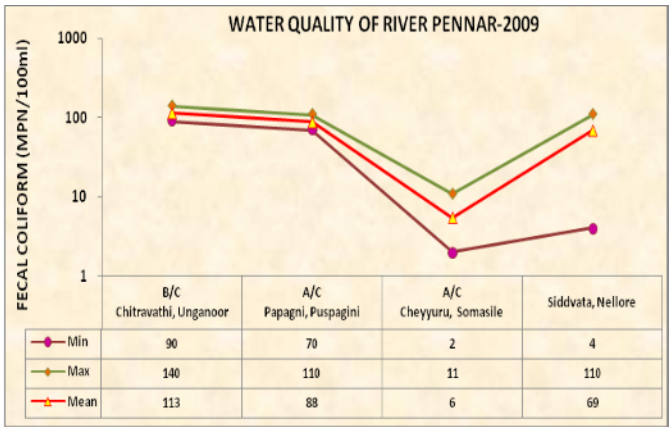
Figure 17.1: Spatial Trend of Water Quality of River Pennar



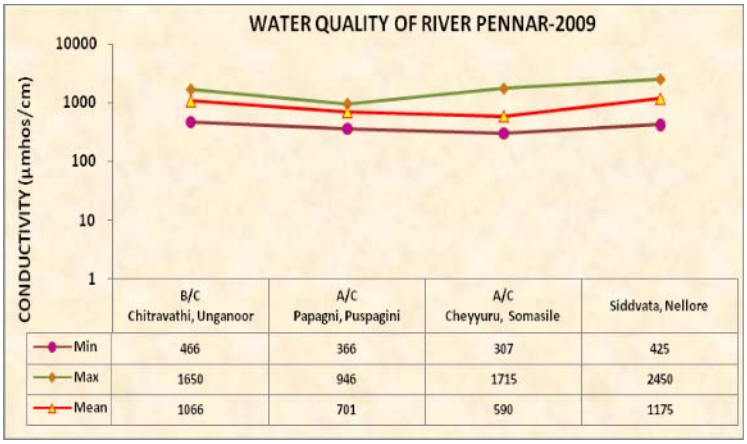




	B/C Chitravathi, Unganoor	A/C Papagni, Puspagini	A/C Cheyyuru, Somasile	Siddvata, Nellore
Min	1400	1100	2000	9
Max	2100	2600	3500	2600
Mean	1700	1525	2733	1327



	B/C Chitravathi, Unganoor	A/C Papagni, Puspagini	A/C Cheyyuru, Somasile	Siddvata, Nellore
Min	90	70	2	4
Max	140	110	11	110
Mean	113	88	6	69



	B/C Chitravathi, Unganoor	A/C Papagni, Puspagini	A/C Cheyyuru, Somasile	Siddvata, Nellore
Min	466	366	307	425
Max	1650	946	1715	2450
Mean	1066	701	590	1175

CHAPTER XVIII

Water Quality of Rivers in Cauvery Basin

18.1 Cauvery River System

The Cauvery Basin extends over an area of 87,900 sq km in the States of Kerala, Karnataka and Tamil Nadu. The total length of the river from the head to its outfall into the sea is 800 km of which about 320 km are in Karnataka 416 km in Tamil Nadu and the remaining length of 64 km forms the common boundary between the States of Karnataka and Tamil Nadu.

The important tributaries, which join the Cauvery within the Karnataka State, are the Harangi, the Hemavati, the Shimsha and the Arkavati on the north (left bank) and the Lakshmantirtha, the Kabani or Kapila and the Suvarnavati on the south (right bank). In the south (right bank), they are the Bhavani, the Noyil and the Amaravati. The delta of Kaveri is so matured that the main river Kaveri has virtually lost its link with the sea, while Coleroon, the main distributaries, bears the brunt of the burden of flow. Like other rivers of South India, the Kaveri too has a rather limited water wealth because of moderate to low rainfall in the basin.

The basin area of Cauvery is covering the States of Karnataka and Tamil Nadu, The important urban centres in these states are Tumkur, Mandya, Mangalore, Mysore, Hassan, Bangalore, Channapatna, Dod, Ballapur, Ramanagaram, in Karnataka; Karaikal in Pondichery; Valparai, Tamilnadu, Pollachi, Coimbatore, Erode, Thanjavur, Karur, Tiruchirappalli, Salem, Kumbakonam, Bhavani, Chidambaram, Coonoor, Devershola, Mannargudi, Mayiladuthurai, Mettuppalaiyam Nagappattinam, Pattukkottai, Pudukkottai, Tiruchengodu, Udhagamandalam, Udumalaippettai, Villupum in Tamil Nadu. Industrial activity is also high in this basin, particularly in the Bangalore area (Karnataka) and the

towns Mettur and Coimbatore in the Tamil Nadu State, followed by the districts of Mysore and Mandya in Karnataka and Periyar and Salem in Tamil Nadu.

18.2 Water Quality Monitoring in Cauvery Basin

The water quality monitoring of the River Cauvery is being done in the basin by the State Pollution Control Board Karnataka, Tamil Nadu and Kerala at 36 locations. The monitoring locations are on mainstream of River Cauvery (20) and on tributaries are- Arkavati (1), Amravati (1), Bhawani (5), Kabini (4), Laxmantirtha (1), Shimsa (2), Hemavati (1) and Yagachi (1). The ranges of water quality observed in Cauvery basin with respect to pH, Conductivity, DO, BOD, COD, Total Coliform (TC) and Faecal Coliform (FC) are presented as minimum, maximum and mean value to assess the extent of water quality variation throughout the year. The detail list of Water Quality Monitoring locations in Cauvery Basin is given in the Table 18(a).

Table 18(a): Water Quality Monitoring locations in Cauvery Basin

Name of Monitoring Station	State Name	Name of Water Body
Cauvery At Napokulu Bdg (D/s)	Karnataka	Cauvery
Cauvery At Kushal Nagar U/s (Near Baichanahalli)	Karnataka	Cauvery
Cauvery At Krs Dam,Balamurikshetra	Karnataka	Cauvery
Cauvery At D/s Of Karekuara Village	Karnataka	Cauvery
Cauvery At Sri Rangapattanna,D/s Of Road Bdg.	Karnataka	Cauvery
Cauvery At Sathyagalam Bridge	Karnataka	Cauvery
Cauvery At Mettur	Tamil Nadu	Cauvery
Bhavani At Bhavani	Tamil Nadu	Cauvery
Cauvery At Pallippalayam	Tamil Nadu	Cauvery
Cauvery At Erode Near Chirapalayam	Tamil Nadu	Cauvery
Cauvery At Velore Near Kattipalayam	Tamil Nadu	Cauvery
Cauvery At Mohanur Near Pattaipalayam	Tamil Nadu	Cauvery
Cauvery At Thirumukkudal-Confl. Pt.of R. Amravati	Tamil Nadu	Cauvery
Cauvery At Musiri	Tamil Nadu	Cauvery
Cauvery At Tiruchirappalli U/s	Tamil Nadu	Cauvery
Cauvery At Tiruchirappalli D/s	Tamil Nadu	Cauvery
Cauvery At Trichy,Grand Anaicut	Tamil Nadu	Cauvery
Cauvery At Thanjavur	Tamil Nadu	Cauvery
Cauvery At Coleroon	Tamil Nadu	Cauvery
Cauvery At Pitchavaram	Tamil Nadu	Cauvery
Hemavati At D/s of Holenarasipura Town At Ramadevala Weir	Karnataka	Hemavati
Shimsha At D/s of Highway Bridge, Yediyar	Karnataka	Shimsha
Shimsha At D/s of Bridge, Halagur	Karnataka	Shimsha
Arkavathi At D/s Of Kanakapura Town	Karnataka	Arkavathi
Lakshmantirtha At D/s Of Hunsur Town, Karnataka	Karnataka	Lakshmantirtha
Kabbani At Muthankara, Kerala	Kerala	Kabbani
Kabbani At Saragur Village D/s, Karnataka	Karnataka	Kabbani
Kabbani At Cause Way Sattur, Karnataka	Karnataka	Kabbani
Kabbani At Water Intake Of Kiadb At Nanjangud	Karnataka	Kabbani
Bhavani At Elachivazhy, Kerala	Kerala	Bhavani
Bhavani At Pathirakaliamman Koil, Tamilnadu	Tamil Nadu	Bhavani
Bhavani At Sirumugai,Tamilnadu	Tamil Nadu	Bhavani
Bhavani At Bhavani Sagar, Tamilnadu	Tamil Nadu	Bhavani
Cauvery At 1km. D/s Of Bhavani River Confl., Tamilnadu	Tamil Nadu	Bhavani
Amravati At 1km D/s From Eff.Dis. Pt. At Madhuthukkulam	Tamil Nadu	Amravati
Yagachi River Near Pumping Station. Hassan City	Karnataka	Yagachi

18.2.1 Water Quality of River Cauvery

The water quality of River Cauvery is presented in Annexure-I Table 18.1. The summary of water quality of River Cauvery with respect to pH, Conductivity, Dissolved oxygen (DO), Biochemical Oxygen Demand (BOD), Total Coliform (TC) and Faecal Coliform (FC) is given below:

pH: -

- The criteria for pH is 6.5 to 8.5.
- pH is observed in the range of 6.5 to 8.9.
- pH is exceeding at all locations except Thanzavur & Thiruchirapalli D/s in Tamil Nadu and Napokulu Bridge D/s in Karnataka.

Conductivity: -

- The criteria of conductivity for irrigation is 2250 µmhos/cm.
- Conductivity ranges from 65 to 81,800 µmhos/cm.
- Conductivity is not meeting the criteria at
    - Picthavaram (81,800 µmhos/cm)
    - Coleroon (16,260 µmhos/cm)

Dissolved Oxygen: -

- The criteria for DO should be more than 4 mg/l.
- DO is observed in the range of 1.5 to 10.3 mg/l.
- DO does not meet the criteria at
    - Erode near Chirapalayam (1.5 mg/l)
    - Pitchavaram (1.8 mg/l)
    - Coleroon (2.6 mg/l)
    - Pallipalayam (2.8 mg/l)
    - Trichy, Grand Anicut (3.3 mg/l)
    - Thiruchirapalli D/s (3.6 mg/l) in Tamil Nadu
    - Sri Rangapattanna D/s (3.8 mg/l) in Karnataka

Biochemical Oxygen Demand: -

- The criteria for BOD should be less than 3 mg/l.
- The BOD value ranges from 0.1 to 17 mg/l.
- BOD observed more than the criteria at
    - Erode near Chirapalayam (17.0 mg/l)
    - Tiruchirapalli (15.7 mg/l)
    - Trichy, Grand Anaicut (8.4 mg/l)
    - Pallipalayam (7.5 mg/l)
    - Mettur (4.3 mg/l)
    - Pitchavaram (4 mg/l) in Tamil Nadu

Faecal Coliform: -

- Faecal Coliform should be less than 2500 MPN/100ml.
- Faecal Coliform (FC) ranges from 2 to 5400 MPN/100ml.

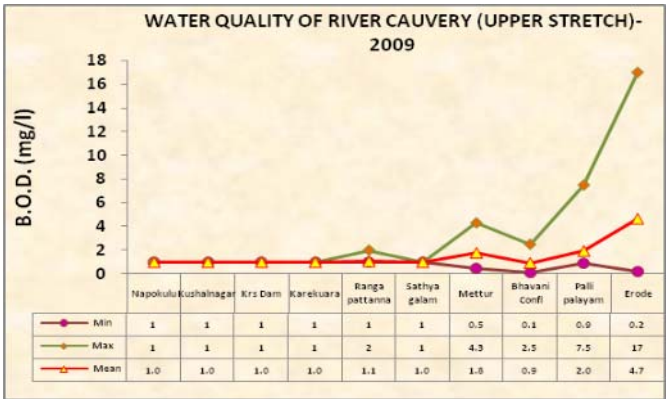
- The highest value of FC is observed at Erode near Chirapalayam (5400 MPN/100ml).

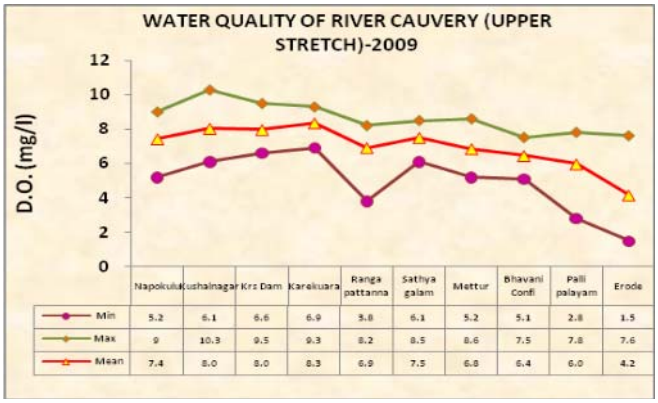
Total Coliform: -

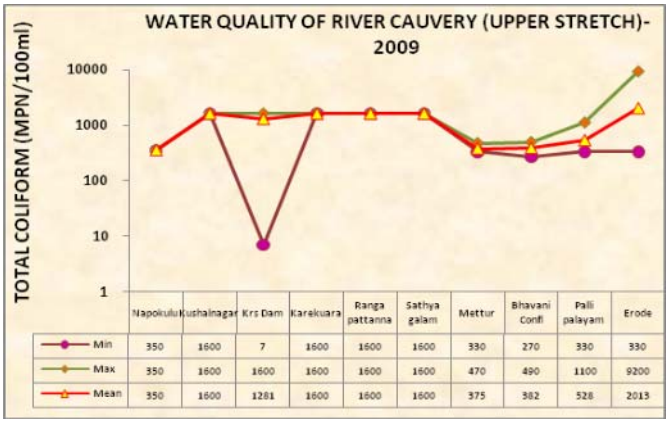
- Total Coliform should be less than 5000 MPN/100ml.
- Total Coliform lies in the range of 7 to 9200 MPN/100ml.
- The maximum count of TC is observed at Erode near Chirapalayam and Thiruchirapalli D/s (9200 MPN/100ml).

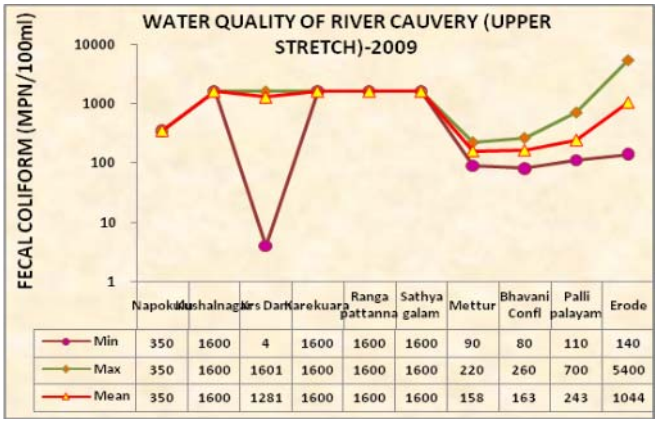
The spatial trend of mainstream of River Cauvery with respect to BOD, DO, Total Coliform, Faecal Coliform and Conductivity is given in Figure 18.1 & 18.2.

Figure 18.1: Spatial Trend of Water Quality of River Cauvery (Upper Stretch)









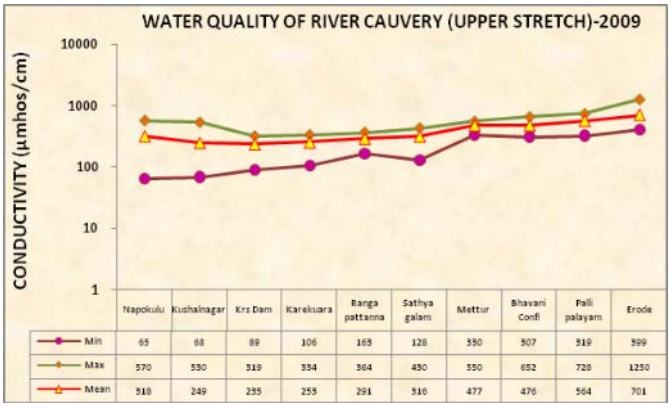
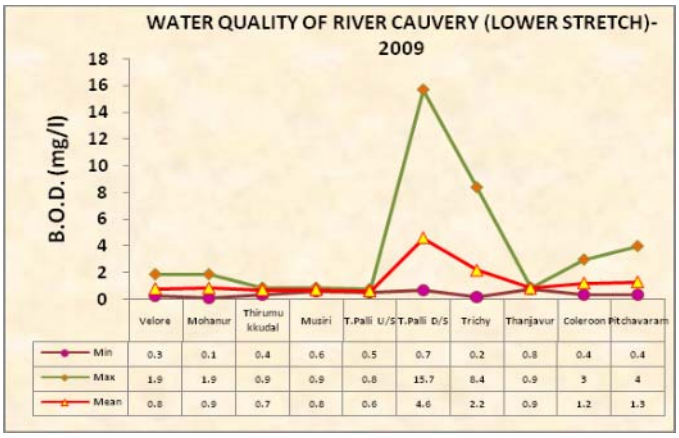
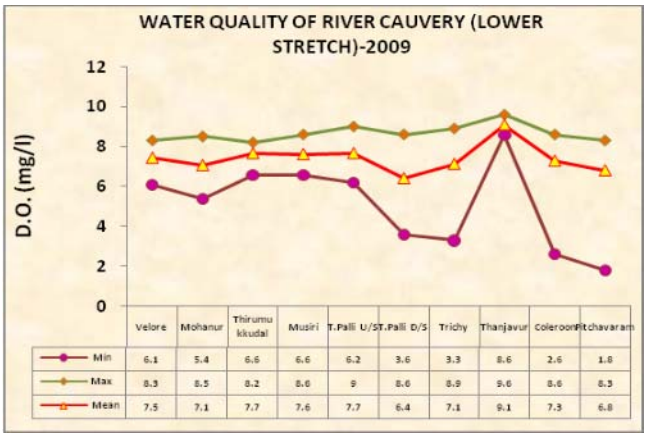
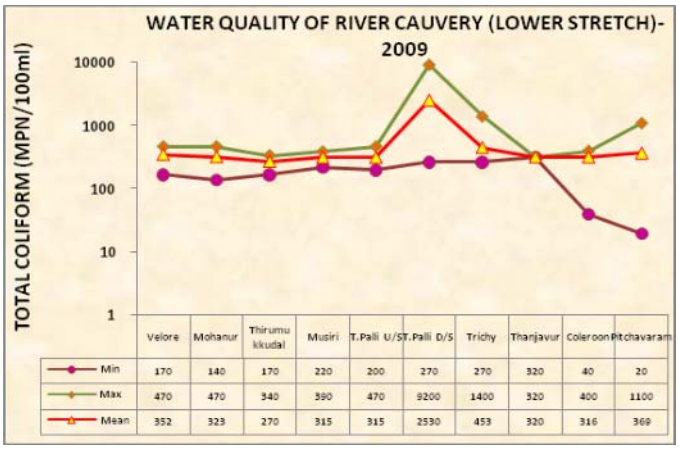
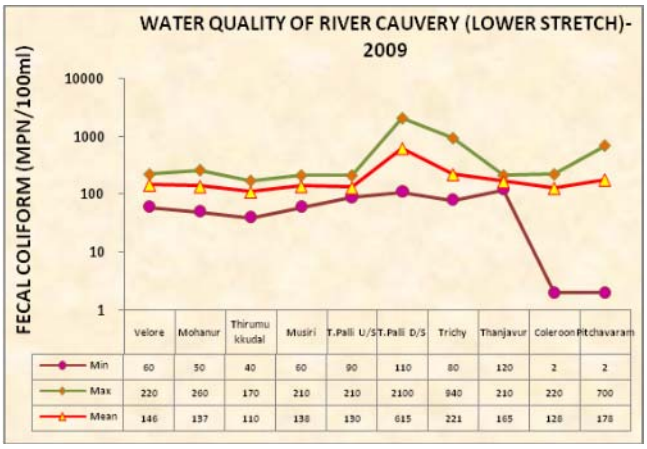


Figure 18.2: Spatial Trend of Water Quality of River Cauvery (Lower Stretch)









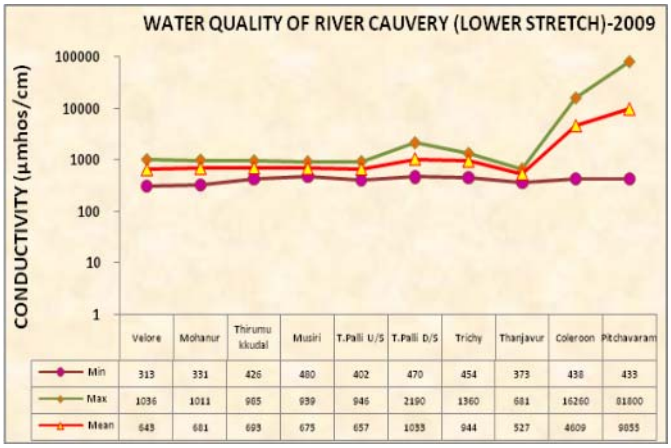
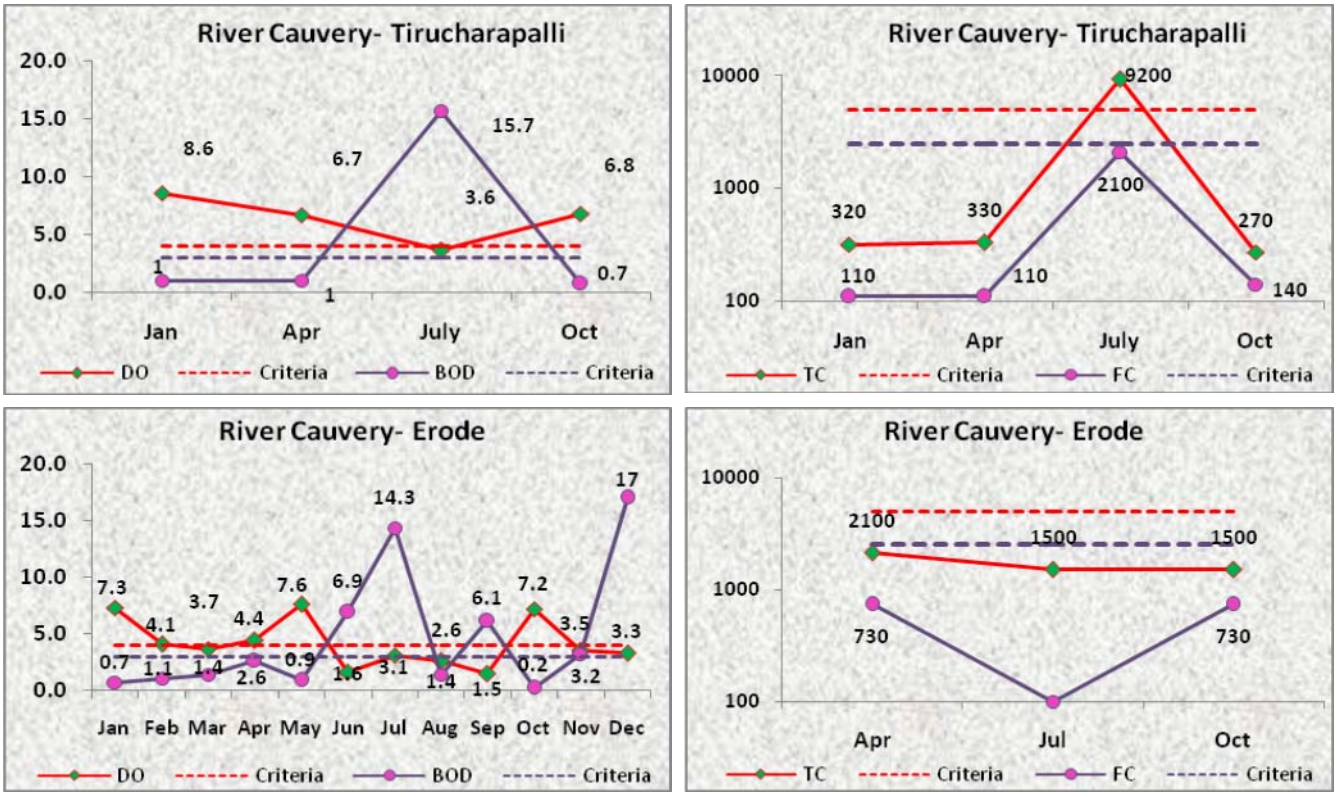


Figure 18.3: Temporal Trend of Water Quality of River Cauvery



18.2.2 Water Quality of tributary streams Yagachi, Hemavati, Shimsa, Akravati, Lakshmantirtha, Kabbani, Bhavani & Amravati

The Bhavani is the second largest river in Tamil Nadu, South India and a major tributary of the Kaveri River, the first largest river in Tamil Nadu. The Bhavani is a 217 km. long perennial river fed mostly by the southwest monsoon and supplemented by the northeast monsoon. Its watershed drains an area of 6,200 km² spread over Tamil Nadu (87%), Kerala (9%) and Karnataka (4%). The main river courses through entire of the North-Western Erode district of Tamil Nadu. About 90 per cent of the river's water is used for agriculture irrigation. 6 million people live along its banks. Textile, leather, sugar, paper, slaughterhouse and distilling industries are located along the river and its tributaries at many points. Industrial, municipal and agricultural pollution of the river results in poor water quality and negative impacts on the health of people, plants and animals dependent on the river water.

The water quality of tributary streams Yagachi, Hemavati, Shimsa, Akravati, Lakshmantirtha, Kabbani, Bhavani & Amravati is presented in Annexure-I Table 18.2. The summary of water quality of tributary streams Yagachi, Hemavati, Shimsa, Akravati, Lakshmantirtha, Kabbani, Bhavani & Amravati with respect to pH, Conductivity, Dissolved oxygen (DO), Biochemical Oxygen Demand (BOD), Total Coliform (TC) and Faecal Coliform (FC) is given below:

pH: -

- The criteria for pH is 6.5 to 8.5.
- pH is observed in the range of 6.3 to 8.9.
- Low value of pH is observed in
    - River Bhavani at Elachivazhy (6.3)
    - River Kabbani at Muthankara (6.4) in Kerala
- pH is observed higher than the criteria in
    - Bhavani at Pathirakaliamman Koil (8.9), Sirumugai (8.8) and Bhavani Sagar (8.6) in Tamil Nadu
    - River Arkavathi at Kanakapura D/s (8.8)
    - River Kabbani at Water Intake of KIADB, Nanjagud (8.6)
    - River Laxmantirtha at D/s of Hunsur Town (8.6) in Karnataka

Conductivity: -

- The criteria of conductivity for irrigation is 2250 µmhos/cm.
- Conductivity ranges from 44 to 1580 µmhos/cm and is meeting the desired crietria.

Dissolved Oxygen: -

- The criteria for DO should be more than 4 mg/l.
- DO is observed in the range of 1.6 to 10 mg/l.
- DO does not meet the criteria in
    - River Bhavani at Bhavani (1.6 mg/l) in Tamil Nadu
    - River Laxmantirtha at D/s of Hunsur Town (1.6 mg/l) in Karnataka

Biochemical Oxygen Demand: -

- The criteria for BOD should be less than 3 mg/l.
- The BOD value ranges from 0.1 to 9.0 mg/l.
- BOD observed more than the criteria at
    - River Lakshmantirtha at D/s of Hunsur Town (9.0 mg/l)
    - River Arkavati at Kanakapura D/s (4.0 mg/l) in Karnataka
    - Amravati at 1KM D/s From Eff. Dis. Pt. at Madhuthukkulam (3.9 mg/l) in Tamil Nadu

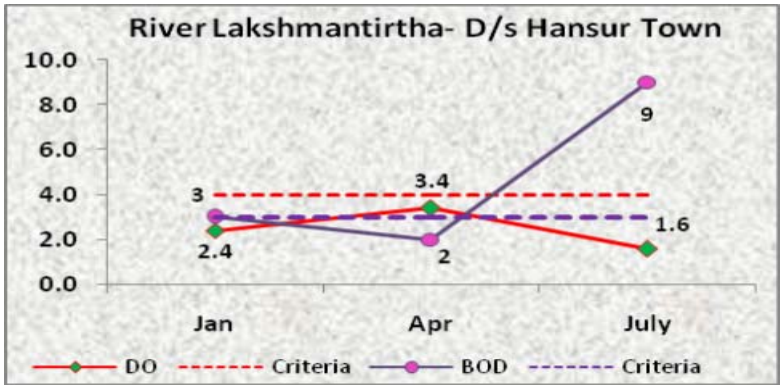
Faecal Coliform: -

- Faecal Coliform should be less than 2500 MPN/100ml.
- Faecal Coliform (FC) ranges from 40 to 1600 MPN/100ml and is meeting the desired criteria.

Total Coliform: -

- Total Coliform should be less than 5000 MPN/100ml.
- Total Coliform lies in the range of 220 to 2200 MPN/100ml and is confirming the desired criteria.

Figure 18.4: Temporal Trend of Water Quality of tributary stream Laxmantirtha



CHAPTER XIX

Water Quality of Medium and Minor Rivers, Canals and Creeks

19.1 Medium and Minor River System

The rivers and streams having catchment area less than 20,000 km^2 are categorized as medium and minor rivers. The medium and minor rivers are mainly confined to the coastal tract of India and are flowing in the States of Gujarat, Maharashtra, Goa, Karnataka, Kerala, Tamil Nadu, Orissa, Andhra Pradesh, Haryana, Himachal Pradesh, Punjab, Rajasthan, Manipur, Meghalaya, Mizoram, Tripura; and Union Territory of Daman and Diu and Pondicherry.

Table 20(a): Water Quality Monitoring locations in Medium and Minor Rivers

Name of Monitoring Station	State Name	Name of Water Body
Nagavalli at Thotapalli Regulator	Andhra Pradesh	Nagavalli
Damanganga at Circuit House, Silvasa	Daman, Diu, Dadra Nagar Haveli	Damanganga
Damanganga at D/S Confl. of W.Water at Masat Indus.Est.		
Damanganga at D/S of Madhuban, Daman		
Damanganga After Confl. of Piparia Drain, Daman		
At Daman Jetty, Moti Daman		
Vapi Weir,Vapi, Daman		
At Lavacha Temple, Silvassa		
At Naroli Bridge, Silvassa		
At Village Namdha, Vapi		
At Zari Cause Way Bridge,Daman		
Discharge Point of Distillery, Daman		
D/S of M/S Surat Beverages, Village Dadra, Silvassa		
Damanganga at Kachigaon U/S at GIDC Wier	Gujarat	
Damanganga at Kachigaon D/S (Daman)		
River Assonora at Assonora	Goa	Assonora
River Bicholim Varazan Nagar , Bicholim		Bicholim
River Chapora Near Alorna Fort ,Pernem		Chapora
River Kalna at Chandel- Pernem		Kalna
River Khandepar at Opa - Ponda		Khandepar
Khandepar at Codli Near Bridge ,U/S Opa Waterworks,Sanguem		
River Kushawati Near Bund at Kevona,Rivon,Sanguem		Kushawati
River Madai at Dabos - Valpoi		Madai
Mandovi at Tonca, Marcela		Mandovi
Mandovi at Neghbourhood of Panaji		
River Mapusa On Culvert On Highway Mapusa-Panaji		Mapusa
Sal Pazorkhoni,Cuncolim(Nr Culvert Margao-Canacona Highway)		Sal
River Sal Near Hotel Leela Mobor,Cavelossim		
River Talpona at Canacona		Talpona
River Valvant at Sankli - Bicholim		Valvant
Zuari at Panchawadi		Zuari
Zuari at D/S of Pt. Where Kumbarjria Canal Joins		
Ambika at Bilimora	Gujarat	Ambika
Amlakhadi After Confl. of W. Water From Ankleshwer		Amlakhadi
Amlakhadi at Pungam Ankleshwar Distt Bharuch		
Balehwar Khadi at N.H. No. 8		Baleshwar Khadi
Bhadar D/S Jetpur Vill. After Conf. of W.Water From Jetpur City		Bhadar
River Bhogavo D/S of Surendranagar.		Bhogavo
River Dhadar at Kothada		Dhadar

River Kaveri On Bridge at Billimora-Valsad Road	Gujarat	Kaveri
Kolak at Patalia Bdg.		Kolak
Mindhola at State Highway Bridge Sachin		Mindhola
Kolak at Railway Bridge No. 313 Vapi,Valsad		Par
River Purna On Bridge at Surat-Navsari Highway		Purna
Triveni Sangam, Nr. Somnath Temple, Veraval, Dist. Junagadh.		Triveni Sangam
Ghaggar Gh-1 at Road Brdg. Sirsa,Debwali Road	Haryana	Ghaggar
Ghaggar Gh-2 at Chandarpur Syphon		
Kala Amb D/S Markanda River		
River Ghaggar at D/S of Surajpur		
Ghaggar Before Ottu Weir (Before Mixing of Satluj Canal Water)		
Ghaggar at Mubarakpur Rest House (Patiala)	Punjab	
Ghaggar at 100m D/S Conf. With R. Saraswati (Patiala)		
Ghaggar Near Bankarpur,Dera Bassi		
Ghaggar at Ratanheri, D/S of Patiala Nadi (After Confl.)		
D/S Chhatbir		
U/S Dhakansu Nallah		
D/S Dhakansu Nallah		
D/S Jharmal Nadi		
U/S Jharmal Nadi		
Ghagger at Moonak		
D/S Sardulgarh		
U/S Sardulgarh		
Gaggar When Entering in Rajasthan Fm Haryana Near Rd No. 629	Rajasthan	
Gaggar D/S Hanumangarh Near 2 Knj Nai Abadi, Makkasr		
River Markanda at Paonta, Distt. Sirmour	Himachal Pradesh	Markanda
Markanda U/S Kala Amb		
Markanda D/S Kala Amb/ Boundary of Haryana		
River Sukhana at Parwanoo, Distt. Solan		Sukhana
Kali at D/S West Coast Paper Mill	Karnataka	Kali
Kumaradhara - U/S of Uppinagady Town B/C With Nethravathi		Kumardhara
Netravathi U/S of Dharmastala at Water Supply Intake Point		Netravathi
Achenkoil at Thumpamon	Kerala	Achenkoli
Achenkoil at Chennithula		
R Ancharakandy at Meruvamba		Ancharakandy
R Ancharakandy at Meruvamba		
R Ayroor at Ayroor Bridge		Ayroor
R Bharathapuzha at Kuttippuram		Bharathapuzha
R Bharathapuzha at Pattambi		
Chalakudy at Pulickalka-Davu		Chalakudy
Chaliyar at Koolimadu		Chaliyar
Chaliyar at Chungapally		
Padiyathadka		Chandragiri
Irumpanam		Chitthrapuzha
R Corapuzha at Kanayankode		Corapuzha
Ayur		Ithikkara
R Ithikkara at Ithikkara		
Thirurangady		Kadalundy
R Kadalundi at Hajirappally		
R Kadambayar at Brahmapuram		Kadambayar
R Kadambayar at Manckakadavu		
Kallada at Perumthottamkadavu, Punaloor		Kallada
R Kallai at Kallai Bridge		Kallai
Kakkadavu		Karingode
Karamana at Moonnattumukku		Karmana
R Karuvannurr at Karuvannur Bridge		Karuvannur
R Kavvai at Kuttiyol Palam		Kavvai
R Keecheri at Vadakkanchery Bridge		Keecheri
R Korayar at Kanjikode		Korayar

Thaliparamba	Kerala	Kuppam
R Kuppam at Rayarom		
Kuttiyady Estate		Kuttiyady
Valayam		Mahe
R Mamom at Mamom Bridge		Mamom
Manimala at Kalloopara		Manimala
Manimala at Thondra		
R Manjeswar at Bajrakkara Br.		Manjeswar
Meenachil at Kidangoor		Meenachil
R Mogral at Mogral Br.		Mogral
Muvattapuzha at Vettikkattumukku		Muvattapuzha
R Neelaswaram at Nambiarkal Dam		Neelaswaram
Hosdurg		
Amaravila		Neyyar
R Neyyar at Aruvipuram		
R Pallickal at Nellimukal		Pallickal
Pamba at Chengannur		Pamba
Pamba at Thakazhy		
Pamba Down		
Periyar Near Alwaye-Eloor		Periyar
Periyar at Kalady		
Periyar at Sewage Discharge Point		
River Periyar at Muppathadam		
River Periyar at Pathalam		
R Periyar at Kalamassery		
R Periyar at Purappallikavu		
R Peruvamba at Chandappura		Peruvamba
R Pullur at Pullur Br.		Pullur
R Puzhackal at Puzhackal Bridge		Puzhackal
R Ramapuram at Ramapuram Bridge		Ramapuram
R Shriya at Angadimogaru		Shriya
R Thallassery at Pathippalam		Thallassery
R Thirur at Thalakkadathur Bridge		Thirur
R Uppala at Uppala Br.		Uppala
Vamanapuram		Vamanapuram
Amba D/S of Waken Bdg-U/S of JS Petrochemicals,Wakenphata,Roha	Maharashtra	Amba
Bhatsa at D/S of Pise Dam Near Pise Village (Ulhas)		Bhatsa
Bhatsa River at D/S of Liberty Oil Mills, Satnel, Shahapur, Thane		
Bhatsa River at U/S of Liberty Oil Mills, Satnel, Shahapur, Thane		
Kalu at Atale Village		Kalu
Kan River Near Sakri Water Works, Sakri, Dhule		Kan
Kundalika at Roha City		Kundalika
Kundalika River at Are Khurd (Saline Zone)		
Kundalika Near Salav Bridge (Salina Zone), Salav, Roha, Raigad		
Kundalika River at Dhatav at Jackwell, Dhatav, Roha, Raigad		
Mithi River		Mithi
Muchkundi at Waked,M/S Asahi India Glass Ltd,Waked,Lanja, Ratnagiri		Muchkundi
Patalganga Near Intake of MIDC W/W		Patalganga
Patalganga at Shilphata		
Patalganga at D/S of Kharpada Bridge, Kharpada, Khalapur, Raigad		
Patalganga River at Vyal Pump House, Vyal, Khalapur, Raigad		
Patalganga River at Khalapur Pumping Station, Khalapur, Raigad		
Patalganga River at Savroli Bridge, Khalapur. Raigad		
Patalganga at Gagangiri Maharaj Temple, Khopoli, Khalapur, Raigad		
Pehlar Dam On Pehlar River-Inlet of Water Works, Pehlar, Vasai, Thane		Pehlar
Savitri River at Ovale Village.		Savitri
Savitri Jackwell at Upsa Kendre, Nangalwadi, Mahad, Raigad		
Savitri River at Shedav Doh, Mahad,Raigad		
Savitri River at Dadli Bridge, Dadli, Mahad, Raigadh		

Savitri River at Muthavali Village, Mahad, Raigadh	Maharashtra	
Surya River, U/S of Surya Dam, Dhammi, Vikramgad, Thane		Surya
Surya River at Midc Pumping Station, Garvashet, Palghar, Thane		
Surya at Intake of Vasai-Virar W/S Scheme, Masvan, Palghar, Thane		
Tansa River Near Road Bridge, Village Dakewali, Wada, Thane		Tansa
Ulhas at U/S of Nrc Bund at Mohane		Ulhas
Ulhas at U/S of Badlapur		
Ulhas River Atjambhul Water Works.		
Vaitarna River Near Road Bridge, Gandhare Village, Wada, Thane		Vaitarna
Vashisti at U/S of Three M Paper Mills Near M/S Multifilms Plastic Pvt. Ltd. at Kherdi.		Vashisti
Vashishti at D/S of Three M Paper Mills Near Chiplun Water Intake Jackwell, Kherdi, Ratnagiri		
Vashishti at U/S of Pophali Nr Konphansawane Bdg,Chiplun, Ratnagiri		
Imphal at Mahabali	Manipur	Imphal
Imphal at Koirengei		
Kiyamgi		
Minuthong (Imphal River)		
Iril at Porampet		Iril
Lilong		
Khuga River (Churachandpur Dist.)		Khuga
Khujairok River, Moreh (Chandel Dist.)		Khujairok
Hump Bridge		Nambul
Heirangoithong		
Sekmai River, Kakching (Thoubal Dist.)		Sekmai
Ganol River Tura	Meghalaya	Ganol
Kyrhukhla Near Sutnga Khlieriat,Jaintia Hills Dt.		Kharkhla
Myntdu River Jowai		Myntdu
Simsang River Williamnagar		Simsang
Umtrew at Byrnihat East		Umtrew
Tlawng Upstream Aizawl	Mizoram	Tlawng
Tlawng Downstream Aizawl		
Tuirial Upper Catchment		Tuirial
Tuirial Lower Catchment		
Budhabalanga, D/S of Baripada Town	Orissa	Budhabalanga
Budhabalanga at Balasore D/S		
River Kerandi(Intake Well of Nalco Refinary, Hal, Sunabeda)		Kerandi
Penta U/S, Jaykaypur Town		Nagavalli
Nagavalli at Jaykaypur D/S		
Nagavalli at Rayagada D/S		
Rushikulya at Ganjam U/S		Rushikulya
Rushikulya at Ganjam D/S		
Muniguda (D/S of M/S Vedantaalumina Project)		Vansadhara
Gunupur (Interstate Boundry)		
Arasalar River Karaikal Region	Pondicherry	Arasalar
Coringa River		Coringa
Gautami-Godavari River		Gautami-Godavari
Gautami-Godavari River		
Mahe River		Mahe
Kodra Dam, Mount Abu	Rajasthan	Kodra Dam
Palar at Vaniyambadi Water Supply Head Work	Tamil Nadu	Palar
Tambiraparani at Bdg.Nr. Madura Coats Ltd.Papavinasam		Tambiraparani
Tambiraparani at Cheranmadevi,Cause Way		
Tambiraparani at Tirunelveli,Collectorate		
Tambiraparani at Murappanadu		
Tambiraparani at Pappankulam		
Tambiraparani at Rail Bdg. Nr. Ambasamudam		
Tambiraparani at Arumuganeri		

Gumti at U/S South Tripura	Tripura	Gumti
Gumti at D/S South Tripura		
Chandrapur, Agartala D/S of Haora River		Haora

19.2 Water Quality of Medium and Minor Rivers in Gujarat and Daman

The water quality monitoring of River Damanganga, Baleshwar Khadi, Purna, Kaveri, Dhadar, Ambika, Kolak, Amlakhadi, Mindhola, Bhadar, Bhogavo and Triveni Sangam in Gujarat and Daman is carried out by the respective State Pollution Control Boards. The water quality status of rivers in Gujarat is presented in Annexure-I, Table 18.1. The summary of water quality with respect to pH, Conductivity, Dissolved oxygen (DO), Biochemical Oxygen Demand (BOD), Total Coliform (TC) and Faecal Coliform (FC) is given below:

pH: -

- The criteria for pH is 6.5 to 8.5.
- pH is observed in the range of 6.9 to 8.9.
- Low value of pH (6.9) is observed in
    - Damanganga at lavacha temple, Silvassa (6.9)
    - Triveni sangam, near somnath temple, veraval, dist. Junagadh (6.9)
    - Damanganga at zari cause way bridge, Daman (7.0)
- High Value (8.9) is observed in river Purna on bridge at Surat-navsari highway and river Bhogavo d/s of Surendranagar.

Conductivity: -

- The criteria of conductivity for irrigation is 2250 µmhos/cm.
- Conductivity ranges observed from 224 to 63500 µmhos/cm.
- Highest value of conductivity is observed in Triveni Sangam, near Somnath temple, veraval, distt. Junagadh (63500 µmhos/cm).

Dissolved Oxygen: -

- The criteria for DO should be more than 4 mg/l.
- DO is observed in the range of Nil to 7.5 mg/l.
    - DO is observed lower than the desired criteria in
    - River Purna on bridge at Surat-navsari highway (3.0 mg/l)
    - River Dhadar at Kothada (1.7 mg/l)
    - Mindhola at state highway bridge Sachin, Gujarat (3 mg/l)
    - Triveni sangam, nr. Somnath temple, Veraval, dist. Junagadh. (2.7 mg/l)
    - River Bhogavo d/s of Surendranagar. (0.0 mg/l)
    - Amlakhadi after confl. of w. water from Anklesh, Gujarat (0.0 mg/l)

Biochemical Oxygen Demand: -

- The criteria for BOD should be less than 3 mg/l.
- The BOD value ranges from 0.6 mg/l to 382 mg/l.
- BOD observed more than the criteria limit:
    - Damanganga at Kachigaon D/S (Daman) (50 mg/l) in Gujarat & Damanganga Discharge Point of Distillery (Daman) (382 mg/l), Daman Jetty (Moti Daman)

(78 mg/l), Lavacha Temple (Silvassa) (8 mg/l) & Naroli Bridge (Silvassa) (21 mg/l) in Daman, Diu & Dadra Nagar Haveli

- Balehwar Khadi at N.H. No. 8 (10 mg/l)
- River Purna on Bridge at Surat-Navsari Highway (7.0 mg/l)
- River Kaveri on Bridge at Billimora-Valsad Road (4.3mg/l)
- River Dhadar at Kothada (7 mg/l), Ambika at Bilimora (4 mg/l)
- Amlakhadi After Confl. of W. Water from Ankleshwer (49 mg/l)
- Bhadar D/s Jetpur Vill. After Conf. of W.Water From Jetpur City (11 mg/l)
- Mindhola at State Highway Bridge Sachin (15mg/l)
- River Bhogavo D/s of Surendranagar (10mg/l)
- Triveni Sangam, Nr. Somnath Temple (6mg/l)

Faecal Coliform: -

- Faecal Coliform should be less than 2500 MPN/100ml.
- Faecal Coliform (FC) ranges from 0 to 28000 MPN/100ml.
    - Highest value of FC is observed in Balehwar Khadi at N.H. No. 8
    - River Purna On Bridge at Surat-Navsari Highway
    - River Kaveri On Bridge at Billimora-Valsad Road
    - Ambika at Bilimora
    - Amlakhadi after Confl. of W. Water From Ankleshwer
    - Mindhola at State Highway Bridge Sachin

Total Coliform: -

- Total Coliform should be less than 5000 MPN/100ml.
- Total Coliform lies in the range of 1 to 15000 MPN/100ml.
    - The location having high value of TC in Balehwar Khadi at N.H. No. 8.
    - River Purna On Bridge at Surat-Navsari Highway
    - River Kaveri On Bridge at Billimora-Valsad Road.
    - Ambika at Bilimora.
    - Amlakhadi after Confl. of W. Water From Ankleshwer.
    - Mindhola at State Highway Bridge Sachin.

19.3 Water Quality of Medium and Minor Rivers in Goa and Maharashtra

The State Pollution Control Board of Goa carries out the water quality monitoring of River, Valvant, Madai, Bicholim, Chapora, Mapusa, Kushawati, Assonora, Zuari, Khandepar, Mandovi, Talpona, Sal and Kalna. The water quality status of rivers in Goa and Maharashtra is presented in Annexure-I Table 18.2. The summary of water quality with respect to pH, Conductivity, Dissolved oxygen (DO), Biochemical Oxygen Demand (BOD), Total Coliform (TC) and Faecal Coliform (FC) is given below:

pH: -

- The criteria for pH is 6.5 to 8.5.
- pH is observed in the range of 6.3 to 8.8.
- Low value of pH (6.3) is observed in
    - Zuari At D/s of Pt. where Kumbarjria Canal Joins

- River Bicholim Varazan Nagar

- High Value (8.8) is observed in Dighali Pukhuri, Assam.
  - River Sal Near Hotel Leela Mobor
  - Vashisti River at U/s of Three M Paper Mills Near M/S Multifilms Plastic Pvt. Ltd. at Kherdi

Conductivity: -

- The criteria of conductivity for irrigation is 2250 µmhos/cm.
- Conductivity ranges from 67 to 61030 µmhos/cm.
- Highest value of conductivity is observed in Mithi River, Zuari at Panchawadi, Mandovi at Tonca, Marcela, River Kalna at Chandel- Pernem, River Valvant at Sankli – Bicholim, River Khandepar at Opa – Ponda, River Talpona at Canacona, River Sal Pazorkhoni, River Mapusa On Culvert On Highway Mapusa-Panaji, River Chapora Near Alorna Fort, River Bicholim Varazan Nagar, Kalu at Atale Village, Savitri River at Ovale Village.

Dissolved Oxygen: -

- The criteria for DO should be more than 4 mg/l.
- DO is observed in the range of Nil to 81 mg/l.
- DO is observed lower than the desired criteria in
  - Kalu at Atale Village, Maharashtra (3.5 mg/L)
  - Mithi River (0 mg/L)

Biochemical Oxygen Demand: -

- The criteria for BOD should be less than 3 mg/l.
- The BOD value ranges from 0.7 mg/l to 50 mg/l.
- BOD observed more than the criteria limit
  - Mithi River (50 mg/l)
  - River Sal Near Hotel Leela Mobor,Cavelossim & River Mapusa on Culvert On Highway Mapusa (3.3 mg/l)
  - Kundalika River at Are Khurd (32 mg/l)
  - Kalu at Atale Village (14 mg/l)
  - Ulhas at U/s of Nrc Bund at Mohane, Ulhas at U/s of Badlapur & Patalganga at Shilphata (5 mg/l)

Faecal Coliform: -

- Faecal Coliform should be less than 2500 MPN/100ml.
- Faecal Coliform (FC) ranges from 0 to 2400 MPN/100ml.
- Value of FC is observed with in the desired criteria.

Total Coliform: -

- Total Coliform should be less than 5000 MPN/100ml.
- Total Coliform lies in the range of 0 to 3500 MPN/100ml.
- Value of FC is observed with in the desired criteria.

19.4 Water Quality of Medium and Minor Rivers in Kerala

The water quality monitoring of River Periyar, Chaliyar, Kallada, Muvattapuzha, Chalakudy, Karmana, Pamba, Meenachil, Manimala, Achenkoil, Vamanapuram, Amaravila, Ayur, Thirurangady, Kuttiyady, Valayum, Kuppam, Hosdurg, Kakkadavu, Padiyathadka, Neyyar, Mamom, Ayroor, Ithikkara, Pallickal, Karuvannur, Puzhackal, Keecheri, Thirur, Kadalundi, Kallai, Corapuzha, Thallassery, Ancharakandy, Ramapuram, Peruvamba, Kavvai, Neeleswaram, Pullur, Mogral, Shriya, Uppala, Manjeswar, Korayar, Bharatapuzha, Kadambyar and Irupanam in Kerala is carried out by the State Pollution Control Board of Kerala. The water quality status of rivers in Kerala is presented in Annexure-I Table 18.3.

pH: -

- The criteria for pH is 6.5 to 8.5.
- pH is observed in the range of 6.0 to 8.4.
- Low value of pH (6) is observed in
    - Periyar Near Alwaye-Eloor
    - Muvattapuzha at Vettikkattumukku
    - Pamba at Chengannur
    - Neyyar Amaravila
    - R Thirur at Thalakkadathur Bridge
    - R Kadalundi at Hajirappally
    - R Manjeswar at Bajrakkara Br.
    - R Kadambayar at Brahmapuram
    - R Kadambayar at Manckakadavu

Conductivity: -

- The criteria of conductivity for irrigation is 2250 µmhos/cm.
- Conductivity ranges from 31 to 48200 µmhos/cm.
- Highest value of conductivity is observed in R Kallai at Kallai Bridge (48200 µmhos/cm) in Assam.

Dissolved Oxygen: -

- The criteria for DO should be more than 4 mg/l.
- DO is observed in the range of Nil to 8.4 mg/l.
- DO is observed lower than the desired criteria in
    - Karamana At Moonnattumukku (0 mg/l)
    - Ayur, Kerala (3.8 mg/l)
    - Pamba Down (3.7 mg/l)
    - Neelashwer Hosdurg (3.7 mg/l)
    - Chaitrapuzha Irumpanam (1.4 mg/l)
    - R Ayroor at Ayroor Bridge (3.7 mg/l)
    - R Mogral at Mogral Br. (3.7 mg/l)
    - R Uppala at Uppala Br. (3.2 mg/l)
    - R Kadambayar at Brahmapuram (0.3 mg/l)
    - R Kadambayar at Manckakadavu (0.7 mg/l)

- R Periyar at Purappallikavu (3.3 mg/l)
- R Periyar at Kalamassery (3.5 mg/l)

Biochemical Oxygen Demand: -

- The criteria for BOD should be less than 3 mg/l.
- The BOD value ranges from 0.1 mg/l to 24 mg/l.
- BOD observed more than the criteria limit in
    - Karamana at Moonnattumukku, Kerala (24 mg/l.)

Faecal Coliform: -

- Faecal Coliform should be less than 2500 MPN/100ml.
- Faecal Coliform (FC) ranges from 0 to 63000 MPN/100ml.
- Highest value of FC is observed in Karamana at Moonnattumukku, Kerala.

Total Coliform: -

- Total Coliform should be less than 5000 MPN/100ml.
- Total Coliform lies in the range of 0 to 82000 MPN/100ml.
- The location having high value of TC in Karamana at Moonnattumukku, Kerala.

19.5 Water Quality of Medium and Minor Rivers in Andhra Pradesh, Orissa, Pondicherry, Tamilnadu and Karnataka

The water quality monitoring of River Nagavalli, Rushikulya, Arasalar, Tambiraparani, Palar, Nethravati, Kumardhara, Vamshadhara and Kali in Andhra Pradesh, Orissa, Pondicherry, Tamilnadu and Karnataka respectively is carried out by the respective State Pollution Control Boards. The water quality status of rivers in Andhra Pradesh, Orissa, Pondicherry, Tamilnadu and Karnataka is presented in Annexure-I, Table 18.4.

pH: -

- The criteria for pH is 6.5 to 8.5.
- pH is observed in the range of 6.1 to 8.6.
- Low value of pH (6.1) is observed in
    - Tambiraparani at Cheranmadevi,Cause Way (6.1)
    - Tambiraparani at Pappankulam (6.1)
    - Tambiraparani at Rail Bdg. Nr. Ambasamudam (6.2)
    - Tambiraparani at Tirunelveli,Collectorate (6.2)
- High Value (8.6) is observed in river Vamshadhara, kalingapatnam.

Conductivity: -

- The criteria of conductivity for irrigation is 2250 µmhos/cm.
- Conductivity ranges from 70 to 45870 µmhos/cm.
- Highest value of conductivity is observed in Rushikulya at Ganjam D/s (45870 µmhos/cm).

Dissolved Oxygen: -

- The criteria for DO should be more than 4 mg/l.

- DO is observed in the range of 6.0 to 8.5 mg/l.
- DO is observed with in the desired criteria for all locations.

Biochemical Oxygen Demand: -

- The criteria for BOD should be less than 3 mg/l.
- The BOD value ranges from 0.2 mg/l to 14 mg/l.
- BOD observed more than the criteria limit
    - Kali At D/s West Coast Paper Mill (14 mg/l)
    - Tambiraparani At Rail Bdg. Nr. Ambasamudam (3.6 mg/l)
    - Arasalar River Karaikal Region (3.6 mg/l)
    - Coringa River(7 mg/l)
    - Gautami-Godavari River(4 mg/l)

Faecal Coliform: -

- Faecal Coliform should be less than 2500 MPN/100ml.
- Faecal Coliform (FC) ranges from 3 to 6300 MPN/100ml.
- Highest value of FC is observed in Budhabalanga, D/s of Baripada Town

Total Coliform: -

- Total Coliform should be less than 5000 MPN/100ml.
- Total Coliform lies in the range of 17 to 15000 MPN/100ml.
- The location having high value of TC in Budhabalanga, D/s of Baripada Town

19.6 Water Quality of Medium and Minor Rivers in Himachal Pradesh, Punjab, Haryana and Rajasthan

The water quality monitoring of River Ghaggar, Markanda, Sukhana and Kodra Dam in Punjab, Haryana, Himachal Pradesh and Rajasthan is carried out by the respective State Pollution Control Boards. The water quality status of medium and minor rivers in Punjab, Haryana, Himachal Pradesh and Rajasthan is presented in Annexure-I, Table 18.5. The water quality status of River Ghaggar with respect to BOD, DO, Total Coliform, Faecal Coliform and Conductivity is given in Figure 18.5.

pH: -

- The criteria for pH is 6.5 to 8.5.
- pH is observed in the range of 6.0 to 8.8.
- Low value of pH (6.4) is observed in
    - Ghaggar Near Bankarpur,Dera Bassi,Punjab (6.0)
    - Ghaggar Gh-1 At Road Brdg. Sirsa,Debwali Road,Haryana (6.3)
    - Ghaggar Gh-1 At Road Brdg. Sirsa,Debwali Road,Haryana (6.2)

Conductivity: -

- The criteria of conductivity for irrigation is 2250 μmhos/cm.
- Conductivity ranges from 67 to 2660 μmhos/cm.
- Highest value of conductivity is observed in Ghaggar at Kala Amb D/s Markanda River

Dissolved Oxygen: -

- The criteria for DO should be more than 4 mg/l.
- DO is observed in the range of 0.8 to 7.5 mg/l.
- DO is observed lower than the desired criteria in
    - Ghaggar at Kala Amb D/s Markanda River (1.6 mg/l)
    - Kodra Dam, Mount Abu, Rajasthan (3.7 mg/l)

Biochemical Oxygen Demand: -

- The criteria for BOD should be less than 3 mg/l.
- The BOD value ranges from 0.2 mg/l to 593 mg/l.
- BOD observed more than the criteria limit in
    - Ghaggar at Kala Amb D/s Markanda River (593 mg/l).
    - Ghaggar at 100m D/s Conf. With R. Saraswati (Patiala) (18 mg/l).
    - Ghaggar at Mubarakpur Rest House (Patiala) (6 mg/l).
    - Ghaggar Gh-1 At Road Brdg. Sirsa,Debwali Road,Haryana (9 mg/l).
    - Ghaggar Near Bankarpur, Dera Bassi,Punjab (8 mg/l)
    - Ghaggar Gh-2 at Chandarpur Syphon, Haryana (12 mg/l)
    - Ghaggar at Ratanheri, D/s of Patiala Nadi (After Confl.), Punjab (16 mg/l)
    - Ghaggar at D/s Chhatbir, Punjab (10 mg/l)
    - D/s Dhakansu Nallah, Punjab (24 mg/l)
    - Ghaggar at D/s Jharmal Nadi, Punjab (16 mg/l)
    - Ghaggar at U/s Jharmal Nadi, Punjab (12 mg/l)
    - Ghagger at Moonak, Punjab (11 mg/l)
    - Ghaggar at D/s Sardulgarh, Punjab (14 mg/l)
    - Ghaggar at U/s Sardulgarh, Punjab (12 mg/l)
    - Ghaggar Gh-1 At Road Brdg. Sirsa,Debwali Road,Haryana (8 mg/l)
    - River Sukhana at Parwanoo, Distt. Solan, H.P. (15 mg/l)

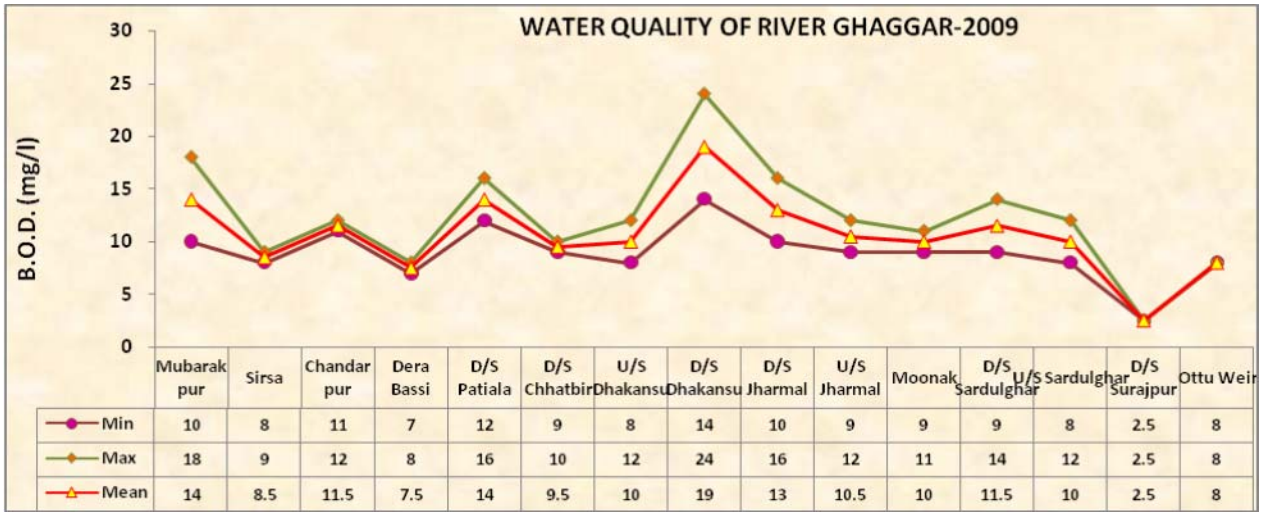
Faecal Coliform: -

- Faecal Coliform should be less than 2500 MPN/100ml.
- Faecal Coliform (FC) ranges from 3 to 10000 MPN/100ml.
- Highest value of FC is observed in D/s Dhakansu Nallah, Punjab

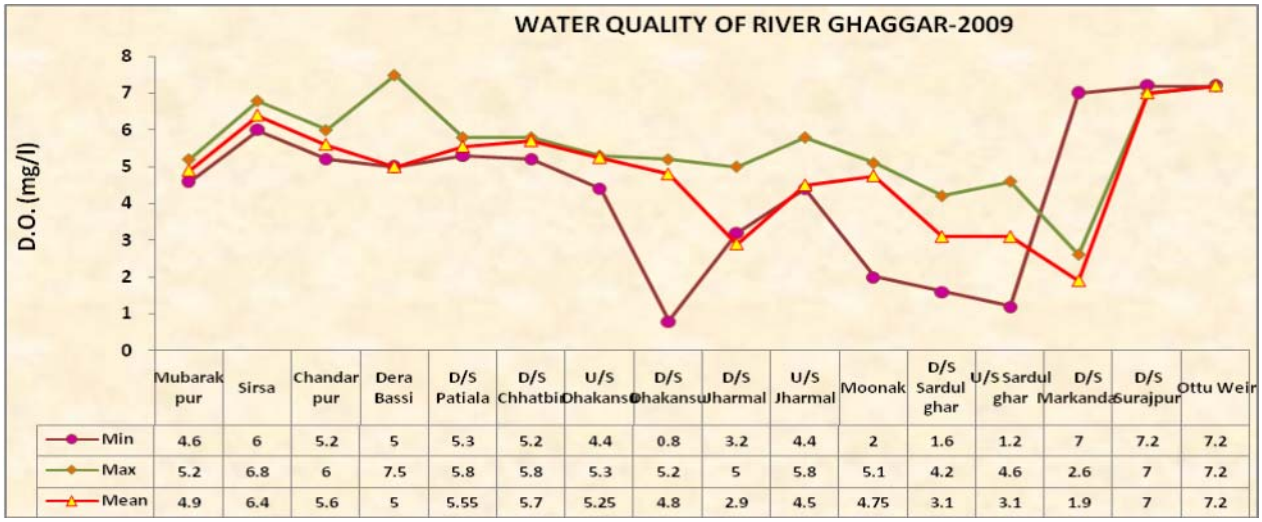
Total Coliform: -

- Total Coliform should be less than 5000 MPN/100ml.
- Total Coliform lies in the range of 7 to 110000 MPN/100ml.
- The location having high value of TC in Ghaggar D/s Dhakansu Nallah & D/s Sardulgarh, Punjab

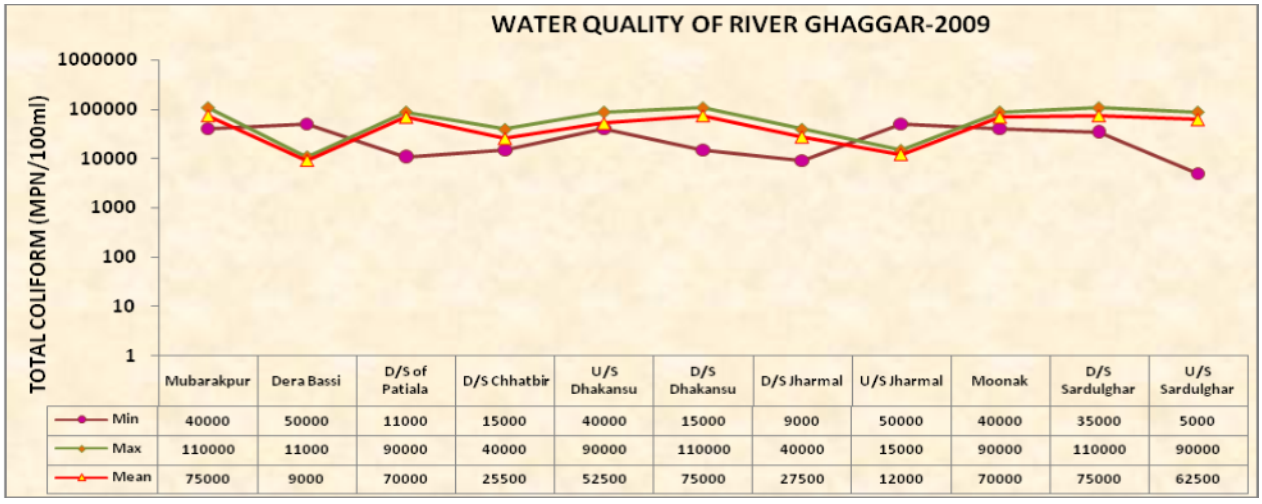
Figure 19.1: Spatial Trend of Water Quality of River Ghaggar



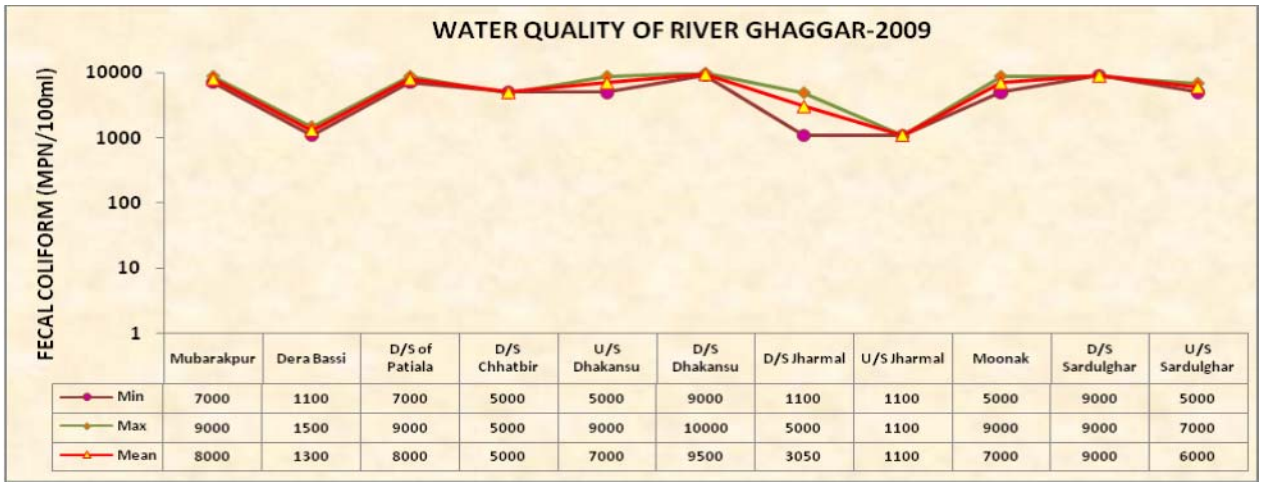
	Mubarak pur	Sirsa	Chandar pur	Dera Bassi	D/S Patiala	D/S Chhatbir	U/S Dhakansu	D/S Dhakansu	D/S Jharmal	U/S Jharmal	Moonak	D/S Sardulghar	U/S Sardulghar	D/S Surajpur	Ottu Weir
Min	10	8	11	7	12	9	8	14	10	9	9	9	8	2.5	8
Max	18	9	12	8	16	10	12	24	16	12	11	14	12	2.5	8
Mean	14	8.5	11.5	7.5	14	9.5	10	19	13	10.5	10	11.5	10	2.5	8



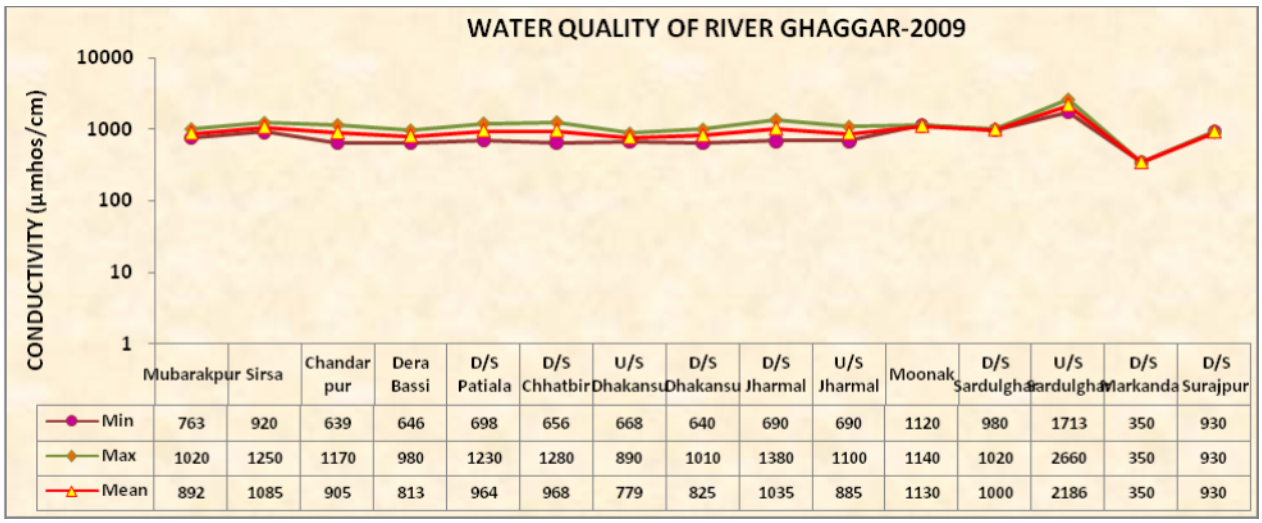
	Mubarak pur	Sirsa	Chandar pur	Dera Bassi	D/S Patiala	D/S Chhatbir	U/S Dhakansu	D/S Dhakansu	D/S Jharmal	U/S Jharmal	Moonak	D/S Sardul ghar	U/S Sardul ghar	D/S Markanda	D/S Surajpur	Ottu Weir
Min	4.6	6	5.2	5	5.3	5.2	4.4	0.8	3.2	4.4	2	1.6	1.2	7	7.2	7.2
Max	5.2	6.8	6	7.5	5.8	5.8	5.3	5.2	5	5.8	5.1	4.2	4.6	2.6	7	7.2
Mean	4.9	6.4	5.6	5	5.55	5.7	5.25	4.8	2.9	4.5	4.75	3.1	3.1	1.9	7	7.2



	Mubarakpur	Dera Bassi	D/S of Patiala	D/S Chhatbir	U/S Dhakansu	D/S Dhakansu	D/S Jharmal	U/S Jharmal	Moonak	D/S Sardulghar	U/S Sardulghar
Min	40000	50000	11000	15000	40000	15000	9000	50000	40000	35000	5000
Max	110000	11000	90000	40000	90000	110000	40000	15000	90000	110000	90000
Mean	75000	9000	70000	25500	52500	75000	27500	12000	70000	75000	62500



	Mubarakpur	Dera Bassi	D/S of Patiala	D/S Chhatbir	U/S Dhakansu	D/S Dhakansu	D/S Jharmal	U/S Jharmal	Moonak	D/S Sardulghar	U/S Sardulghar
Min	7000	1100	7000	5000	5000	9000	1100	1100	5000	9000	5000
Max	9000	1500	9000	5000	9000	10000	5000	1100	9000	9000	7000
Mean	8000	1300	8000	5000	7000	9500	3050	1100	7000	9000	6000



	Mubarakpur	Sirsa	Chandar pur	Dera Bassi	D/S Patiala	D/S Chhatbir	U/S Dhakansu	D/S Dhakansu	D/S Jharmal	U/S Jharmal	Moonak	D/S Sardulghar	U/S Sardulghar	D/S Markanda	D/S Surajpur
Min	763	920	639	646	698	656	668	640	690	690	1120	980	1713	350	930
Max	1020	1250	1170	980	1230	1280	890	1010	1380	1100	1140	1020	2660	350	930
Mean	892	1085	905	813	964	968	779	825	1035	885	1130	1000	2186	350	930

19.7.1 Water Quality of Medium and Minor Rivers in Manipur, Meghalaya, Mizoram and Tripura

The water quality monitoring of River Imphal, Kiyamgio, Minuthong, Iril, Lilong, Tlawing, Tuirial, Umtrew, Kharkhla, Myntdu, Ganol, Khuga, Khujairok, Simsang, Gumti, Nambul and Haora in the states Manipur, Meghalaya, Mizoram and Tripura is carried out by the respective State Pollution Control Boards. The water quality of Medium and Minor Rivers in Manipur, Meghalaya, Mizoram and Tripura is presented in Annexure-I, Table 18.6.

pH: -

- The criteria for pH is 6.5 to 8.5.
- pH is observed in the range of 6.2 to 8.6.
- Low value of pH (6.2) is observed in Tuirial Lower Catchment
- High Value (8.6) is observed in Tlawng Downstream Aizawl.

Conductivity: -

- The criteria of conductivity for irrigation is 2250 µmhos/cm.
- Conductivity ranges from nil to 619 µmhos/cm.
- The conductivity is meeting the desired criteria at all the locations.

Dissolved Oxygen: -

- The criteria for DO should be more than 4 mg/l.
- DO is observed in the range of 1.3 to 9.8 mg/l.
- DO is observed lower than the desired criteria in
    - Nambul Hump Bridge, Manipur (1.3 mg/l)
    - Nambul Heirangoithong, Manipur (2.0 mg/l)
    - Myntdu Jaintia Hills Meghalaya (1.8 mg/l)

Biochemical Oxygen Demand: -

- The criteria for BOD should be less than 3 mg/l.
- The BOD value ranges from 0.4 mg/l to 24 mg/l.
- BOD observed more than the criteria limit
    - Nambul Hump Bridge, Manipur (24.5 mg/l)
    - Nambul Heirangoithong, Manipur (24 mg/l)

Faecal Coliform: -

- Faecal Coliform should be less than 2500 MPN/100ml.
- Faecal Coliform (FC) ranges from 0 to 2700 MPN/100ml.
- Highest value of FC is observed in Myntdu Jaintia Hills Meghalaya

Total Coliform: -

- Total Coliform should be less than 5000 MPN/100ml.
- Total Coliform lies in the range of 3 to 3400 MPN/100ml.
- Total Coliform is meeting the desired criteria at all the locations.

19.8 Water Quality of Creeks, Sea water and Canals

The monitoring locations on creeks in Gujarat, Goa and Maharashtra are one each on Marmugao, Masma Khadi, Amlakhadi, Thane, Mahim and Bassein, two locations on Vashi creeks. The sea water is monitored on four locations in the vicinity of Mumbai in Maharashtra. Gurgaon Canal, Western Yamuna Canal, Cumbarjua Canal, Narmada Main Canal, Tapi Canal at Village Umarwada, Samarla Kota Canal, Tulje Bagh Canal and Katakhal Canal (Agartala Canal) are monitored in Haryana, Goa, Gujarat, Andhra Pradesh and Tripura.

19.8.1 Water Quality of Creeks and Sea water

The water quality of the creeks and sea water with respect to pH, Conductivity, DO, BOD, Total Coliform (TC), Faecal Coliform (FC), Nitrite, Nitrate and Ammonical Nitrogen are presented as minimum, maximum and mean value to assess the extent of water quality

variation throughout the year. The water quality status of the creeks and sea water is presented in Annexure-I, Table 18.7.

pH: -

- The criteria for pH is 6.5 to 8.5.
- pH is observed in the range of 6.7 to 8.4.
- The pH is meeting the desired criteria at all the locations.

Conductivity: -

- The criteria of conductivity for irrigation is 2250 µmhos/cm.
- Conductivity ranges from 67 to 64220 µmhos/cm.
- Highest value of conductivity is observed in Sea Water at Versova.

Dissolved Oxygen: -

- The criteria for DO should be more than 4 mg/l.
- DO is observed in the range of Nil to 7.8 mg/l.
- DO is observed lower than the desired criteria in
    - Amlakhadi Creek at Pungam (nil).
    - Bassein Creek at Bassin in Thane Dt (3.4 mg/l)
    - Thane Creek at Elephanta Island (3.4 mg/l)
    - Mahim Creek at Mahim Bay, Maharashtra (3.4 mg/l)
    - Vashi Creek at Airoli Bridge. (3.5 mg/l)
    - Vashi Creek at Vashii Bridge (3.5 mg/l)
    - Sea Water at Gateway of India (3.5 mg/l)
    - Sea Water at Charni Road Choupathy (3.5 mg/l)
    - Sea Water at Worli Sea Face (3.6 mg/l)
    - Sea Water at Versova. (3.6 mg/l)

Biochemical Oxygen Demand: -

- The criteria for BOD should be less than 3 mg/l.
- The BOD value ranges from 0.6 mg/l to 238 mg/l.
- BOD observed more than the criteria limit in Amlakhadi Creek at Pungam (238 mg/l.)

Faecal Coliform: -

- Faecal Coliform should be less than 2500 MPN/100ml.
- Faecal Coliform (FC) ranges from 0 to 50000 MPN/100ml.
- Highest value of FC is observed in Amlakhadi Creek at Pungam.

Total Coliform: -

- Total Coliform should be less than 5000 MPN/100ml.
- Total Coliform lies in the range of 2 to 210000 MPN/100ml.
- The location having high value of TC is Amlakhadi Creek at Pungam.

19.8.2 Water Quality of Canals and Drain

The water quality status of Gurgaon Canal, Western Yamuna Canal, Cumbarjua Canal, Narmada Main Canal, Tapi Canal, Samarla Kota Canal, Tulje Bagh Canal and Katakhal Canal. The water quality status of canals is presented in Annexure-I, Table 18.7.

pH: -

- The criteria for pH is 6.5 to 8.5.
- pH is observed in the range of 6.1 to 8.9.
- Low value of pH (6.1) is observed in Cumbarjua Canal Corlim (Discharge Point of Syngenta Limited) & Chikhali Nallah Meets Godavari River whereas high Value (8.8) is observed in Narmada Main Canal, Nr. Village. Limbadia, Dist. Gandhinagar.

Conductivity: -

- The criteria of conductivity for irrigation is 2250 µmhos/cm.
- Conductivity ranges from 181 to 29600 µmhos/cm.
- Highest value of conductivity is observed in Tulje Bagh Canal, Tekri Drain, Kakinada, East Godavari.

Dissolved Oxygen: -

- The criteria for DO should be more than 4 mg/l.
- DO is observed in the range of Nil to 9.6 mg/l.
- DO is observed lower than the desired criteria in
    - Western Yamuna Canal DO found nil at Damla D/S Of Yamuna Nagar
    - Noai Canal North 24 Parganas, Near Ganga Nagar Motibridge (nil)

Biochemical Oxygen Demand: -

- The criteria for BOD should be less than 3 mg/l.
- The BOD value ranges from 0.2 mg/l to 90 mg/l.
- BOD observed more than the criteria limit.
    - W. Yam. Canal WC-1 (Y.Nagar)100m D/S After Receiving Ind.&Sew.Effl Haryana (90 mg/l)
    - Gurgaon Canal, GC-1, (Near Badarpur Border), Haryana (22 mg/l)
    - Near Pragati Vidyabhawan, Agartala, Tripura (25.5 mg/l)

Faecal Coliform: -

- Faecal Coliform should be less than 2500 MPN/100ml.
- Faecal Coliform (FC) ranges from 0 to 170000000 MPN/100ml.
- Highest value of FC is observed in Noai Canal North 24 Parganas, Near Ganga Nagar Motibridge.

Total Coliform: -

- Total Coliform should be less than 5000 MPN/100ml.
- Total Coliform lies in the range of nil to 220000000 MPN/100ml.
- The location having high value of TC is Noai Canal North 24 Parganas, Near Ganga Nagar Motibridge.

CHAPTER XX

Water Quality of Lakes, Tanks and Ponds

20.1 Lantic Water Bodies

Lakes in India spread over an area of about 7.2 Lakh hectares. There are very few lakes in India, and among them most are quite shallow and none of any considerable size. In the hilly regions, there is abundance of lakes. Lakes are an integral part of a drainage basin and landlocked body of water with a horizontal surface water level.

The Lakes being monitored are Hussainsagar (1), Saroornagar (1), Himayatsagar (1), Pulicate (1), Salaulim (1), Kankoria (1), Chandola (1), Ajwah (1), Sursagar (1), Brahamsarovar (1), Sukhna (2), Govindsagar (1), Pongdam (1), Renuka (1), Wuller (1), Dal (1), Ulsoor (1), HebbalaValley (1), Oruvathikotta (1), Sasthamcotta (1), Ashthamudi (1), Paravur (1), Vembanad (1), Periyar (1), Kodumgallor (1), Kayamkula (1), Punnamadakayal (1), Pookotekayal (1), UpperLake (4), LowerLake (1), MultaiLake (1), Loktak (4), Umiam (1), Ward (1), Thadlaskena (1), Osteri (1), Bahour (1), Harike (2), Pichola (1), Udaisagar (1), Ramgarh Jaipur (1), Pushkar (1), Fatehsagar (1), Kalyana (1), Nakki (1), Udhagamadalam (1), Kodaikanal (1), Yercaud (1), Lakshminarayan Baridigh (1), Rudrasagar (1), Ramgarh-UttarPradesh (1), Naini (1), Rabindrasarovar (1), Nalsarovar (1), Bindusaraovar (1), Sahastrling Sarovar (1), Lakhota Talav (1), Narsimehta Talav (1), Nadiad city Lake (1), Ranjitnagar Talav (1), Ankleshwar reservoir (1), Dharoi dam(1), Kuwadava (1), Moticher lake (1), Mayem lake (1), Janunia talav (1), Yashwant sagar (1), Sirpur talav (1), Kali sindh reservoir (1), Periat tank (1), Shahpura (1), Madhav lake (1), Nagchun (1), Karwa dam (1), Khandari reservoir (1), Daloni Beel (1), Mer Beel (1), Govindgarh tank (1), Bilawali talav (1), Bhoothathankettu reservoir (1), Dimna lake (1), Edamalayar reservoir (1), Hazaribagh Meethajheel (1), Kondacharala- aava lake (1), Laxminarayan Chevuru (1), Malampuzha reservoir (1), Miralam lake (1), Noor Md. Kunta (1), Pazhassi reservoir (1), Ranchi lake (1), Topchachi lake (1), Vembanadu lake (1), Chilka lake (1), Anshupa lake (1), Kawar lake (1), Moti Jheel (1), Samarpur lake (1), Shukra Tal (1), Khaziar lake (1), Riwalsar lake (1), Belboni lake (1), Koch Bihar lake (1), Mirikh lake (1), Saheb bandh (1), Sinchal lake (1), Tarkeshwar lake (3) & Delo reservoir (1).

The tanks and ponds being monitoring are Dharamsagar (1), Bibinagar (1), Kistrareddypet (1), Goysagar (1), Thol (1), Gandigudem (1), Kajipally Tank (1), Mallapur Tank (1), Premajipet Tank (1), Elangabeel System Pond (1), Lakshadweep (1), Olpad village pond (1), Bishnu Pushkar pukhuri (1), Bor Beel (1), Bor pukhuri(1), Botodriva pond (1), Chand dubi Beel (1), Deepar Beel (1), Dighali pukhuri (1), Dhudia talav (1), Baskandi pond (1), Galabeel (1), Ganga pukhuri (1), Gaurisagar (1), Gopur tank (1), Padum pukhuri (1), Hordai pukhuri (1), Jaipal pukhuri (1), Mahamaya mandir pukhuri (1), Rajadinia pukhuri (1), Raja pukhuri (1), Rajmaw pukhuri (1), Saranbeel (1), Sivasagar tank (1), Subhagya kund (1), Sai Chevuru (1), Asani Kunta (1), Durgam Chevuru (1), Pedda Chevuru (1), Nalla Chevuru (1), Bhadrakali Chevuru (1), Shiv Ganga Pond (1), Padmanabha Swamy Temple Pond (1), Bindusagar (1), Narendra pokhari (1), Markanda pokhari (1),

Indradyumna (1), Swetaganga (1), Parvatisagar (1), Tighi Talab (1), Suraj Kund (1), Laxmi Pond (1), Maahil Pond (1). The number of monitoring locations on each lake is given in parenthesis.

20.2 Lakes, Tanks and Ponds in Andhra Pradesh, Karnataka, Kerala, Tamilnadu, Pondicherry & Goa

The respective State Pollution Control Boards/ Pollution Control Committees carry out the water quality monitoring of Lakes, Tanks and Pond in Andhra Pradesh, Karnataka, Kerala, Tamilnadu & Goa and Union Territory of Pondicherry. The ranges of water quality observed in these water bodies with respect to pH, Conductivity, DO, BOD, Total Coliform (TC) and Faecal Coliform (FC) are presented as minimum, maximum and mean value to assess the extent of water quality variation throughout the year.

The water quality status of Lakes, Tanks and Ponds in Andhra Pradesh, Karnataka, Kerala, Tamilnadu, Goa and Union Territory of Pondicherry is presented in Annexure-I Table 20.1. The summary of water quality of Lakes, Tanks and Ponds in Andhra Pradesh, Karnataka, Kerala, Tamilnadu, Goa and Union Territory of Pondicherry with respect to pH, Conductivity, Dissolved oxygen (DO), Biochemical Oxygen Demand (BOD), Total Coliform (TC) and Faecal Coliform (FC) is given below:

pH: -

- The criteria for pH is 6.5 to 8.5.
- pH is observed in the range of 6.0 to 8.3.
- Low value of pH is observed in
    - Premajipet Tank & Kajipally Tank (6.0), Pedda Chevuru (6.1), Pond at Shree Padmanabha Swamy Temple (TVPM) (6.2) and Sai Chevuru & Asani Kunta (6.3 in Andhra Pradeh
    - Pookote (6.0), Kodungallur Lake, Pazhassi Reservoir, Edamalayar Reservoir & Bhoothathanketu Reservoir (6.3) and Oruvathilkotta Lake (6.4) in Kerala
    - Kodai Kanal Lake (6.4) in Tamil Nadu

Conductivity: -

- The criteria of conductivity for irrigation is 2250 µmhos/cm.
- Conductivity ranges from 32 to 1, 00,000 µmhos/cm.
- High values of conductivity is observed in
    - Pulicate Lake (1, 00,000 µmhos/cm), Kistrareddypet Tank (38,100 µmhos/cm), Sai Chevuru (37,000 µmhos/cm), Asani Kunta (23,744 µmhos/cm), Kajipally Tank (17,330 µmhos/cm), Premajipet Tank (6590 µmhos/cm), Noor Mohammad Kunta (4050 µmhos/cm), Gandigudem Tank (3830 µmhos/cm), Pedda Chevuru (3120 µmhos/cm), Hussain Sagar Lake (2619 µmhos/cm) and Mallapur Tank (2475 µmhos/cm) in Andhra Pradesh
    - Kayamkulum Lake (56,000 µmhos/cm), Oil tanker Jetty (42,100 µmhos/cm), Ashtamudi Lake (36,800 µmhos/cm), Paravur Lake (35,000 µmhos/cm), Kodungallur Lake (32,900 µmhos/cm), Alappuzha Lake (17,000 µmhos/cm),

Vembanadu Lake (13,800 µmhos/cm) and Oruvathilkotta Lake (5900 µmhos/cm) in Kerala
- Salaulim Lake (4385 µmhos/cm) and Mayem Lake (4077 µmhos/cm) in Goa

Dissolved Oxygen: -

- The criteria for DO should be more than 4 mg/l.
- DO is observed in the range of 0.0 to 12.1 mg/l.
- DO does not meet the criteria in
  - Hussain Sagar lake, Saroornagar, Laxminarayana Chevuru, Miralam Lake, Noor Md. Kunta, Nalla Chevuru, Sai Chevuru, Asani Kunta, Pedda Chevuru, Premajipet Tank, Kajipally Tank and Mallapur Tank (0.0 mg/l)
  - Durgam Chevuru (1.0 mg/l)
  - Gandigudem (1.2 mg/l)
  - Bibinagar Tank (3.3 mg/l)
  - Pulicate Lake ((3.4 mg/l)
  - Kistrareddypet Tank (3.9 mg/l) in Andhra Pradesh
  - Heballa Valley Lake (0.0 mg/l) in Karnataka
  - Oruvathilkotta Lake (0.8 mg/l)
  - Alappuzha Lake (2.1 mg/l) in Kerala.

Biochemical Oxygen Demand: -

- The criteria for BOD should be less than 3 mg/l.
- The BOD value ranges from 0.0 to 50 mg/l.
- BOD observed more than the criteria at
  - Kistrareddypet Tank (Medak Dist.), Sai Chevuru, Asani Kunta, Kajipally Tank, Noor Md. Kunta & Pedda Chevuru (50 mg/l)
  - Durgam Chevuru (45 mg/l)
  - Gandigudem Tank (38 mg/l)
  - Mallapur Tank (30 mg/l)
  - Saroornagar lake (23 mg/l)
  - Premajipet Tank & Nalla Chevuru (22 mg/l)
  - Hussain Sagar lake (19 mg/l)
  - Miralam Lake & Dharmasagar Tank (12 mg/l)
  - Laxminarayana Chevuru (10 mg/l)
  - Bhadrakali Chevuru (6.1 mg/l)
  - Himayat Sagar Lake (5.0 mg/l)
  - Pulicate lake (4.8 mg/l) in Andhra Pradesh
  - Udhagamadalem Lake (Ooty) (11.1 mg/l) and Kodai Kanal (5.4 mg/l) in Tamilnadu
  - Bahour Lake (4.0 mg/l) and Osteri Lake (3.1 mg/l) in Pondicherry
  - Heballa Valley (10 mg/l) and Ulsoor Lake (8 mg/l) in Karnataka
  - Oruvathilkotta Lake (6.8 mg/l)
  - Ashthamudi Lake at Quilon (6.0 mg/l)
  - Pond at (Padmanabha) Sree Padmanabha Swamy Temple (TVPM) (5.2 mg/l)
  - Paravur (4.2 mg/l)
  - Kayamkulam Lake (3.4 mg/l) in Kerala

Faecal Coliform: -

- Faecal Coliform should be less than 2500 MPN/100ml.
- Faecal Coliform (FC) ranges from Nil to 14000 MPN/100ml.
- The locations having high value of FC are
    - Udhagamadalem Lake (Ooty) (14000 MPN/100ml) in Tamilnadu
    - Mayem Lake (9200 MPN/100ml) in Goa
    - Oruvathilkotta Lake (9200 MPN/100ml) in Kerala

Total Coliform: -

- Total Coliform should be less than 5000 MPN/100ml.
- Total Coliform lies in the range of 4 to 47,000 MPN/100ml.
- The locations having high value of TC are
    - Udhagamadalem Lake (Ooty) (47,000 MPN/100ml) in Tamilnadu
    - Oruvathilkotta Lake (30,000 MPN/100ml) in Kerala
    - Mayem Lake (16,000 MPN/100ml) in Goa
    - Sai Chevuru (16,000 MPN/100ml) in Andhra Pardesh

20.3 Lakes in Gujarat, Madhya Pradesh and Rajasthan

The water quality monitoring of Lakes, Tanks and Pond in Gujarat, Madhya Pradesh and Rajasthan is carried out by the respective State Pollution Control Boards. The ranges of water quality observed in these Lakes with respect to pH, Conductivity, DO, BOD, Total Coliform (TC) and Faecal Coliform (FC) are presented as minimum, maximum and mean value to assess the extent of water quality variation throughout the year.

The water quality status of Lakes, Tanks and Pond in Gujarat, Madhya Pradesh and Rajasthan is presented in Annexure-I Table 20.2. The summary of water quality of Lakes, Tanks and Pond in Gujarat, Madhya Pradesh and Rajasthan with respect to pH, Conductivity, Dissolved oxygen (DO), Biochemical Oxygen Demand (BOD), Total Coliform (TC) and Faecal Coliform (FC) is given below:

pH: -

- The criteria for pH is 6.5 to 8.5.
- pH is observed in the range of 7.0 to 9.2.
- High value of pH is observed in
    - Chandola Lake (9.2), Kankoria Lake (9.0), Narsimehta Talav (8.9), Bindusarovar (8.8), Dharoi dam (8.7) and Olpad Tank & Nalsarovar Lake (Sanand) (8.6) in Gujarat
    - Fateh Sagar Lake (9.2), Thol Tank (8.9), Pichola Lake & Nakki Lake (8.8) and Udaisagar Lake (8.7) in Rajasthan
    - Bilawali Talab (9.0), Nagchun Talab (8.9) and Janunia Talab & Lower Lake (8.6) in Madhya Pradesh

Conductivity: -

- The criteria of conductivity for irrigation is 2250 μmhos/cm.

- Conductivity ranges from 180 to 14,700 µmhos/cm.
- High values of conductivity is observed in
    - Nalsarovar Lake (Sanand) (14700 µmhos/cm), Kuwadawa Lake (10500 µmhos/cm) and Narsimehta Talav (8450 µmhos/cm) in Gujarat
    - Udaisagar Lake at Udaipur (2700 µmhos/cm) in Rajasthan

Dissolved Oxygen: -

- The criteria for DO should be more than 4 mg/l.
- DO is observed in the range of Nil to 11.9 mg/l.
- DO does not meet the criteria in
    - Pushkar lake & Udaisagar Lake at Udaipur (Nil) and Nakki Lake, Mt. Abu (2.6 mg/l) in Rajasthan
    - Nalsarovar Lake, Dudhiya Talav at Navsari & City Lake at Nadiad (Nil) and Kuwadawa Lake at Rajkot (3.2 mg/l) in Gujarat
    - Upper Lake at Karbala Club (2.4 mg/l) in Madhya Pradesh

Biochemical Oxygen Demand: -

- The criteria for BOD should be less than 3 mg/l.
- The BOD value ranges from 0.1 mg/l to 40 mg/l.
- BOD observed more than the criteria in
    - City Lake of Nadiad (26.4 mg/l)
    - Kankoria lake (38 mg/l), Bindusarovar (15 mg/l), Nalsarovar Lake (14 mg/l), Chandola Lake (13 mg/l), Kuwadava Lake (12 mg/l), Dhudhia Talav (9.0 mg/l), Narsimehta Talav (7.8 mg/l), Dharoi Dam (6.0 mg/l), Olpad Village Pond (4.0 mg/l) and Thol Tank (3.2 mg/l) in Gujarat
    - Udaisagar lake (12.4 mg/l), Pushkar Lake (12.2 mg/l) and Pichola lake (3.2 mg/l) in Rajasthan
    - Lower lake (5.2 mg/l), Upper Lake (4.8 mg/l), at Karbala Club (4.0 mg/l) & at Yatch Club (3.8 mg/l), Kewra Dam (4.2 mg/l), Govingarh tank (4.4 mg/l) and Janunia Talab (4.2 mg/l) in Madhya Pradesh

Faecal Coliform: -

- Faecal Coliform should be less than 2500 MPN/100ml.
- Faecal Coliform (FC) ranges from Nil to 64,000 MPN/100ml.
- Maximum value of FC (64,000 MPN/100ml) is observed in Olpad village Pond in Gujarat.

Total Coliform: -

- Total Coliform should be less than 5000 MPN/100ml.
- Total Coliform lies in the range of Nil to 1, 20,000 MPN/100ml.
- The locations having high value of TC are
    - Olpad village Pond (1, 20,000 MPN/100ml)
    - Moticher Lake (7500 MPN/100ml) in Gujarat

20.4 Lakes, Tanks & Ponds in Chandigarh, Haryana, Himachal Pradesh, Punjab, Uttarakhand, Uttar Pradesh, Bihar, Orissa and West Bengal

The water quality monitoring of Lakes, Tanks and Ponds in Chandigarh, Haryana, Himachal Pradesh, Punjab, Uttarakhand, Uttar Pradesh, Bihar, Orissa and West Bengal is carried out by the respective State Pollution Control Boards. The ranges of water quality observed in these water bodies with respect to pH, Conductivity, DO, BOD, Total Coliform (TC) and Faecal Coliform (FC) are presented as minimum, maximum and mean value to assess the extent of water quality variation throughout the year.

The water quality status of Lakes, Tanks and Ponds in Chandigarh, Haryana, Himachal Pradesh, Punjab, Uttarakhand, Uttar Pradesh, Bihar, Orissa and West Bengal is presented in Annexure-I Table 20.3. The summary of water quality of Lakes, Tanks and Pond in Chandigarh, Haryana, Himachal Pradesh, Punjab, Uttarakhand, Uttar Pradesh, Bihar, Orissa and West Bengal with respect to pH, Conductivity, Dissolved oxygen (DO), Biochemical Oxygen Demand (BOD), Total Coliform (TC) and Faecal Coliform (FC) is given below:

pH: -

- The criteria for pH is 6.5 to 8.5.
- pH is observed in the range of 6.4 to 8.8.
- Low value of pH (6.4) is observed in Mirikh Lake in West Bengal & Tighi Talab in Bihar.
- High Value (8.8) is observed in Indradyumna Tank in Orissa.

Conductivity: -

- The criteria of conductivity for irrigation is 2250 µmhos/cm.
- Conductivity ranges from 31 to 46,410 µmhos/cm.
- High values of conductivity is observed in Chilka Lake (46,410 µmhos/cm) & Swetaganga Pond (2770 µmhos/cm) in Orissa.

Dissolved Oxygen: -

- The criteria for DO should be more than 4 mg/l.
- DO is observed in the range of 1.2 to 23.1 mg/l.
- High values of DO are observed in
  - Narendra Pokhuri (23.1 mg/l)
  - Markanda Pokhari (21.9 mg/l)
  - Indradyumna Tank (21.6 mg/l)
  - Swetaganga Pond (20.2 mg/l) in Orissa indicate that these ponds are septic or eutrophicated.
- DO is observed lower than the desired criteria in
  - Motijheel (1.2 mg/l) in Bihar
  - Khaziar Lake (2.6 mg/l) in Himachal Pradesh
  - Laxmi Pond (3.6 mg/l) in Uttar Pradesh
  - Hanuman Ghat (3.9 mg/l) in West Bengal

Biochemical Oxygen Demand: -

- The criteria for BOD should be less than 3 mg/l.
- The BOD value ranges from 0.2 mg/l to 29 mg/l.
- BOD observed more than the criteria in
    - Bindusagar (29 mg/l), Swetaganga (20.5 mg/l), Narendra Pokhari (15 mg/l), Parvati sagar (12.5 mg/l), Indradyumna Tank (8.5 mg/l), Markanda Pokhari (8 mg/l), Anshupa lake (4.4 mg/l) and Chilka Lake (3.2 mg/l) in Orissa
    - Khaziar Lake (13 mg/l) in Himachal Pradesh
    - Tighi Talab (12 mg/l) and Surajkund & Kawar Lake (3.2 mg/l) in Bihar
    - Rabindrasarobar (6.1 mg/l), Mainh Ghat (5.2 mg/l), Hanuman Ghat (4.9 mg/l), Mirikh Lake (4.8 mg/l), Hathishala Ghat (4.6 mg/l), Kochbihar Lake (3.8 mg/l), Delo Reservoir (3.5 mg/l) and Sahebbandh (3.4 mg/l) in West Bengal
    - Maahil Pond (5.3 mg/l), Ramgarh Lake (5.2 mg/l), Samarpur Jheel (3.7 mg/l) and Laxmi Pond (3.6 mg/l) in Uttar Pradesh
    - Naini Lake (3.2 mg/l) in Uattarakhand

Faecal Coliform: -

- Faecal Coliform should be less than 2500 MPN/100ml.
- Faecal Coliform (FC) ranges from 2 to 1, 10,000 MPN/100ml.
- High values of FC are observed in
    - Rabindra Sarobar Lake (1, 10,000 MPN/100ml), Mainh Ghat & Hanuman Ghat (50,000 MPN/100ml), Kochbihar Lake (17,000 MPN/100ml), Mirikh Lake & Delo Reservoir (11,000 MPN/100ml), Hathishala Ghat & Sahebbandh (8000 MPN/100ml) and Sinchal Lake (4000 MPN/100ml) in West Bengal
    - Narendra Pokhari (92,000 MPN/100ml), Markanda Pokhari (14,000 MPN/100ml), Swetaganga Pond (13,000 MPN/100ml), Indradyumna Tank (11,000 MPN/100ml), Bindusarovar (9400 MPN/100ml) and Parvati Sagar (4900 MPN/100ml) in Orissa
    - Laxmi Pond (6300 MPN/100ml) and Samarpur Lake (4600 MPN/100ml) in Uttar Pradesh

Total Coliform: -

- Total Coliform should be less than 5000 MPN/100ml.
- Total Coliform lies in the range of 8 to 2, 20,000 MPN/100ml.
- The locations having high value of TC are
    - Rabindra Sarobar Lake (2, 20,000 MPN/100ml), Mainh Ghat (1, 10,000 MPN/100ml), Hanuman Ghat (80,000 MPN/100ml), Kochbihar Lake & Mirikh Lake (30,000 MPN/100ml), Delo Reservoir (22,000 MPN/100ml), Hathishala Ghat (14,000 MPN/100ml), Sahebbandh (13,000 MPN/100ml) and Sinchal Lake (7000 MPN/100ml) in West Bengal
    - Narendra Pokhari (1, 60,000 MPN/100ml), Swetaganga Pond (22,000 MPN/100ml), Markanda Pokhari (21,000 MPN/100ml), Indradyumna Tank (17,000 MPN/100ml), Bindusarovar (15,000 MPN/100ml) and Parvati Sagar (7900 MPN/100ml) in Orissa
    - Laxmi Pond (92,000 MPN/100ml) and Samarpur Lake (6300 MPN/100ml) in Uttar Pradesh

- Kawar lake (9000 MPN/100ml) in Bihar

20.5 Lakes, Tanks and Ponds in Assam, Manipur, Tripura and Meghalaya

The water quality monitoring of Lakes, Tanks and Pond in Assam, Manipur, Tripura and Meghalaya is carried out by the respective State Pollution Control Boards. The ranges of water quality observed in these lakes with respect to pH, Conductivity, DO, BOD, Total Coliform (TC) and Faecal Coliform (FC) are presented as minimum, maximum and mean value to assess the extent of water quality variation throughout the year.

The water quality status of Lakes, Tanks and Ponds in Assam, Manipur, Tripura and Meghalaya is presented in Annexure-I Table 20.4. The summary of water quality of Lakes, Tanks and Pond in Assam, Manipur, Tripura and Meghalaya with respect to pH, Conductivity, Dissolved oxygen (DO), Biochemical Oxygen Demand (BOD), Total Coliform (TC) and Faecal Coliform (FC) is given below:

pH: -

- The criteria for pH is 6.5 to 8.5.
- pH is observed in the range of 6.0 to 8.8.
- Low value of pH (6.4) is observed in
  - Bor Pukhuri, Rajadinia Pukhuri & Hardoi Pukhuri (6.0)
  - Baskandi Pond & Goysagar Tank (6.1)
  - Botodriva Satra Pond & Chand Dubi Beel (6.2)
  - Mer Beel, Elangbee System Pond, Gaurisagar Tank, Rajmaw Pukhuri & Sivasagar Tank (6.3)
  - Mahamaya Mandir Pukhuri (6.4) in Assam
- High Value (8.8) is observed in Dighali Pukhuri, Assam.

Conductivity: -

- The criteria of conductivity for irrigation is 2250 µmhos/cm.
- Conductivity ranges from 67 to 3220 µmhos/cm.
- Highest value of conductivity is observed in Elangbeel System Pond (3220 µmhos/cm) in Assam.

Dissolved Oxygen: -

- The criteria for DO should be more than 4 mg/l.
- DO is observed in the range of Nil to 13 mg/l.
- DO is observed lower than the desired criteria in
  - Elangabeel System Pond (Nil), Gophur Tank (1.2 mg/l) and Hardoi Pukhuri (3.8 mg/l) in Assam
  - Karang Island (Loktak Lake) (2.8 mg/l) in Manipur

Biochemical Oxygen Demand: -

- The criteria for BOD should be less than 3 mg/l.
- The BOD value ranges from 0.2 mg/l to 42 mg/l.
- BOD observed more than the criteria in

- Elangabeel System Pond (42 mg/l), Padumpukhuri (26.5 mg/l), Jaipal Pukhuri (14 mg/l), Rajapukhuri (13 mg/l), Botodriva Satra Pond (12.5 mg/l), Ganga Pukhuri (11.2 mg/l), Deepar Beel (11.0 mg/l), Bishnu Puskar Pukhuri (10.6 mg/l), Subhagya Kunda Pond & Chand Dubi Beel (9.4 mg/l), Dighali Pukhuri (8.2 mg/l), Gaurisagar Tank (8 mg/l), Bor Beel (7.8 mg/l), Mahamaya Mandir Pukhuri (7.6 mg/l), Gophur Tank (7.2 mg/l), Rajadinia Pukhuri (6.7 mg/l), Baskandi (6 mg/l), Bor Pukhuri (5.0 mg/l), Gala Beel (4.6 mg/l), Rajmaw (4.4 mg/l), Sivasagar Tank (3.6 mg/l) and Saran Beel (3.1 mg/l) in Assam
- Loktak Lake (23 mg/l) in Manipur
- Umiam Lake (10.5 mg/l) in Meghalaya
- Laxminarayan Bari Palace (3.2 mg/l) in Tripura

Faecal Coliform: -

- Faecal Coliform should be less than 2500 MPN/100ml.
- Faecal Coliform (FC) ranges from 0 to 3300 MPN/100ml.
- Highest value of FC is observed in Umiam Lake at Barapani in Meghalaya.

Total Coliform: -

- Total Coliform should be less than 5000 MPN/100ml.
- Total Coliform lies in the range of 1 to 15000 MPN/100ml.
- The location having high value of TC is Saubhagya Kunda Pond in Assam.

CHAPTER XXI

Assessment of Groundwater Quality

21.1 Ground Water Quality Monitoring

The groundwater occurrence and availability is largely governed by the state of cementation and compaction of the formation, which control the pore volume. The geological formations encountered in the country may be broadly divided into three categories-the unconsolidated, the semi-consolidated and the consolidated. In India a sizable proportion of population is dependant on ground water for drinking and other household utilities besides its use in irrigation at large. Due to limited cost effective treatment options for polluted ground water, the affected resource is generally lost for drinking and other utilities.

21.2 State wise Groundwater Quality Monitoring

To assess the problem of groundwater quality deterioration, network of groundwater quality monitoring is extended to 490 locations. The State-wise number of groundwater monitoring locations is given below.

Table 21.1: State wise Distribution of Groundwater Monitoring Stations

State/Water Body	No. of wells
Andhra Pradesh	24
Assam	32
Bihar	45
Chandigarh	7
Chhatissgarh	4
Daman, Diu, Dadra and Nagar Haveli	12
Delhi	-
Goa	6
Gujarat	42
Haryana	-
Himachal Pradesh	41
Jammu & Kashmir	-
Jharkhand	-
Karnataka	-
Kerala	30
Lakshdweep	15
Madhya Pradesh	18
Maharashtra	30
Manipur	5
Meghalaya	5
Mizoram	2
Nagaland	-
Orissa	15
Pondicherry	15
Punjab	6
Rajasthan	37

Sikkim	-
Tamil Nadu	2
Tripura	7
Uttar Pradesh	40
Uttranchal	1
West Bengal	49
Total	**490**

The ranges of water quality observed in groundwater with respect to pH, Conductivity, BOD, Total Coliform (TC) and Faecal Coliform (FC) are presented as minimum, maximum and mean value to assess the extent of water quality variation throughout the year.

21.3 Status of Ground Water Quality in Andhra Pradesh

The water quality monitoring of ground water in Andhra Pradesh is carried out by Andhra Pradesh Pollution Control Board.

pH: -

- The criteria for pH is 6.5 to 8.5.
- pH of groundwater is observed in the range of 6.77-8.4.

Conductivity: -

- The criteria of conductivity for irrigation is 2250 µmhos/cm.
- Conductivity varies from 202.5-5620 µmhos/cm and is meeting the criteria limit for drinking as well as irrigation purposes
- The higher values of conductivity are observed in
    - B/W, Panchayat Office, Bollaram, Dist. Medak (5620 µmhos/cm)
    - O/W near Rama Temple Ward No. 2 Mindi, Vishakhapatnam. (4380 µmhos/cm)
    - B/W- Krishna Murthy, D. No. 48-16-43 Auto Nagar Vijaywada, Krishna Dist (2493 µmhos/cm).

Biochemical Oxygen Demand: -

- The criteria for BOD should be less than 3 mg/l.
- BOD ranges from 0.5 to 37.5 mg/l.
- High values of BOD are observed in
    - Bore-well, Panchayat Office, Bollaram (V), Medak (37.5 mg/l)
    - Bore-well-IDA , Near Chaitnaya Chlorides ,Pashmaylam , Medak (4.0 mg/l)
    - Bore-well, Primary School, Rudravelli (V), Bibinagar (M), Nalgonda (3.5 mg/l)

Faecal Coliform: -

- Faecal Coliform should be less than 2500 MPN/100ml.
- Faecal Coliform (FC) ranges from 0 to 121 MPN/100 ml.

Total Coliform: -

- Total Coliform should be less than 5000 MPN/100ml.
- The Total Coliform count varies from 17 to 1, 367 MPN/100 ml.

The quality of ground water in Andhra Pradesh is presented in Annexure-I Table 21.1.

21.4 Status of Ground Water Quality in Assam

The water quality monitoring of ground water in Assam by Assam Pollution Control Boards.

pH: -

- The criteria for pH is 6.5 to 8.5.
- pH of groundwater is observed in the range of 6.1-7.3
- pH observed below the desrired range at-
    - Sibsagar (6.1)
    - Bonaigaon (6.3)
    - Groundwater from Ledo (Margherita) (6.35)
    - Groundwater from Tezpur (Mission Chairali) (6.4)
    - Groundwater from Jagi Road Near HPC Effluent Discharge Point (6.4)
    - Near BPRL Dhaligaon (6.4)
    - Ground water from KokraJhar Dist. (HS School) (6.45)

Conductivity: -

- The criteria of conductivity for irrigation is 2250 µmhos/cm.
- Conductivity varies from 139-941 µmhos/cm and is meeting the criteria limit for drinking as well as irrigation purposes.

Biochemical Oxygen Demand: -

- The criteria for BOD should be less than 3 mg/l.
- BOD ranges from 0.55 to 25.8mg/l.
- BOD is not meeting the desired criteria at –
    - Guwhati in Assam (25.8 mg/l)
    - Lakhimpur Town (7.55 mg/l) in Assam State.

Faecal Coliform: -

- Faecal Coliform should be less than 2500 MPN/100ml.
- Faecal Coliform (FC) ranges from 0 to 19 MPN/100 ml.

Total Coliform: -

- Total Coliform should be less than 5000 MPN/100ml.
- The Total Coliform count varies from 17 to 715 MPN/100 ml.
- Total Coliform is meeting the desired criteria at all monitoring locations.

Nitrate:-

- The concentration of Nitrate (NO_3^-) is observed having the value 6.01 mg/l at Guwhati in Assam.

The quality of ground water in Assam, is presented in Annexure-I Table 21.2.

21.5 Status of Ground Water Quality in Mizoram

The water quality monitoring of groundwater in Mizoram is carried out by respective State Pollution Control Boards and is having two locations in the entire state – Ramhlum (Northern Part) and Mission Vengthlang (Southern Part).

pH: -

- The criteria for pH is 6.5 to 8.5.
- pH of groundwater is observed in the range of 7.25-7.7 and meet the water quality criteria.

Conductivity: -

- The criteria of conductivity for irrigation is 2250 µmhos/cm.
- Conductivity varies from 443-568 µmhos/cm and is meeting the criteria limit for drinking as well as irrigation purposes.

Total Coliform: -

- Total Coliform should be less than 5000 MPN/100ml.
- The Total Coliform count varies from 17 to 715 MPN/100 ml and is meeting the desired criteria at all monitoring locations

The quality of ground water in Mizoram is presented in Annexure-I Table 21.3.

21.6 Status of Ground Water Quality in Manipur

The water quality monitoring of ground water in Manipur is carried out by respective State Pollution Control Boards.

pH: -

- The criteria for pH is 6.5 to 8.5.
- pH of groundwater is observed in the range of 6.9-7.69 and meet the water quality criteria.

Conductivity: -

- The criteria of conductivity for irrigation is 2250 µmhos/cm.
- Conductivity varies from 348-498 µmhos/cm and is meeting the criteria limit for drinking as well as irrigation purposes.

The quality of ground water in Manipur is presented in Annexure-I Table 21.4.

21.7 Status of Ground Water Quality in Tripura

The water quality monitoring of ground water in Tripura is carried out by respective State Pollution Control Boards.

pH: -

- The criteria for pH is 6.5 to 8.5.
- pH of groundwater is observed in the range of 6.51-7.69.

Conductivity: -

- The criteria of conductivity for irrigation is 2250 µmhos/cm.
- Conductivity varies from 127-498 µmhos/cm and is meeting the criteria limit for drinking as well as irrigation purposes.

The quality of ground water in Tripura is presented in Annexure-I Table 21.5.

21.8 Status of Ground Water Quality in Chattisgarh

The State Pollution Control Board carry out the water quality monitoring of ground water in Chattisgarh.

pH: -

- The criteria for pH is 6.5 to 8.5.
- pH of groundwater is observed in the range of 7.26-8.2.

Conductivity: -

- The criteria of conductivity for irrigation is 2250 µmhos/cm.
- Conductivity varies from 637-2310 µmhos/cm
- The higher values of conductivity are observed at
    - Bilaspur, Chattisgarh (2310 µmhos/cm.

Biochemical Oxygen Demand: -

- The criteria for BOD should be less than 3 mg/l.
- BOD value is observed in the range of 0.15-0.8 mg/l

Nitrate: -

- Nitrate is observed in the range of 2.38-4.17 mg/l.

Total Coliform: -

- Total Coliform should be less than 5000 MPN/100ml.
- Total Coliform is observed in the range of 13-15 MPN/ 100 ml.

The quality of ground water in Chattisgarh is presented in Annexure-I Table 21.6.

21.9 Status of Ground Water Quality in Madhya Pradesh

The water quality monitoring of ground water in Madhya Pradesh is carried out by Madhya Pradesh Pollution Control Board.

pH: -

- The criteria for pH is 6.5 to 8.5.
- pH of groundwater is observed in the range of 7.4-7.93 and meeting the water quality criteria at all monitoring locations.

Conductivity: -

- The criteria of conductivity for irrigation is 2250 µmhos/cm.
- Conductivity varies from 473-3070 µmhos/cm and is meeting the desired criteria at all locations except
- The high values of conductivity are observed at
    - Pratal Nagar; Dewas (3070 µmhos/cm)
    - Trenching ground in the Premises of M/s Lakhani Footwear (3007 mg/l)
    - Dosigaon; Ratlam (2885 mg/l)
    - Trenching ground in the Premises of M/s Rishabh Masala Udhyog,; Indore (2567 mg/l)

Biochemical Oxygen Demand: -

- The criteria for BOD should be less than 3 mg/l.
- BOD is observed high at Open well/ Tube well Industrial area (7.45mg/l).

Nitrate: -

- The concentration of Nitrate is observed in the range of 0.66- 9.64 mg/l.

Faecal Coliform: -

- Faecal Coliform should be less than 2500 MPN/100ml.
- Faecal Coliform (FC) ranges from 0 to 6 MPN/100 ml.

Total Coliform: -

- Total Coliform should be less than 5000 MPN/100ml.
- Total Coliform is observed in the range of 6-189 MPN/ 100 ml.

The quality of ground water in Madhya Pradesh is presented in Annexure-I Table 21.7.

21.10 Status of Ground Water Quality in Himachal Pradesh

The water quality monitoring of ground water in Himachal Pradesh is carried out by Himachal Pradesh Pollution Control Board.

pH: -

- The criteria for pH is 6.5 to 8.5
- pH of groundwater is observed in the range of 7.2-8.66

- pH is meeting the water quality criteria at all monitoring locations except at
    - Nalagarh (pH-8.66).

Conductivity: -

- The criteria of conductivity for irrigation is 2250 µmhos/cm.
- Conductivity varies from 52-1388 µmhos/cm

Biochemical Oxygen Demand: -

- The criteria for BOD should be less than 3 mg/l.
- BOD is in the range of 0.1-19 mg/l
- The highest value i.e.
    - 19 mg/l is observed at Solan Downstream of MSW dumping site.

Nitrate: -

- The concentration of Nitrate is observed in the range of 0.03-5.87 mg/l.

Faecal Coliform: -

- Faecal Coliform should be less than 2500 MPN/100ml.
- Faecal Coliform (FC) ranges from 2 to 117 MPN/100 ml

Total Coliform: -

- Total Coliform should be less than 5000 MPN/100ml.
- Total Coliform is observed in the range of 4-341 MPN/ 100 ml

The quality of ground water in Himachal Pradesh is presented in Annexure-I Table 21.8.

21.11 Status of Ground Water Quality in Chandigarh

The water quality monitoring of ground water in Chandigarh is carried out by Chandigarh Pollution Control Committee.

pH: -

- The criteria for pH is 6.5 to 8.5
- pH of groundwater is observed in the range of 6.95-7.9
- pH is meeting the water quality criteria at all monitoring locations.

Conductivity: -

- The criteria of conductivity for irrigation is 2250 µmhos/cm
- Conductivity varies from 682-1160 µmhos/cm.

Biochemical Oxygen Demand: -

- The criteria for BOD should be less than 3 mg/l.
- BOD is in the range of 0.1-0.55 mg/l

Nitrate: -

- The concentration of Nitrate is observed in the range of 0.55- 13.42 mg/l.

The quality of ground water in Chandigarh is presented in Annexure-I Table 21.9.

21.12 Status of Ground Water Quality in Punjab

The water quality monitoring of ground water in Punjab is carried out by Punjab Pollution Control Board.

pH: -

- The criteria for pH is 6.5 to 8.5
- pH of groundwater is observed in the range of 7.1-7.3 and meeting the water quality criteria at all monitoring locations.

Nitrate: -

- The concentration of Nitrate is observed in the range of 1.3-1.8 mg/l.

The quality of ground water in Punjab is presented in Annexure-I Table 21.10.

21.13 Status of Ground Water Quality in Kerala

The water quality monitoring of ground water in Kerala is carried out by the respective Pollution Control Board.

pH: -

- The criteria for pH is 6.5 to 8.5
- pH of groundwater is observed in the range of 6.0-7.65
- pH is not meeting the water quality criteria at some monitoring locations –
    - Hazardous waste dump; Ambalamughal (pH 6.0)
    - well at Chungapally, (pH 6.1)
    - Edyar Ernakulam Dist (pH 6.2)
    - Punkunnam,Triisur Dist (pH 6.2)
    - Vaikum (pH 6.25)
    - Mavoor, Kozhikkode dist (pH 6.3)
    - Karoor; Pala (pH 6.4)
    - Brahamapuram,MSW Dumpark, Ernakulam (pH 6.45)

Conductivity: -

- The criteria of conductivity for irrigation is 2250 µmhos/cm
- Conductivity varies from 70-1438 µmhos/cm.

Biochemical Oxygen Demand: -

- The criteria for BOD should be less than 3 mg/l.
- BOD is in the range of 0.2-1.55 mg/l

Faecal Coliform: -

- Faecal Coliform should be less than 2500 MPN/100ml.

- Faecal Coliform (FC) ranges from 0-620 MPN/100 ml

Total Coliform: -
- Total Coliform should be less than 5000 MPN/100ml.
- Total Coliform is observed in the range of 10-1100 MPN/ 100 ml

The quality of ground water in Kerala is presented in Annexure-I Table 21.11.

21.14 Status of Ground Water Quality in Tamil Nadu

The water quality monitoring of ground water in Tamil Nadu is carried out by the respective Pollution Control Board.

pH: -
- The criteria for pH is 6.5 to 8.5
- pH of groundwater is observed in the range of 6.93-7.5
- pH is meeting the water quality criteria at all the monitoring locations.

Conductivity: -
- The criteria of conductivity for irrigation is 2250 µmhos/cm
- Conductivity varies from 1240-2005 µmhos/cm.

Biochemical Oxygen Demand: -
- The criteria for BOD should be less than 3 mg/l.
- BOD is in the range of 0.4-2.88 mg/l.

Nitrate: -
- The concentration of Nitrate is observed in the range of 0.1 mg/l.

Faecal Coliform: -
- Faecal Coliform should be less than 2500 MPN/100ml.
- Faecal Coliform (FC) ranges from 6-90 MPN/100 ml

Total Coliform: -
- Total Coliform should be less than 5000 MPN/100ml.
- Total Coliform is observed in the range of 6-277 MPN/ 100 ml

The quality of ground water in Tamil Nadu is presented in Annexure-I Table 21.12.

21.15 Status of Ground Water Quality in Pondicherry

The water quality monitoring of ground water in Pondicherry is carried out by the respective Pollution Control Board.

pH: -
- The criteria for pH is 6.5 to 8.5

- pH of groundwater is observed in the range of 6.2- 8.45
- pH is not meeting the water quality criteria at some monitoring locations-
  - pH 6.2 is observed at Well at Kalapet, Pondicherry University
  - The value of 6.3 is observed at Kurumbapet.

Conductivity: -

- The criteria of conductivity for irrigation is 2250 µmhos/cm
- Conductivity varies from 227-2430 µmhos/cm
- The highest value is observed at well at Muthialpet (I) (2430 µmhos/cm).

Biochemical Oxygen Demand: -

- The criteria for BOD should be less than 3 mg/l.
- The value of BOD is 0.67 mg/l at Chunmbar river, Pondicherry.

Nitrate: -

- The concentration of Nitrate is observed in the range of 0.24-95.18 mg/l.

The quality of ground water in Pondicherry is presented in Annexure-I Table 21.13.

21.15 Status of Ground Water Quality in Daman

The water quality monitoring of ground water in Daman is carried out by the respective Pollution Control Committee.

pH: -

- The criteria for pH is 6.5 to 8.5
- pH of groundwater is observed in the range of 6.85- 7.25.

Conductivity: -

- The criteria of conductivity for irrigation is 2250 µmhos/cm
- Conductivity varies from 630.25-2945 µmhos/cm,
- The highest value is observed at village Kachigam (2945 µmhos/cm).

Biochemical Oxygen Demand: -

- The criteria for BOD should be less than 3 mg/l.
- BOD value is meeting the water quality criteria at all locations except
  - Well at Somnath Industrial Estate (4.0 mg/l),
  - Village Dabhel (6.0 mg/l)
  - village Kachigam (8.0 mg/l)

The quality of ground water in Daman is presented in Annexure-I Table 21.14.

21.16 Status of Ground Water Quality in Dadra Nagar Haveli

The water quality monitoring of ground water in Dadra Nagar Haveli is carried out by the respective Pollution Control Committee.

pH: -

- The criteria for pH is 6.5 to 8.5
- pH of groundwater is observed in the range of 6.85- 7.25.

Conductivity: -

- The criteria of conductivity for irrigation is 2250 µmhos/cm
- Conductivity varies from 1335-6034µmhos/cm
- The highest value is observed at-
    - village Dadra (2570 µmhos/cm).
    - village Masat, Dadra (6034µmhos/cm)

Biochemical Oxygen Demand: -

- The criteria for BOD should be less than 3 mg/l.
- BOD value is not meeting the water quality criteria at all locations analysed.
    - Village Piperia, Dadra (4.0 mg/l)
    - Village Dadra (4.0 mg/l)
    - Village Athal, Dadra (6.0 mg/l)
    - Village Masat, Dadra (10.0 mg/l)

Nitrate: -

- The concentration of Nitrate is observed in the range of 0.2-1.4 mg/l.

The quality of ground water in Dadra Nagar Haveli is presented in Annexure-I Table 21.15.

21.17 Status of Ground Water Quality in Maharasthra

The water quality monitoring of ground water in Maharashtra is carried out by the respective Pollution Control Board.

pH: -

- The criteria for pH is 6.5 to 8.5
- pH of groundwater is observed in the range of 7.2- 8.45.

Conductivity: -

- The criteria of conductivity for irrigation is 2250 µmhos/cm
- Conductivity varies from 211-6257 µmhos/cm
- pH is not meeting the water quality criteria at some monitoring locations-
    - Dug well at Ranjangaon (2438.5 µmhos/cm,
    - Rasulwadi- Sambarwadi; Sangli (2903.67 µmhos/cm),
    - Palghar (3191.5 µmhos/cm),
    - Savali; Sangli (3482.25 µmhos/cm),
    - Mira; Bhayander (3767 µmhos/cm),
    - bore well at Katpur; near Z. P. School (5392.5 µmhos/cm),
    - dug well at Ghane Kunt; near Awasthi (6257 µmhos/cm).

Biochemical Oxygen Demand: -

- The criteria for BOD should be less than 3 mg/l.
- BOD value lies in the range of 2.0-6.9 mg/l.

The quality of ground water in Maharashtra is presented in Annexure-I Table 21.16.

21.18 Status of Ground Water Quality in Gujrat

The water quality monitoring of ground water in Gujrat is carried out by the respective Pollution Control Board.

pH: -

- The criteria for pH is 6.5 to 8.5
- pH of groundwater is observed in the range of 7.5- 8.7.
- High value of pH is observed at-
    - Bore well of Bardolia at Rest House (pH 8.55)
    - Mora-Hazira (industrial) – Hazira (pH 8.7)

Conductivity: -

- The criteria of conductivity for irrigation is 2250 µmhos/cm
- Conductivity varies from 260.5-30300 µmhos/cm and is not meeting the water quality criteria at some monitoring locations-
    - Bore well of Navsari GIDC (2275 µmhos/cm),
    - Dahod (2286 µmhos/cm),
    - bore well at Someshwar Rice Well (2300 µmhos/cm),
    - bore well at Sachin GIDC (2315 µmhos/cm),
    - Bore well of Pirana Terminal Pumping (3590 µmhos/cm),
    - bore well at Senior Vinayak Jal Suddhikaran (4130 µmhos/cm),
    - bore well of Santej Village (6637.5 µmhos/cm),
    - bore well of Navsari GIDC (7483 µmhos/cm),
    - Ankleshwar Industrial Area (7517 µmhos/cm),
    - Junagadh (10400 µmhos/cm),
    - Surndra Nagar (30300 µmhos/cm).

Biochemical Oxygen Demand: -

- The criteria for BOD should be less than 3 mg/l.
- BOD value is meeting the water quality criteria at all locations except
    - bore well at Someshwar Rice Mill (3.75),
    - Mehsana (6.1) and
    - at Himat nagar (8.3).

Nitrate: -

- The concentration of Nitrate is observed in the range of 0.1-3.85 mg/l.

Faecal Coliform: -

- Faecal Coliform should be less than 2500 MPN/100ml.
- Faecal Coliform (FC) ranges from 0-300 MPN/100 ml

Total Coliform: -

- Total Coliform should be less than 5000 MPN/100ml.
- Total Coliform is observed in the range of 2-1100 MPN/ 100 ml

The quality of ground water in Gujrat is presented in Annexure-I Table 21.17.

21.19 Status of Ground Water Quality in Rajasthan

The water quality monitoring of ground water in Rajasthan is carried out by State Pollution Control Board.

pH: -

- The criteria for pH is 6.5 to 8.5
- pH of groundwater is observed in the range of 7.1-8.46 and meet the water quality criteria.

Conductivity: -

- The criteria of conductivity for irrigation is 2250 µmhos/cm
- The conductivity varies from 700-20,500 µmhos/cm and is not meeting the desired criteria at
    - Opp. Pvt. Bus Stand, Ajmer (2385 µmhos/cm),
    - well of Goojraon ki Talai Mohana Road, Sanganer ;Jaipur, Loomji Chaudhary (2850 µmhos/cm);
    - Near Rana Pratap Nagar, Railway Station, Udaipur(3050 µmhos/cm);
    - Inside Shiv Temple Near Air Force Station, Ajmer (3150 µmhos/cm);
    - Village Vinayakia, Jodhpur (Hiralal Kumhar) (3400 µmhos/cm);
    - near Kalyaneshwar Mahadev Temple, Jai Singh Pura, Khurd (3400 µmhos/cm);
    - Handpump of Vidhani village, Goner road, Jaipur (3700 µmhos/cm);
    - Pabupura Road near Civil Airport, Jodhpur (3900 µmhos/cm);
    - Well Kothi in village Bagar Rajput, Alwar (4100 µmhos/cm);
    - Near Khanpura Talab, Ajmer (5200 µmhos/cm);
    - Village Vinayakia, Jodhpur (Hukum Singh Rathore) (5700 µmhos/cm);
    - well U/s 1 km from Jodhpur Town (10750 µmhos/cm);
    - well of Loomji Chaudhary, near Nayagaon, Pali (17700 µmhos/cm);
    - well of Bhopal Singh, 24 km. from Pali Town (20500 µmhos/cm).

Biochemical Oxygen Demand: -

- The criteria for BOD should be less than 3 mg/l.
- BOD is observed in the range of 0.13-11.4 mg/l
- Locations having BOD more than the criteria are
    - well of Loomji Chaudhary, near Nayagaon, Pali (7.85 mg/l);

- Bhopal Singh, 24 km. from Pali Town (3.91 mg/l)
- U/s 1 km from Jodhpur Town (11.4 mg/l).

Nitrate: -

- The concentration of Nitrate is observed in the range of 0.31-6.82 mg/l.

Faecal Coliform: -

- Faecal Coliform should be less than 2500 MPN/100ml.
- Faecal Coliform (FC) ranges from 3-13 MPN/100 ml

Total Coliform: -

- Total Coliform should be less than 5000 MPN/100ml.
- Total Coliform is observed in the range of 4-82 MPN/ 100 ml
- Total Coliforms are meeting the desired criteria at all the locations.

The quality of ground water in Rajasthan is presented in Annexure-I Table 21.18.

21.20 Status of Ground Water Quality in Uttar Pradesh

The ground water quality monitoring in Uttar Pradesh is carried out by respective State Pollution Control Board.

pH: -

- The criteria for pH is 6.5 to 8.5
- pH of groundwater is observed in the range of 6.18-7.75 and meeting the water quality criteria except at
    - M/s Kanoria Chemical, Sonbhadra, U.P. (6.18).

Conductivity: -

- The criteria of conductivity for irrigation is 2250 µmhos/cm
- Conductivity varies from 410-3185 µmhos/cm. Conductivity is observed high at
    - Pilkhua Industrial Area Ghaziabad (2501 µmhos/cm)
    - Sahibabad Industrial Area, Ghaziabad (3185 µmhos/cm).

Biochemical Oxygen Demand: -

- The criteria for BOD should be less than 3 mg/l.
- BOD observed high at Captain Ganj (4.1 mg/l) in Uttar Pradesh.

Faecal Coliform: -

- Faecal Coliform should be less than 2500 MPN/100ml.
- Faecal Coliform (FC) ranges from 0-40 MPN/100 ml

Total Coliform: -

- Total Coliform should be less than 5000 MPN/100ml.
- Total Coliform is observed in the range of 10-93 MPN/ 100 ml

- Total Coliforms are meeting the desired criteria at all the locations

The quality of ground water in Uttar Pradesh and Uttarakhand is presented in Annexure-I Table 21.19.

21.21 Status of Ground Water Quality in Orissa

State Pollution Control Board carries out the water quality monitoring of ground water in Orissa.

pH: -

- The criteria for pH is 6.5 to 8.5
- pH of groundwater is observed in the range of 6.95-8.25 and meet the water quality criteria.

Conductivity: -

- The criteria of conductivity for irrigation is 2250 µmhos/cm
- Conductivity varies from 102.5-1099µmhos/cm and meeting the desired criteria.

Biochemical Oxygen Demand: -

- The criteria for BOD should be less than 3 mg/l.
- BOD is observed in the range of 0.3-1.7 mg/l

Nitrate: -

- The concentration of Nitrate is observed in the range of 0.31-9.19 mg/l.

Faecal Coliform: -

- Faecal Coliform should be less than 2500 MPN/100ml.
- Faecal Coliform (FC) ranges from 1-2 MPN/100 ml

Total Coliform: -

- Total Coliform should be less than 5000 MPN/100ml.
- Total Coliform is observed in the range of 2-7 MPN/ 100 ml
- Total Coliforms are meeting the desired criteria at all the locations

The quality of ground water in Orissa is presented in Annexure-I Table 21.20.

21.22 Status of Ground Water Quality in Bihar

State Pollution Control Board carries out the water quality monitoring of ground water in Bihar.

pH: -

- The criteria for pH is 6.5 to 8.5
- pH of groundwater is observed in the range of 6.8 – 8.6 and meet the water quality criteria except at

- Well at Rohtas (8.6).

Conductivity: -

- The criteria of conductivity for irrigation is 2250 µmhos/cm
- Conductivity varies from 294-1105 µmhos/cm and is meeting the desired criteria.

Biochemical Oxygen Demand: -

- The criteria for BOD should be less than 3 mg/l.
- BOD is reported 1.4 mg/l at Aurangabad.

Nitrate: -

- The concentration of Nitrate is observed in the range of 0.22-1.8 mg/l.

Faecal Coliform: -

- Faecal Coliform should be less than 2500 MPN/100ml.
- Faecal Coliform (FC) ranges from 1-30 MPN/100 ml

Total Coliform: -

- Total Coliform should be less than 5000 MPN/100ml.
- Total Coliform is observed in the range of 2-80 MPN/ 100 ml

The quality of ground water in Bihar is presented in Annexure-I Table 21.21.

21.23 Status of Ground Water Quality in West Bengal

State Pollution Control Board carries out the water quality monitoring of ground Water in West Bengal.

pH: -

- The criteria for pH is 6.5 to 8.5
- pH of groundwater is observed in the range of 6.6-9.5 and meets the water quality criteria except at Hot spring at Bakreshwar (9.5)

Conductivity: -

- The criteria of conductivity for irrigation is 2250 µmhos/cm
- Conductivity varies from 133-10823.5 µmhos/cm and meeting the criteria except at
    - Cossipore- North Kolkata (2300 µmhos/cm),
    - Central Howrah- Residential Area (2300 µmhos/cm),
    - Residential Area- Sonarpur (2510 µmhos/cm),
    - near IOC Refinery Haldia (10511 µmhos/cm),
    - inside Hindustan Liver factory; Haldia (10823.5 µmhos/cm).

Biochemical Oxygen Demand: -

- The criteria for BOD should be less than 3 mg/l.
- BOD is observed in the range of 0.1-7.2 mg/l.
- BOD is observed 7.2 mg/l at Ground water point at Purulia R K Mission.

Nitrate: -

- The concentration of Nitrate is observed in the range of 0.1-1.08 mg/l.

Faecal Coliform: -

- Faecal Coliform should be less than 2500 MPN/100ml.
- Faecal Coliform (FC) ranges from 0-110 MPN/100 ml

Total Coliform: -

- Total Coliform should be less than 5000 MPN/100ml.
- Total Coliform is observed in the range of 0-280 MPN/ 100 ml

The quality of ground water in West Bengal is resented in Annexure-I Table 21.22.

Annexure-I

WATER QUALITY DATA-2009

- **RIVER BASINS - INDUS, GANGA, BRAHMAPUTRA, MAHI, SABARMATI, NARMADA, TAPI, MAHANADI, BRAHMANI AND BAITRANI, SUBARNAREKHA, GODAVARI, KRISHNA, PENNERU & CAUVERY.**

- **MEDIUM & MINOR RIVERS, CANALS, CREEKS/SEA WATER AND DRAINS**

- **STATEWISE - LAKES, TANKS AND PONDS**

- **STATEWISE - GROUNDWATER**

(ANNEXURE-II)

Table-1.6 River Basin wise distribution of Water Quality Monitoring Stations- 2009

River (main stream), Tributaries and Sub-Tributaries, Lake, Ponds, Tanks, Canals, Creeks and Groundwater Stations	Total stations
Baitarni (5**)** **Tributaries**- Kusei(1)	6
Brahmani (16) **Tributaries**-Karo (1), Kharasrota(2), Koel (5), Sankh (1)	25
Brahmaputra (10) **Tributaries**-Burhidihing (3), Dhansiri (7), Disang (2), Jhanji (1), Subansiri (1), Bhogdoi (1), Bharalu (1), Borak (2), Deepar Bill (1), Digboi (1), Mora Bharali (1), Teesta (5), Dickhu (1), Maney (2), Ranchu (2), Rangit (5), Jai Bharali (1), Kathakal (1), Kharsang (1), Kolong (2), Manas(1), Pagldia (1), Chathe (1), Dzu (1), Kapili(1), Beki(1), Kundli(1), Kushiara(1), Panchnai(1), Sankosh(1), Sonai(1), Kohara(1), Ranga(1), Boginadi(1), Dikhow(1),Kaljani(1), Karola(1)	68
Cauvery (20) **Tributaries**-Arkavati (1), Amravati (1), Bhawani (5), Kabini (4), Laxmantirtha (1), Shimsa (2), Hemavati (1), Yagachi (1)	36
Ganga (52) **Tributaries**-Alakananda-Upper Ganga (4), Mandakini-Upper Ganga (1)**,** Ajay (1), Ashwani(1), Barakar (2), Batta(2), Betwa (10), Bhalla (2), Bichia(1), Bihar(1), Bokaro (1), Burhi Gandak(1), Chambal (8), Churni (3), Daha (3), Damodar (12), Dhela (2), Dhous (1), Dwarakeshwar(1), Dwarka(2), Farmer (1), Gandak (3), Giri(3), Gohad (1), Gola (1), Gomti (5), Harbora(1), Hindon (4), Jalangi(1), Johila (1), Kali (West) (2), Kali Nadi (3), Kali sot (1), Kamala(2), Kansi (1), Khan (3), Kichha (1), Kolar (1), Konar (3), Koshi (2), Kosi (Uttarakhand) (1), Kshipra (3), Mahananda (3), Mandakini (Madhya Pradesh) (1), Manusmar(1), Matha Bhanga(1), Mayurakshi(1), Nalkari (1), Nandaur (2), Pabbar(3), Parvati (4), Pilkhar (1), Ramganga (1), Ram Rekha(1), Rapti (2), Rihand (2), Rupanarayan (2), Sai (2), Sankh (1), Sikrana (2), Silabati(1), Sindh (1), Sirsa (1), Saryu-Ghaghra (4), Sone (5), Suswa (1), Tons (Himachal Pradesh) (1), Tons (Madhya Pradesh) (2), Varuna(2), Vindyadhari(2), Yamuna (27)	233
Godavari (35) **Tributaries**- Manjara (Manjira) (6), Maner (2), Nira (1), Wainganga (8), Wardha (6), Kolar (1), Kanhan (3), Purna (3), Indravati (2), Sankhani (1), Nakkavagu (1), Vamsadhara (1), Darna (5), Bindusar (1), Penganga (3), Wena (2), Kinnersani (1), Sabari (1)	83
Indus **Tributaries**-Beas (23), Chenab (1), Jhelum (3), Largi (1), Parvati (3), Ravi (6), Sutlej (22), Tawi (1), Gawkadal (1), Chuntkol (1), Sirsa (3), Swan (1), Baspa (1), Binwa(1), Neugal(1), Siuel(1), Spiti(1), Suketi Khad(1)	72
Krishna (22) **Tributaries**- Bhadra (3), Bhima (12), Ghataprabha (2), Malprabha (3), Muneru (1), Musi (3), Nira (5), Paleru (1), Tunga (1), Tungabhadra (6), Panchganga (4), Chandrabhaga (2), Kagina(1), Koyna(1), Mula(2), Mutha(4), Mula-Mutha(2), Venna(3), Pawana(6), Indrayani(3), Hundri (1), Kundu (1), Ghod (1), Sina (1), Urmodi(1), Vel (1)	93
Mahi (9) **Tributaries**-Anas (1), Panam (1) , Jammer(1), Malei(1), Shivna(1), Chillar(1)	15
Mahanadi (22) **Tributaries**-Ib (4), Hasdeo (2), Kathajodi (1), Kharoon (4), Kuakhai (3), Sheonath (3), Birupa (1), Arpa (1), Kelo (2), Bheden(1), Tel(1), Serua(1), Daya(1), Sankha(1)	48
Narmada (21) **Tributaries**-Chhota Tawa (1), Gour(1), Katni(1), Kunda(1)	25
Pennar (5)	5

Sabarmati (9) **Tributaries**-Meswa (1), Shedhi (1), Khari (1)	12
Subarnarekha (12) **Tributaries-** Jumar (1)	13
Tapi (14) **Tributaries-**Girna (2), Rangavali (1), Denwa(1), Kim(1), Amravati (1), Bori (1), Burai(1), Gomai (1), Hiwara (1), Mor (1), Morna (1), Panzara (1), Pedhi (1), Titur (1), Waghur (1)	30
Medium rivers Ambika (1), Ulhas (3), Ulhas-Bhatsa (3), Ulhas-Kalu (1), Imphal (4), Mandovi (2), Palar (1), Pamba (3), Pariyar (7), Rushikulya (2), Tambiraparani (7), Achankoil (2), Chalakudy (1), Damanganga (14), Ghaggar (19), Kallada (1), Kali-Karnataka (1), Manimala (2), Mindhola (1), Nagavalli (4), Amlakhadi (2), Chaliyar (2), Iril (2), Kharkhala (1), Karmana (1), Kolak (2), Kundalika (4), Meenachil (1), Muvattupuza (1), Patalganga (7), Umtrew (1), Vamanpuram(1), Zuari(2), Gumti(2), Kalna (1),Valvant (1), Madai (1), Khandepar (2), Asanora (1), Bhadar (1), Neyyar (1), Ithikkara (2), Kadalundy (1), Kuttiyady (1), Mahe (2), Kuppum (1), Neelsvaram (2), Karingoda (1), Chandergiri (1), Chitrapuzha (1), Nambul (2), Ganol (1), Simsang (1), Myntdu (1), Arasalar (1), Kodra (1), Haora (1), Khuga (1), Khujairok (1), Sekmai (1), Markanda (3), Sukna (1), Baleshwar Khadi (1), Netravati (1), Kumardhara (1), Purna (1), Kaveri (1), Dhadar (1), Tlawng (2), Tuirial (2), Talpona (1), Bhogavo(1), Triveni sangam(1), Mapusa(1), Bicholim(1), Chapora(1), Kushawati(1), Sal(2), Meethi(1), Savitri(5), Vashisti(3), Neyyar (1), Mamom (1), Ayroor(1), Pallickal (1), Karuvannurr (1), Puzhackal (1), Keecheri (1), Thirur (1), Kadalundi (1), Kallai (1), Korapuzha (1), Thallassery (1), Ancharakandy(2), Kuppam (1), Ramapuram (1), Peruvamba (1), Kavvai (1), Pullur (1), Mogral (1), Shriya (1), Uppala (1), Manjeswar (1), Korayar (1), Bharathapuzha (2), Kadambayar (2), Gautami-Godavari(2), Coringa(1), Budhabalanga(2), Vanshadhara(2), Kerandi(1), Amba (1), Kan (1), Muchkundi (1), Pehlar (1), Surya (3), Tansa (1), Vaitarna (1)	216
Lakes (117) Hussainsagar (1), Saroornagar (1), Himayatsagar (1), Pulicate (1), Salaulim (1), Kankoria (1), Chandola (1), Ajwah (1), Sursagar (1), Brahamsarovar (1), Sukhna (2), Govindsagar (1), Pongdam (1), Renuka (1), Wuller (1), Dal (1), Ulsoor (1), HebbalaValley (1), Oruvathikotta (1), Sasthamcotta (1), Ashthamudi (1), Paravur (1), Vembanad (1), Periyar (1), Kodumgallor (1), Kayamkula (1), Punnamadakayal (1), Pookotekayal (1), UpperLake (4), LowerLake (1), MultaiLake (1), Loktak (4), Umiam (1), Ward (1), Thadlaskena (1), Osteri (1), Bahour (1), Harike (2), Pichola (1), Udaisagar (1), Ramgarh Jaipur (1), Pushkar (1), Fatehsagar (1), Kalyana (1), Nakki (1), Udhagamadalam (1), Kodaikanal (1), Yercaud (1), Lakshminarayan Baridigh (1), Rudrasagar (1), Ramgarh-UttarPradesh (1), Naini (1), Rabindrasarovar (1), Nalsarovar (1), Bindusaraovar (1), Sahastrling Sarovar (1), Lakhota Talav (1), Narsimehta Talav (1), Nadiad city Lake (1), Ranjitnagar Talav (1), Ankleshwar reservoir (1), Dharoi dam(1), Kuwadava (1), Moticher lake (1), Mayem lake (1), Janunia talav (1), Yashwant sagar (1), Sirpur talav (1), Kali sindh reservoir (1), Periat tank (1), Shahpura (1), Madhav lake (1), Nagchun (1), Karwa dam (1), Khandari reservoir (1), Daloni Beel (1), Mer Beel (1), Govindgarh tank (1), Bilawali talav (1), Bhoothathankettu reservoir (1), Dimna lake (1), Edamalayar reservoir (1), Hazaribagh Meethajhee l(1), Kondacharala- aava lake (1), Laxminarayan Chevuru (1), Malampuzha reservoir (1), Miralam lake (1), Noor Md. Kunta (1), Pazhassi reservoir (1), Ranchi lake (1), Topchachi lake (1), Vembanadu lake (1), Chilka lake (1), Anshupa lake (1), Kawar lake (1), Moti Jheel (1), Samarpur lake (1), Shukra Tal (1), Khaziar lake (1), Riwalsar lake (1), Belboni lake (1), Koch Bihar lake (1), Mirikh lake (1), Saheb bandh (1), Sinchal lake (1), Tarkeshwar lake (3), Delo reservoir (1)	170
Tanks (9) Dharamsagar (1), Bibinagar (1), Kistrareddypet (1), Goysagar (1), Thol (1), Gandigudem (1), Kajipally Tank(1), Mallapur Tank (1), Premajipet Tank (1)	
Ponds (44) Elangabeel System (1), Lakshadweep (1), Olpad village pond (1), Bishnu Pushkar pukhuri (1), Bor Beel (1), Bor pukhuri(1), Botodriva pond (1), Chand dubi Beel (1), Deepar Beel (1), Dighali pukhuri (1), Dhudia talav (1), Baskandi pond (1), Galabeel (1), Ganga pukhuri (1), Gaurisagar (1), Gopur tank (1), Padum pukhuri (1), Hordai pukhuri (1), Jaipal pukhuri (1), Mahamaya mandir pukhuri (1), Rajadinia pukhuri (1), Raja pukhuri (1), Rajmaw pukhuri (1), Saranbeel (1), Sivasagar tank (1), Subhagya kund (1),Sai Chevuru (1), Asani Kunta (1), Durgam Chevuru (1), Pedda Chevuru (1), Nalla Chevuru (1), Bhadrakali Chevuru (1), Shiv Ganga Pond (1), Padmanabha Swamy Temple Pond (1), Bindusagar (1), Narendra pokhari (1), Markanda pokhari (1), Indradyumna (1), Swetaganga (1), Parvatisagar (1), Tighi Talab (1), Suraj Kund (1), Laxmi Pond (1), Maahil	

Pond (1)	
Creeks, Canals and Drains Creeks (8), Sea Water (7), Agra Canal (1), Gurgaon Canal (1), Western Yamuna Canal (11), Agartala Canal (1), Cuncolim canal (2), Panoli canal (1), Narmada canal (1), Cumbarjua canal (1), Samarla Kota Canal (1), Tulje Bagh Canal (1), Kharda canal (1), NOAI canal (1), Upper Ganga Canal (1), Taladanda canal(3), Drains (18)	60
Groundwater	490
Total	**1700**

G-GEMS - *Global Environmental Monitoring System*
M-MINARS - *Monitoring of Indian National Aquatic Resources*
YAP- - *Yamuna Action Plan*

TABLE 5.1 :- WATER QUALITY OF RIVER BEAS - 2009

STATION CODE	LOCATIONS	TEMPERATURE °C			D.O. (mg/l)			pH			CONDUCTIVITY (µmhos/cm)			B.O.D. (mg/l)			NITRATE- N (mg/l)			NITRITE- N (mg/l)			FECAL COLIFORM (MPN/100ml)			TOTAL COLIFORM (MPN/100ml)		
		Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
	WATER QUALITY CRITERIA				> 4 mg/l			6.5-8.5			< 2250 µmhos/cm			< 3 mg/l									< 2500 MPN/100ml			< 5000 MPN/100ml		
1001	BEAS AT U/S MANALI, H.P.	5.0	12.0	8.0	8.4	10.2	9.5	7.2	7.9	7.6	68	121	93	0.2	1.2	0.5	0.25	0.25	0.25	-	-	-	4	49	27	49	2400	1225
1002	BEAS AT D/S KULU, H.P.	8.0	16.0	11.4	8.1	10.1	9.5	7.4	7.7	7.5	62	267	137	0.4	0.7	0.6	0.18	0.18	0.18	-	-	-	23	540	282	130	2400	1265
1003	BEAS AT D/S AUT, H.P.	8.0	15.0	12.5	8.8	10.3	9.5	7.1	8.0	7.5	46	156	107	0.2	0.4	0.4	0.22	0.22	0.22	-	-	-	110	540	325	920	2400	1660
1004	BEAS AT U/S PANDOH DAM, H.P.	9.0	18.0	14.0	8.4	10.8	9.4	7.9	8.2	8.0	66	195	127	0.2	1.0	0.5	0.18	0.51	0.34	-	-	-	14	280	155	220	2400	1407
1005	BEAS AT EXIT OF TUNNEL DEHAL POWER HOUSE, H.P.	8.0	21.0	15.8	9.3	11.8	10.6	7.4	8.5	7.9	58	225	130	0.1	1.1	0.5	0.32	0.32	0.32	-	-	-	27	1600	659	240	2400	1413
1550	U/S MANDI, H.P.	10.0	22.0	16.5	8.3	10.8	9.5	7.2	8.1	7.8	62	186	130	0.1	0.5	0.3	0.26	0.26	0.26	-	-	-	33	350	174	350	2400	1223
1006	BEAS AT D/S MANDI, H.P.	11.0	24.0	17.5	8.3	10.6	9.5	7.3	7.9	7.5	73	207	156	0.2	4.3	1.4	0.65	0.65	0.65	-	-	-	540	540	540	2400	2400	2400
2604	BEAS AT D/S JAISINGHPUR	21.0	21.0	21.0	8.4	8.4	8.4	8.2	8.2	8.2	263	263	263	0.3	0.3	0.3	0.25	0.25	0.25	-	-	-	2	2	2	17	17	17
1007	BEAS AT D/S ALAMPUR, H.P.	14.0	26.0	20.3	7.8	8.8	8.4	7.6	8.2	7.8	88	323	239	0.2	0.4	0.3	0.41	0.82	0.62	-	-	-	4	9	6	7	1700	459
1008	BEAS AT D/S DEHRAGOPIPUR, H.P.	17.0	22.0	19.5	8.0	9.6	8.6	7.4	8.1	7.6	118	310	243	0.2	0.7	0.4	0.55	0.55	0.55	-	-	-	6	170	47	27	1600	460
1009	BEAS AT D/S PONG DAM, H.P.	16.5	26.0	20.6	6.4	8.4	7.4	7.6	8.2	7.9	153	192	175	0.2	0.4	0.3	1.09	1.09	1.09	-	-	-	2	27	10	9	170	59
1693	BEAS AT TALWARA H/W, PUNJAB	16.0	17.0	16.7	8.1	8.4	8.2	7.1	7.4	7.3	282	300	291	0.3	0.4	0.4	0.80	1.30	1.00	0.30	0.50	0.40	9	9	9	50	50	50
1694	U/S PATHANKOT, PUNJAB	17.0	19.0	18.0	8.0	8.2	8.1	7.1	7.6	7.4	301	304	302	0.6	1.5	1.0	0.90	1.20	1.03	0.50	0.60	0.57	11	35	19	90	150	123
1695	D/S PATHANKOT,PUNJAB	17.0	19.0	18.0	7.6	7.8	7.7	7.5	7.6	7.6	324	330	327	0.6	1.1	0.9	1.10	1.40	1.23	0.60	0.70	0.67	50	50	50	350	500	400
1010	BEAS AT MIRTHAL BRIDGE, GURDASPUR, PUNJAB	17.0	19.0	18.0	7.6	7.8	7.7	7.6	7.8	7.7	310	315	312	1.0	1.2	1.1	1.50	1.60	1.57	0.70	0.90	0.80	50	100	73	500	500	500
1294	BEAS AT 1KM.D/S OF EFFL. DISH. POINT AT MUKERIAN , PUNJAB	17.0	18.0	17.3	7.6	7.8	7.7	7.4	7.5	7.4	322	338	329	1.2	1.4	1.3	1.60	1.80	1.70	1.10	1.40	1.23	50	350	170	700	900	767
1011	BEAS AT G.T.ROAD UNDER BDG. NEAR KAPURTHALA, PUNJAB	17.0	18.0	17.3	6.8	7.7	7.4	7.5	7.6	7.6	247	296	275	0.8	0.8	0.8	1.20	2.00	1.50	0.80	1.00	0.90	50	110	87	500	700	633
1696	U/S GOINDWAL, PUNJAB	16.0	18.0	17.0	6.9	7.7	7.4	7.6	7.6	7.6	234	312	278	0.8	0.8	0.8	1.00	2.20	1.40	0.70	1.20	0.87	50	70	63	500	500	500
1012	BEAS AT 100M D/S INDUST. DISCH. GOINDWAL PUNJAB	16.0	17.0	16.7	6.9	7.8	7.4	7.5	7.7	7.6	249	322	287	0.8	0.9	0.9	1.00	2.40	1.53	0.80	1.40	1.03	110	110	110	700	700	700
1697	BEAS AT HARIKE, PUNJAB	16.0	19.0	17.7	7.0	7.6	7.4	7.4	7.6	7.5	292	302	298	0.3	0.7	0.5	1.20	2.20	1.57	0.60	1.00	0.80	50	70	57	350	500	450

TABLE 5.2 :- WATER QUALITY OF RIVER SATLUJ - 2009

STATION CODE	LOCATIONS	TEMPERATURE °C			D.O. (mg/l)			pH			CONDUCTIVITY (µmhos/cm)			B.O.D. (mg/l)			NITRATE- N (mg/l)			NITRITE- N (mg/l)			FECAL COLIFORM (MPN/100ml)			TOTAL COLIFORM (MPN/100ml)		
		Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
	WATER QUALITY CRITERIA				> 4 mg/l			6.5-8.5			< 2250 µmhos/cm			< 3 mg/l									< 2500 MPN/100ml			< 5000 MPN/100ml		
1867	SATLUJ B/C WITH RIVER SPITI AT KHAB, DISTT. KINNAUR, H.P.	7.5	13.0	10.2	6.9	8.5	7.8	6.3	8.1	7.4	237	425	354	0.1	0.1	0.1	0.11	0.11	0.11	-	-	-	0	0	0	4	5	5
1389	SATLUJ AT NEPTHA ZAKHAI, H.P.	9.2	12.5	10.7	8.2	9.6	8.6	7.9	8.4	8.1	124	330	234	0.1	0.3	0.2	0.31	0.31	0.31	-	-	-	2	8	5	7	26	16
1086	SATLUJ AT U/S RAMPUR, H.P.	9.2	12.5	10.7	8.2	10.5	9.5	7.4	8.0	7.7	182	406	285	0.1	0.2	0.1	0.31	0.31	0.31	-	-	-	3	28	13	11	60	31
1087	SATLUJ AT D/S RAMPUR, H.P.	9.3	12.4	10.7	8.5	10.1	9.4	7.5	8.4	7.9	183	340	283	0.1	30.0	7.7	0.21	0.21	0.21	-	-	-	5	24	13	13	80	42
1013	SATLUJ AT U/S TATAPANI, H.P.	12.8	14.0	13.3	8.5	10.9	9.5	7.6	8.2	8.0	188	540	345	0.1	0.5	0.2	0.21	0.60	0.41	0.05	0.05	0.05	8	22	16	25	100	61
1014	SATLUJ AT U/S SLAPPER, H.P.	8.0	21.0	15.5	8.6	11.4	10.0	7.3	8.5	7.9	202	350	281	0.1	0.8	0.4	0.16	0.16	0.16	-	-	-	17	170	79	110	2400	1017
1015	SATLUJ AT D/S SLAPPER, H.P.	8.0	20.0	15.3	8.6	11.4	10.1	7.2	8.4	7.9	170	291	234	0.2	0.9	0.5	0.13	0.13	0.13	-	-	-	70	540	260	280	2400	1200
1016	SATLUJ AT D/S BHAKHRA, H.P.	17.5	21.0	19.5	8.2	10.2	9.2	7.8	8.4	8.1	182	252	211	0.1	0.3	0.2	0.20	0.51	0.35	0.02	0.02	0.02	4	10	7	16	42	28
1017	AT 100M U/S OF HEADWORKS, NANGAL, PUNJAB	20.0	22.0	20.7	7.9	8.2	8.0	7.4	7.7	7.6	274	288	279	0.4	0.8	0.6	0.60	0.90	0.77	0.30	0.60	0.43	0	0	0	35	35	35
1018	SATLUJ AT 100M D/S ,NANGAL	20.0	23.0	21.7	7.7	8.0	7.8	7.7	7.9	7.8	288	294	291	0.6	0.9	0.8	0.80	1.40	1.17	0.60	0.80	0.73	11	110	61	70	350	190
1293	SATLUJ AT 1 KM. D/S OF ZENITH, PUNJAB	20.0	23.0	21.3	6.6	7.4	7.1	7.1	7.9	7.6	352	417	376	0.8	10.0	4.2	1.60	2.30	2.00	1.40	1.70	1.57	50	500	213	700	900	833
1814	SATLUJ AT D/S KIRATPUR SAHIB, PUNJAB	19.0	21.0	20.3	7.6	8.4	8.0	7.3	7.7	7.5	268	320	286	0.8	1.2	0.9	2.00	2.60	2.20	0.80	1.20	1.05	9	1100	299	110	9000	2430
1019	SATLUJ AT U/S HEAD WORKS ROPAR, PUNJAB	20.0	23.0	21.0	7.4	7.6	7.5	7.3	7.7	7.5	340	360	349	0.6	1.4	1.1	1.20	1.70	1.50	1.00	1.30	1.20	50	110	77	500	900	633
1380	SATLUJ AT D/S NFL, PUNJAB	21.0	22.0	21.7	7.8	8.2	7.9	7.7	7.9	7.8	288	304	295	0.8	1.0	0.9	0.80	2.00	1.40	0.60	1.00	0.87	50	110	70	300	1100	583
1690	U/S BUDHA NALLAH (UPPER), PUNJAB	22.0	25.0	24.0	5.4	6.8	6.1	7.5	7.6	7.6	382	408	395	2.0	4.5	3.5	1.70	2.40	2.17	1.50	1.90	1.73	100	1100	517	900	25000	8967
1020	AT 100M D/S BUDHA NALA CONFL., LUDHIANA,PUNJAB	22.0	25.0	24.0	0.6	4.2	2.9	7.0	7.2	7.1	622	932	767	36.0	55.0	43.0	5.40	6.80	6.10	3.90	5.00	4.37	1500	110000	38333	50000	250000	123333
1021	AT BOAT BDG. DHARMKOTNAKODAR ROAD, JALANDHAR	21.0	26.0	24.0	2.4	6.0	4.4	6.7	7.4	7.2	394	526	480	3.0	16.0	10.3	1.90	5.00	3.90	1.60	3.40	2.47	1100	50000	17400	25000	110000	53333
1381	AT D/S EAST BEIN, PUNJAB	17.0	18.0	17.7	4.0	5.0	4.3	7.1	7.2	7.1	520	640	561	3.8	6.1	5.1	2.40	4.00	3.33	2.20	3.40	2.67	900	10000	4333	1000	100000	50333
1691	U/S HUSSANIWALA - H/W FEROZEPUR, PUNJAB	22.0	26.0	24.3	5.2	6.4	5.8	7.4	7.6	7.5	178	482	347	1.4	6.0	3.8	1.60	1.80	1.70	0.80	1.40	1.10	50	100	75	110	500	370
1692	D/S HUSSANIWALA-H/W FEROZEPUR, PUNJAB	21.0	26.0	24.0	6.0	6.2	6.1	7.5	7.6	7.5	202	488	362	1.5	8.0	5.2	1.80	1.90	1.83	0.90	1.60	1.23	50	100	75	110	500	370
1022	SATLUJ AT BRIDGE HARIKE, AMRITSAR, PUNJAB	17.0	18.0	17.7	4.8	7.6	6.2	7.0	7.6	7.2	414	502	471	3.4	14.0	7.0	1.60	2.80	2.07	1.20	2.00	1.53	100	250	153	500	900	767

TABLE 5.3 :- WATER QUALITY OF TRIBUTARY STREAMS RAVI, PARVATI, LARGI, SIRSA, SWAN, SIUEL, SUKETI KHAD, NEUGAL, BINWA, TAWI & CHENAB - 2009

STATION CODE	LOCATIONS	TEMPERATURE °C			D.O. (mg/l)			pH			CONDUCTIVITY (µmhos/cm)			B.O.D. (mg/l)			NITRATE- N (mg/l)			NITRITE- N (mg/l)			FECAL COLIFORM (MPN/100ml)			TOTAL COLIFORM (MPN/100ml)		
		Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
	WATER QUALITY CRITERIA				> 4 mg/l			6.5-8.5			< 2250 µmhos/cm			< 3 mg/l									< 2500 MPN/100ml			< 5000 MPN/100ml		
1089	RAVI AT U/S CHAMBA, H.P.	9.5	16.0	12.4	9.8	10.9	10.3	7.5	8.1	7.9	109	167	140	0.1	0.2	0.2	0.80	0.80	0.80	-	-	-	2	6	4	7	34	17
2614	RAVI AT CHAMERA RESERVOIR	12.0	12.0	12.0	10.1	10.1	10.1	8.0	8.0	8.0	135	135	135	0.4	0.4	0.4	0.49	0.49	0.49	-	-	-	9	9	9	27	27	27
2615	RAVI AT AT D/S CHAMERA III HEP	15.0	15.0	15.0	10.7	10.7	10.7	8.1	8.1	8.1	360	360	360	0.2	0.2	0.2	0.29	0.29	0.29	-	-	-	4	4	4	7	7	7
2613	RAVI AT D/S OF CHAMBA TOWN	11.0	11.0	11.0	9.7	9.7	9.7	8.1	8.1	8.1	134	134	134	0.2	0.2	0.2	0.80	0.80	0.80	-	-	-	4	4	4	14	14	14
1088	RAVI AT U/S MADHOPUR, H.P.	10.5	24.0	17.9	7.8	8.8	8.4	7.3	8.0	7.7	110	379	215	0.2	0.6	0.3	0.61	0.92	0.77	-	-	-	7	33	14	22	130	64
1097	RAVI AT U/S OF MADHOPUR HEADWORKS, GURDASPUR	16.0	17.0	16.3	7.8	8.4	8.0	7.6	7.6	7.6	282	304	293	0.2	0.3	0.3	1.00	1.10	1.03	0.50	0.80	0.70	9	9	9	50	50	50
1290	PARVATI BEFORE CONF. TO RIVER BEAS, H.P.	8.0	11.0	9.6	9.4	10.3	9.7	7.4	7.7	7.6	44	110	82	0.2	0.3	0.2	0.14	0.14	0.14	-	-	-	5	220	88	49	1600	777
1090	LARGI AT D/S, H.P.	7.0	15.0	12.0	7.0	10.7	9.0	6.9	7.9	7.4	51	116	97	0.1	0.5	0.3	0.22	0.22	0.22	-	-	-	46	350	198	540	2400	1470
1551	RIVER SIRSA , U/S SITOMAJRI NALLAHGARH, H.P.	15.0	24.0	20.0	6.9	10.0	8.3	7.8	8.2	8.0	358	440	400	0.5	0.9	0.7	0.61	0.61	0.61	-	-	-	11	21	15	27	90	45
1552	RIVER SIRSA , D/S NALAGARH BRIDGE, H.P.	17.0	32.0	22.6	6.2	12.2	10.3	7.3	8.6	8.1	631	835	710	1.0	5.0	2.4	0.88	0.88	0.88	-	-	-	12	24	19	32	129	59
1868	RIVER SIRSA AT D/S NALAGARH DISTT. SOLAN, H.P.	16.5	32.0	22.6	5.4	12.3	8.9	7.5	8.6	8.2	649	823	715	1.2	2.8	1.8	0.15	0.15	0.15	-	-	-	2	26	17	36	48	42
1869	RIVER SWAN AT D/S NANGAL DISTT. UNA, H.P.	17.0	23.0	19.6	6.0	9.3	7.7	7.6	8.6	8.1	368	438	400	0.5	24.0	6.9	0.21	0.21	0.21	-	-	-	9	44	29	32	140	88
2616	SIUEL AT D/S SURGANI	8.0	8.0	8.0	10.8	10.8	10.8	8.5	8.5	8.5	205	205	205	0.2	0.2	0.2	0.26	0.26	0.26	-	-	-	7	7	7	17	17	17
2607	SUKETI KHAD AT D/S MANDI	25.0	25.0	25.0	7.9	7.9	7.9	8.1	8.1	8.1	247	247	247	0.4	0.4	0.4	0.24	0.24	0.24	-	-	-	920	920	920	2400	2400	2400
2609	NEUGAL AT D/S THURAL, H.P.	23.0	23.0	23.0	8.2	8.2	8.2	8.2	8.2	8.2	140	140	140	0.2	0.2	0.2	0.55	0.55	0.55	-	-	-	4	4	4	9	9	9
2608	BINWA AT D/S PAPROLA/BAIJNATH, H.P.	15.0	15.0	15.0	7.8	7.8	7.8	7.9	7.9	7.9	123	123	123	0.5	0.5	0.5	0.45	0.45	0.45	-	-	-	4	4	4	27	27	27
1412	TAWI AT JAMMU U/S. (TAWI BRIDGE), J&K	16.0	31.0	22.1	3.5	8.0	6.0	6.7	7.8	7.3	173	327	263	2.3	6.7	5.0	0.10	0.81	0.51	0.10	0.50	0.30	-	-	-	-	-	-
1305	CHENAB AT JAMMU D/S, J&K	14.0	17.0	15.8	9.1	9.8	9.5	7.1	7.9	7.5	86	169	139	0.3	2.0	1.3	0.16	0.20	0.18	0.05	0.10	0.08	-	-	-	-	-	-

TABLE 6.1 :- WATER QUALITY OF RIVER GANGA - 2009

STATION CODE	LOCATIONS	TEMPERATURE °C			D.O. (mg/l)			pH			CONDUCTIVITY (µmhos/cm)			B.O.D. (mg/l)			NITRATE- N (mg/l)			NITRITE- N (mg/l)			FECAL COLIFORM (MPN/100ml)			TOTAL COLIFORM (MPN/100ml)		
		Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
	WATER QUALITY CRITERIA				**> 5 mg/l**			**6.5-8.5**			**< 2250 µmhos/cm**			**< 3 mg/l**									**< 2500 MPN/100ml**			**< 500 MPN/100ml**		
1491	BHAGIRATHI AT GANGOTRI, UT	4.0	7.8	5.9	8.4	10.0	9.2	7.0	7.4	7.2	107	110	109	1.0	1.0	1.0	-	-	-	-	-	-	990	990	990	71000	71000	71000
1484	ALKANANDA B/C MANDAKINI AT RUDRA PRAYAG	12.0	18.4	14.2	8.0	9.4	8.7	7.1	7.7	7.4	120	540	232	0.5	2.8	1.2	0.20	0.20	0.20	-	-	-	2900	9900	6400	79000	171000	125000
1485	MANDAKINI B/C ALKALNADA AT RUDRAPRAYAG	12.0	18.4	16.1	8.2	9.5	8.8	7.1	7.7	7.5	68	103	82	0.3	2.4	1.1	0.23	0.23	0.23	-	-	-	2100	21000	11550	65000	75000	70000
1486	ALKANANDA A/C MANDAKINI AT RUDRAPRAYAG	12.0	18.2	14.8	8.2	9.3	8.9	7.3	7.9	7.5	103	130	110	0.8	1.6	1.1	0.23	0.23	0.23	-	-	-	2200	11700	6950	85000	88000	86500
1487	ALKANANDA B/C TO BHAGIRATHI AT DEVPRAYAG	13.0	22.0	17.3	7.5	9.6	8.6	7.4	7.8	7.6	86	141	116	0.8	1.4	1.1	0.23	0.23	0.23	-	-	-	3100	11900	7500	89000	102000	95500
1488	BHAGIRATHI B/C WITH ALAKNANDA AT DEVPRAYAG	12.0	22.0	18.1	7.6	9.1	8.7	7.1	7.9	7.5	76	186	114	0.5	2.8	1.2	0.22	0.22	0.22	-	-	-	2100	40000	21050	29000	200000	114500
1489	ALKANANDA A/C WITH BHAGIRATHI AT DEVPRAYAG	13.0	22.0	17.8	8.0	9.2	8.6	7.3	8.0	7.6	101	175	129	0.5	2.0	1.3	0.26	0.26	0.26	-	-	-	2200	30000	16100	66000	210000	138000
1060	GANGA AT RISHIKESH U/S, UT	10.0	27.0	17.4	8.0	9.1	8.7	7.2	8.7	7.8	104.5	110	107	0.2	2.5	1.4	-	-	-	-	-	-	-	-	-	2	4	3
1061	GANGA AT HARIDWAR D/S, UT	15.0	28.0	20.6	5.6	8.4	6.6	6.5	8.7	7.6	178	334	243	2.7	5.6	3.9	-	-	-	-	-	-	2	1300	171	14	3500	888
1062	GANGA AT GARHMUKTESHWAR	16.0	25.0	20.5	7.0	10.0	8.3	7.2	7.6	7.5	186	378	272	3.0	4.2	3.6	0.80	1.20	0.87	-	-	-	1100	4000	2150	2200	16000	6250
1145	GANGA AT NARORA, U.P	13.0	22.6	19.8	7.6	8.5	8.1	7.8	8.3	8.0	218	304	277	2.0	3.6	2.5	-	-	-	-	-	-	430	1100	812	1400	5400	4220
1063	GANGA AT KANNAUJ U/S (RAJGHAT)	16.0	32.0	26.7	6.8	11.1	8.4	7.3	8.7	8.1	250	550	384	2.3	4.9	3.7	0.05	2.50	1.12	0.98	1.60	1.29	700	2300	1200	2000	7500	3475
1066	GANGA AT KANNAUJ D/S, U.P	17.0	32.0	26.8	6.4	10.8	8.3	7.4	8.7	8.0	270	500	394	3.4	5.2	4.4	0.06	1.80	1.24	1.40	1.80	1.60	900	2800	1700	3900	9300	5742
1146	GANGA AT BITHOOR (KANPUR), U.P	17.0	32.0	26.5	6.6	10.3	8.3	7.4	8.6	8.1	260	540	359	2.7	5.4	3.6	0.06	2.40	1.20	0.92	2.00	1.33	700	2300	1300	1500	7500	3650
1067	GANGA AT KANPUR U/S (RANIGHAT), U.P	17.0	32.0	27.0	6.8	11.2	8.4	7.2	8.6	8.1	260	550	365	2.3	5.2	3.5	0.07	2.20	1.49	1.20	1.80	1.50	400	2300	1117	1100	7500	3650
1068	GANGA AT KANPUR D/S (JAJMAU PUMPING STATION)	17.0	32.0	27.0	4.7	7.2	6.1	7.6	8.4	8.0	71	624	422	4.8	16.0	9.2	0.08	3.40	2.08	0.10	2.60	0.87	4000	75000	20417	28000	120000	74083
1147	GANGA AT DALMAU (RAI BAREILLY), U.P	19.0	31.0	25.7	8.0	9.8	8.9	7.6	8.0	7.8	288	492	390	3.1	3.9	3.5	0.66	0.88	0.77	0.28	0.68	0.43	4300	4900	4775	6300	7900	7292
2498	GANGA AT KALA KANKAR, RAEBARELI	23.0	25.0	24.0	7.9	8.1	8.0	7.8	8.0	7.9	369	376	373	3.8	3.9	3.9	0.76	0.82	0.79	0.36	0.36	0.36	4900	4900	4900	7600	7900	7750
1046	GANGA AT ALLAHABAD (RASOOLABAD), U.P	17.3	31.0	25.6	6.5	9.8	7.6	8.1	8.4	8.3	252	575	408	2.7	4.3	3.3	2.40	3.10	2.87	0.15	0.18	0.16	1400	2300	1892	3000	5000	3733
1049	GANGA AT ALLAHABAD D/S (SANGAM), U.P	18.0	31.5	26.2	6.3	9.3	7.3	8.2	8.4	8.3	285	687	475	3.2	4.8	3.8	2.70	3.30	2.99	0.14	0.18	0.16	2200	4000	2983	4000	6000	5500
2487	GANGA AT KADAGHAT, ALLAHABAD	22.0	28.0	25.0	7.4	8.6	8.0	8.1	8.2	8.1	285	386	336	2.6	3.0	2.8	2.20	2.60	2.40	-	-	-	1300	1700	1500	3000	3000	3000
1070	GANGA AT VARANASI U/S (ASSIGHAT), U.P	17.5	29.5	24.6	8.2	8.5	8.4	7.3	7.8	7.5	318	368	351	3.3	3.8	3.5	0.20	0.30	0.27	0.02	0.28	0.18	8000	13000	10444	11000	17000	13667
1071	GANGA AT VARANASI D/S (MALVIYA BRIDGE), U.P	18.0	30.0	25.4	6.5	7.9	7.2	8.2	8.9	8.5	330	397	370	1.0	12.8	9.4	0.36	1.28	0.57	0.04	0.42	0.27	46000	90000	74444	70000	140000	111556
1073	GANGA AT TRIGHAT (GHAZIPUR), U.P	18.5	30.5	26.1	7.6	8.2	7.9	8.2	8.6	8.4	336	387	364	3.6	4.4	4.0	0.32	0.40	0.35	0.03	0.36	0.20	17000	27000	22625	22000	34000	29000
2551	GANGA AT BUXAR, RAMREKHAGHAT	17.0	22.0	20.3	8.0	9.2	8.5	8.0	8.5	8.3	344	362	350	2.5	2.9	2.8	0.36	0.44	0.41	0.00	-	-	5000	9000	6333	16000	24000	18667
1074	GANGA AT BUXAR,BIHAR	15.0	25.0	21.8	7.6	9.0	8.2	8.0	8.5	8.2	290	364	339	2.6	2.9	2.8	0.00	-	-	-	-	-	1100	5000	2264	2800	16000	6618
2556	GANGA AT INDRAPURI, DEHRI ON SONE	18.0	22.0	20.0	7.9	8.2	8.1	8.6	8.7	8.6	251	281	269	2.3	2.7	2.5	0.42	0.56	0.50	0.00	-	-	500	1100	800	1100	3000	2167
2564	GANGA AT THE CONFLUENCE OF SONE RIVER DORIGANJ, CHAPRA	25.0	25.0	25.0	8.6	8.6	8.6	8.8	8.8	8.8	262	262	262	2.7	2.7	2.7	0.76	0.76	0.76	0.00	-	-	1300	1300	1300	2400	2400	2400
1077	GANGA AT KHURJI, PATNA U/S, BIHAR	18.0	31.0	22.9	7.5	9.1	8.1	7.7	8.4	8.1	236	454	372	2.5	2.8	2.7	0.00	-	-	-	-	-	1300	3000	1630	2800	9000	4280
2552	GANGA DARBHANGA GHAT AT PATNA	20.0	23.0	21.7	7.8	8.5	8.0	8.1	8.2	8.1	338	406	369	2.7	2.8	2.8	0.32	0.38	0.35	0.00	-	-	5000	5000	5000	16000	16000	16000
1079	GANGA AT PATNA D/S (GANGA BRIDGE),BIHAR	19.0	32.0	23.4	7.4	8.8	8.0	7.6	8.4	8.1	252	467	389	2.6	3.0	2.9	0.00	-	-	-	-	-	2200	9000	5600	9000	24000	18167
2555	GANGA AT PUNPUN, PATNA	22.0	23.0	22.5	6.0	7.4	6.7	7.4	7.9	7.7	450	461	456	2.5	2.7	2.6	0.38	0.42	0.40	0.00	-	-	1300	1300	1300	3000	3000	3000
2553	GANGA AT FATUHA	21.0	23.0	22.0	7.9	8.8	8.3	8.1	8.3	8.2	352	399	371	2.6	2.8	2.7	0.32	0.36	0.34	0.00	-	-	1100	1700	1500	5000	5000	5000
1817	GANGA AT MOKAMA (U/S)	17.0	26.0	21.7	7.4	8.7	8.0	8.0	8.9	8.2	312	476	378	2.8	3.0	2.9	-	-	-	-	-	-	1300	9000	4464	3000	24000	14727
1815	GANGA AT MOKAMA (D/S)	18.0	31.5	23.1	7.5	9.0	8.1	7.5	8.3	8.1	307	462	362	2.6	2.9	2.7	-	-	-	-	-	-	1100	3000	1950	2200	24000	5983
1818	GANGA AT MUNGER	20.0	28.0	23.3	7.6	8.9	8.5	7.7	8.2	8.0	260	365	321	2.6	2.7	2.7	-	-	-	-	-	-	1300	2400	1900	2400	9000	5350
2554	GANGA AT SULTANGANJ, BHAGALPUR	17.0	23.0	20.3	8.2	8.9	8.4	8.2	8.4	8.3	284	362	310	2.5	2.7	2.6	0.72	0.82	0.77	0.00	-	-	2200	3000	2533	9000	9000	9000
1819	GANGA AT BHAGALPUR	19.0	30.0	23.3	7.6	9.0	8.2	7.9	8.2	8.1	322	412	361	2.7	2.9	2.8	-	-	-	-	-	-	1300	3000	1867	3000	9000	5000
1816	GANGA AT KAHALGAON	20.0	29.0	23.2	7.5	9.1	8.1	8.0	8.4	8.2	282	384	358	2.6	2.9	2.8	-	-	-	-	-	-	1400	5000	3164	3000	16000	8455
1080	GANGA AT BAHARAMPORE	19.0	31.0	27.4	5.6	9.0	7.0	7.9	8.4	8.3	196	357	289	1.0	2.0	1.4	0.17	0.54	0.33	-	-	-	13000	80000	46600	23000	110000	73300
2506	TRIBENI ON GANGA, NEAR BURNING GHAT	32.0	32.0	32.0	6.3	6.3	6.3	7.3	7.3	7.3	210	210	210	1.2	1.2	1.2	0.31	0.31	0.31	0.00	-	-	70000	70000	70000	110000	110000	110000
1054	GANGA AT PALTA WEST BENGAL	21.0	31.0	28.2	5.1	8.7	6.8	7.7	8.5	8.2	157	374	285	1.1	1.6	1.4	0.10	0.76	0.37	-	-	-	27000	170000	78700	70000	220000	125000
1472	GANGA AT SERAMPORE	21.0	33.0	29.3	6.2	9.0	7.4	7.6	8.2	7.8	184	381	288	1.0	1.8	1.4	0.10	0.60	0.42	-	-	-	30000	110000	75000	50000	140000	110000
1053	GANGA AT DAKSHINESHWAR	21.0	37.0	29.0	4.6	8.3	6.5	7.6	8.4	8.0	198	386	312	2.2	6.7	4.5	0.10	0.67	0.27	-	-	-	70000	400000	137500	110000	650000	352083
1471	GANGA AT HOWRAH-SHIVPUR	21.0	31.0	27.1	5.3	8.4	6.8	7.8	8.3	8.0	263	394	325	1.4	4.9	3.0	0.10	0.65	0.25	-	-	-	55000	250000	121250	85000	550000	242500
1470	GANGA AT GARDEN REACH	21.0	31.0	26.7	5.5	8.9	7.0	8.0	8.3	8.1	212	393	281	2.2	3.0	2.6	0.10	0.23	0.14	-	-	-	85000	250000	148333	250000	350000	316667
2511	NABADIP ON GANGA,GHOSHPARA NEAR MONIPURGHAT	30.0	30.0	30.0	6.5	6.5	6.5	8.3	8.3	8.3	176	176	176	0.9	0.9	0.9	0.22	0.22	0.22	0.00	-	-	7000	7000	7000	14000	14000	14000
1052	GANGA AT ULUBERIA	22.0	35.0	27.7	4.3	7.7	6.0	7.4	8.4	8.0	199	392	317	1.5	5.2	2.8	0.10	0.75	0.32	-	-	-	4000	110000	26167	8000	280000	62167
1469	GANGA AT DIAMOND HARBOUR	27.0	33.0	30.0	6.1	7.9	7.1	7.9	8.1	8.0	248	4460	1553	2.0	2.6	2.3	0.13	0.30	0.22	-	-	-	7000	110000	41000	11000	170000	78250

TABLE 6.2 :- WATER QUALITY OF RIVER YAMUNA - 2009

STATION CODE	LOCATIONS	TEMPERATURE °C			D.O. (mg/l)			pH			CONDUCTIVITY (µmhos/cm)			B.O.D. (mg/l)			NITRATE- N (mg/l)			NITRITE- N (mg/l)			FECAL COLIFORM (MPN/100ml)			TOTAL COLIFORM (MPN/100ml)		
		Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
	WATER QUALITY CRITERIA				> 4 mg/l			6.5-8.5			< 2250 µmhos/cm			< 3 mg/l									< 2500 MPN/100ml			< 5000 MPN/100ml		
1492	YAMUNA AT YAMUNOTRI, UT	5.0	10.0	7.5	7.1	9.0	8.1	7.0	7.0	7.0	80	106	93	1.0	1.0	1.0	-	-	-	-	-	-	1750	1750	1750	16100	16100	16100
1493	SHYAMA CHATTI, UT	11.0	12.7	11.9	8.3	9.0	8.7	7.1	7.1	7.1	115	133	124	2.0	2.0	2.0	-	-	-	-	-	-	3300	3300	3300	22000	22000	22000
1494	YAMUNA AT U/S OF LAKHWAR DAM, UT	12.0	23.3	19.1	7.8	8.9	8.2	7.4	8.3	8.0	108	212	148	0.2	1.0	0.7	0.27	0.27	0.27	-	-	-	500	19700	10100	26000	101000	63500
1490	YAMUNA AT U/S DAK PATTHAR, UT	13.0	24.0	19.9	6.7	8.5	7.8	7.8	9.4	8.3	137	225	200	0.6	3.8	1.7	0.27	0.27	0.27	-	-	-	500	29000	14750	4	240000	73256
1553	RIVER YAMUNA , U/S PAONTA SAHIB, H.P	15.0	28.0	23.3	6.3	8.8	7.3	7.4	8.1	7.7	122	607	465	1.0	2.0	1.2	-	-	-	-	-	-	1100	530000	157733	80000	4900000	1615833
1554	RIVER YAMUNA , D/S PAONTA SAHIB, H.P	15.0	26.0	22.3	6.5	9.5	7.8	8.1	8.2	8.2	267	363	326	0.6	1.6	1.0	0.21	0.21	0.21	-	-	-	9	18	14	17	32	27
1117	YAMUNA AT HATHNIKUND HARYANA	12.0	29.0	21.5	7.0	11.4	9.1	7.4	8.1	7.7	127	300	245	1.0	2.0	1.2	-	-	-	-	-	-	1200	690000	97055	73000	3200000	829727
1496	YAMUNA AT KALANAUR, YAMUNA NAGAR, HARYANA	16.0	31.0	24.2	4.5	11.1	7.8	7.4	8.2	7.7	292	482	395	1.0	7.0	2.1	-	-	-	-	-	-	5300	830000	154350	97000	7500000	1407300
1119	YAMUNA AT SONEPAT, HARYANA	11.0	27.0	17.8	4.1	7.8	6.9	7.6	8.0	7.8	460	1349	941	1.0	7.0	3.8	-	-	-	-	-	-	5900	320000	173483	161000	33000000	7401833
1120	YAMUNA AT WAZIRABAD, DELHI	14.0	32.0	24.5	4.5	10.0	7.3	7.4	8.6	7.9	291	3040	799	1.0	6.0	2.3	0.07	3.69	0.84	0.05	0.70	0.27	600	43000	16117	25000	810000	311167
1121	YAMUNA AT NIZAMUDDIN, DELHI	13.5	32.0	24.2	0.0	0.0	0.0	7.3	8.0	7.6	950	1758	1406	12.0	33.0	23.4	0.02	2.02	0.62	0.03	0.65	0.37	440000	17900000	5799167	7300000	410000000	97191667
1375	YAMUNA AT OKHLA BRIDGE (INLET OF AGRA CANAL), DELHI	15.5	31.5	24.2	0.0	0.6	0.1	7.3	8.0	7.7	565	1350	892	7.0	33.0	14.5	0.20	1.80	0.75	0.81	1.32	1.00	330000	6600000	3094546	3500000	80000000	38727273
1812	RIVER YAMUNA AT OKHLA AFTER MEETING OF SHAHDARA DRAIN, DELHI				0	0	0	7.1	7.96	7.63				18	103	51.3							780000	2100000000	216378000	2600000	2.3E+10	2475240000
1497	YAMUNA AT MAZAWALI, U.P	14.0	32.0	25.0	0.0	7.5	2.1	7.3	8.3	7.8	300	2090	1602	7.0	28.0	18.2	0.02	2.38	0.87	0.02	1.21	0.37	17000	2700000	540917	970000	38000000	9210909
1123	YAMUNA AT MATHURA U/S , U.P	14.5	32.5	26.0	1.9	11.8	5.7	7.3	8.2	7.8	642	1630	1261	5.0	14.0	9.2	0.02	1.86	0.96	0.06	1.17	0.39	10400	290000	89950	111000	8500000	2389182
1124	YAMUNA AT MATHURA D/S , U.P	16.0	32.0	26.2	2.8	7.1	6.0	7.4	8.1	7.7	418	1784	1277	6.0	16.0	9.4	0.01	2.85	1.17	0.07	1.33	0.44	37000	500000	182417	850000	35000000	6643333
1125	YAMUNA AT AGRA U/S, U.P.	17.0	32.0	25.2	3.4	12.4	6.3	7.5	8.6	7.9	429	1910	1381	3.0	11.0	8.1	0.19	2.08	1.00	0.09	1.51	0.69	21000	1500000	232818	110000	24000000	6380636
1126	YAMUNA AT D/S OF AGRA, U.P.	18.0	35.0	26.0	0.0	6.7	4.1	7.4	8.3	7.8	678	2120	1529	6.0	32.0	14.5	0.28	2.17	1.06	0.08	1.44	0.61	62000	5400000	1403546	1890000	88000000	31799091
1498	YAMUNA AT BATESWAR, U.P	17.0	33.0	25.3	4.4	13.4	8.9	7.4	8.3	7.8	420	1840	1423	5.0	20.0	12.3	-	-	-	-	-	-	3300	780000	236530	73000	10600000	2920300
1127	YAMUNA AT ETAWAH, U.P.	17.0	35.0	25.9	5.6	17.9	11.5	7.3	8.7	7.9	386	1965	1391	3.0	19.0	13.2	-	-	-	-	-	-	3000	1500000	273273	70000	14500000	2270909
1499	YAMUNA AT JUHIKA B/C WITH CHANBAL, ETAWAH, U.P	17.0	35.0	25.7	4.5	13.8	9.8	7.4	8.8	7.9	270	1265	738	1.0	7.0	4.4	-	-	-	-	-	-	2000	1340000	248700	55000	6700000	1819546
2283	YAMUNA AT HAMIRPUR	15.0	31.5	25.3	6.7	9.3	7.6	7.5	8.4	8.0	154	886	548	1.0	3.0	2.5	-	-	-	-	-	-	37000	730000	266250	1330000	2200000	1876667
1069	YAMUNA AT ALLAHABAD D/S (BALUA GHAT), U.P	18.5	32.0	26.8	6.7	8.1	7.3	7.7	8.4	8.1	338	768	593	1.5	2.5	1.8	2.00	2.70	2.38	0.10	0.14	0.13	600	1700	1167	1100	2400	1933

TABLE 6.3 :- WATER QUALITY OF TRIBUTARY STREAMS RAMGANGA, GOMTI, SAI, SARYU, GHAGHARA, RIHAND, GANDAK, DAHA, SIRSA, FARMAR & BURHIGANDAK - 2009

STATION CODE	LOCATIONS	TEMPERATURE °C			D.O. (mg/l)			pH			CONDUCTIVITY (µmhos/cm)			B.O.D. (mg/l)			NITRATE- N (mg/l)			NITRITE- N (mg/l)			FECAL COLIFORM (MPN/100ml)			TOTAL COLIFORM (MPN/100ml)		
		Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
	WATER QUALITY CRITERIA				> 4 mg/l			6.5-8.5			< 2250 µmhos/cm			< 3 mg/l									< 2500 MPN/100ml			< 5000 MPN/100ml		
1064	RAMGANGA AT KANNAUJ (BEFORE CONF),U.P	17.0	32.0	26.8	5.4	9.2	7.3	7.4	8.4	7.9	67	620	433	4.0	8.4	6.0	0.06	2.40	1.31	0.60	1.80	1.37	400	2300	1067	2100	9300	3717
1350	GOMTI AT SITAPUR U/S AT WATER INTAKE, U.P.	15.0	33.0	27.0	6.1	10.6	8.0	7.6	8.2	7.9	286	552	437	1.4	2.5	2.1	0.60	1.90	1.01	0.10	0.14	0.11	220	1400	849	790	2800	1866
1351	GOMTI AT LUCKNOW U/S AT WATER INTAKE POINT,U.P.	18.0	33.0	26.9	4.7	10.1	7.3	7.4	8.1	7.8	193	596	450	2.6	3.5	3.0	0.70	2.60	1.32	0.10	0.30	0.14	1100	3400	2183	2200	5400	3675
1352	GOMTI AT LUCKNOW D/S	17.0	33.0	27.0	0.7	5.1	2.6	7.1	7.8	7.4	221	693	519	6.5	13.0	9.8	1.10	3.70	1.75	0.12	0.23	0.19	70000	130000	99167	110000	170000	131167
1072	GOMTI AT VARANASI, U.P	18.5	30.0	25.3	7.8	8.3	8.0	7.7	8.2	8.0	314	382	342	3.4	4.4	3.8	0.20	0.32	0.27	0.30	0.34	0.32	13000	23000	19375	17000	31000	24875
1353	GOMTI AT JAUNPUR D/S, U.P.	17.5	29.5	25.3	7.6	8.0	7.8	8.2	8.7	8.4	318	403	351	4.0	5.2	4.3	0.32	0.42	0.36	0.03	0.36	0.23	17000	27000	21111	22000	34000	28778
1361	SAI AT UNNAO AFTER DRAIN OUTFALL, U.P.	14.5	32.0	25.5	2.8	10.5	7.5	7.7	8.5	8.2	195	632	475	1.5	7.0	3.1	0.50	3.50	1.24	0.07	0.14	0.10	220	17000	3177	1100	22000	5850
1354	SARYU AT AYODHYA AT MAIN BATHING GHAT, U.P.	18.0	28.0	24.6	8.6	9.8	9.2	7.4	7.7	7.6	232	366	290	2.5	3.5	3.0	0.60	0.78	0.69	0.26	0.38	0.32	3100	4600	3642	4600	7000	5667
1076	GHAGHARA NEAR CHAPRA, BIHAR	16.5	32.0	23.6	2.7	9.2	7.6	7.2	8.0	7.5	220	292	254	2.3	2.7	2.5	-	-	-	-	-	-	700	1700	950	1100	5000	2192
1355	GHAGHARA AT DEORIA D/S, U.P.	13.0	30.0	22.4	7.5	8.2	7.7	7.9	8.2	8.0	324	394	351	1.7	2.9	2.2	0.10	0.72	0.27	0.07	0.28	0.15	60	100	76	140	240	193
1359	RIHAND AT RENUKUT U/S.	18.0	33.0	27.5	6.9	8.8	7.6	7.3	8.3	7.8	182	365	247	1.6	2.7	2.0	1.60	2.60	2.02	0.12	0.17	0.14	700	1300	975	1300	2200	1692
1360	RIHAND AT RENUKUT D/S.	17.5	33.0	27.3	7.1	8.5	7.8	7.2	8.4	7.8	145	389	261	1.8	2.9	2.3	1.90	2.60	2.24	0.13	0.15	0.14	800	1700	1208	1700	2600	2083
1078	GANDAK AT SONEPUR, PATNA (BEFORE CONFL.),BIHAR	20.0	30.0	23.4	7.5	8.9	8.0	7.1	8.2	7.4	229	286	249	2.0	2.6	2.4	-	-	-	-	-	-	500	1300	764	1100	2400	1573
2568	GANDAK AT REWAGHAT, MUJAFFARPUR	26.0	26.0	26.0	8.7	8.7	8.7	7.9	7.9	7.9	306	306	306	2.0	2.0	2.0	0.96	0.96	0.96	-	-	-	700	700	700	1400	1400	1400
2570	GANDAK AT SAMASTIPUR ROAD BRIDGE	26.0	26.0	26.0	8.6	8.6	8.6	7.8	7.8	7.8	362	362	362	2.4	2.4	2.4	0.52	0.52	0.52	-	-	-	800	800	800	2200	2200	2200
1821	DAHA AT SIWAM	19.0	25.0	23.0	7.2	8.5	7.7	7.7	8.1	7.9	364	442	410	2.6	2.9	2.8	-	-	-	-	-	-	500	1700	1025	1100	5000	2675
2560	D/S DAHA RIVER AT SASAMUSA	26.0	26.0	26.0	3.8	3.8	3.8	8.3	8.3	8.3	967	967	967	3.0	3.0	3.0	0.74	0.74	0.74	-	-	-	1400	1400	1400	3500	3500	3500
2561	DAHA RIVER AT ITWA BRIDGE, SIWAN	27.0	27.0	27.0	8.8	8.8	8.8	7.5	7.5	7.5	459	459	459	2.8	2.8	2.8	0.92	0.92	0.92	-	-	-	1300	1300	1300	3000	3000	3000
1822	SIRSA AT RUXOL	20.0	28.0	25.5	6.9	7.1	7.0	7.2	7.8	7.5	367	710	540	2.6	3.5	3.0	-	-	-	-	-	-	700	1100	967	1700	2800	2233
1824	FARMAR AT JOGBANI	20.0	25.0	22.8	7.8	8.3	8.1	7.2	7.8	7.5	249	524	385	2.4	2.8	2.6	-	-	-	-	-	-	500	1100	825	1100	2200	1600
2562	BURHI GANDAK AT AKHARAGHAT, MUZAFFARPUR	27.0	27.0	27.0	8.8	8.8	8.8	8.2	8.2	8.2	341	341	341	1.8	1.8	1.8	0.44	0.44	0.44	-	-	-	900	900	900	2200	2200	2200

TABLE 6.4 :- WATER QUALITY OF TRIBUTARY STREAMS KALINADI (E), KALI (W), HINDON, BETWA, KALISOT, CHAMBAL, TONS, GOHAD DAM, KHAN, BATTA, KOLAR, KSHIPRA, SANKH, SINDH, SONE, CHURNI, RAPTI, SIKRANA, DHOUS & GOVIND SAGAR - 2009

STATION CODE	LOCATIONS	TEMPERATURE °C			D.O. (mg/l)			pH			CONDUCTIVITY (µmhos/cm)			B.O.D. (mg/l)			NITRATE- N (mg/l)			NITRITE- N (mg/l)			FECAL COLIFORM (MPN/100ml)			TOTAL COLIFORM (MPN/100ml)		
		Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
	WATER QUALITY CRITERIA				**> 4 mg/l**			**6.5-8.5**			**< 2250 µmhos/cm**			**< 3 mg/l**									**< 2500 MPN/100ml**			**< 5000 MPN/100ml**		
1480	KALINADI AT U/S OF GULAOTHI TOWN IN BULANDSAHAR, U.P.	28.5	30.5	29.5	0.0	0.0	0.0	7.5	7.9	7.7	1968	2124	2046	38.0	353	195.5	0.58	8.62	4.60	0.41	0.41	0.41	3200000	40000000	21600000	310000000	350000000	330000000
1065	KALINADI AT KANNAUJ (BEFORE CONF.),U.P	18.0	32.0	26.8	6.1	13.3	9.0	7.3	9.2	8.0	72	620	344	3.6	10.8	6.6	0.07	2.70	1.54	0.10	2.10	0.78	400	2300	1083	2800	7500	4400
1477	KALINADI AT U/S OF MUZAFFAR NAGAR U.P.	28.5	31.0	29.8	6.7	9.5	8.1	7.5	8.1	7.8	455	533	494	1.0	1.0	1.0	0.60	0.60	0.60	-	-	-	6100	950000	478050	1690000	11900000	6795000
1478	KALINADI AT D/S OF MUZAFFAR NAGAR, U.P.	30.0	33.0	31.5	0.0	0.0	0.0	7.5	8.2	7.9	1590	1635	1613	47.0	203	125.0	1.34	1.34	1.34	-	-	-	13700000	40000000	26850000	340000000	550000000	445000000
1357	HINDON AT SAHARANPUR D/S, U.P.	12.0	12.0	12.0	2.9	2.9	2.9	7.5	7.5	7.5	490	490	490	17.0	17.0	17.0	-	-	-	-	-	-	-	-	-	-	-	-
1483	HINDON AFTER CONFL. WITH R. KRISHNA & KALI NEAR BINAULI TOWN, MEERUT,U.P.	30.5	32.5	31.5	0.0	0.0	0.0	7.7	8.0	7.8	920	966	943	70.0	86.0	78.0	1.64	1.71	1.68	-	-	-	400000	31000000	15700000	280000000	380000000	330000000
1358	HINDON AT GHAZIABAD D/S, U.P.	16.0	27.0	21.2	0.0	2.0	0.7	7.0	7.4	7.1	860	1998	1594	27.0	49.5	39.8	0.40	2.00	1.35	-	-	-	90000	180000	109833	96000	280000	168500
2119	BETWA AT NAYAPUR D/S MANDIDEEP INDL. AREA NO.1, DIST.RAISEN	25.0	32.0	28.3	0.0	8.8	3.9	6.7	8.4	7.4	280	5456	1132	1.4	8.5	4.9	0.10	17.51	4.83	-	-	-	0	170	90	40	2400	1151
2121	BETWA NEAR ROAD BRIDGE, BHOJPUR	24.0	34.0	27.0	5.4	14.8	7.4	7.3	8.2	7.9	200	1500	557	0.8	8.8	3.2	0.10	11.50	2.24	-	-	-	0	25	10	33	1600	262
2122	BETWA NEAR W/S INTAKE WELL POINT RAISEN	23.0	27.0	25.0	3.7	9.3	6.7	7.1	8.2	7.8	284	620	446	1.8	4.9	2.6	0.14	2.25	0.82	-	-	-	4	7	6	30	1600	394
1614	R.BETWA NEAR INTAKE POINT, VIDISHA, M.P.	24.0	34.0	27.0	5.7	11.6	7.1	7.1	8.2	7.9	210	650	349	1.1	6.0	2.4	0.10	2.25	0.67	-	-	-	0	5	3	17	1600	226
2124	BETWA AT CHARANTIRGHAT, VIDISHA	24.0	38.0	27.8	5.3	9.0	6.8	7.7	8.6	8.2	390	800	492	1.9	4.7	3.6	0.10	1.50	0.57	-	-	-	0	28	8	14	2400	848
2125	BETWA D/S AFTER MIXING OF RIVER BAIS AT VIDISHA	23.0	36.0	27.0	0.0	8.8	6.0	6.8	8.9	8.1	288	624	430	2.3	4.4	3.4	0.05	14.18	1.63	-	-	-	2	170	26	14	2400	434
1356	BETWA BEFORE CONF. YAMUNA AT HAMIRPUR, U.P.	17.0	28.4	22.9	6.9	12.8	9.8	7.8	8.8	8.3	305	610	462	1.9	4.8	3.0	-	-	-	-	-	-	200	700	411	700	17000	7833
2120	RIVER KALIASOT NEAR ROAD BRIDGE, MANDIDEEP	27.0	27.0	27.0	4.4	9.8	6.7	7.7	8.5	8.0	288	630	382	1.4	2.9	2.4	0.15	2.33	0.85	-	-	-	4	8	6	34	540	221
1365	CHAMBAL AT NAGDA U/S (WATER INTAKE POINT) M.P.	25.0	29.0	27.1	6.3	8.0	7.1	7.2	9.0	7.8	166	680	493	2.0	2.0	2.0	0.90	4.08	1.46	-	-	-	-	-	-	-	-	-
1366	CHAMBAL AT NAGDA D/S, M.P.	25.0	30.0	27.9	0.4	6.5	3.5	7.1	8.5	7.5	512	9720	6932	22.0	22.0	22.0	0.35	3.52	1.70	0.20	2.76	1.48	-	-	-	-	-	-
1418	CHAMBAL AT GANDHI SAGAR DAM, RAMPURA, MP	21.0	26.0	24.3	7.6	8.0	7.7	7.3	8.0	7.6	187	440	340	-	-	-	0.13	1.24	0.78	-	-	-	-	-	-	-	-	-
1288	CHAMBAL AT KOTA U/S (INTAKE PT. NEAR BARRAGE), RAJASTHAN	24.0	35.0	30.1	4.1	7.3	5.7	7.5	8.8	8.3	260	510	348	0.2	4.1	1.3	0.14	0.72	0.35	-	-	-	3	4	3	4	20	9
1289	CHAMBAL AT KOTA D/S (2 KM. FROM CITY), RAJASTHAN	20.0	33.0	27.5	2.9	8.5	5.5	7.8	8.9	8.5	330	910	603	1.3	4.6	3.1	0.02	0.80	0.51	0.16	0.16	0.16	4	20	7	14	150	62
1609	R. CHAMBAL AT DHOLPUR	18.0	36.0	25.3	7.5	8.2	7.8	7.2	7.9	7.6	396	920	694	1.3	2.5	1.9	0.14	0.52	0.35	-	-	-	-	-	-	-	-	-
1413	CHAMBAL AT RAMESHWARGHAT NR. SAWAIMADHOPUR, RAJASTHAN	21.5	33.0	27.7	3.5	7.0	5.0	7.5	8.7	8.3	290	880	634	0.1	1.9	0.9	0.14	0.74	0.39	0.10	0.10	0.10	3	4	4	4	20	10
1376	CHAMBAL AT ETAWAH BEFORE CONFL. TO R. YAMUNA, U.P.	18.0	33.0	25.0	5.9	9.9	8.3	7.5	8.6	8.0	208	775	466	1.0	3.0	1.9	-	-	-	-	-	-	2100	270000	38473	21000	3100000	563273
1510	TONS RIVER, H.P.	9.0	24.0	15.8	7.2	10.6	8.7	7.0	8.2	7.7	63	405	194	0.1	5.0	1.1	0.24	0.37	0.30	0.03	0.03	0.03	7	7300	1658	18	92000	23687
1607	GOHAD DAM, GOHAD, M.P.	23.0	32.0	27.5	7.6	8.2	7.9	7.3	7.3	7.3	460	675	538	1.9	2.1	2.0	0.42	0.56	0.49	-	-	-	-	-	-	-	-	-
2111	RIVER KHAN AT SANWER	18.0	26.0	22.0	0.0	6.2	3.9	7.8	8.3	7.9	804	1462	1144	11.2	60.0	36.7	0.05	4.08	2.79	0.01	1.08	0.24	0	9	5	900	1600	1483
2110	RIVER KHAN AT SAKKAR KHADI, INDORE	20.5	30.0	26.7	0.0	1.8	0.2	7.4	8.0	7.7	1468	2520	1833	2.5	88.0	57.0	0.48	7.24	4.20	0.04	1.06	0.45	6	26	11	1600	1600	1600
1367	KHAN AT KABIT KHEDI (NEAR INDORE) M.P.	20.0	30.0	25.3	0.0	0.0	0.0	7.5	8.0	7.6	1251	2207	1816	30.0	150.0	71.4	0.19	5.20	3.19	0.18	0.62	0.33	6	21	11	1600	1600	1600
2626	BATTA AT U/S PAONTA	24.5	24.5	24.5	7.1	7.1	7.1	7.9	7.9	7.9	535	535	535	1.2	1.2	1.2	0.19	0.19	0.19	-	-	-	13	13	13	25	25	25
2627	BATTA BEFORE CONFLUENCE TO YAMUNA	26.0	26.0	26.0	7.0	7.0	7.0	8.2	8.2	8.2	357	357	357	1.2	1.2	1.2	0.22	0.22	0.22	-	-	-	11	11	11	27	27	27
1613	KOLAR DAM WATER SUPPLY INTAKE WELL, DISTT. SEHORE, M.P.	23.0	35.0	27.7	6.5	8.2	7.2	7.0	8.0	7.7	210	460	323	0.3	2.4	1.9	0.05	2.16	0.95	-	-	-	0	4	3	17	170	91
1369	KSHIPRA AT RAMGHAT AT UJJAIN, M.P.	26.0	28.0	27.3	5.8	8.0	6.7	7.5	8.5	8.0	358	1600	982	10.0	10.0	10.0	0.63	9.10	2.03	0.18	0.18	0.18	-	-	-	-	-	-
1370	KSHIPRA AT TRIVENISANGAM (1 KM. D/S OF SANGAM), M.P.	23.0	28.0	25.7	6.2	7.8	7.1	7.4	8.4	7.8	456	1202	854	5.0	6.0	5.3	0.89	1.83	1.48	-	-	-	-	-	-	-	-	-
1468	KSHIPRA AT SIDDHAWAT (D/S) OF UJJAIN.,M.P.	24.0	29.0	26.5	3.0	8.0	5.8	7.4	7.8	7.6	305	1220	765	10.0	12.0	10.7	0.44	1.93	1.14	-	-	-	-	-	-	-	-	-
1433	SANKH AT TIGRA RESERVOIR, M.P.	19.5	26.0	23.4	7.8	8.4	8.2	7.0	7.8	7.5	580	780	675	1.4	2.0	1.7	0.28	0.40	0.36	-	-	-	-	-	-	-	-	-
1608	R. SINDH AT DABRA, M.P.	18.0	29.0	23.8	6.8	8.4	7.8	7.8	8.2	8.0	230	990	650	1.2	2.2	1.8	0.30	0.60	0.44	-	-	-	-	-	-	-	-	-
1075	SONE AT KOELWAR, BIHAR	16.0	24.0	21.0	7.5	8.8	8.1	7.3	8.5	8.0	206	262	236	2.0	2.7	2.4	-	-	-	-	-	-	500	800	658	800	2200	1375
1763	CHURNI AT GADE BORDER (BANGLADESH - INDIA BORDER), WEST BENGAL	22.0	31.5	28.6	2.5	5.9	4.1	7.7	8.4	8.0	228	640	533	0.8	2.2	1.4	0.23	0.23	0.23	-	-	-	13000	130000	47556	23000	220000	83667
1764	CHURNI D/S OF SANTIPUR TOWN, WEST BENGAL	29.5	29.5	29.5	2.1	2.1	2.1	8.5	8.5	8.5	362	362	362	2.5	2.5	2.5	0.27	0.27	0.27	-	-	-	50000	50000	50000	70000	70000	70000
1363	RAPTI AFTER CONFL. OF R. HONIN NR. DOMINGARH RLY BRIDGE, GORAKHPUR, U.P.	15.0	30.0	22.8	7.4	8.1	7.7	7.7	8.2	8.0	312	406	346	1.8	3.2	2.4	0.10	0.80	0.33	0.00	0.20	0.10	40	120	86	120	300	227
2575	SIKRAHNA RIVER AT LAL PARSE, BITTIAH	25.0	25.0	25.0	8.5	8.5	8.5	7.9	7.9	7.9	298	298	298	2.1	2.1	2.1	0.42	0.42	0.42	-	-	-	500	500	500	1300	1300	1300
1820	SIKRANA AT CHANPATIYA	20.0	28.0	25.0	7.1	9.0	8.0	7.3	8.0	7.8	277	501	359	2.0	2.8	2.5	-	-	-	-	-	-	800	1300	967	1300	2400	1800
1823	DHOUS AT MADHUBANI	18.0	28.0	23.5	6.2	7.5	6.9	7.8	8.2	8.1	341	584	437	2.8	2.9	2.9	-	-	-	-	-	-	800	1700	1275	1100	3000	2325
1735	GOVIND SAGAR, U.P.	18.0	26.2	22.1	7.8	10.4	9.4	7.8	8.4	8.0	296	592	444	0.7	5.1	2.6	-	-	-	-	-	-	200	1300	525	400	14000	7225

TABLE 6.5 :- WATER QUALITY OF TRIBUTARY STREAMS BARAKAR, RUPANARAYAN, MAHANANDA, BOKARO, KONAR, DWARAKESHWAR, DWARKA, HARBORA, JALANGI, KAMALA, KANSI, KOSHI, MANUSMAR, MATHA BHANGA, MAYURKASHI, RAMREKHA, SILABATI & VINDHYADHARI - 2009

STATION CODE	LOCATIONS	TEMPERATURE °C			D.O. (mg/l)			pH			CONDUCTIVITY (µmhos/cm)			B.O.D. (mg/l)			NITRATE- N (mg/l)			NITRITE- N (mg/l)			FECAL COLIFORM (MPN/100ml)			TOTAL COLIFORM (MPN/100ml)		
		Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
	WATER QUALITY CRITERIA				> 4 mg/l			6.5-8.5			< 2250 µmhos/cm			< 3 mg/l									< 2500 MPN/100ml			< 5000 MPN/100ml		
2382	DAMODAR AT PHUSRO ROAD BRIDGE	20.0	42.0	30.2	6.5	7.8	7.2	6.5	7.6	7.4	-	-	-	1.2	2.9	1.8	-	-	-	-	-	-	-	-	-	-	-	-
2383	DAMODAR U/S JAMADOVA	19.0	42.0	29.7	6.7	7.8	7.1	6.5	7.5	7.3	-	-	-	1.1	2.5	2.2	-	-	-	-	-	-	-	-	-	-	-	-
2384	DAMODAR D/S SINDRI	20.0	40.0	29.3	6.8	7.6	7.2	7.4	7.5	7.5	-	-	-	1.9	2.5	2.1	-	-	-	-	-	-	-	-	-	-	-	-
2391	DAMODAR AT PANCHET DAM	20.4	38.0	29.5	7.2	8.0	7.7	7.2	7.5	7.4	-	-	-	1.0	1.8	1.3	-	-	-	-	-	-	-	-	-	-	-	-
1331	DAMODAR AT DISHERGARH VILL. (NR. BIHAR-WEST BENGAL BORDER) WB	21.0	34.5	27.6	7.2	9.5	8.3	7.3	8.3	7.8	118	265	231	0.9	3.6	2.3	0.10	0.59	0.35	-	-	-	700	90000	13630	1700	160000	25720
1332	DAMODAR AT D/S OF IISCO AFTER 3RD OUTFALL AT DHENNA VILLAGE, WB	22.0	34.0	27.9	7.4	10.0	8.7	7.3	8.3	7.8	184	317	252	1.4	5.2	2.8	0.10	0.97	0.62	-	-	-	400	35000	8060	1100	160000	35820
1333	DAMODAR AT NARAINPUR AFTER CONFL. OF NUNIA NALLAH, WB	25.0	36.0	29.9	5.0	10.8	8.0	7.0	8.4	7.8	290	495	359	1.6	4.8	3.1	0.10	1.05	0.72	-	-	-	1400	50000	11880	3000	90000	29200
1334	DAMODAR NEAR MUJHER MANA VILLAGE AFTER CONF. OF TAMLA NALLAH, WEST BENGAL	24.0	34.0	29.4	5.8	8.8	7.1	7.0	8.5	7.8	281	666	460	1.0	5.3	2.8	0.10	1.69	1.15	-	-	-	2300	90000	22730	13000	160000	57800
1335	DAMODAR AT HALDIA D/S (2 KM AWAY FROM HALDIA TOWN), WB	21.0	34.0	27.6	5.7	7.1	6.1	7.6	8.2	7.9	155	55800	10698	0.5	4.9	2.3	0.10	0.92	0.32	-	-	-	55000	700000	259583	110000	850000	390833
2527	WATER INTAKE POINT FOR BURDWAN TOWN	29.0	29.0	29.0	7.3	7.3	7.3	7.5	7.5	7.5	185	185	185	3.4	3.4	3.4	0.30	0.30	0.30	-	-	-	1700	1700	1700	11000	11000	11000
1336	BARAKAR AT ASANSOL (WATER INTAKE POINT), WB	22.0	29.0	26.8	6.5	8.3	7.4	7.2	8.2	7.7	122	203	178	0.7	2.6	2.1	0.27	1.58	0.87	-	-	-	1700	90000	29175	3300	160000	68825
2509	D/S OF RUPNARAYAN AT KOLAGHAT, NEAR KOLAGHAT RAIL BRIDGE NO 3	29.0	29.0	29.0	5.8	5.8	5.8	7.6	7.6	7.6	236	236	236	5.7	5.7	5.7	0.16	0.16	0.16	-	-	-	110000	110000	110000	170000	170000	170000
1337	RUPNARAYAN BEFORE CONFL. TO RIVER GANGA NEAR GEONKHALI, WB	22.0	30.0	27.5	6.0	7.8	6.5	7.6	8.1	7.9	223	837	648	1.2	1.8	1.6	0.12	0.28	0.21	-	-	-	30000	105000	67500	50000	130000	88750
1946	MAHANANDA AT SILIGURI	20.0	33.0	26.0	6.5	8.0	7.0	7.2	7.7	7.4	105	187	156	1.6	4.3	3.4	0.10	0.33	0.16	-	-	-	4000	50000	22500	8000	80000	34250
2525	MAHANANDA D/S, RAMGHAT	28.0	28.0	28.0	6.2	6.2	6.2	7.0	7.0	7.0	171	171	171	1.9	1.9	1.9	0.10	0.10	0.10	-	-	-	17000	17000	17000	50000	50000	50000
2572	MAHANANDA AT THAKURGANJ, KISHANGANJ ROAD BRIDGE	27.0	27.0	27.0	8.5	8.5	8.5	7.4	7.4	7.4	206	206	206	2.4	2.4	2.4	0.96	0.96	0.96	-	-	-	1300	1300	1300	2400	2400	2400
2381	BOKARO AT JARANDI	20.0	40.0	29.7	6.0	7.7	6.6	6.0	7.5	6.7	-	-	-	0.8	4.0	2.8	-	-	-	-	-	-	-	-	-	-	-	-
2390	KONAR AT TENUGHAT DAM	18.0	40.0	29.1	7.3	8.2	8.0	7.0	7.5	7.4	-	-	-	0.2	2.0	0.8	-	-	-	-	-	-	-	-	-	-	-	-
2541	WATER INTAKE POINT FOR BANKURA TOWN ON RIVER DWARAKESHWAR	32.0	32.0	32.0	7.9	7.9	7.9	8.2	8.2	8.2	250	250	250	0.8	0.8	0.8	0.10	0.10	0.10	-	-	-	900	900	900	2100	2100	2100
2531	U/S OF TARAPITH ON RIVER DWARKA AT SADHAK BAMDEB GHAT	35.0	35.0	35.0	7.3	7.3	7.3	7.5	7.5	7.5	141	141	141	2.2	2.2	2.2	0.10	0.10	0.10	-	-	-	50000	50000	50000	160000	160000	160000
2532	D/S OF TARAPITH ON RIVER DWARKA, SATIGHAT	34.0	34.0	34.0	8.5	8.5	8.5	7.6	7.6	7.6	150	150	150	1.6	1.6	1.6	0.14	0.14	0.14	-	-	-	30000	30000	30000	50000	50000	50000
2558	HARBORA RIVER AT NARKATIAGANJ	22.0	22.0	22.0	8.5	8.5	8.5	8.0	8.0	8.0	290	290	290	2.2	2.2	2.2	0.28	0.28	0.28	-	-	-	500	500	500	1100	1100	1100
2514	JALANGI, D/S OF KRISHNA NAGAR	30.0	30.0	30.0	4.4	4.4	4.4	7.8	7.8	7.8	312	312	312	1.6	1.6	1.6	0.20	0.20	0.20	-	-	-	13000	13000	13000	23000	23000	23000
2567	KAMALA RIVER AT BENIPATTI (MADHUBANI)	25.0	25.0	25.0	8.0	8.0	8.0	7.9	7.9	7.9	332	332	332	2.4	2.4	2.4	0.63	0.63	0.63	-	-	-	1100	1100	1100	3000	3000	3000
2569	KAMALA RIVER AT DARBHANGA	26.0	26.0	26.0	8.0	8.0	8.0	7.5	7.5	7.5	265	265	265	2.6	2.6	2.6	0.48	0.48	0.48	-	-	-	1400	1400	1400	2800	2800	2800
2507	D/S OF KANSI AT MIDNAPORE, NEAR NEW HANUMAN MANDIR, GANDHIGHAT	29.5	29.5	29.5	6.7	6.7	6.7	7.9	7.9	7.9	163	163	163	2.7	2.7	2.7	0.10	0.10	0.10	-	-	-	14000	14000	14000	17000	17000	17000
2565	KOSHI RIVER AT KURSHELA AT KATIHAR	26.0	26.0	26.0	7.5	7.5	7.5	7.2	7.2	7.2	209	209	209	2.6	2.6	2.6	0.84	0.84	0.84	-	-	-	700	700	700	1400	1400	1400
2566	KOSHI RIVER AT MADHEPURA	25.0	25.0	25.0	7.2	7.2	7.2	7.4	7.4	7.4	317	317	317	2.8	2.8	2.8	0.56	0.56	0.56	-	-	-	1100	1100	1100	2800	2800	2800
2563	MANUSMAR RIVER AT RIGA, SITAMARHI	23.5	23.5	23.5	8.4	8.4	8.4	8.4	8.4	8.4	384	384	384	2.0	2.0	2.0	0.40	0.40	0.40	-	-	-	1700	1700	1700	3000	3000	3000
2517	MATHA BHANGA, GOBINDAPUR	29.0	29.0	29.0	8.3	8.3	8.3	8.3	8.3	8.3	372	372	372	2.8	2.8	2.8	0.23	0.23	0.23	-	-	-	70000	70000	70000	80000	80000	80000
2534	WATER INTAKE POINT FOR SURI TOWN ON RIVER MAYURAKSHI	33.5	33.5	33.5	8.7	8.7	8.7	7.3	7.3	7.3	116	116	116	2.4	2.4	2.4	0.27	0.27	0.27	-	-	-	200	200	200	400	400	400
2559	RAM REKHA RIVER AT HARINAGAR	23.5	23.5	23.5	7.3	7.3	7.3	8.2	8.2	8.2	289	289	289	2.6	2.6	2.6	0.38	0.38	0.38	-	-	-	800	800	800	2200	2200	2200
2508	D/S OF SILABATI AT GHATAL	28.0	28.0	28.0	7.2	7.2	7.2	7.7	7.7	7.7	188	188	188	5.3	5.3	5.3	0.13	0.13	0.13	-	-	-	13000	13000	13000	30000	30000	30000
2549	U/S OF VINDYADHARI RIVER AT HAROA BRIDGE	31.0	31.0	31.0	2.9	2.9	2.9	8.1	8.1	8.1	700	700	700	2.4	2.4	2.4	0.10	0.10	0.10	-	-	-	17000	17000	17000	22000	22000	22000
2550	D/S OF VINDYADHARI RIVER AT MALANCHA BURNING GHAT	31.0	31.0	31.0	1.3	1.3	1.3	7.8	7.8	7.8	126	126	126	2.8	2.8	2.8	0.10	0.10	0.10	-	-	-	13000	13000	13000	23000	23000	23000

TABLE 7.1 :- WATER QUALITY OF RIVER BRAHMAPUTRA - 2009

STATION CODE	LOCATIONS	TEMPERATURE °C			D.O. (mg/l)			pH			CONDUCTIVITY (µmhos/cm)			B.O.D. (mg/l)			NITRATE- N (mg/l)			NITRITE- N (mg/l)			FECAL COLIFORM (MPN/100ml)			TOTAL COLIFORM (MPN/100ml)		
		Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
					> 4 mg/l			6.5-8.5			< 2250 µmhos/cm			< 3 mg/l									< 2500 MPN/100ml			< 5000 MPN/100ml		
1260	BRAHAMPUTRA AT KHERGHAT (A/C WITH DIBANG & DIHANG), ASSAM	18	30	24.6	5.5	8.3	7.0	6.7	7.6	7.3	98	281	177	0.8	3	1.8	0.1	0.1	0.10	-	-	-	0	0	0	1	910	493
1030	BRAHAMPUTRA AT DIBRUGARH, ASSAM	19.5	28	23.5	4.7	8.6	7.2	6.6	7.3	7.1	95	239	138	0.4	4.7	1.7	0.1	0.7	0.20	-	-	-	0	360	40	360	910	586
1262	BRAHAMPUTRA AT NIMATIGHAT, ASSAM	17	29	24.0	4.4	8.2	6.0	6.1	7.9	7.0	69	236	136	1	4.1	2.1	0.1	0.1	0.10	-	-	-	0	730	217	300	2400	882
1526	BRAHMPUTRA RIVER AT DHENUKHAPAHAR, ASSAM	18	31	24.9	6.8	8.1	7.5	6.8	7.9	7.4	73	225	137	0.6	5	2.7	0.1	0.16	0.11	-	-	-	0	1100	212	300	24000	3181
1031	BRAHAMPUTRA AT PANDU, ASSAM	20	31	25.7	6.2	9.1	7.4	6.8	7.6	7.3	108	205	150	0.5	5.1	1.9	0.05	0.1	0.10	-	-	-	0	360	200	730	1500	1066
1299	BRAHAMPUTRA AT JOGIJHOGA NEAR BRIDGE, ASSAM	23	31	26.8	4.8	7.5	6.5	6.8	7.5	7.2	136	303	202	0.5	4.5	2.6	0.1	0.13	0.10	-	-	-	0	730	231	360	2200	950
2069	BRAHMPUTRA RIVER NEAR WATER INTAKE POINT AT KACHARIGHAT, PANBAZAR, GUWAHATI, ASSAM	21	29.5	25.1	6.2	9.2	8.0	7.2	8.1	7.5	120	206	161	0.8	5.4	2.5	0.1	0.1	0.10	-	-	-	0	730	243	730	1500	1047
2064	BRAHMAPUTRA RIVER AT CHANDRAPUR, GUWAHATI	21	30	26.5	6.5	10.5	7.9	6.7	7.2	7.0	115	159	137	0.7	3.6	2.0	0.1	0.1	0.10	-	-	-	0	360	120	360	910	667
2067	BRAHMPUTRA RIVER AT SUALKUCHI, DIST. KAMRUP, ASSAM	23	29	25.5	6.2	10.3	7.8	7.3	7.9	7.6	110	299	236	0.3	2.3	1.5	0.1	0.1	0.10	-	-	-	0	360	120	360	730	597
2066	BRAHMAPUTRA RIVER AT DHUBRI	22	29	26.0	6.1	7.1	6.6	6.8	7.4	7.1	131	157	148	1.3	4.5	2.5	0.1	0.1	0.10	-	-	-	0	0	0	720	1100	1005

TABLE 7.2 :- WATER QUALITY OF RIVER DHANSIRI AND ITS TRIBUTARY STREAMS DZU & CHATHE - 2009

STATION CODE	LOCATIONS	TEMPERATURE °C			D.O. (mg/l)			pH			CONDUCTIVITY (µmhos/cm)			B.O.D. (mg/l)			NITRATE- N (mg/l)			NITRITE- N (mg/l)			FECAL COLIFORM (MPN/100ml)			TOTAL COLIFORM (MPN/100ml)		
		Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
					> 4 mg/l			6.5-8.5			< 2250 µmhos/cm			< 3 mg/l									< 2500 MPN/100ml			< 5000 MPN/100ml		
1796	DHANSIRI AT FULL NAGARJAN, NAGALAND	19	34	26.3	4	9.2	7.0	7.1	8.2	7.6	123	264	194	0.2	0.8	0.5	0.75	4.2	2.5	-	-	-	-	-	-	-	-	-
1799	DHANSIRI SAT TOWN BOUNDARY BRIDGE (DIPHU ROAD), NAGALAND	13	32	23.0	3.4	7.2	5.5	7.1	7.9	7.6	189	200	194	0.2	0.8	0.5	5.8	5.8	5.8	-	-	-	-	-	-	-	-	-
1797	BRIDGE NEAR PURANA BAZAAR, NAGALAND	20	32	26.8	3	8.8	6.3	7	8.1	7.7	132	218	175	0.4	1.6	0.9	1.54	5	3.3	-	-	-	-	-	-	-	-	-
1800	DHANSIRI AT NUTON BASTI, NAGALAND	15	32	25.0	1.2	4	2.5	6.7	8	7.3	136	245	193	0.6	2	1.3	4.96	5	5.0	-	-	-	-	-	-	-	-	-
1798	DHANSIRI NEAR CHECK GATE (DIMAPUR KHUTKHUTI ROAD), NAGALAND	20	33	27.5	3.2	9.6	6.6	7.5	8.3	7.9	182	268	221	0.2	1.4	0.7	1.56	5.1	3.3	-	-	-	-	-	-	-	-	-
1259	DHANSIRI AT GOLAGHAT, ASSAM	24	32	28.5	6.4	7	6.8	6.7	7.3	7.0	140	222	185	0.6	4.5	2.3	0.1	0.1	0.1	-	-	-	0	0	0	360	360	360
1928	DHANSIRI AT NAGALAND-ASSAM BORDER, DIMAPUR	18	32	26.3	3.2	8	5.3	7.1	8	7.5	143	263	201	0.4	1.4	0.9	0.6	6.2	3.4	-	-	-	-	-	-	-	-	-
1930	DZU D/S KOHIMA TOWN	15	25	20.3	4.4	7.2	5.7	8	8.4	8.2	215	386	287	0.2	0.8	0.4	0.68	4.3	2.5	-	-	-	-	-	-	-	-	-
1929	CHATHE AT MEDZIPHEMA, DIMAPUR	19	32	26.3	3.8	6.4	5.6	7.3	7.8	7.7	68	144	98	0.1	0.8	0.4	0.88	4.1	2.5	-	-	-	-	-	-	-	-	-

TABLE 7.3 :- WATER QUALITY OF TRIBUTARY STREAMS SUBANSIRI, KHARSANG, BURHIDIHING, PAGLDIA, DIGBOI, JAI BHARALI, KOLONG, MANAS, DISANG, JHANJI, BHOGDOI, MORA BHARALI, BORAK, BHARALU, DEEPAR BEEL & KATHAKAL - 2009

STATION CODE	LOCATIONS	TEMPERATURE °C			D.O. (mg/l)			pH			CONDUCTIVITY (µmhos/cm)			B.O.D. (mg/l)			NITRATE- N (mg/l)			NITRITE- N (mg/l)			FECAL COLIFORM (MPN/100ml)			TOTAL COLIFORM (MPN/100ml)		
		Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
					> 4 mg/l			6.5-8.5			< 2250 µmhos/cm			< 3 mg/l									< 2500 MPN/100ml			< 5000 MPN/100ml		
1261	SUBANSIRI AT GEREKAMUKH, ASSAM.(B/C WITH BRAH.) ASSAM	17	24	20.5	8.7	8.9	8.8	6.3	7.3	6.9	85	126	101	0.9	3.6	2.4	0.1	0.38	0.17	-	-	-	0	0	0	1	1	1
2061	RIVER KHARSANG B/C WITH BURIDIHING NEAR KHARSANG (ASSAM-ARUNANCHAL BORDER)	19	28	23.5	6.8	7.7	7.2	6.5	7.1	6.7	159	211	184	0.8	3.8	2.2	0.1	0.3	0.20	-	-	-	0	0	0	1	300	76
1422	BURHIDIHING AT MARGHERITA, ASSAM	20	28	23.5	2.9	9.3	5.9	6.7	7	6.9	81	399	219	0.3	3.1	1.4	0.1	0.1	0.10	-	-	-	0	0	0	1	730	244
2062	BURIDIHING NEAR DULIAJAN AT D/S. TINSUKIA	20	26	21.8	4.7	7.2	6.4	6.6	7.1	6.8	96	226	183	0.8	4.6	2.0	0.1	0.1	0.10	-	-	-	0	0	0	360	730	603
2230	BURHIDIHING RIVER AT DULIAJAN (INTAKE POINT OF OIL INDIA LTD.)	20	21	20.3	5.9	6.8	6.4	6.4	7.2	6.8	181	197	189	1.2	7.6	3.3	0.1	0.13	0.11	-	-	-	0	0	0	1	360	181
2065	PAGLDIA RIVER NEAR NALBARI TOWN, DIST. NALBARI, ASSAM	23	30	26.0	7.2	8.3	7.7	7.3	7.8	7.6	162	265	229	0.4	3	1.7	0.1	0.1	0.10	-	-	-	0	360	120	1	730	364
1530	DIGBOI RIVER AT LAKHIPATHE, RESERVE FOREST, DIGBOI, ASSAM	20	30	24.8	2.5	6.5	5.3	6.7	7.1	6.9	84	307	186	3.4	6.1	4.8	0.1	0.32	0.19	-	-	-	0	730	182.5	300	1500	908
2063	JAI BHARALI RIVER NEAR BISWANATH CHARALI, SONITPUR	18	29	24.8	8.5	8.7	8.6	6.8	7.4	7.2	84	130	101	0.8	4.2	2.3	0.1	0.11	0.10	-	-	-	0	360	120	300	760	473
2237	KALONG RIVER AT U/S OF ANANDARAM DEKIAL PHUKAN BRIDGE, NAGAON	18	31	25.3	4.9	8	6.8	6.7	7.3	7.1	87	204	143	0.9	6.6	3.1	0.1	0.1	0.10	-	-	-	0	360	220	700	1100	967
2059	KOLONG RIVER AT MARIGAON	25	31	27.3	6	9.5	7.3	6.6	7.5	6.9	88	540	241	0.6	1.2	1.0	0.1	0.1	0.10	-	-	-	0	360	90	360	1500	830
2060	MANAS RIVER AT NH-31 CROSSING, BARPETA DISTRICT	25	30	27.4	6.1	7.3	6.9	7.1	7.9	7.5	403	447	432	0.9	2.7	2.1	0.1	0.1	0.10	-	-	-	0	0	0	1	300	76
2058	DISANG RIVER AT DILLIGHAT, DIBRUGARH DIST.ASSAM	19	28	24.3	6.2	6.7	6.4	6.2	7.1	6.5	89	220	139	1.4	2.9	1.8	0.1	0.13	0.11	-	-	-	0	0	0	1	730	358
1298	DISANG AT GUNDAMGHAT, ASSAM	19	27	24.3	5.2	5.7	5.6	6.6	7	6.8	67	237	138	1	2.7	2.0	0.1	1.2	0.41	-	-	-	0	360	90	1	1100	440
1258	JHANJI AT N.H. CROSSING JORHAT, ASSAM	18	27	23.3	4.9	7.4	6.5	6.7	7.8	7.1	105	560	235	0.8	2.7	1.5	0.1	0.11	0.10	-	-	-	0	0	0	360	730	607
1527	BHOGDOI RIVER AT JORHAT ,ASSAM	18	28	23.8	4.4	7.6	6.0	6.3	7.3	6.9	120	610	267	0.5	1.9	1.0	0.1	0.1	0.10	-	-	-	0	0	0	360	1500	863
1531	*MORA BHARALI AT TEZPUR, ASSAM	18	30	25.0	5.7	7.9	7.0	6.8	7.2	7.0	122	224	156	1.1	6.4	4.0	0.1	0.1	0.10	-	-	-	0	720	255	360	2200	1143
1423	BORAK AT PANCHAGRAM , ASSAM	10	13	11.3	4.5	7.1	6.4	6.7	7.3	7.0	79	600	231	0.5	2.6	1.7	0.1	0.1	0.10	-	-	-	0	360	240	730	1500	987
1528	BHARALU RIVER AT GUWAHATI	22	30	26.0	0	0.4	0.1	6.8	7	6.9	124	774	530	6.5	50	27.8	0.1	1.4	0.62	-	-	-	0	730	548	1500	2100	1800
1529	DEEPAR BEEL, ASSAM*	20	32	28.5	4	13	9.0	7	7.9	7.3	153	617	328	1.2	7.2	3.0	0.1	0.3	0.18	-	-	-	0	360	120	360	910	543
2068	U/S OF KATHAKAL AT MATIJURI, DIST. HAILAKANDI, ASSAM	10	12	10.8	5.8	7.2	6.8	6.8	7.7	7.2	89	640	261	0.9	1.6	1.3	0.1	0.1	0.10	-	-	-	0	0	0	1	360	240

TABLE 7.4 :- WATER QUALITY OF TRIBUTARY STREAMS TEESTA, DIKCHU, MANEY KHOLA, RANICHU, KUNDLI, DIKHOW, KOHORA, BOGINADI, RANGA, PACHNAI, KAPILI, BEKI, SANKOSH, BARAK, SONAI, KUSHIYARA KAROLA & KALJANI - 2009

STATION CODE	LOCATIONS	TEMPERATURE °C			D.O. (mg/l)			pH			CONDUCTIVITY (µmhos/cm)			B.O.D. (mg/l)			NITRATE- N (mg/l)			NITRITE- N (mg/l)			FECAL COLIFORM (MPN/100ml)			TOTAL COLIFORM (MPN/100ml)		
		Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
					> 4 mg/l			6.5-8.5			< 2250 µmhos/cm			< 3 mg/l									< 2500 MPN/100ml			< 5000 MPN/100ml		
1801	TEESTA A/C OF RIVERS LACHENCHU AND LACHUNGCHU AT CHUNGTHAANG, SIKKIM	-	-	-	8	12	10.4	6	7.2	6.5	230	270	250	2	3.5	2.5	2	3.5	2.6	-	-	-	60	190	112	90	260	188
1807	TEESTA A/C WITH RIVER RANICHU AT SINGTAM	-	-	-	9	12.5	11.1	6	7	6.6	230	280	257	2.5	3.5	3.0	2.3	3.5	2.9	-	-	-	80	200	142	170	350	244
1808	TEESTA A/C WITH RANGICHU AFTER MEETING THE INDL EFFS FROM THE TOWN RA	-	-	-	9	12.5	11.1	6	7	6.5	240	290	262	2	3.5	3.0	2.4	3.5	3.0	-	-	-	80	170	135	170	350	246
1809	RIVER TEESTA AT MELLI DOWNSTREAM, SIKKIM	-	-	-	9	12.4	10.9	6	7	6.5	250	290	269	2.7	3.5	3.3	2.5	3.5	3.2	-	-	-	80	180	137	170	350	270
1947	TEESTA AT SILIGURI	14	24	19	8	9.9	8.8	7.2	7.8	7.5	77	640	223	1.1	3.1	2.1	0.1	0.2	0.13	-	-	-	200	110000	32800	4000	220000	65500
1802	DIKCHU B/C WITH TEESTA NEAR NHPC HYDROELECTRIC POWER PROJECT, SIKKIM	-	-	-	2.5	12.5	9.9	6	6.8	6.5	220	280	251	2	3.5	2.6	2	3.5	2.8	-	-	-	10	170	103	130	280	216
1803	MANEY KHOLA AT BURTUK NEAR ARMY BASE CAMP, 4 KM U/S OF GANGTOK, SIKKIM	-	-	-	9	12	11.0	6.2	7	6.7	240	280	256	2.2	3.2	2.6	2.4	3.5	2.8	-	-	-	40	140	101	80	280	213
1804	MANEY KHOLA A/C WITH RAY KHOLA AT ADAMPOOL AFTER MEETING WASTE OF STP, GANGTOK D	-	-	-	9.5	12.5	11.3	6	7	6.6	250	280	262	2	3.2	2.6	2	3.2	2.6	-	-	-	60	200	127	110	350	233
1805	A/C OF RANICHU AND RORACHU AT RANIPOOL, SIKKIM	-	-	-	8.5	12	11.0	6	7.2	6.6	240	270	255	2	3.5	2.6	2	3.2	2.6	-	-	-	60	150	102	170	280	225
1806	RANICHU B/C WITH TEESTA AT SINGTAM, SIKKIM	-	-	-	8.5	12	11.0	6	7	6.6	230	280	258	2.5	3.5	2.9	2	3.2	2.7	-	-	-	50	180	124	170	280	237
2229	KUNDLI RIVER AT KUNDLI/ SAPAKHOWA, SADIA	12	26	20	6.4	8.5	7.7	7.2	7.5	7.3	102	259	176	1.7	3.9	2.6	0.1	0.2	0.13	-	-	-	0	360	90	1	730	273
2231	DIKHOW RIVER AT DIKHOW BRIDGE SIVASAGAR	18	28	24	4.5	7.2	5.7	6.9	7.5	7.2	90	200	136	0.5	1.6	1.0	0.1	0.1	0.10	-	-	-	0	0	0	300	700	433
2232	KOHORA RIVER AT N.H. CROSSING, KOHORA	22	31	28	4.9	6.9	6.2	7.2	7.3	7.3	128	230	180	1	2.2	1.4	0.1	0.25	0.14	-	-	-	0	0	0	1	1100	440
2233	BOGINADI NEAR BRIDGE NH-52, LAKHIMPUR	18	28	25	7.8	8.4	8.0	6.6	7.1	6.8	98	198	136	0.3	4.6	2.3	0.1	0.32	0.16	-	-	-	0	0	0	1	1	1
2234	RANGA NADI D/S OF HYDEL PROJECT	18	28	24	7.6	8.4	8.0	6.6	7.4	6.9	96	198	139	0.7	5.3	2.8	0.1	0.33	0.16	-	-	-	0	0	0	1	360	91
2235	PANCHNAI RIVER AT NH-52 CROSSING, ORANG	18	26	23	8.3	8.5	8.4	7	7.9	7.5	98	129	114	0.9	3.4	1.7	0.1	0.2	0.14	-	-	-	0	300	100	700	730	710
2236	KAPILI RIVER AT DHARMTUL BRIDGE, NH-31, NAGAON	15	31	25	6.3	7.5	6.7	6.2	7.2	6.8	80	610	218	0.6	2.7	1.6	0.1	0.1	0.10	-	-	-	0	0	0	1	730	433
2238	BEKI RIVER AT NH-37 CROSSING AT BARPETA ROAD	24	29	27	6.4	7	6.7	6.5	7.5	7.0	76	153	116	0.7	4.9	3.0	0.1	0.1	0.10	-	-	-	0	360	90	300	720	420
2239	SANKOSH RIVER, DHUBRI	23	30	26	5.8	6.7	6.4	6.9	7.3	7.1	107	123	117	0.6	5.9	2.2	0.1	0.1	0.10	-	-	-	0	0	0	300	730	438
2240	BARAK RIVER AT D/S OF SILCHAR	10	10	10	7.1	7.2	7.1	6.8	7	6.9	69	137	100	1.3	2.4	1.9	0.1	0.1	0.10	-	-	-	0	1100	550	730	2300	1515
2241	SONAI RIVER AT SONAI	10.1	15	12	7	7.2	7.1	6.7	7.5	7.1	71	189	113	1.1	3.6	2.0	0.1	1.12	0.42	-	-	-	0	360	90	360	1100	638
2242	KUSHIARA RIVER AT KARIMGANJ	10	18	13	6.8	7.2	7.0	6.6	7.3	7.0	81	160	105	1.2	2.9	2.0	0.1	0.43	0.19	-	-	-	0	360	90	360	1500	730
2523	KAROLA, D/S OF JALPAIGURI, NEAR MIN BHAWAN	28	28	28	6.9	6.9	6.9	6.8	6.8	6.8	80	80	80	2.5	2.5	2.5	0.1	0.1	0.10	-	-	-	4000	4000	4000	8000	8000	8000
2524	KALJANI D/S OF ALIPURDWAR, MUNICIPALITY DISCHARGE POINT	32	32	32	7	7	7.0	7.3	7.3	7.3	151	151	151	2.3	2.3	2.3	0.16	0.16	0.16	-	-	-	11000	11000	11000	14000	14000	14000

TABLE 8.1 :- WATER QUALITY OF RIVER MAHI AND ITS TRIBUTARY STREAMS ANAS, SHIVNA, JAMMER, MALEI & CHILLAR - 2009

STATION CODE	LOCATIONS	TEMPERATURE			D.O. (mg/l)			pH			CONDUCTIVITY			B.O.D. (mg/l)			NITRATE- N (mg/l)			NITRITE- N (mg/l)			FECAL COLIFORM (MPN/100ml)			TOTAL COLIFORM (MPN/100ml)		
		Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
					> 4 mg/l			6.5-8.5			< 2250 µmhos/cm			< 3 mg/l									< 2500 MPN/100ml			< 5000 MPN/100ml		
1233	MAHI AT BADNAWAR, M.P.	22	26	23.7	7.2	7.9	7.4	7.5	7.9	7.63	160	580	359	0.8	1.3	1.0	0.05	0.1	0.08	0.05	0.05	0.05	0	2	1	110	170	130
1232	MAHI (D/S) CONF WITH R. CHAP (UNDER SAGWARA-SARHI RD. BDG.),RAJASTHAN	23	32	27.2	3.5	8	5.6	7.6	8.65	8.35	450	700	541	0.32	2.12	0.9	0.1	0.8	0.37	-	-	-	3	4	4	4	20	12
1863	MAHI AT UMETA BRIDGE	26	30	28.0	7	8.5	7.6	7.9	8.5	8.18	232	483	361	0.3	0.4	0.4	0.23	0.82	0.53	-	-	-	3	9	6	7	34	19
1864	MAHI AT MUJPUR	29	30	29.5	6.4	6.9	6.7	7.5	7.9	7.7	482	641	562	0.6	0.6	0.6	0.48	0.55	0.52	-	-	-	3	4	4	11	11	11
4	MAHI AT SEVALIA, GUJARAT	26	28	27.2	5.8	7.8	7.1	8	8.2	8.13	224	395	305	0.1	0.4	0.2	0.34	0.6	0.44	0	0.44	0.11	2	4	3	3	13	8
5	MAHI AT VASAD, GUJARAT	26	28	27.0	5.9	8	7.0	7.4	8.2	8.05	234	470	330	0.2	0.9	0.5	0.38	0.6	0.50	0	0.44	0.24	3	9	5	11	21	15
1228	ANAS AT DAHOD,(KUSHALGARH),DIST PANCHMAHAL,GUJARAT	25	27	26	5.9	8.6	7.3	8	8.5	8.3	408	510	459	1.3	3.8	2.6	-	-	-	-	-	-	-	-	-	4	4	4
2102	RIVER SHIVNA AT RAMGHAT, MANDSAUR	23	26	24.3	6.9	7.9	7.3	7.1	8.6	7.87	179	766	419	2	2	2.0	0.49	1.48	1.04	0.01	0.006	0.01	-	-	-	-	-	-
2103	RIVER JAMMER AT DHOLOWAD, RATLAM	22	28	25.0	6.8	7.6	7.3	7.2	8	7.71	280	448	340	2.3	4	3.2	0.76	1.8	1.22	0.2	0.2	0.2	-	-	-	-	-	-
2104	RIVER MALEI AT JAORA	22	29	24.7	7.1	7.8	7.4	7.4	7.9	7.69	284	652	394	2.5	3	2.8	0.674	0.86	0.78	-	-	-	-	-	-	-	-	-
2105	RIVER CHILLAR AT SHAJAPUR	24	28	25.9	6	7.5	7.2	7.1	10	8.13	295	480	400	2	3	2.5	0.1	1.24	0.81	0.00	0.00	0.00	-	-	-	-	-	-

TABLE 9.1 : - WATER QUALITY OF RIVER SABARMATI AND ITS TRIBUTARY STREAMS SHEDHI & KHARI - 2009

STATION CODE	LOCATIONS	TEMPERATURE °C			D.O. (mg/l)			pH			CONDUCTIVITY (µmhos/cm)			B.O.D. (mg/l)			NITRATE- N (mg/l)			NITRITE- N (mg/l)			FECAL COLIFORM (MPN/100ml)			TOTAL COLIFORM (MPN/100ml)		
		Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
					> 4 mg/l			6.5-8.5			< 2250 µmhos/cm			< 3 mg/l									< 2500 MPN/100ml			< 5000 MPN/100ml		
1866	RIVER SABARMATI AT HANSAOL BRIDGE, GUJARAT	26	30	27.7	7.7	8.8	8.3	8.4	8.6	8.47	253	497	369	1.5	12	5.5	0.16	0.25	0.21	-	-	-	150	750	367	240	1500	980
1221	SABARMATI AT KHEROJ BRIDGE, GUJARAT	29	29	29.0	5.8	5.8	5.80	8.5	8.5	8.50	471	471	471	9	9	9	0.53	0.53	0.53	-	-	-	90	90	90	750	750	750
2	SABARMATI AT AHMEDABAD AT V.N. BRIDGE,GUJARAT	26	29	27.5	0	6	2.08	7.6	8.6	7.92	407	2060	1278	9	39	22	0.83	1.77	1.54	-	-	-	210	1500	888	1100	2400	1917
1409	SABARMATI AT RAILWAY BRIDGE AHMEDABAD, GUJARAT	25	31	28.3	4.4	8.9	6.23	7.9	8.6	8.27	267	421	342	1.2	13	5.6	0.11	2.04	1.13	-	-	-	80	460	199	240	4100	987
1408	SABARMATI AT VILL MIROLI TALUKA DASCROI,AHMEDABAD,GUJARAT	27	31	29.0	0	0	0	7.3	8.5	7.83	1870	3200	2441	28	46	37	0.42	0.57	0.47	-	-	-	2300	15000	7986	7500	46000	20757
1223	SABARMATI AFTER CONF WITH MESHWA AT VAUTHA (NEAR DHOKLA),GUJARAT	27	31	28.7	0	0	0	7.8	8.7	8.14	979	2800	2028	19	39	30.7	0.05	0.73	0.47	0.02	0.02	0.02	700	7500	2971	3300	9300	6029
1222	SHEDHI AT KHEDA, GUJARAT	26	31	28.0	4.9	7.6	6.03	8.2	9	8.60	735	1690	1328	5	16	9.7	0.39	0.42	0.40	0.11	0.12	0.115	43	200	106	150	430	263
1437	KHARI AT LALI VILLAGE NEAR AHMEDABAD, GUJARAT	28	30	29.3	0	2.7	0.90	7.7	8.3	7.97	6450	9900	7773	-	-	-	0.11	0.17	0.15	-	-	-	2100	43000	28033	7500	93000	64500

TABLE 10.1 : - WATER QUALITY OF RIVER NARMADA AND ITS TRIBUTARY STREAMS CHOTA TAWA, KUNDA, GOUR & KATNI- 2009

STATION CODE	LOCATIONS	TEMPERATURE °C			D.O. (mg/l)			pH			CONDUCTIVITY (µmhos/cm)			B.O.D. (mg/l)			NITRATE- N (mg/l)			NITRITE- N (mg/l)			FECAL COLIFORM (MPN/100ml)			TOTAL COLIFORM (MPN/100ml)		
		Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
					> 4 mg/l			6.5-8.5			< 2250 µmhos/cm			< 3 mg/l									< 2500 MPN/100ml			< 5000 MPN/100ml		
1241	NARMADA AT MANDLA NEAR ROAD BDG. M.P.	20	27	24.5	-	-	-	7.2	7.8	7.46	178	1207	506	0.9	2.3	1.6	0.34	2.98	1.16	-	-	-	0	7	2	39	1100	311
44	NARMADA AT SETHANIGHAT M.P.	24	32	27.0	6	11.4	7.37	7.3	8.91	7.93	180	448	332	1.5	3.9	2.6	0.11	2.61	0.91	-	-	-	0	13	4	21	1600	235
1240	NARMADA AT NARSINGHPUR M.P.	20	26	23.0	-	-	-	7.4	7.9	7.60	296	1310	609	1.2	2.3	1.5	0.3	4.3	1.90	-	-	-	0	7	2	7	1100	294
1234	NARMADA AT HOSHANGABAD U /S M.P.	24	27	25.5	5.3	11.5	7.98	7.2	8.9	8.07	180	460	311	1.1	4.7	2.3	0.05	1.82	0.68	-	-	-	0	4	3	8	900	124
2123	NARMADA AT KORIGHAT HOSHANGABAD	23	32	26.5	6.1	12	7.58	7.21	8.8	7.99	180	1930	454	1.7	30	5.0	0.02	2.1	0.60	0.01	0.01	0.01	0	9	5	9	1600	279
1235	NARMADA AT HOSHANGABAD D /S M.P.	24	33	26.3	4.2	11.5	7.57	6.5	8.6	7.89	190	480	345	2.1	3.6	2.6	0.04	3.91	1.15	-	-	-	0	17	6	20	1600	492
2106	RIVER NARMADA AT NEMAWAR	23	26	24.8	6.1	7.6	7.16	7	8.4	7.80	190	440	307	1.1	1.4	1.3	0.036	2	0.87	0.007	1.3	0.65	-	-	-	-	-	-
2113	RIVER NARMADA NEAR PUNASA DAM, PUNASA	19	29.6	24.8	6.5	7.8	7.33	7.4	8.2	7.71	190	396	277	0.6	1.1	0.9	0.05	2.78	0.40	0.002	0.06	0.02	0	2	1	40	170	106
1430	NARMADA AT D S OF OMKARESHWAR M.P.	21	29	24.8	6.8	8	7.41	7.5	8.4	7.81	218	458	296	0.8	1.4	1.1	0.05	0.6	0.30	0	0.07	0.04	0	2	0	80	300	181
2112	RIVER NARMADA NEAR MORTAKKA BRIDGE, BADWAH	19	29.2	24.8	6.6	8.3	7.41	7.4	8.3	7.72	214	545	288	0.6	1.6	1.0	0.05	2.5	0.70	0	0.03	0.01	0	2	1	80	350	160
2099	RIVER NARMADA LALPUR, JABALPUR	18	28	22.6	-	-	-	7.3	7.8	7.59	290	1207	558	0.6	2.6	1.5	0.1	3.1	1.27	-	-	-	0	0	0	28	1100	278
45	NARMADA AT MANDLESHWAR M.P.	19	30	25.3	6.8	7.7	7.32	7.3	8.2	7.74	198	455	300	0.6	1.2	0.9	0.05	2.2	0.45	0	0.05	0.01	0	2	1	30	220	109
1431	NARMADA AT MAHESHWAR, M. P.	22.3	30	25.6	6	7.8	7.07	7.6	8.1	7.82	243	388	294	1	1.4	1.2	0.1	1.003	0.42	0.003	0.05	0.02	0	2	1	80	170	132
1239	NARMADA AT BADWANI, M.P.	21.2	27	23.9	6.4	7.8	7.40	7.8	8.2	7.96	220	368	300	0.7	1.1	0.9	0.05	0.8	0.38	0.002	0.05	0.03	0	2	1	70	170	112
7	NARMADA AT GARUDESHWAR, GUJARAT	26	30	28.0	6.8	9	7.81	7.7	8.1	7.93	228	389	308	0.5	1.3	0.9	0.05	1.82	0.64	0.05	0.05	0.05	0	2	2	2	4	4
1245	NARMADA AT CHANDOD, GUJARAT	25	32	27.6	7	7.7	7.19	7.9	8.3	8.11	257	336	294	0.2	1.8	0.6	0.38	0.68	0.53	-	-	-	3	7	4	7	19	12
1244	NARMADA AT PANETHA, GUJARAT	27	30	28.5	6.8	9.2	7.63	7.8	8.3	8.11	242	402	308	0.5	1.4	0.8	0.05	2.21	0.75	0.05	0.05	0.05	0	2	2	2	6	4
1243	NARMADA AT BHARUCH,ZADESHVAR,GUJARAT	27	33	29.0	6.1	8.3	6.95	7.8	8.4	8.17	217	384	319	0.7	2.4	1.3	0.1	2.5	0.74	0.05	0.05	0.05	2	90	38	4	260	125
1981	NARMADA AT ZANOR (NTPC), BHARUCH	27	31	28.8	6.4	7.8	6.93	7.6	8.2	7.95	297	312	304	0.5	1.4	1.0	0.1	1.15	0.49	0.05	0.05	0.05	1	17	6	2	40	15
1236	CHOTA TAWA BEFORE CONFL. WITH RIVER NARMADA,M.P.	22.5	27.5	25.0	6.6	7.6	7.10	7.5	8.3	7.90	427	476	452	0.8	0.9	0.9	-	-	-	0.05	0.05	0.05	2	2	2	110	140	125
2114	RIVER KUNDA AT KHARGONE	21	29	25.4	6.1	8.4	7.13	7.4	8.5	7.80	468	934	637	1.1	1.9	1.5	0.05	6.21	1.70	0.002	0.06	0.03	0	2	1	170	900	424
2100	GOUR RIVER BHOGA DOOR, JABALPUR	18	29	22.7	-	-	-	6.9	7.9	7.47	194	818	433	0.9	2.6	1.6	0.16	3.1	0.86	-	-	-	0	0	0	11	460	194
2101	KATNI RIVER NEAR NAGAR NIGAM	17.2	29	24.3	-	-	-	7.3	8.2	7.68	231	955	506	1	2.8	1.8	0.16	2.18	1.14	-	-	-	0	0	0	39	460	211

TABLE 11.1 : - WATER QUALITY OF RIVER TAPI AND ITS TRIBUTARY STREAMS GIRNA, RANGAVALI, KIM & DENWA - 2009

STATION CODE	LOCATIONS	TEMPERATURE °C			D.O. (mg/l)			pH			CONDUCTIVITY (µmhos/cm)			B.O.D. (mg/l)			NITRATE- N (mg/l)			NITRITE- N (mg/l)			FECAL COLIFORM (MPN/100ml)			TOTAL COLIFORM (MPN/100ml)		
		Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
					> 4 mg/l			6.5-8.5			< 2250 µmhos/cm			< 3 mg/l									< 2500 MPN/100ml			< 5000 MPN/100ml		
9	TAPI AT NEPANAGAR M.P	22.0	30.0	26.4	6.9	7.9	7.3	7.6	7.8	7.7	270	828	459	0.6	1.2	1.0	0.08	0.60	0.35	0.01	0.05	0.03	0	2	1	30	140	82
2115	RIVER TAPTI AT NEPA NAGAR 100 METRE D/S AFTER MIXING PANDHAR NALLA	21.2	30.0	25.1	6.7	7.8	7.1	7.4	8.1	7.6	265	638	439	0.6	1.9	1.3	0.05	3.20	1.00	0.009	0.02	0.015	0	2	1	110	500	253
10	TAPI AT BURHANPUR M.P	18.0	27.0	24.4	6.8	8.2	7.4	7.3	7.8	7.6	330	796	458	1	1.8	1.4	0.05	0.88	0.32	0	0.05	0.025	0	2	0	170	900	405
1250	TAPI AT HATHNUR M.P	23.0	27.5	24.8	6.7	8.0	7.4	7.6	8.2	7.9	273	486	370	0.8	1.3	1.1	0.50	0.50	0.50	0.05	0.05	0.05	0	2	1	130	220	163
1313	TAPI AT AJNAND VILLAGE, MAHARASHTRA	23.0	40.0	31.9	4.9	6.4	5.6	7.2	8.9	7.9	186	923	447	4.2	12	8.5	0.00	0.72	0.23	-	-	-	4	9	7	14	30	21
1251	TAPI AT BHUSAWAL US MAHARASHTRA	24.0	42.0	31.5	4.7	6.9	5.7	7.2	8.4	7.8	175	905	439	4	11	7.3	0.00	3.70	0.51	-	-	-	4	25	11	14	45	27
1314	TAPI AT UPHAD VILLAGE, MAHARASHTRA	30.0	40.0	34.5	5.0	6.4	5.8	7.2	8.2	7.8	173	946	446	3.8	12	7.8	0.10	0.64	0.27	-	-	-	4	12	7	14	35	23
46	TAPI AT UKAI, SHERULA BRIDGE, GUJARAT	25.0	31.0	28.3	5.1	7.9	6.8	7.7	8.9	8.2	338	725	444	1	6.5	2.5	0.10	0.38	0.28	-	-	-	700	2300	1223	1400	7500	3273
1247	TAPI AT MANDAVI, GUJARAT	25.0	31.0	28.6	6.3	7.7	7.0	6.2	8.8	8.0	379	633	489	0.8	3.7	2.2	0.12	0.50	0.30	-	-	-	1100	4300	2025	2800	9300	5550
47	TAPI AT KATHORE, (NH-8 BRIDGE), GUJARAT	22.0	31.0	28.2	5.7	7.9	6.8	7.3	8.8	8.2	375	673	518	1.9	7	3.1	0.18	0.45	0.32	-	-	-	2300	9300	5918	6400	21000	14355
1248	TAPI AT SURAT U/S KATHORE, GUJARAT	23.0	31.0	27.8	5.7	7.9	6.7	7.4	8.8	8.3	418	712	537	2	3.7	2.8	0.26	0.90	0.49	-	-	-	750	9000	4654	4600	23000	10875
1982	TAPI AT RANDER BRIDGE, SURAT	27.0	31.0	28.5	5.4	7.5	6.4	7.6	8.8	8.2	324	849	535	2.3	4.3	3.3	0.20	0.49	0.33	-	-	-	900	9000	4575	2300	20000	10050
1983	RIVER TAPI NEAR BARDOLI (KAPP BRIDGE) BARDOLI	28.0	29.0	28.3	5.0	7.7	6.6	7	8.8	8.0	366	486	417	0.9	2.4	1.9	0.30	0.38	0.34	-	-	-	900	1400	1233	2300	3900	3367
2071	RIVER TAPI AT ONGC BRIDGE AT SURAT, DIST. SURAT	22.0	32.0	29.1	3.7	7.1	4.7	7.5	8.9	8.1	1796	45400	26236	1.6	4.5	2.8	0.20	0.80	0.42	-	-	-	2300	14000	7242	7500	39000	18000
1253	GIRNA AT MALEGAON (MANMAD), MAHARASHTRA	26.0	28.0	26.7	5.8	6.4	6.1	8.2	8.8	8.4	235	312	281	4.1	8	6.0	0.20	0.82	0.42	-	-	-	8	14	10	14	25	21
1252	GIRNA AT JALGAON, MAHARASHTRA	26.0	32.0	28.0	5.4	6.1	5.8	8.1	8.9	8.4	169	221	187	4	9	6.3	0.20	0.42	0.28	-	-	-	5	12	8	17	30	22
1907	RANGAVALI D/S OF NAVAPUR	26.0	32.0	29.0	4.9	5.4	5.2	8.1	8.5	8.3	173	465	319	8	12	10	0.14	0.20	0.17	-	-	-	4	12	8	20	25	23
2070	RIVER KIM AT SAHOL BRIDGE, OLPAD HANSOT ROAD, DIST. SURAT	24.0	31.0	28.6	5.1	7.0	6.1	7.3	8.8	7.8	378	1120	853	1.1	3.7	2.4	0.17	0.44	0.28	-	-	-	900	4300	2522	2100	9300	6700
2127	DENWA NEAR SARNI, ROAD BRIDGE	23.0	32.0	26.0	6.0	10.3	7.7	7	8.3	7.8	187	1920	519	0.6	25	4.3	0.05	2.60	0.61	-	-	-	2	11	7	9	1600	297

TABLE 12.1 : - WATER QUALITY OF RIVER MAHANADI - 2009

STATION CODE	LOCATIONS	TEMPERATURE °C			D.O. (mg/l)			pH			CONDUCTIVITY (µmhos/cm)			B.O.D. (mg/l)			NITRATE- N (mg/l)			NITRITE- N (mg/l)			FECAL COLIFORM (MPN/100ml)			TOTAL COLIFORM (MPN/100ml)		
		Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
					> 4 mg/l			6.5-8.5			< 2250 µmhos/cm			< 3 mg/l									< 2500 MPN/100ml			< 5000 MPN/100ml		
1851	MAHANADI AT SIHAWA	24	34	27.5	6.4	9.4	7.3	7.8	8.3	7.98	241	326	285	0.8	0.8	0.8	-	-	-	1.1	1.6	1.35	-	-	-	8	220	96
1264	MAHANADI AT RUDRI U/S AT DHAMTORI RESERVOIR,CHHATISSGARH	24	35	28.5	0.2	9	5.8	7.7	8.4	8.03	278	396	330	1	1	1.0	-	-	-	1	1.2	1.05	-	-	-	13	220	93
1099	MAHANADI AT U/S OF RAJIM, CHHATISSGARH.	23	34.2	27.9	6.8	8.4	7.3	7.5	7.9	7.74	234	345	303	2	2.3	2.2	1.1	1.2	1.15	1.1	1.5	1.26	-	-	-	33	280	134
1852	MAHANADI AT ARRANG, RAIPUR	24	29	26.5	6.5	8.1	7.0	7.6	7.9	7.73	274	330	312	1.8	1.8	1.8	-	-	-	1.1	1.3	1.25	-	-	-	13	240	118
1100	MAHANADI AT KHARAD CHHATISSGARH.	23	34	28.6	6.8	7.1	7.0	7.96	8.7	8.32	135	274	204	0.3	1.3	0.6	0.95	1.711	1.45	0.049	0.06	0.05	-	-	-	5	17	11
1282	MAHANADI AT SHEORINARAYAN VILLAGE, CHHATISSGARH.	23	34	28.5	6.8	6.9	6.9	7.96	8.75	8.40	121	275	219	0.3	1.3	0.6	1.3	1.828	1.55	0.05	0.059	0.05	-	-	-	7	15	11
1467	MAHANADI AFTER CONFL. WITH RIVER MAND,CHHATISSGARH	25	34	29.0	6.8	7.2	7.0	7.65	8.59	8.03	112	224	176	0.2	1.2	0.6	1	1.714	1.39	0	0.057	0.04	-	-	-	5	17	11
1101	MAHANADI AT INTERSTATE BOUNDRY CHHATISSGARH	23	29	25.2	6.8	7.5	7.3	7	8.43	7.66	139	239	188	1.3	2.3	1.7	1.013	1.272	1.10	0.023	0.033	0.03	-	-	-	74	130	94
1281	MAHANADI AT HIRAKUD RESERVOIR, ORISSA	27	36	30.3	6.3	10.3	8.4	7.1	8.4	7.65	120	244	182	0.6	1.4	0.9	0.013	1.14	0.50	0.011	0.05	0.04	110	2100	1125	210	4300	2025
1270	MAHANADI AT SAMBALPUR U/S, ORISSA	17	39	28.5	6.9	10.2	8.2	7.06	8.3	7.80	113	301	179	0.4	2.2	1.3	0.138	1.17	0.52	0.017	0.696	0.25	630	1200	959	1100	1700	1455
1271	MAHANADI AT SAMBALPUR D/S, ORISSA	17	39	28.7	6.8	9.1	7.6	6.76	8.2	7.81	116	258	202	1.6	3.4	2.6	0.104	1.89	0.75	0.05	0.464	0.19	24000	160000	59750	43000	1600000	238083
2405	SAMBHALPUR FDS AT HUMA	18	38	28.7	6	10.1	7.9	6.9	8.4	7.81	118	224	174	0.6	3	1.6	0.05	0.8	0.39	0.01	0.81	0.23	790	22000	7308	1700	43000	12627
1272	MAHANADI D/S (AFTER CONFL. WITH R. ONG SONEPUR U/S), ORISSA	27	38	30.3	6.9	9.3	8.5	7.1	8.3	7.70	113	222	173	0.5	1.4	0.9	0.004	1.07	0.62	0.009	0.05	0.04	700	840	780	940	1700	1235
1274	MAHANADI A/C WITH R. TEL (SONEPUR D/S), ORISSA	27	38	30.3	7	10.7	9.0	7.1	8.5	7.98	143	372	241	1	1.8	1.5	0.158	0.83	0.49	0.008	0.05	0.04	1300	1700	1400	2200	2800	2400
1275	MAHANADI AT TIKARPADA, ORISSA	27	36	30.5	7.4	8.6	7.9	6.7	8	7.55	119	215	184	0.6	1.7	1.0	0.095	0.49	0.28	0.006	0.05	0.04	1200	1700	1425	1500	2800	2300
1276	MAHANADI AT NARSINGHPUR, ORISSA	24	34	27.3	7.2	8.7	7.9	6.8	8.3	7.80	103	255	189	0.4	1.4	1.0	0.076	0.56	0.41	0.01	0.05	0.04	430	1100	680	840	1700	1145
1277	MAHANADI AT CUTTACK U/S, ORISSA	22	36	29.4	6.9	9	8.0	6.77	8.3	7.81	130	218	179	0.4	7.1	1.6	0.12	0.68	0.38	0.003	1.508	0.52	460	1100	768	700	1700	1287
1278	MAHANADI AT CUTTACK D/S, ORISSA	23	36	29.2	6.8	9.7	7.8	6.8	8.4	7.74	129	239	184	1.3	2.9	2.2	0.05	1.39	0.46	0.004	0.87	0.24	430	17000	9411	940	28000	14970
2409	CUTTACK FDS (SERUA) AT SANKHATRASA	22	32	26.4	6.7	9.3	8.1	6.7	8.1	7.60	155	274	210	1.2	2.6	2.0	0.371	2.25	0.84	0.005	0.05	0.04	1300	2800	1780	2200	4300	3000
2406	MUNDALI(WATER INTAKE POINT OF BHUBANESWAR CITY	21	36	28.1	6.9	9	8.1	6.84	8.3	7.67	139	306	192	0.6	1.8	1.1	0.017	1.13	0.44	0.003	0.696	0.25	240	790	577	700	1300	1001
	ESTUARINE ZONE																											
2407	PARADEEP U/S (BEFORE INDUSTRIAL ACTIVITY AT PARADEEP)	23	37	29.7	6.4	9	7.6	7.5	8.2	7.96	221	26020	11532	0.4	1.6	1.0	0.43	1.124	0.71	0.004	0.05	0.03	940	1500	1291	1500	2400	1957
1639	MAHANADI AT PARADEEPD/S, ORISSA	24	36	30.1	5.8	9.1	7.5	7	8.3	7.64	1522	48830	28837	0.8	2.1	1.4	0.839	2.312	1.13	0.003	0.05	0.03	1300	3100	2000	2500	5800	3457
2404	POWER CHANNEL D/S NEAR BURLA	28	35	32.0	6.5	8	7.1	7.3	8.2	7.77	146	200	174	0.4	2.2	1.3	0.021	0.56	0.27	0.009	0.05	0.03	200	580	333	310	840	540

TABLE 12.2 : - WATER QUALITY OF TRIBUTARY STREAMS SEONATH, KHAROON, HASDEO, ARPA, KELO, IB,BHEDEN, KUAKHAI, KATHAJODI,TEL AND BIRUPA - 2009

STATION CODE	LOCATIONS	TEMPERATURE °C			D.O. (mg/l)			pH			CONDUCTIVITY (µmhos/cm)			B.O.D. (mg/l)			NITRATE- N (mg/l)			NITRITE- N (mg/l)			FECAL COLIFORM (MPN/100ml)			TOTAL COLIFORM (MPN/100ml)		
		Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
					> 4 mg/l			6.5-8.5			< 2250 µmhos/cm			< 3 mg/l									< 2500 MPN/100ml			< 5000 MPN/100ml		
1107	SEONATH AT U/S RAJNANDGAON, CHATISSGARH	25	31	26.6	7.2	8	7.5	7.3	7.9	7.50	310	331	322	1.1	1.9	1.5	0.4	0.55	0.45	0.008	0.45	0.08	-	-	-	120	2400	485
1845	SEONATH RIVER WATER SUPPLY WELL, DURG.	25	29	26.7	7.2	7.6	7.4	7.5	7.6	7.53	318	324	321	1	1.6	1.2	0.4	0.458	0.42	0.008	0.008	0.01	-	-	-	120	460	263
1266	SEONATH AT SHIMGA AFTER CONFL WITH R. KHAROON,CHHATISSGARH	23	34	28.3	6.3	8.3	7.0	7.9	8.4	8.10	318	365	349	1.6	1.6	1.6	-	-	-	1.1	1.3	1.23	-	-	-	33	280	139
1265	KHAROON AT RAIPUR U/S, CHHATTISGARH	24	34	28.0	6.5	8.3	7.2	7.4	8.5	7.80	279	330	306	1.1	1.1	1.1	-	-	-	1	1.6	1.28	-	-	-	8	220	110
1847	KHAROON RIVER B/C KHAPRI DRAIN, DURG, RAIPUR ROAD BRIDGE	26	31	27.3	7.3	8	7.6	7.5	7.7	7.58	317	336	327	1.3	1.9	1.6	0.4	0.55	0.49	-	-	-	-	-	-	120	1100	480
1846	KHAROON RIVER A/C KHAPRI DRAIN	26	31	27.3	7.4	7.9	7.6	7.5	7.8	7.63	324	341	333	1.4	2.1	1.8	0.4	0.6	0.50	0.41	0.5	0.46	-	-	-	150	1100	703
1853	KHAROON RIVER BUNDRI, RAIPUR	24	35	28.0	6.4	7.9	6.9	7.4	8.2	7.75	290	346	323	1.6	1.6	1.6	-	-	-	1.2	1.5	1.35	-	-	-	11	240	110
1105	HASDEO AT U/S KORBA,CHHATISSGARH	25	30.2	27.9	6.7	7.6	7.1	7.28	7.4	7.31	-	-	-	1	1.6	1.4	1.6	1.7	1.66	0.06	0.06	0.06	-	-	-	80	254	169
1106	HASDEO AT U/S OF CHAMPA,CHHATISSGARH	23	34	28.3	6.8	7.2	7.0	7.96	8.73	8.37	120	256	157	0.3	1.4	0.7	1.25	1.75	1.50	0.049	0.069	0.05	-	-	-	10	22	13
1848	ARPA RIVER D/S OF BILASPUR	27	27	27.0	7	7	7.0	7.89	7.89	7.89	144	144	144	2.4	2.4	2.4	1.749	1.749	1.75	0.049	0.049	0.05	-	-	-	48	48	48
1849	KELO RIVER U/S OF RAIGARH	23	29	25.0	6.7	7.4	7.1	7.06	7.89	7.59	164	196	183	0.9	2.6	1.9	0.965	1.109	1.05	0.025	0.033	0.03	-	-	-	79	240	134
1850	KELO RIVER D/S OF RAIGARH	23	29	25.2	6.6	7.8	7.1	7.13	8.43	7.86	176	218	193	1.2	2.9	2.3	1.007	1.13	1.08	0.027	0.034	0.03	-	-	-	94	240	165
1267	IB AT SUNDARGARH, ORISSA	20	39	30.4	7.3	9.2	8.3	6.8	8.2	7.71	66	178	129	0.3	1.4	1.0	0.05	0.73	0.31	0.05	0.696	0.32	700	1700	1033	1100	2100	1542
1268	IB AT JHARSUGUDA (INTAKE), ORISSA	18	37	28.3	6.2	9	7.9	6.72	8.2	7.59	74	188	144	0.4	1.6	1.0	0.034	0.69	0.29	0.05	1.16	0.33	1100	2100	1500	2100	3500	2533
1300	IB AT RAJ NAGAR U/S, ORISSA	18	38	28.8	6.5	9.3	7.8	7	8.3	7.74	66	209	145	0.4	2.2	1.0	0.05	0.94	0.56	0.05	0.70	0.42	700	1700	1000	940	2100	1495
1269	IB AT BRAJRAJNAGAR (INTAKE) D/S, ORISSA	18	38	29.0	6	9	7.7	7.1	8.4	7.92	80	600	200	0.6	2.4	1.4	0.05	1.098	0.46	0.05	0.812	0.43	840	1400	1138	1400	2400	1827
2403	BHEDEN RIVER BEFORE CONFLUENCE WITH IB RIVER	18	37	27.9	6.9	9.2	7.8	6.94	8.4	7.84	107	309	205	0.4	2.2	0.9	0.2	1.27	0.53	0.016	1.04	0.40	78	940	224	130	1500	473
1279	KUAKHAI AT BHUBANESWAR U/S, ORISSA	23	36	29.3	7	15.4	8.6	6.9	8.2	7.58	124	229	180	0.8	2.5	1.8	0.14	1.65	0.77	0.006	0.464	0.14	790	2200	1491	1100	3500	2492
2410	BHUBANESWAR FU/S	24	36	29.3	7.3	9.4	8.1	7.1	8.3	7.70	117	212	164	0.4	4	1.5	0.05	1.9	0.51	0.005	0.696	0.20	240	840	614	700	1400	1030
1280	KUAKHAI AT BHUBANESWAR D/S, ORISSA	22	37	29.1	6	14	7.9	6.8	8.1	7.29	130	336	229	2.1	5.6	4.0	0.05	7.072	2.29	0.014	0.348	0.12	3100	14000	8467	6300	150000	25475
2411	BHUBANESWAR FD/S (2 KM AFTER CONFLUENCE OF GANGUA NALLAH WITH RIVER DAYA)	22	36	28.4	6	13.1	7.8	6.8	8.4	7.48	122	358	218	0.8	5.1	2.8	0.05	7.067	1.69	0.02	0.58	0.18	1300	7900	4450	2200	14000	8225
1301	KATHAJODI AT CUTTACK D/S, ORISSA	22	33	28.2	5.5	9.1	7.4	6.7	8.4	7.92	136	245	192	2.2	4.8	3.5	0.22	1.04	0.53	0.004	0.522	0.16	5400	92000	41450	9400	160000	86033
2408	TEL	27	38	30.3	6.5	10.4	8.9	7	8.05	7.49	123	236	186	0.5	2.2	1.2	0.05	1.18	0.46	0.009	0.05	0.04	580	1300	980	1200	2100	1625
	ESTUARINE ZONE																											
1640	BIRUPA AT CHOUDWAR, ORISSA	25	32	27.8	7.2	8.2	7.7	6.9	8.5	7.93	91	199	156	0.6	0.8	0.7	0.1	0.243	0.17	0.003	0.05	0.03	1100	1300	1200	1700	2400	2025

TABLE 13.1 : - WATER QUALITY OF RIVER BRAHMANI AND ITS TRIBUTARY STREAMS KOEL, KARO, SANKHA, KHARASROTA & AUL - 2009

STATION CODE	LOCATIONS	TEMPERATURE °C			D.O. (mg/l)			pH			CONDUCTIVITY (µmhos/cm)			B.O.D. (mg/l)			NITRATE- N (mg/l)			NITRITE- N (mg/l)			FECAL COLIFORM (MPN/100ml)			TOTAL COLIFORM (MPN/100ml)		
		Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
					> 4 mg/l			6.5-8.5			< 2250 µmhos/cm			< 3 mg/l									< 2500 MPN/100ml			< 5000 MPN/100ml		
1037	BRAHMANI AT U/S PANPOSH, ORISSA	25	39	30.3	7.4	9.7	8.2	7.1	8.4	7.8	69.9	228	125	0.4	2.7	1.1	0.05	2.446	0.62	0.004	0.05	0.03	630	2200	1146	940	2800	1728
1038	BRAHMANI AT D/S PANPOSH, ORISSA	25	40	30.7	4.5	11.5	7.4	6.9	8.3	7.6	173	431	291	2.6	5.8	4.5	0.81	7.056	3.36	0.05	0.05	0.05	4600	13000	8150	9400	22000	13900
1302	BRAHMANI AT ROURKELA D/S, ORISSA	24	40	30.3	6.2	18.3	8.7	6.7	8.3	7.6	88.3	395	251	2.4	5.4	3.7	0.284	6.42	2.69	0.05	0.05	0.05	1400	11000	5067	2100	17000	8267
2414	ROURKELA FDS AT BIRITOLA	25	30	26.6	7.1	11	8.6	6.8	8.3	7.6	88.3	392	211	1.5	4	2.5	0.11	1.063	0.50	0.05	0.05	0.05	1100	9400	3980	1400	15000	7260
1039	BRAHMANI AT BONAIGARH, ORISSA	24	28	26.3	6.8	11	9.0	7.5	8.4	7.9	184	235	212	0.7	2.5	1.6	0.121	0.95	0.58	0.006	0.05	0.04	1400	1700	1550	2100	2800	2450
1040	BRAHMANI AT RENGALI, ORISSA	27	32	28.8	7.7	10.6	9.4	6.6	8.2	7.3	93	219	149	0.6	2.2	1.5	0.179	1.17	0.50	0.05	0.05	0.05	790	1400	993	1100	2100	1550
1041	BRAHMANI AT SAMAL, ORISSA	27	33	28.8	6.9	9.9	8.4	7.1	8.2	7.7	132	216	178	0.9	2.1	1.3	0.307	1.21	0.65	0.05	0.05	0.05	630	1100	805	940	1700	1310
1303	BRAHMANI AT TALCHER U/S, ORISSA	21	38	28.6	7.4	9.4	8.1	6.6	8.2	7.7	91.9	199	142	0.6	1.9	1.2	0.05	2.07	0.54	0.003	0.05	0.03	940	2100	1478	1700	3500	2433
2415	TALCHER FU/S (INTAKE WELL OF MCL, TALCHER)	22	38	29.5	6.6	9.1	7.9	6.9	8.5	7.7	99	190	146	0.2	1.8	0.9	0.05	1.06	0.35	0.002	0.05	0.03	460	1300	825	940	2100	1444
2416	TALCHER FD/S	25	40	29.1	7.2	9.6	8.2	6.7	8.4	7.9	128	227	175	0.2	2.2	1.2	0.05	0.5	0.24	0.004	0.05	0.03	1300	2700	1873	2100	4300	3164
1042	BRAHMANI AT KAMALANGA, ORISSA	23	39	29.8	7.4	10	8.2	6.7	8.4	7.7	120.9	251.1	173	0.9	2.4	1.8	0.049	2.44	0.52	0.003	0.05	0.03	2200	7000	3658	2800	11000	7100
2417	DHENKANAL D/S, DHENKANAL TOWN	27	36	30.8	7.3	9.1	8.4	7.7	8.3	8.0	191	276	236	0.5	1.5	1.0	0.087	0.541	0.36	0.004	0.05	0.03	1100	1700	1350	1400	2800	2000
1043	BRAHMANI AT BHUBAN, ORISSA	27	37	30.7	7.3	8.7	7.8	7.5	8.1	7.9	101	383	206	0.6	1.6	1.0	0.04	0.77	0.35	0.011	0.05	0.04	1300	2800	1933	2200	4300	3100
2418	KABATABANDHA (BEFORE IMPACT OF INDUSTRIAL ACTIVITY IN KALINGANAGAR AREA)	25	33	29.0	7.4	8.5	7.9	7.1	8	7.7	100	171	137	0.8	1.7	1.2	0.05	0.25	0.15	0.009	0.05	0.04	1200	1700	1400	1500	3500	2350
1044	BRAHMANI AT DHARMASHALA, ORISSA	25	37	28.8	7.2	8.4	8.1	7.3	8.1	7.9	120	236	188	0.8	2.2	1.4	0.42	1.226	0.75	0.002	0.05	0.03	1300	2400	1775	2400	5400	3700
1045	BRAHMANI AT PATTAMUNDAI, ORISSA	24	38	29.7	6.7	9.8	8.5	7.4	8.3	8.0	111	258	183	0.4	2.6	1.3	0.05	0.92	0.41	0.008	0.05	0.03	940	1700	1403	1500	2800	2325
1033	KOEL AT BASIA,DAM U/S,JHARKHAND	25	29.5	27.0	6.7	7.9	7.3	6.2	7.4	7.0	-	-	-	0.6	4.8	2.1	-	-	-	-	-	-	200	430	263	750	1500	1085
2413	KOEL U/S (AFTER CONFLUENCE OF RIVER KARO)	25	30	26.4	6.2	11.3	8.6	7.4	8.3	7.8	140	389	235	1	12	3.4	0.14	6.691	2.00	0.004	0.05	0.03	630	1300	932	1300	2600	1700
2376	NORTH KOEL U/S DALTANGANJ	21.5	34.5	27.8	6	7.8	7.1	6.7	7.2	7.0	-	-	-	1	3.6	1.9	-	-	-	-	-	-	200	280	228	750	1200	930
2377	NORTH KOEL D/S BCCL, REHLA	21	33	28.7	6.7	7.9	7.3	6.5	7.2	6.9	-	-	-	1.2	4.2	2.2	-	-	-	-	-	-	210	280	235	750	1500	1130
1035	KARO AT LOHOJIMI U/S, JHARKAND	12.3	31	25.4	6.9	7.7	7.3	6.6	7.4	7.0	-	-	-	0.9	4.8	2.1	-	-	-	-	-	-	150	430	262	750	1500	1180
1034	SANKH AT BOLBA, JHARKAND	20	30	26.5	6.8	8	7.4	6	7.5	7.1	-	-	-	0.8	4.9	2.5	-	-	-	-	-	-	110	430	207	750	1500	1280
2412	SANKHA U/S (D/S OF MANDIRA DAM)	26	32	28.5	7.5	9.6	8.5	7.1	8.2	7.65	152	237	215	1.3	1.8	1.6	0.09	3.611	1.14	0.002	0.05	0.03	630	1100	783	1200	1700	1375
2419	KHANDITARA (D/S OF INDUSTRIAL ACTIVITIES AT KALINGA NAGAR)	25	32	27.3	7.1	8.5	7.7	6.6	8	7.4	128	293	196	1.4	2.4	2.0	0.045	2.552	0.94	0.025	0.05	0.04	1300	2200	1575	1700	3500	2275
2420	AUL	25	39	28.9	6.7	8.8	7.9	7.3	8.2	7.8	97	267	158	0.8	2.6	1.4	0.05	1.177	0.46	0.046	0.05	0.05	2100	**3500**	2511	2800	**5400**	4533

TABLE 13.2 : - WATER QUALITY OF RIVER BAITARNI AND ITS TRIBUTARY KUSEI - 2009

STATION CODE	LOCATIONS	TEMPERATURE °C			D.O. (mg/l)			pH			CONDUCTIVITY (µmhos/cm)			B.O.D. (mg/l)			NITRATE- N (mg/l)			NITRITE- N (mg/l)			FECAL COLIFORM (MPN/100ml)			TOTAL COLIFORM (MPN/100ml)		
		Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
					> 4 mg/l			6.5-8.5			< 2250 µmhos/cm			< 3 mg/l									< 2500 MPN/100ml			< 5000 MPN/100ml		
1081	BAITARNI AT JODA ORISSA	25	38	28.8	7.5	8.4	8.0	7.3	8.2	7.8	73	201	136	0.6	1.5	1.1	0.26	1.6	0.68	0.005	0.05	0.04	460	940	648	840	1200	1020
1082	BAITARNI AT ANANDPUR, ORISSA	26	30	27.8	7.3	9	8.1	6.9	8.2	7.7	69	212	158	1.1	1.9	1.6	0.18	2.05	0.68	0.003	0.05	0.03	1300	2200	1850	2400	4300	3250
1083	BAITARNI AT JAJPUR ORISSA	27	36	29.8	6.9	8.6	7.7	6.9	8.1	7.5	75	236	172	0.7	2.3	1.5	0.041	0.4	0.27	0.029	0.05	0.04	1500	2800	2200	2100	5400	4025
1084	BAITARNI AT CHANDBALI, ORISSA	28	35	30.8	6.1	8.4	7.2	7.1	7.8	7.5	281	13220	4337	0.7	2.1	1.4	0.11	1.235	0.59	0.012	0.05	0.04	1100	2200	1675	1700	4300	2925
	ESTUARINE ZONE																											
1085	BAITARNI AT DHAMRA ORISSA	26	34	29.0	6.2	6.9	6.6	6.7	8.2	7.3	646	28400	15632	1.1	3.4	2.2	0.28	1.921	1.20	0.007	0.05	0.04	230	1100	743	630	1700	1168
2421	KUSEI BEFORE JOINING WITH BAITARANI RIVER AT ANANDPUR	27	29	27.7	7.3	8.3	7.9	7.8	8.4	8.1	121	433	227	1.1	2	1.6	0.05	0.299	0.16	0.05	0.05	0.05	700	1400	963	1100	2100	1533

TABLE 14.1 :- WATER QUALITY OF RIVER SUBARNAREKHA AND ITS TRIBUTARY JUMAR- 2009

STATION CODE	LOCATIONS	TEMPERATURE °C			D.O. (mg/l)			pH			CONDUCTIVITY (µmhos/cm)			B.O.D. (mg/l)			NITRATE- N (mg/l)			NITRITE- N (mg/l)			FECAL COLIFORM (MPN/100ml)			TOTAL COLIFORM (MPN/100ml)		
		Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
	WATER QUALITY CRITERIA				> 4 mg/l			6.5-8.5			< 2250 µmhos/cm			< 3 mg/l									< 2500 MPN/100ml			< 5000 MPN/100ml		
1641	SUBARNAREKHA AT RAJGHAT NEAR BIHAR BORDER, ORISSA	27.0	32.0	29.0	7.6	8.2	7.9	7.2	8.4	7.9	168	717	371	0.4	1.5	1.1	0.55	0.86	0.69	0.01	0.50	0.19	230	1300	983	480	2400	1745
2397	SUBARNAREKHA AT GATALSUD DAM	23.0	29.0	26.2	5.2	7.8	7.3	6.5	7.5	6.9	-	-	-	0.5	5.5	2.7	-	-	-	-	-	-	70	230	180	750	1200	876
23	SUBARNAREKHA AT RANCHI,(TATISILWAI) JHARKHAND	22.0	30.0	26.3	5.6	8.5	6.9	6.5	7.0	6.8	-	-	-	0.5	6.3	3.6	-	-	-	-	-	-	230	430	272	1200	2400	2000
2386	SUBARNAREKHA AT MURI ROAD BRIDGE	22.0	40.0	29.8	5.9	7.9	7.0	6.4	8.0	7.1	-	-	-	1.0	3.4	1.7	-	-	-	-	-	-	200	750	362	640	1500	1182
2385	SUBARNAREKHA AT NAMKUM ROAD BRIDGE	20.0	32.0	26.9	4.0	8.5	6.6	6.5	7.5	6.8	-	-	-	2.4	6.3	4.5	-	-	-	-	-	-	430	930	513	1500	2400	2250
1762	SUBARNAREKHA AT BIHAR - WEST BENGAL BORDER, WEST BENGAL	21.5	35.0	28.1	6.6	6.8	6.8	6.4	7.6	7.0	265	325	298	0.4	1.4	1.0	-	-	-	-	-	-	540	920	825	920	1600	1430
2395	SUBARNAREKHA AT HATIA DAM	19.5	32.5	25.6	6.9	8	7.4	6.5	7.3	6.9	-	-	-	0.5	3.2	1.5	-	-	-	-	-	-	70	230	158.3	280	1500	1071.7
2399	SUBARNAREKHA AT CHANDIL DAM	-	-	-	-	-	-	7.4	7.4	7.4	164	164	164	0.7	0.7	0.7	-	-	-	3.88	3.88	3.88	-	-	-	-	-	-
2396	JUMAR AT KANKE DAM	21	31	26.6	5.5	7.8	6.8	6.5	7.4	6.8	-	-	-	1.3	10	4.9	-	-	-	-	-	-	210	750	410	930	2400	1812

TABLE 15.1 :- WATER QUALITY OF RIVER GODAVARI - 2009

STATION CODE	LOCATIONS	TEMPERATURE °C			D.O. (mg/l)			pH			CONDUCTIVITY (µmhos/cm)			B.O.D. (mg/l)			NITRATE- N (mg/l)			NITRITE- N (mg/l)			FECAL COLIFORM (MPN/100ml)			TOTAL COLIFORM (MPN/100ml)		
		Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
					> 4 mg/l			6.5-8.5			< 2250 µmhos/cm			< 3 mg/l									< 2500 MPN/100ml			< 5000 MPN/100ml		
1312	GODAVARI AT JAYAKWADI DAM, AURNAGABAD, MAHARASHTRA	20	41	27.5	3.4	7.2	5.6	7.26	8.2	7.7	300	756	392	2	5.4	3.9	0.1	1.5	0.7	-	-	-	4	9	6	240	350	277
2177	GODAVARI RIVER NEAR SOMESHWAR TEMPLE.	22	32	26.3	4.7	6.2	5.4	7.2	8.4	7.7	137	443	238	4	10	6.4	0.1	1.9	0.5	-	-	-	5	14	8	17	40	24
2182	GODAVARI RIVER AT SAIKHEDA.	21	33	26.3	5.2	7.4	6.0	7.2	8.2	7.9	211	569	377	4	8	6.3	0.1	1.7	0.6	-	-	-	5	17	10	15	30	24
2179	GODAVARI RIVER AT HANUMAN GHAT, NASHIK CITY	22	32	26.5	4.3	6	5.3	6.6	8.9	8.0	217	566	393	3	14	8.5	0.1	1.5	0.6	1.8	1.8	1.8	6	25	10	17	35	26
2183	GODAVARI RIVER AT NANDUR- MADMESHWAR DAM.	23.7	33	26.9	5	7	5.6	6.8	8.44	7.9	182	550	298	4	7	5.6	0.1	1.1	0.4	-	-	-	2	8	5	9	20	15
2181	GODAVARI RIVER AT KAPILA- GODAVARI CONFLUENCE POINT, TAPOVAN.	21	32	26.1	3.9	5.9	5.3	6.6	8.8	7.9	189	642	425	4.8	22	11.3	0.1	2.2	0.6	0.1	0.2	0.1	8	30	16	30	55	40
2180	GODAVARI RIVER NEAR TAPOVAN.	22	32	26.1	4.5	6.2	5.3	6.2	8.9	8.0	209	647	448	7	26	12.6	0.1	1.2	0.5	-	-	-	8	35	17	30	55	40
1096	GODAVARI AT PANCHAVATI AT RAMKUND,MAHARASHTRA	24	34	27.3	4.7	6	5.2	7.3	8.44	8.1	155	482	325	6	16	9.7	0.1	4.0	0.6	-	-	-	9	20	13	25	45	35
1211	GODAVARI AT NASIK D/S, MAHARASHTRA	24	34	27.4	4.4	6.9	5.3	7.6	8.9	8.1	192	572	380	4.5	14	9.2	0.0	4.4	0.6	-	-	-	12	25	17	30	50	42
1095	GODAVARI AT U/S OF GANGAPUR DAM,NASIK,MAHARASHTRA	22	32	26.5	5.2	6.7	5.8	7.4	8.7	7.9	128	287	169	3	12	5.9	0.1	2.6	0.4	-	-	-	2	14	5	9	30	16
2160	GODAVARI RIVER AT U/S OF AURANGABAD RESERVOIR, KAIGAON TOKKA NEAR KAIGAON BRIDGE.	20	39	26.6	3.9	7.1	5.6	7.3	8.4	7.9	300	1430	971	1.7	5.2	3.5	1.1	2.1	1.5	-	-	-	4	40	11	240	350	300
2158	GODAVARI RIVER AT U/S OF PAITHAN AT PAITHAN INTAKE PUMP HOUSE AT JAYAKWADI	20	39	27.6	3.7	7.5	5.5	7.1	8.5	7.8	315	526	380	3	5.4	4.1	0.1	0.9	0.5	-	-	-	4	7	6	240	350	287
2159	GODAVARI RIVER AT D/S OF PAITHAN AT PATHEGAON BRIDGE.	20	39	27.3	3.7	7.5	5.5	7.2	9.2	8.1	426	1430	956	2.4	5.2	4.1	0.9	11.7	6.8	-	-	-	4	8	7	240	350	289
2161	GODAVARI RIVER AT JALNA INTAKE WATER PUMP HOUSE, SHAHABAD	26	29	27.6	3.8	7.2	5.1	6.9	8.3	7.7	327	3169	1328	2.4	5.2	3.8	0.1	10.8	4.0	-	-	-	6	8	7	240	350	290
12	GODAVARI AT DHALEGAON, MAHARASHTRA	27	27	27.0	3.3	7.1	5.2	6.98	8.1	7.6	249	891	459	2.8	7.2	4.3	0.4	3.1	1.3	-	-	-	5	8	7	240	350	286
1210	GODAVARI AT NANDED, MAHARASHTRA	27	27	27.0	5.7	7	6.4	8	8.13	8.1	345	510	428	3.5	3.82	3.7	0.2	1.3	0.8	-	-	-	7	9	8	280	350	315
1209	GODAVARI AT RAHER, MAHARASHTRA	27	31	28.5	3.2	7.4	5.5	7.18	8.4	7.9	127	776	464	2.8	4.8	3.9	0.3	2.5	1.0	-	-	-	4	8	6	240	350	283
2360	GODAVARI AT BASARA, ADILABAD	15	30	24.9	3.9	6.5	5.0	7.1	8.5	7.8	313	766	545	0	3.5	2.0	0.4	3.8	1.3	-	-	-	0	13	6	5	500	191
2361	GODAVARI AT MANCHERIAL NEAR RLY BDG B/C OF RALLAVAGU	24	28	26.6	6.2	12.1	8.7	7	8.7	8.0	383	585	478	0.7	6.4	2.6	0.1	1.0	0.3	0.1	0.1	0.1	2	20	9	17	210	71
2362	GODAVARI AT RAMAGUNDAM D/S. NEAR FCI INTAKE WELL, KARIMNAGAR	24	28	26.5	7	11	8.7	7.3	8.9	8.1	412	580	504	1.2	5.1	2.5	0.1	1.0	0.3	0.1	0.1	0.1	2	340	49	14	3000	589
2363	GODAVARI AT GODAVARIKHANI, NEAR BATHING GHAT, KARIMNAGAR	24	28	26.4	3.5	10.2	6.6	7.2	8.4	7.8	453	648	571	2.4	7	5.2	0.1	2.9	1.0	0.1	0.8	0.4	7	280	82	50	2400	713
2364	GODAVARI AT RAMAGUNDAM U/S., KARIMNAGAR	24	28	26.4	7.7	12.3	9.0	7	8.8	8.1	379	886	535	0.9	6.3	2.6	0.1	1.0	0.3	0.1	0.1	0.1	2	40	11	17	900	300
2356	GODAVARI, D/S OF RAMANUGUNDAM.	24	28	26.4	6.9	9.7	7.8	7.3	8.9	8.0	393	760	535	0.2	3.5	1.9	0.1	1.0	0.2	0.1	0.1	0.1	2	280	39	23	2400	354
2365	GODAVARI AT KAMALPUR U/S M/S AP RAYONS LTD. INTAKE WELL, WARANGAL	24	30	26.9	6	7.9	6.8	7	8.4	7.8	148	547	355	0.3	2.2	0.95	0.1	1.3	0.3	0.1	0.1	0.1	2	280	36	11	2400	600
2366	GODAVARI AT KAMALPUR D/S AT M/S. AP RAYONS LTD DISCHARGE POINT, WARANGAL	24	30	27.3	5.8	7.3	6.8	7	8.4	7.9	159	546	354	0.4	2.3	1.06	0.1	1.3	0.3	0.1	0.1	0.1	2	150	37	14	1600	457
13	GODAVARI AT MANCHERIAL, A.P.	24	28	26.2	4.4	12.2	8.5	7	8.8	8.1	369	584	481	0.5	5.8	2.61	0.1	0.9	0.2	0.1	0.1	0.1	2	90	18	17	16000	1498
2367	GODAVARI AT BHADRACHALAM U/S BATHING GHAT, KHAMMAM	20	29	22.9	5.2	10	7.4	7.4	8.6	7.9	115	510	321	0.6	2.2	1.21	0.1	0.1	0.1	0.1	0.1	0.1	2	6	3	800	2800	1650
2368	GODAVARI AT BHADRACHALAM D/S BATHING GHAT, KHAMMAM	20	27	23.2	4.1	8.4	6.9	7	8.5	7.7	125	990	449	1.2	5	2.84	0.1	1.4	0.3	0.1	0.5	0.2	2	14	6	900	9000	2583
2369	GODAVARI AT BURGAMPAHAD, KHAMMAM	20	26	22.7	3.2	8	6.0	6.7	8.4	7.5	149	1193	714	1	6.2	3.26	0.1	1.8	0.8	0.1	0.1	0.1	2	7	4	800	3500	1783
2370	GODAVARI AT RAJAMUNDRY U/S OF NALLA CHANNEL	20	27.5	24.0	6.4	9	6.8	6	8.1	7.2	139	289	207	1	1.4	1.13	0.1	6.9	1.9	0.1	0.1	0.1	3	3	3	21	460	101
14	GODAVARI AT POLAVARAM, A.P.	23.8	28.5	26.3	7	7.8	7.5	6.6	7.9	7.4	127	265	187	0.8	1.4	1.05	0.1	0.8	0.4	0.1	0.1	0.1	3	3	3	11	240	60
1218	GODAVARI AT RAJAHMUNDRY U/S, A.P.	23.8	27	24.8	6.2	6.6	6.4	6.5	8.2	7.5	178	228	199	1	1.2	1.08	0.3	0.5	0.4	0.1	0.1	0.1	3	4	3	15	64	47
2371	GODAVARI AT RAJAMUNDRY D/S OF NALLA CHANNEL	22	29.2	25.0	5.5	7.4	6.2	6	8.3	7.1	157	296	219	1	1.6	1.31	0.2	8.7	2.2	0.3	0.3	0.3	3	7	4	43	1100	306
1219	GODAVARI AT RAJAHMUNDRY D/S, A.P.	21	30	25.7	6.2	7	6.6	6.3	8.4	7.5	134	275	192	0.8	1.4	1.08	0.1	6.5	2.2	0.1	0.1	0.1	3	4	3	39	1100	190
2157	GODAVARI RIVER AT LATUR WATER INTAKE NEAR PUMP HOUSE AT DHAMEGAON.	22	24.1	22.7	3.8	4.6	4.1	7.8	8.2	8.0	265	366	308	4.8	5	4.93	0.4	0.5	0.4	-	-	-	7	7	7	300	350	333

TABLE 15.2 :- WATER QUALITY OF TRIBURATY STREAMS INDRAVATI, SHANKINI, MANJEERA, MANER, WARDHA, WAINGANGA, KOLAR, KANHAN, PURNA, NIRA, KINNERSANI & SABARI - 2009

STATION CODE	LOCATIONS	TEMPERATURE °C			D.O. (mg/l)			pH			CONDUCTIVITY (µmhos/cm)			B.O.D. (mg/l)			NITRATE- N (mg/l)			NITRITE- N (mg/l)			FECAL COLIFORM (MPN/100ml)			TOTAL COLIFORM (MPN/100ml)		
		Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
					> 4 mg/l			6.5-8.5			< 2250 µmhos/cm			< 3 mg/l									< 2500 MPN/100ml			< 5000 MPN/100ml		
1854	INDRAVATI RIVER A/C DANTEWADA RIVER, NELSONNAR, DANTEWADA	26	30	28.3	7.6	7.8	7.7	7.6	7.85	7.8	-	-	-	0.6	2	1.23	-	-	-	-	-	-	-	-	-	4	12	7.5
1855	INDRAVATI B/C GODAVARI AT BHOPALPATNAM, DANTEWADA	22	22	22.0	8.1	8.1	8.1	7.6	7.6	7.6	310	310	310	2.4	2.4	2.40	0.4	0.4	0.4	-	-	-	1100	1100	1100	2200	2200	2200
1856	SHANKNI RIVER A/C DANKANI RIVER DANTEWADA.	26	30	28.3	7.4	7.9	7.7	7.3	7.7	7.6	-	-	-	0.9	2	1.40	-	-	-	-	-	-	-	-	-	6	18	11
2374	RIVER MANJEERA AT GOWDICHARLA B/C WITH NAKKAVAGU	23.5	37	29.5	2.9	5.9	4.5	7.2	8.5	8.0	163	384	330	0	3.4	1.68	0.2	1.3	0.5	-	-	-	0	60	12	2	800	221
2375	RIVER MANJEERA AT GOWDICHARLA A/C WITH NAKKAVAGU	23.5	36	28.8	3	4.9	3.8	7.1	8.2	7.7	388	1003	588	1	4.9	2.85	0.7	6.3	2.9	-	-	-	2	11	4	12	1000	326
1781	MANJEERA NEAR GANAPATHI SUGARS , MEDAK, A.P.	24	38	29.7	2.9	5.8	4.4	7.2	8.9	7.9	190	390	324	1.5	3.5	2.53	0.2	1.5	0.6	-	-	-	0	1370	343	4	2400	726
1891	MANJRA AT D/S IN INTAKE POINT TO BIDAR CITY	26	29	27.4	8	8.3	8.0	7.2	8	7.5	400	740	627	1	4.6	2.40	0.1	1.3	0.5	-	-	-	23	900	344	50	1600	895
1215	MANER AT WARANGAL U/S, A.P.	25	30	27.8	6	8.1	7.3	7.3	8.4	8.0	224	633	452	1.5	3.4	2.15	0.2	9.4	4.8	0.1	0.1	0.1	2	90	29	17	300	154
1158	MANER AT SOMNAPALLI, A.P.	24	29	26.3	6.7	9.5	8.2	7.2	8.4	7.9	284	534	416	1.3	3.9	2.51	0.1	6.9	1.6	0.1	0.1	0.1	2	70	17	23	500	153
2174	WARDHA RIVER D/S OF ACC GHUGGUS	22	28	25.0	5	6.38	5.7	6.7	8.6	7.9	247	673	375	5.3	14.4	7.88	0.4	9.5	2.5	-	-	-	50	140	100	90	350	180
2156	WARDHA AT CONFL PT OF PENGANGA & WARDHA, JUAD	22	28	23.5	3.4	6.8	5.4	7.6	8.2	8.0	245	680	397	6.7	9.8	7.53	0.1	8.7	3.4	-	-	-	13	50	27	22	70	53
1212	WARDHA AT RAJURA BRIDGE, MAHARASHTRA	28	33	30.3	4.2	5.6	5.1	7.6	8.2	7.9	312	831	546	6.9	13	9.37	2.0	4.3	2.9	-	-	-	21	300	154	170	500	297
1213	WAINGANGA AT BALAGHAT, M.P.	17.2	28	22.2	-	-	-	7.1	7.9	7.6	282	724	477	1.1	2.1	1.59	0.1	2.9	1.2	-	-	-	0	14	1	28	1100	174
1214	WAINGANGA AT CHINDWARA, M.P.	19	25	22.2	-	-	-	7.3	8	7.8	294	1151	544	1.8	3	2.25	0.2	3.0	1.2	-	-	-	0	7	1	64	1100	314
1910	WAINGANGA AFTER CONLUENCE WITH KANHAN	20	27	23.0	3.4	6	5.1	7.3	8.3	7.9	257	648	462	6.5	32	15.17	2.0	5.5	3.8	-	-	-	22	900	407	350	1600	1183
2173	WAINGANGA RIVER U/S OF ELLORA PAPER MILL	20	32	27.8	5.6	7.7	6.3	7.8	8.4	8.1	192	1184	527	4.5	6.8	5.57	0.2	10.5	2.7	-	-	-	14	140	55	26	170	96
2172	WAINGANGA RIVER D/S OF ELLORA PAPER MILL	20	32	27.5	4.4	6.6	5.5	7.7	8.3	8.1	212	1400	552	4.9	18	8.16	0.2	15.4	2.9	-	-	-	40	350	172	110	1600	405
2175	WAINGANGA U/S OF GAURAV PAPER MILLS, NEAR JACKWELL	18	27	24.0	5.6	7	6.4	6.8	8.6	8.0	266	573	389	2.9	10	6.14	0.6	2.4	1.2	-	-	-	22	170	88	90	220	163
2176	WAINGANGA D/S OF GAURAV PAPER MILLS, NEAR JACKWELL	18	27	24.0	4.9	6.3	5.6	7.8	8.5	8.1	240	624	417	5.2	14	7.46	0.7	2.3	1.2	-	-	-	34	240	143	140	900	361
11	WAINGANGA AT ASHTI, MAHARASHTRA	18	32	25.4	5	6.5	5.7	7.2	8.8	8.1	224	452	313	4.2	10	6.39	0.1	10.1	2.0	-	-	-	13	500	133	30	1600	336
1908	KOLAR BEFORE CONFLUENCE TO KANHAN AT KAMPTEE	20	22	20.7	5.4	5.6	5.5	8.1	8.5	8.2	274	1230	660	7	16	10.37	0.5	2.4	1.2	-	-	-	17	90	66	70	170	127
1909	KANHAN D/S OF NAGPUR	25	27	26.0	4.3	5.8	5.2	7.2	8.2	7.6	299	1092	651	7	15	9.73	2.5	3.9	3.2	-	-	-	14	900	378	140	1600	697
2170	KANHAN U/S OF M/S VIDHARBHA PAPER MILL, SINORA	20	30	21.6	4.9	6.81	5.9	7.3	8.6	7.9	196	666	363	3.7	12	6.50	0.2	2.5	1.1	-	-	-	2	70	32	5	140	75
2171	KANHAN D/S OF M/S VIDHARBHA PAPER MILL, SINORA	20	23	20.8	3	6.2	5.0	7.4	8.5	7.9	191	1688	530	4.9	27	9.62	0.2	8.8	2.0	-	-	-	7	90	48	22	500	144
1913	PURNA AT DHUPESHWAR	28	31	29.0	5.6	6.2	5.9	8	8.7	8.3	251	770	517	5.8	7	6.57	1.7	3.2	2.7	-	-	-	33	500	294	500	900	767
2155	PURNA RIVER A/C OF MORNA, NANDURA VILLAGE	27.0	32.0	28.7	4.8	6.2	5.6	7.5	8.3	7.8	289	3087	1453	6.5	16	9.9	0.71	2.40	1.77	-	-	-	140	900	463	900	1600	1367
1315	NIRA AT PULGAON COTTON MILL, WARDHA	20	30	25.6	4.2	6.8	5.9	7.4	8.9	8.2	272	844	436	4.1	23	8.08	0.2	9.2	2.3	-	-	-	17	220	47	33	500	150
1157	MANJERA AT RAIPALLU, A.P.	20.5	35	28.6	3	6	4.7	7.4	8.6	7.9	243	501	360	1.4	4.4	2.88	0.2	1.8	0.9	-	-	-	0	3	2	12	550	142
2372	KINNERASANI A/C OF KTPS ASH POND EFFLUENTS, KHAMMAM	20	25	22.5	4.3	9	7.2	6.9	8.5	7.8	304	535	421	0.4	4.8	2.2	0.1	0.84	0.28	0.05	0.05	0.05	2	7	4	1100	3000	1975
2373	SABARI AT KUNAVARAM, KHAMMAM	25	30	26.1	4.5	9	7.4	6.9	8.5	7.6	70	192	98	0.2	3.7	1.63	0.1	0.1	0.1	0.1	0.1	0.1	2	4	3	800	1700	1182

TABLE 16.1 :- WATER QUALITY OF RIVER KRISHNA - 2009

STATION CODE	LOCATIONS	TEMPERATURE °C			D.O. (mg/l)			pH			CONDUCTIVITY (µmhos/cm)			B.O.D. (mg/l)			NITRATE- N (mg/l)			NITRITE- N (mg/l)			FECAL COLIFORM (MPN/100ml)			TOTAL COLIFORM (MPN/100ml)		
		Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
					> 4 mg/l			6.5-8.5			< 2250 µmhos/cm			< 3 mg/l									< 2500 MPN/100ml			< 5000 MPN/100ml		
1906	KRISHNA D/S OF ISLAMPUR	20	38	28.0	5.8	7.4	6.6	6.89	8.6	7.6	240	1139	439	2	3.6	2.5	1.1	3.24	2.16	-	-	-	2	12	8	90	240	151
1153	KRISHNA AT RAJAPUR WEIR, MAHARASHTRA	20	26	21.9	3.8	7.4	6.0	6.9	7.7	7.3	102	643	307	1.8	3.4	2.6	0.6	3.45	1.61	-	-	-	2	11	7	90	170	136
2187	KRISHNA RIVER AT KSHETRA MAHULI	19.2	26.5	21.5	5	6.3	5.7	7.7	8.3	8.0	257	571	438	5.1	9.6	7.5	0.36	2.34	1.44	-	-	-	100	225	144	900	1600	1536
2188	KRISHNA RIVER AT KRISHNA-VENNA SANGAM AT MAHULI.	18.4	26.6	20.7	4.8	6.5	6.0	7.8	8.31	8.0	270	571	417	4.6	9.5	6.6	1.12	2.57	1.59	-	-	-	70	275	158	900	1600	1282
2190	KRISHNA RIVER AT WAI.	20.2	28.2	22.7	5.4	6.7	5.8	7.6	8.3	7.9	99	467	280	6.1	9.2	7.4	0.12	0.91	0.27	-	-	-	175	350	257	1800	1800	1800
1194	KRISHNA AT MAHABALESHWAR DHOM DAM NEAR KOINA DAM, MAHARASHTRA	20	28	22.5	5.6	6.6	6.3	7.3	8.2	7.8	75	110	89	4.5	6.7	5.5	0.05	0.41	0.17	-	-	-	15	70	32	200	550	377
36	KRISHNA AT KRISHNA BRIDGE, KARAD, MAHARASHTRA	20	25.2	21.7	5.3	6.8	6.0	7	8.2	7.9	80	630	286	5.3	9.1	6.9	0.25	1.3	0.43	-	-	-	65	250	171	350	1800	1270
1310	KRISHNA AT KURUNDWAD IN KOLHAPUR,MAHARASHTRA	20	26	21.9	3.6	7.1	6.0	6.68	7.8	7.4	98	881	321	2	3.2	2.5	0.78	4.17	1.89	-	-	-	2	11	6	80	220	136
37	KRISHNA AT SANGLI, MAHARASHTRA	20	38	28.2	5.7	7.5	6.6	6.9	8.7	7.5	267	1089	680	2	3.2	2.4	1.04	2.79	1.91	-	-	-	2	9	6	90	170	122
1182	KRISHNA AT U/S OF UGARKHURD BARRAGE,KARNATAKA	20	32	26.5	5.8	8.4	7.4	7.3	8.7	8.2	240	1370	776	0.8	5.1	2.4	1.33	13.33	7.46	0.1	0.1	0.1	130	900	332	300	1600	1182
1889	KRISHNA - ANKALI BRIDGE ALONG CHIKKODI KAGWAD ROAD	20	36	27.2	5.6	8.5	7.3	7.6	8.7	8.2	210	1360	678	0.4	4.7	2.1	1.06	23.24	8.77	0.1	0.1	0.1	80	900	442	300	1600	1283
1181	KRISHNA AT D/S OF NARAYANPURA DAM,KARNATAKA	27	39	35.3	7.2	8.1	7.7	7.2	8.5	7.8	310	760	552	0.3	1.5	1.1	0.1	1.08	0.50	-	-	-	23	900	173	50	1600	535
1028	KRISHNA AT TINTINI BRIDGE, KARNATAKA	25	33	28.0	6.3	8	7.3	7.4	8.3	7.8	340	880	625	0.3	4.8	1.8	0	0.71	0.29	0.1	0.1	0.1	17	900	361	21	1600	691
1170	KRISHNA AT D/S OF DEVASAGAR BDG., KARNATAKA	25	30	27.6	6.5	7.8	7.1	7.8	8.6	8.1	470	1110	883	1	5.8	2.3	0.1	0.6	0.30	-	-	-	50	900	462	240	1600	963
1784	KRISHNA AT THANGADI., MAHABOOBNAGAR DIST., A.P	21	31.5	27.9	7.6	9	8.4	7.8	8.3	8.0	603	800	703	1.4	4.2	2.9	1.2	3.83	2.16	0.05	0.05	0.05	0	455	120	120	1622	601
39	KRISHNA AT GADWAL BRIDGE, A.P.	22	41	31.8	0	12.6	7.3	7.2	9	7.9	292	944	664	0.7	4.4	2.2	1	6	2.05	0.05	0.1	0.08	0	125	15	42	705	212
1175	KRISHNA AFTER CONFL. WITH TUNGABHADRA, SANGAMESHWARAM A.P	22	27	25.2	6.8	7.3	7.2	7.2	7.8	7.6	133	780	437	2	3.2	2.7	0.17	1	0.46	0.05	0.1	0.09	70	1400	323	1100	170000	15667
1465	KRISHNA AT WADAPALLY AFTER CONFL. WITH R. MUSI, A.P.(SHIFTED FROM 1220)	25	33	28.8	3.1	5.2	3.9	7.6	8.6	8.1	440	1215	654	1.2	6.8	3.3	0.35	1.74	0.93	-	-	-	1	80	27	11	800	315
1786	KRISHNA AT VEDADRI., GUNTUR DIST., A.P	26	30	28.5	6.8	8.4	7.3	7.8	8.6	8.1	396	572	502	1.9	2.2	2.1	0.1	0.12	0.11	0.05	0.05	0.05	2	11	6	2000	5000	3375
1787	KRISHNA AT AMARAVATI., GUNTUR DIST., A.P	28	34	30.8	6.2	7.7	6.9	7.2	7.9	7.6	406	551	509	1.6	5.3	2.7	0.1	1.76	0.93	0.05	0.05	0.05	4	11	7	2000	5000	3325
25	KRISHNA AT VIJAYWADA, A.P.	25	31	28.3	6	8.2	7.3	7.3	8.7	8.0	381	1080	547	0.9	3.9	2.0	0.05	0.16	0.10	0.05	0.05	0.05	2	11	5	1100	3500	2633
	ESTUARINE ZONE																											
1782	KRISHNA AT HAMSALA DEEVI., GUNTUR DIST, A.P	25	33	29.2	5.9	9.4	7.3	7.1	8.5	7.9	917	19960	7387	0.4	4.8	2.6	0.1	0.15	0.12	0.05	0.2	0.1	2	11	6	900	5000	2167

TABLE 16.2 :- WATER QUALITY OF TRIBUTARY STREAMS PANCHGANGA AND BHIMA- 2009

STATION CODE	LOCATIONS	TEMPERATURE °C			D.O. (mg/l)			pH			CONDUCTIVITY (µmhos/cm)			B.O.D. (mg/l)			NITRATE- N (mg/l)			NITRITE- N (mg/l)			FECAL COLIFORM (MPN/100ml)			TOTAL COLIFORM (MPN/100ml)		
		Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
					> 4 mg/l			6.5-8.5			< 2250 µmhos/cm			< 3 mg/l									< 2500 MPN/100ml			< 5000 MPN/100ml		
1311	PANCHAGANGA AT ICHALKARANJI, MAHARASHTRA	21	22	21.7	6.6	7.7	7.1	6.8	8	7.4	115	403	213	2	2.8	2.3	0.6	2.4	1.33	-	-	-	2	9	5	90	240	147
2163	PANCHAGANGA RIVER AT SHIROL NEAR SHIROL INTAKE WELL	20	27	22.1	3.7	7.3	6.2	7.02	7.5	7.4	102	492	255	2.2	4.2	2.7	0.74	3.33	1.67	-	-	-	2	14	8	70	280	189
1904	PANCHAGANGA U/S OF KOLHAPUR TOWN	20	26	21.7	5.9	7.4	6.6	7.3	7.9	7.6	84	580	153	1.8	3.2	2.5	0.71	3.21	1.43	-	-	-	4	11	8	110	170	136
1905	PANCHAGANGA D/S OF KOLHAPUR TOWN	20	26	21.8	3.6	7.1	5.8	6.9	7.9	7.5	98	457	166	1.8	3.8	2.9	0.6	3.96	1.83	-	-	-	9	14	12	170	280	236
1189	BHIMA AT PUNE U/S VITHALWADI, MAHARASHTRA	27	28	27.7	1.1	5.4	3.2	7.2	7.9	7.6	262	304	279	7.8	22.4	17.1	0.17	0.82	0.53	-	-	-	195	425	298	1600	1800	1667
1190	BHIMA AT PUNE, D/S OF BUNDGARDEN,MAHARASHTRA	28	31	29.0	0	2.6	1.5	7.2	7.9	7.7	422	2806	1221	16.5	28.5	23.5	0.35	0.6	0.44	-	-	-	275	425	350	1800	1800	1800
1191	BHIMA AT PARGAON (AFTER CONFL WITH MULA MUTHA) MAHARASHTRA.	27	30	28.3	5.1	6.1	5.5	7.3	8	7.7	239	1812	876	6.9	11.8	8.7	0.1	0.46	0.26	-	-	-	200	225	217	900	1600	1133
1192	BHIMA AFTER CONF. WITH DAUND, MAHARASHTRA	27	30	28.7	6.1	6.4	6.2	7.4	7.9	7.7	217	1812	877	6.2	6.9	6.5	0.2	0.88	0.45	-	-	-	120	195	155	900	1600	1133
1188	BHIMA AT NARSINGHPUR.(D/S AF CONFL WITH R.NIRA),MAHARASHTRA	26	33	29.7	3.1	6.3	5.3	7.8	8.5	8.1	421	1186	798	4.9	15.2	9.3	0.18	1.41	0.42	-	-	-	95	350	239	900	1800	1627
28	BHIMA AT TAKLI, MAHARASHTRA	24	30	27.3	4.2	6.3	5.4	7.7	8.3	8.0	539	1551	1007	5.1	11.3	8.6	0.13	0.68	0.38	-	-	-	110	350	217	1600	1800	1717
1183	BHIMA AT D/S OF ROAD BRIDGE AT GANGAPUR VILLAGE,KARNATAKA	26	30	27.7	6	7.3	6.9	7.8	8.2	8.1	520	1120	903	1.5	4	2.7	0.1	2.11	0.65	-	-	-	2400	9000	6400	3000	16000	14182
1184	BHIMA AT FEROZABAD VILLAGE (D/S), KARNATAKA	26	36	30.3	6.7	7.5	7.2	7.9	8.5	8.1	540	1000	820	1	3	1.6	0.1	1.92	0.52	-	-	-	230	9000	2685	500	16000	7927
1888	BHIMA RIVER AT CONFLUENCE OF JEWARGI TOWN SEWAGE DISPOSAL POINT	25	35	30.6	6.8	7.4	7.0	7.7	8.2	8.0	550	1050	841	1	2.8	1.8	0.1	1.56	0.53	-	-	-	800	9000	5273	1700	16000	11645
1167	BHIMA AT D/S OF BDG. NEAR YADGIR,KARNATAKA	27	32	28.7	6.5	7.6	7.1	7.6	8.5	8.1	620	1050	863	1	2.3	1.7	0.1	1.94	0.99	-	-	-	230	9000	2939	300	16000	7145

TABLE 16.3 :- WATER QUALITY OF TRIBUTARY STREAMS GHATPRABHA, MALPRABHA, NIRA, VENNA, KOYNA, MULA, MULA-MUTHA, MUTHA, PAWANA, INDRAYANI, TUNGHABHADRA, TUNGHA, BHADRA, MUSI, PALLERU, MUNERU, CHANDRABHAGA, KAGINA, NAKKAVAGU, HUNDRI & KUNDU- 2009

STATION CODE	LOCATIONS	TEMPERATURE °C			D.O. (mg/l)			pH			CONDUCTIVITY (µmhos/cm)			B.O.D. (mg/l)			NITRATE- N (mg/l)			NITRITE- N (mg/l)			FECAL COLIFORM (MPN/100ml)			TOTAL COLIFORM (MPN/100ml)		
		Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
					> 4 mg/l			6.5-8.5			< 2250 µmhos/cm			< 3 mg/l									< 2500 MPN/100ml			< 5000 MPN/100ml		
1185	GHATPRABHA AT D/S OF MUDHOL RD. CROSS BDG., KARNATAKA	27	31	29.5	7.2	8.9	8.1	7.8	8.8	8.2	490	1400	825	0.3	2.8	1.8	2.6	11.5	7.1	0.1	0.1	0.1	170	900	718	1600	1600	1600
1163	GHATPRABHA AT W.A. POINT TO GOKAK TOWN,KARNATAKA	20	26	24.5	6.4	7	6.8	7.4	8.7	8.0	320	510	435	0.6	5.4	2.2	1.19	19.8	10.6	-	-	-	30	900	303	300	1600	1100
1187	MALPRABHA AT D/S OF KHANAPUR VILLAGE,KARNATAKA	24	28	25.8	6.8	7.6	7.2	7	8.3	7.7	280	450	338	0.9	3.4	1.9	2.6	18.4	8.5	-	-	-	240	900	570	900	1600	1425
1164	MALPRABHA AT WATER ABSTR. PT. TO HUBLI,DHARWAR,KARNATAKA	26	28	27.3	5.8	7.5	6.5	7.6	8.5	8.0	290	480	363	0.7	1.2	0.9	1.55	4.1	2.9	-	-	-	21	240	128	500	1600	875
1186	MALPRABHA AT D/S OF AIHOLE TOWN, KARNATAKA	26	30	28.0	6.4	8.6	7.9	7.9	8.7	8.2	750	3800	1655	0.7	3.4	2.1	5.7	12.5	8.2	-	-	-	60	900	440	900	1600	1250
2195	NIRA RIVER AT D/S OF JUBILANT ORGANOSIS, PUNE	24	31	27.4	4.2	6.7	5.5	7.5	8.3	7.9	250	1269	750	5.9	9.6	8.1	0.88	2.1	1.5	-	-	-	65	250	158	160	1600	1215
1463	NIRA AT SAROLE BDG.ON PUNE-BANGLORE HIGHWAY, MAHARASHTRA	24	29	26.2	5.2	6.8	5.9	7.52	8.4	8.0	66	973	308	5.1	8.9	7.0	0	0.34	0.22	-	-	-	85	200	145	550	1600	1186
2186	VENNA RIVER AT VARYE, SATARA.	19	28.8	22.1	5.1	6.5	5.8	7.3	8.1	7.8	134	494	343	5.1	9.2	7.0	0.33	2.4	0.77	-	-	-	85	150	120	900	1600	1027
2189	KOYNA RIVER AT KARAD.	19.9	25.5	21.8	5.1	6.6	6.2	7.8	8.3	8.1	78	339	144	4.8	8.8	6.1	0.18	0.73	0.30	-	-	-	170	275	209	900	1600	1518
2194	MULA RIVER AT HARRISON BRIDGE NEAR MULA- PAWANA SANGAM.	22	32	27.1	0	3.1	1.4	7.1	8.3	7.7	334	1814	600	12.7	33.6	24.0	0.1	1.52	0.71	-	-	-	200	425	314	1600	1800	1709
2193	MULA RIVER AT AUNDH BRIDGE, AUNDGAON.	22	32	27.0	0	4.3	2.3	7.2	8.2	7.6	261	614	442	10.9	56	23.5	0.13	1.04	0.49	-	-	-	275	425	361	1800	1800	1800
2192	MULA-MUTHA RIVER AT MUNDHAWA BRIDGE.	23	31	27.1	0	2.3	1.0	7.1	8.2	7.5	299	665	466	22.3	38.6	29.8	0.1	0.68	0.36	-	-	-	350	425	391	1800	1800	1800
2191	MUTHA RIVER AT SANGAM BRIDGE NEAR GANAPATHY GHAT.	24	32	27.4	0	3	0.4	7.1	7.9	7.5	270	523	417	21.2	48	37.4	0.16	0.6	0.35	-	-	-	200	425	345	1800	1800	1800
2196	PAWANA RIVER AT SANGAVIGAON, PUNE.	25	39	28.2	0	2.9	1.3	7.2	8	7.5	148	687	530	15.9	37.2	25.7	0.1	0.29	0.18	-	-	-	25	275	211	900	1800	1555
2197	INDRAYANI RIVER AT D/S OF ALANDIGAON, PUNE	22	34	28.4	2.8	6	4.9	7.2	8.2	7.8	203	1422	431	6.3	14.8	9.9	0.1	0.49	0.27	-	-	-	110	350	200	900	1800	1555
38	TUNGHABHADRA AT HONNALI BRIDGE, KARNATAKA	22	32	25.5	7.3	7.5	7.4	7.3	8.16	7.9	120	500	330	1.2	3.4	2.6	0.08	0.7	0.33	-	-	-	30	170	114	50	2220	1176
1029	TUNGHABHADRA AT HARALAHALLI BRIDGE, KARNATAKA	22	32	25.1	7.1	7.6	7.4	7.5	8.7	8.0	136	560	381	1.2	3.7	2.4	0.1	0.63	0.36	-	-	-	40	170	82	60	1300	932
29	TUNGHABHADRA AT ULLANUR, KARNATAKA	26	31	28.0	6	8	7.2	7.6	8.4	7.9	270	1240	847	1.7	5.2	3.1	0.2	1.4	0.54	-	-	-	1100	9000	6827	2200	16000	13109
1785	TUNGHABHADRA AT MANTHRALAYAM , KURNOOL DIST . A.P	21	27	24.5	6.3	7.3	6.7	7.1	7.8	7.5	368	1728	1153	3.2	3.4	3.3	0.5	2.2	1.07	0.05	0.1	0.08	130	1700	535	1400	170000	44000
1174	TUNGHABHADRA AT KURNOOL U/S, BAVAPURAM, A.P.	22	28.5	25.2	6.2	7	6.7	6.7	7.9	7.4	1139	1696	1509	2.8	3.4	3.1	0.56	0.9	0.70	0.05	0.1	0.08	110	140	130	1200	1700	1433
1168	TUNGHA AT D/S OF SHIMOGA TOWN, KARNATAKA	24	27	26.0	5.6	7.1	6.6	7	8.39	7.4	140	560	311	1.5	4.3	2.9	0.13	0.69	0.30	-	-	-	50	500	233	70	9000	3147
1896	CONFLUENCE POINT OF TUNGA AND BHADRA AT KUDLI	25	27	26.0	5.2	7	6.0	7.5	8.34	8.0	116	400	259	2.3	3.1	2.7	0.21	0.54	0.33	-	-	-	80	240	155	110	3000	1928
1091	BHADRA AT MALLESWARAM D/S OF KIOCL KARNATAKA	12	28	22.5	5	7.8	6.4	6.2	7.8	7.3	80	600	423	2	3	2.1	0.07	1.33	0.25	-	-	-	300	1000	496	1000	2800	1700
1387	BHADRA AT D/S OF BHADRAVATHI, KARNATAKA	25	27	25.6	4.1	7	5.8	6.9	7.8	7.4	200	690	348	1.6	5.8	3.9	0.12	0.51	0.32	-	-	-	280	1600	971	350	16000	11895
1169	BHADRA AT D/S OF KIOCL ROAD BRIDGE, NEAR HOLE;HUNNUR,KARNATAKA	25	27	25.7	4.8	7.1	6.3	7.1	7.6	7.4	170	420	315	1.7	3.4	2.9	0.18	0.68	0.35	-	-	-	110	500	270	140	9000	3574
1172	MUSI U/S AT HYDERABAD, A.P.	20	26	23.3	5.2	10.4	7.4	7.3	8.7	7.8	254	1416	417	0	2	1.1	0.5	5.3	1.98	0.05	0.1	0.08	0	955	105	3	960	242
1173	MUSI D/S AT HYDERABAD, A.P.	22	27	24.5	0	1.9	0.9	6.8	7.6	7.3	1193	1652	1412	4	19	10.9	3	46.3	13.4	0.05	15.4	7.73	0	1680	285	102	2400	671
2339	RIVER MUSI AT NAGOLE,RANGAREDDY	22	27	24.2	0	3	0.7	6.9	8.5	7.3	1305	3220	1693	8	48	22.3	2.8	52.7	12.3	0.05	11.3	5.68	0	2150	445	80	2400	818
1178	PALLERU BEFORE CONFL. WITH KRISHNA, JAGGAYYAPET, A.P.	26	29	28.0	6	10.3	8.1	8.1	8.6	8.3	324	768	589	0.6	2.4	1.7	0.05	0.14	0.10	0.05	0.05	0.05	4	7	5	2600	3500	3000
1177	MUNERU BEFORE CONFL. WITH KRISHNA, NANDIGAMA, A.P.	26	29	27.8	7	8	7.6	8.2	8.4	8.3	572	733	638	1	2.2	1.6	0.05	0.1	0.08	0.05	0.05	0.05	2	7	6	2000	3000	2600
1911	CHANDRABHAGA U/S OF PANDHARPUR TOWN	28	29	28.3	5.6	6.1	5.9	8.1	8.3	8.2	451	1428	863	5.7	8.3	6.6	0.13	0.96	0.42	-	-	-	95	110	105	550	900	783
1912	CHANDRABHAGA D/S OF PANDHARPUR TOWN	28	29	28.3	4.6	6.3	5.5	8.1	8.3	8.2	825	2054	1300	4.9	12.7	8.2	0.17	1.21	0.53	-	-	-	120	195	168	900	1800	1200
1895	KAGINA D/S OF SEWAGE DISPOSAL POINT	25	32	29.5	6.7	7.4	7.0	7.9	8.2	8.1	480	610	545	1.5	2.9	2.1	0.2	2.06	0.98	-	-	-	500	9000	3725	2800	16000	8200
2349	River NAKKAVAGU, Bachugudem,Medak	25	30	27.5	1.8	2.9	2.5	7.2	7.5	7.3	1280	2700	1898	16	32	23.5	8.1	25.6	13.0	-	-	-	10	15	13	200	210	205
2350	RIVER HUNDRI, JOHARPUR(V), NEAR TEMPLE. KURNOOL	21	26	24.8	6.6	7.2	7.0	7.4	8.2	7.7	204	1462	828	2.4	3.6	3.1	0.43	1.4	0.67	0.1	0.1	0.10	40	900	306	800	170000	22800
2351	RIVER KUNDU, NANDYAL, NEAR OVER BDG., KURNOOL	22	30	25.3	6.8	7	6.9	6.9	7.9	7.3	695	1029	824	2.8	32	10.2	0.64	1.9	1.04	0.05	0.1	0.08	90	170	128	1100	2200	1700

TABLE 17.1 :- WATER QUALITY OF RIVER PENNAR - 2009

STATION CODE	LOCATIONS	TEMPERATURE °C			D.O. (mg/l)			pH			CONDUCTIVITY (µmhos/cm)			B.O.D. (mg/l)			NITRATE- N (mg/l)			NITRITE- N (mg/l)			FECAL COLIFORM (MPN/100ml)			TOTAL COLIFORM (MPN/100ml)		
		Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
					> 4 mg/l			6.5-8.5			< 2250 µmhos/cm			< 3 mg/l									< 2500 MPN/100ml			< 5000 MPN/100ml		
1255	PENNAR B/C CHITRAVATHI, TADPATRI, UNGANOOR, A.P.	23	25	24.0	6.4	7	6.7	7.1	7.8	7.5	466	1650	1066	2.8	3.2	3	0.7	0.8	0.74	0.05	0.1	0.08	90	140	113	1400	2100	1700
1256	PENNAR A/C PAPAGNI, PUSPAGINI, A.P.	24.5	30	28.0	6.6	7.3	7.0	7.2	8.2	7.6	366	946	701	1.4	3.2	2.6	0.56	1.9	0.98	0.05	0.1	0.08	70	110	88	1100	2600	1525
1257	PENNAR A/C CHEYYURU, SOMASILE, A.P.	26	32	28.9	6.5	10	8.3	6.7	8.6	7.7	307	1715	590	0.7	3.9	2.0	0.1	0.5	0.26	0.05	0.1	0.07	2	11	6	2000	3500	2733
30	PENNAR AT SIDDVATA, NELLORE, A.P.	24	30	28.1	3.3	7.3	6.2	6.6	8.6	7.5	425	2450	1175	1.4	3.2	2.55	0.58	11	3.66	0.05	0.1	0.08	4	110	69	9	2600	1327

TABLE 18.1 :- WATER QUALITY OF RIVER CAUVERY - 2009

STATION CODE	LOCATIONS	TEMPERATURE °C			D.O. (mg/l)			pH			CONDUCTIVITY (µmhos/cm)			B.O.D. (mg/l)			NITRATE- N (mg/l)			NITRITE- N (mg/l)			FECAL COLIFORM (MPN/100ml)			TOTAL COLIFORM (MPN/100ml)		
		Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
					> 4 mg/l			6.5-8.5			< 2250 µmhos/cm			< 3 mg/l									< 2500 MPN/100ml			< 5000 MPN/100ml		
1198	CAUVERY AT NAPOKULU BDG (D/S), KARNATAKA	20	28	24.5	5.2	9	7.4	6.5	8.4	7.6	65	570	318	1	1	1.0	0.1	1.26	0.54	-	-	-	350	350	350	350	350	350
1195	CAUVERY AT KUSHAL NAGAR U/S (NEAR BAICHANAHALLI), KARNATAKA	22	31	27.3	6.1	10.3	8.0	6.6	8.9	7.6	68	530	249	1	1	1.0	0.06	1	0.53	-	-	-	1600	1600	1600	1600	1600	1600
33	CAUVERY AT KRS DAM,BALAMURIKSHETRA,KARNATAKA	26	30	28.1	6.6	9.5	8.0	6.8	8.9	8.2	89	319	235	1	1	1.0	0.17	1.68	0.79	-	-	-	4	1601	1281	7	1600	1281
1386	CAUVERY AT D/S OF KAREKUARA VILLAGE, KARNATAKA	24	29	27.4	6.9	9.3	8.3	7.1	8.7	8.2	106	334	253	1	1	1.0	0.2	2.56	0.92	-	-	-	1600	1600	1600	1600	1600	1600
1171	CAUVERY AT SRI RANGAPATTANNA,D/S OF ROAD BDG, KARNATAKA	25	34	27.8	3.8	8.2	6.9	6.8	8.7	7.9	163	364	291	1	2	1.1	0.3	1.69	0.90	-	-	-	1600	1600	1600	1600	1600	1600
34	CAUVERY AT SATHYAGALAM BRIDGE, KARNATAKA	26	30	28.2	6.1	8.5	7.5	6.9	8.8	8.4	128	430	316	1	1	1.0	0.1	1.28	0.49	-	-	-	1600	1600	1600	1600	1600	1600
50	CAUVERY AT METTUR, TAMIL NADU	25	28	26.6	5.2	8.6	6.8	7.5	8.9	8.1	330	550	477	0.5	4.3	1.8	0.1	0.2	0.13	0.1	0.7	0.15	90	220	158	330	470	375
1322	CAUVERY AT 1KM. D/S OF BHAVANI RIVER CONFL., TAMILNADU	28	29	28.1	5.1	7.5	6.4	7.4	8.9	8.0	307	652	476	0.1	2.5	0.9	0.1	0.2	0.11	0.1	0.3	0.13	80	260	163	270	490	382
51	CAUVERY AT PALLIPPALAYAM, TAMIL NADU	25	29	27.2	2.8	7.8	6.0	7.3	8.7	7.9	319	728	564	0.9	7.5	2.0	0.1	0.6	0.18	0.1	0.5	0.16	110	700	243	330	1100	528
1320	CAUVERY AT ERODE NEAR CHIRAPALAYAM, TAMILNADU	27	30	28.2	1.5	7.6	4.2	7.3	8.8	7.9	399	1250	701	0.2	17	4.7	0.1	0.3	0.13	-	-	-	140	5400	1044	330	9200	2013
1323	CAUVERY AT VELORE NEAR KATTIPALAYAM, TAMILNADU	25	29	26.9	6.1	8.3	7.5	7.4	8.6	8.1	313	1036	643	0.3	1.9	0.8	0.1	0.7	0.18	0.1	0.3	0.13	60	220	146	170	470	352
1324	CAUVERY AT MOHANUR NEAR PATTAIPALAYAM, TAMILNADU	25	29	27.0	5.4	8.5	7.1	7.5	8.8	8.0	331	1011	681	0.1	1.9	0.9	0.1	0.9	0.21	0.1	0.3	0.14	50	260	137	140	470	323
1451	CAUVERY AT THIRUMUKKUDAL-CONFL. PT.OF R. AMRAVATI,TAMILNADU	27	30	28.5	6.6	8.2	7.7	8.1	8.8	8.4	426	985	693	0.4	0.9	0.7	0.1	0.4	0.18	0.1	0.1	0.10	40	170	110	170	340	270
31	CAUVERY AT MUSIRI, TAMIL NADU	27	30	28.5	6.6	8.6	7.6	8	8.8	8.3	480	939	675	0.6	0.9	0.8	0.1	0.2	0.15	0.1	0.2	0.13	60	210	138	220	390	315
1202	CAUVERY AT TIRUCHIRAPPALLI U/S, TAMILNADU	27	30	28.0	6.2	9	7.7	8	8.6	8.3	402	946	657	0.5	0.8	0.6	0.1	0.2	0.13	0.1	0.1	0.10	90	210	130	200	470	315
1325	CAUVERY AT TIRUCHIRAPPALLI D/S, TAMILNADU	26	29	28.0	3.6	8.6	6.4	7.7	8.3	8.1	470	2190	1033	0.7	15.7	4.6	0.1	0.2	0.13	0.1	0.1	0.10	110	2100	615	270	9200	2530
1203	CAUVERY AT TRICHY,GRAND ANAICUT, TAMILNADU	26	32	28.6	3.3	8.9	7.1	7.2	8.8	8.1	454	1360	944	0.2	8.4	2.2	0.1	1.3	0.23	-	-	-	80	940	221	270	1400	453
1206	CAUVERY AT THANJAVUR, TAMILNADU	27	29	28.0	8.6	9.6	9.1	7.9	8.1	8.0	373	681	527	0.8	0.9	0.9	0.1	0.4	0.25	0.1	0.1	0.10	120	210	165	320	320	320
	ESTUARINE ZONE																											
1326	CAUVERY AT COLEROON, TAMILNADU	26	34	30.4	2.6	8.6	7.3	7.4	8.9	8.1	438	16260	4609	0.4	3	1.2	0.1	0.7	0.17	0.1	0.3	0.13	2	220	128	40	400	316
1327	CAUVERY AT PITCHAVARAM, TAMILNADU	25	34	29.1	1.8	8.3	6.8	6.8	8.8	7.8	433	81800	9855	0.4	4	1.3	0.1	0.3	0.13	0.1	0.4	0.13	2	700	178	20	1100	369

TABLE 18.2 :- WATER QUALITY OF TRIBUTARY STREAMS YAGACHI, HEMAVATI, SHIMSA, AKRAVATI, LAKSHMANTIRTHA, KABBANI, BHAVANI AND AMRAVATI - 2009

STATION CODE	LOCATIONS	TEMPERATURE °C			D.O. (mg/l)			pH			CONDUCTIVITY (µmhos/cm)			B.O.D. (mg/l)			NITRATE- N (mg/l)			NITRITE- N (mg/l)			FECAL COLIFORM (MPN/100ml)			TOTAL COLIFORM (MPN/100ml)		
		Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
					> 4 mg/l			6.5-8.5			< 2250 µmhos/cm			< 3 mg/l									< 2500 MPN/100ml			< 5000 MPN/100ml		
1893	YAGACHI RIVER NEAR PUMPING STATION. HASSAN CITY	20	24.4	22.4	6.1	7.8	6.8	7	8	7.6	180	390	275	1	3	1.8	0.1	0.28	0.19	-	-	-	250	400	350	900	2000	1563
1199	HEMAVATI AT D/S OF HOLENARASIPURA TOWN AT RAMADEVALA WEIR	19	21	20.0	6.4	8.3	7.2	7	8	7.4	130	220	180	2	2	2.0	0.1	0.15	0.12	-	-	-	300	450	363	1100	1800	1475
1200	SHIMSHA AT D/S OF HIGHWAY BRIDGE, YEDIYAR, KARNATAKA	24	29	26.8	7.5	7.9	7.7	7	8.3	7.5	130	691	430	1	3	1.9	0.18	2.42	0.93	-	-	-	240	1600	810	500	1600	1325
1166	SHIMSHA AT D/S OF BRIDGE, HALAGUR, KARNATAKA	26	28	26.8	6.5	8	7.2	8	8.6	8.4	430	632	535	1	1	1.0	0.1	0.95	0.53	-	-	-	-	-	-	-	-	-
1165	ARKAVATHI AT D/S OF KANAKAPURA TOWN, KARNATAKA	28	33	29.8	4	6	5.4	7.3	8.8	8.0	830	1580	1273	2	4	2.8	0.24	18.4	9.55	-	-	-	140	1600	660	500	1600	867
1196	LAKSHMANTIRTHA AT D/S OF HUNSUR TOWN, KARNATAKA	26	31	27.7	1.6	3.4	2.5	7.5	8.6	7.9	528	779	644	2	9	4.7	0.6	1.16	0.87	-	-	-	-	-	-	-	-	-
1207	KABBANI AT MUTHANKARA, KERALA	24	27	25.5	6.5	7	6.8	6.4	7.2	6.8	44	115	70	0.4	0.6	0.5	0.2	0.7	0.47	-	-	-	140	900	450	340	1600	735
1197	KABBANI AT SARAGUR VILLAGE D/S, KARNATAKA	24	30	26.8	6.9	8.2	7.7	7.4	8.3	7.9	98	129	119	1	1	1.0	0.2	0.92	0.44	-	-	-	-	-	-	-	-	-
41	KABBANI AT CAUSE WAY SATTUR, KARNATAKA	24	29	26.8	6.9	8.4	7.5	7.2	8.5	8.0	94	463	280	1	1	1.0	0.43	1.27	0.75	-	-	-	1600	1600	1600	1600	1600	1600
1445	KABBANI AT WATER INTAKE OF KIADB AT NANJANGUD,KARNATAKA	25	31	27.5	7.3	8.6	8.0	7	8.6	8.0	81	382	228	1	1	1.0	0.2	0.78	0.45	-	-	-	-	-	-	-	-	-
1208	BHAVANI AT ELACHIVAZHY, KERALA	24	29	27.0	7	7.8	7.4	6.3	7.8	7.2	54	240	161	0.4	1	0.6	0.05	0.2	0.11	-	-	-	40	1100	445	240	2200	885
1201	BHAVANI AT PATHIRAKALIAMMAN KOIL, TAMILNADU	22	32	26.7	7.1	10	8.5	7.1	8.9	7.7	84	620	207	0.1	1.4	0.6	0.1	0.2	0.13	0.1	0.1	0.1	90	230	141	260	390	321
1204	BHAVANI AT SIRUMUGAI,TAMILNADU	24	33	27.9	5.8	8.8	8.0	6.9	8.8	7.5	68	382	162	0.2	3	1.0	0.1	0.9	0.25	0.1	0.1	0.1	90	170	117	260	340	298
1321	BHAVANI AT BHAVANI SAGAR, TAMILNADU	20	29	27.1	6.5	8	7.3	6.9	8.6	7.5	105	222	158	0.1	2.1	1.0	0.1	0.7	0.16	0.1	0.1	0.1	80	330	153	220	460	333
1205	BHAVANI AT BHAVANI, TAMILNADU	20	29	27.3	1.6	7.6	6.1	7.4	8.4	7.8	280	621	447	0.3	2.2	1.0	0.018	0.7	0.16	0.01	0.60	0.17	110	330	183	330	490	390
1319	AMRAVATI AT 1KM D/S FROM EFF DIS. PT. AT MADHUTHUKKULAM,TAMILNADU	25	29	27.0	4.1	9.3	8.1	7.2	8.4	7.9	66	769	368	0.4	3.9	1.4	0.1	0.3	0.13	0.1	0.1	0.1	110	260	160	260	490	346

TABLE 19.1 :- WATER QUALITY OF MEDIUM & MINOR RIVERS IN GUJARAT & DAMAN - 2009

STATION CODE	LOCATIONS	TEMPERATURE °C			D.O. (mg/l)			pH			CONDUCTIVITY (µmhos/cm)			B.O.D. (mg/l)			NITRATE- N (mg/l)			NITRITE- N (mg/l)			FECAL COLIFORM (MPN/100ml)			TOTAL COLIFORM (MPN/100ml)		
		Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
					> 4 mg/l			6.5-8.5			< 2250 µmhos/cm			< 3 mg/l									< 2500 MPN/100ml			< 5000 MPN/100ml		
1150	DAMANGANGA AT KACHIGAON U\S AT GIDC WIER,GUJARAT	23	32	28	7.1	7.5	7.3	7.1	8.2	7.4	322	344	332	0.6	0.9	0.7	0.04	0.60	0.30	0.01	0.20	0.04	4	9	6	7	20	12
1246	DAMANGANGA AT KACHIGAON D\S (DAMAN),GUJARAT	23	33	29	5.9	7.5	6.5	7.2	7.8	7.5	20900	22100	21417	1.8	50.0	16.4	0.30	0.60	0.40	0.04	0.10	0.10	14	20	15	28	43	37
2459	DAMANGANGA AT ZARI CAUSE WAY BRIDGE,DAMAN	29	30	30	5.8	6.7	6.1	7	7.9	7.3	290	17466	11855	10.0	15.0	12.5	8.50	28.60	18.60				180	180	180	4	1800	902
2460	DAMANGANGA DISCHARGE POINT OF DISTILLERY, DAMAN	29	31	30	4.9	6.8	6.3	7.1	7.8	7.4	332	60200	24506	3.0	382	136	2.30	33.80	16.90				20	275	158	20	1800	698
2461	DAMANGANGA AT DAMAN JETTY, MOTI DAMAN	29	31	30	5.3	6.9	5.9	7.2	7.9	7.5	365	43990	25343	35.0	78.0	56.5	1.90	13.90	7.70				180	180	180	1800	1800	1800
2462	DAMANGANGA VAPI WEIR,VAPI, DAMAN	29	30	30	6.3	6.9	6.6	7.5	8.1	7.8	224	452	371				2.80	6.10	4.10				180	180	180	1800	1800	1800
2463	DAMANGANGA AT LAVACHA TEMPLE, SILVASSA	29	31	30	5.9	6.7	6.2	6.9	8.1	7.4	258	457	368	8.0	8.0	8.0	1.90	4.20	3.20				180	350	265	350	1800	1075
2464	DAMANGANGA D/S OF M/S SURAT BEVERAGES, VILLAGE DADRA, SILVASSA	29	30	30	6.6	6.7	6.7	7.2	8.2	7.7	246	462	354	4.0	4.0	4.0	2.33	2.90	2.60				95	180	137	95	1800	947
2465	DAMANGANGA AT NAROLI BRIDGE, SILVASSA	29	40	33	6.3	7.1	6.8	7.6	8.6	8.0	284	470	374	21.0	21.0	21.0	1.54	1.50	1.50				180	180	180	1800	1800	1800
2466	DAMANGANGA AT VILLAGE NAMDHA, VAPI	29	30	30	5.0	6.8	5.9	7.3	7.6	7.4	248	16800	7173	12.0	12.0	12.0	13.20	97.60	58.10				0	17	7	5	1800	607
1393	DAMANGANGA AT D/S OF MADHUBAN, DAMAN	23	32	28	7.1	7.5	7.3	7.1	8.2	7.4	322	344	332	0.6	0.9	0.7	0.04	0.60	0.30	0.01	0.20	0.04	4	9	6	7	20	12
1860	BALEHWAR KHADI AT N.H. NO. 8	26	32	30	4.0	6.7	5.7	7.6	8.8	8.0	540	660	601	2.9	10.0	7.4	0.30	0.70	0.50				4800	28000	14600	12000	46000	28666
1861	RIVER PURNA ON BRIDGE AT SURAT-NAVSARI HIGHWAY	27	34	30	3.0	6.2	4.7	8	8.9	8.3	461	1140	753	2.6	7.0	3.7	0.30	0.60	0.50				7500	11000	9166	15000	28000	21333
1862	RIVER KAVERI ON BRIDGE AT BILLIMORA-VALSAD ROAD	26	30	28	5.1	6.4	5.8	7.6	8.1	7.8	14150	17800	16177	0.9	4.3	3.0	0.40	0.70	0.50				7000	14000	10100	15000	39000	25000
1865	RIVER DHADAR AT KOTHADA	30	30	30	1.7	3.3	2.5	7.2	7.9	7.5	974	1242	1108	5.0	7.0	6.0	0.40	1.00	0.60	0.50	0.50	0.50	5	28	16	21	150	85
1148	AMBIKA AT BILIMORA, GUJARAT	27	34	30	5.3	7.5	6.1	7.4	8.8	8.1	2930	25301	14921	2.2	4.0	3.2	0.20	0.40	0.30				1148	9325	4300	7500	43000	23625
1434	AMLAKHADI AFTER CONFL. OF W. WATER FROM ANKLESH,GUJARAT	28	32	30	0.0	2.4	0.6	6.6	7.5	7.1	271	9740	3115	24.0	49.0	36.5	0.20	3.60	1.70	0.05	0.05	0.05	800	14000	4450	1700	50000	15425
1436	BHADAR D/S JETPUR VILL. AFTER CONF. OF W.WATER FROM JETPUR CITY,GUJARAT	26	29	27	5.5	5.5	3.2	7.9	8.3	7.8	1870	11200	5073	3.9	11.0	5.8	0.50	0.50	0.20				1100	1100	833	1600	1600	1366
1438	MINDHOLA AT STATE HIGHWAY BRIDGE SACHIN, GUJARAT	27	33	30	3.0	5.1	4.2	8	8.7	8.2	697	1365	901	3.0	15.0	6.7	0.20	0.60	0.40				7000	14000	9750	15000	28000	21500
2072	RIVER BHOGAVO D/S OF SURENDRANAGAR	25	30	28	0.0	5.2	2.9	7.9	8.9	8.3	3070	29200	11405	1.0	10.0	5.6	0.10	0.20	0.10	0.10	1.00	0.30	22	80	49	70	240	148
2082	TRIVENI SANGAM, NR. SOMNATH TEMPLE, VERAVAL, DIST. JUNAGADH.	28	30	29	2.7	7.1	5.0	6.9	8.4	7.7	20300	63500	47156	2.2	6.0	3.1	0.05	0.20	0.10	0.10	0.10	0.10	17	70	41	70	150	114

TABLE 19.2 :- WATER QUALITY OF MEDIUM & MINOR RIVERS IN GOA & MAHARASHTRA - 2009

STATION CODE	LOCATIONS	TEMPERATURE °C			D.O. (mg/l)			pH			CONDUCTIVITY (µmhos/cm)			B.O.D. (mg/l)			NITRATE- N (mg/l)			NITRITE- N (mg/l)			FECAL COLIFORM (MPN/100ml)			TOTAL COLIFORM (MPN/100ml)		
		Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
					> 4 mg/l			6.5-8.5			< 2250 µmhos/cm			< 3 mg/l									< 2500 MPN/100ml			< 5000 MPN/100ml		
1399	ZUARI AT D/S OF PT. WHERE KUMBARJRIA CANAL JOINS, GOA	31	31	31	7.2	7.2	7.2	6.3	6.3	6.3	14100	14100	14100	1.6	1.6	1.6	0.41	0.41	0.41				13	13	13	17	17	17
1400	MANDOVI AT NEGHBOURHOOD OF PANAJI, GOA	29	29	29	5.5	5.5	5.5	7.8	7.8	7.8	401	401	401	1.3	1.3	1.3	0.21	0.21	0.21				2	2	2	5	5	5
1475	ZUARI AT PANCHAWADI	30	30	30	6.2	6.2	6.2	6.9	6.9	6.9	11000	11000	11000	1.3	1.3	1.3	0.48	0.48	0.48				13	13	13	17	17	17
1476	MANDOVI AT TONCA, MARCELA, GOA	29	29	29	6.5	6.5	6.5	6.8	6.8	6.8	30190	30190	30190	2.3	2.3	2.3	0.04	0.04	0.04	0.01	0.01	0.01	5	5	5	8	8	8
1543	RIVER KALNA AT CHANDEL- PERNEM, GOA	24	24	24	8.1	8.1	8.1	7.7	7.7	7.7	7400	7400	7400	2.6	2.6	2.6	0.10	0.10	0.10				79	79	79	130	130	130
1544	RIVER VALVANT AT SANKLI - BICHOLIM, GOA	27	27	27	7.8	7.8	7.8	6.4	6.4	6.4	609	609	609	2.3	2.3	2.3	0.08	0.08	0.08				49	49	49	70	70	70
1545	RIVER MADAI AT DABOS - VALPOI, GOA	27	27	27	7.8	7.8	7.8	6.4	6.4	6.4	90	90	90	2.0	2.0	2.0							13	13	13	17	17	17
1546	RIVER KHANDEPAR AT OPA - PONDA, GOA	28	28	28	7.2	7.2	7.2	6.5	6.5	6.5	8240	8240	8240	1.6	1.6	1.6	0.25	0.25	0.25				17	17	17	46	46	46
1547	RIVER TALPONA AT CANACONA, GOA	27	27	27	4.2	4.2	4.2	7.6	7.6	7.6	5543	5543	5543	0.7	0.7	0.7	0.18	0.18	0.18				2	2	2	8	8	8
1548	RIVER ASSONORA AT ASSONORA, GOA	26	26	26	6.5	6.5	6.5	6.4	6.4	6.4	505	505	505	1.6	1.6	1.6	0.13	0.13	0.13				8	8	8	13	13	13
2270	RIVER KHANDEPAR AT CODLI NEAR BRIDGE ,U/S OPA WATERWORKS,SANGUEM	27	30	28	6.8	7.8	7.4	6.4	7.4	6.9	70	7617	3844	1.2	2.6	2.0	0.03	0.27	0.15				5	5	5	8	11	10
2271	RIVER SAL PAZORKHONI,CUNCOLIM(NEAR CULVERT MARGAO- CANACONA NATIONAL HIGHWAY)	26	29	28	4.2	6.2	5.4	6.8	7.2	7.0	6898	8400	7692	1.6	2.0	1.7	0.21	1.73	0.92				8	49	29	17	79	48
2272	RIVER KUSHAWATI NEAR BUND AT KEVONA,RIVON,SANGUEM	25	29	27	6.5	6.8	6.6	6.5	7.8	7.2	90	1293	692	1.2	2.3	1.9	0.26	0.41	0.34	0.02	0.02	0.02	79	130	105	110	240	175
2273	RIVER SAL NEAR HOTEL LEELA MOBOR,CAVELOSSIM	27	30	29	4.6	6.2	5.1	6.9	8.7	7.5				1.3	3.3	2.3	0.04	0.75	0.38				2	2400	1201	8	3500	1754
2274	RIVER MAPUSA ON CULVERT ON HIGHWAY MAPUSA-PANAJI	26	32	29	6.5	8.5	7.3	6.4	7.3	6.8	15080	30100	20640	1.7	3.3	2.5	0.22	0.58	0.42				2	130	87	5	240	162
2275	RIVER CHAPORA NEAR ALORNA FORT ,PERNEM	26	31	28	6.8	8.1	7.2	6.5	7.1	6.9	3380	7820	5350	1.6	2.6	2.2	0.12	0.49	0.28				33	240	134	49	350	206
2276	RIVER BICHOLIM VARAZAN NAGAR , BICHOLIM	26	29	28	6.5	7.8	7.0	6.3	7.6	6.8	151	14000	4800	2.9	3.3	3.0	0.01	0.76	0.32	0.01	0.01	0.01	8	130	69	11	240	126
1092	KALU AT ATALE VILLAGE, MAHARASHTRA	26	30	28	3.5	6.6	5.5	7.4	8.1	7.7	138	23650	8092	3.8	14.0	7.6	0.29	1.23	0.72				80	900	410	250	1600	800
1093	ULHAS AT U/S OF NRC BUND AT MOHANE, MAHARASHTRA	26	32	29	6.4	7.5	6.9	7.3	8.4	7.6	100	163	136	3.0	5.0	3.8	0.10	0.50	0.26				35	900	143	80	1600	309
1094	ULHAS AT U/S OF BADLAPUR, MAHARASHTRA	26	34	29	6.5	7.5	6.9	7.4	8.3	7.7	73	163	120	3.4	5.0	3.9	0.05	1.18	0.37				20	1600	207	35	1800	280
1461	BHATSA AT D/S OF PISE DAM NEAR PISE VILLAGE (ULHAS), MAHARASHTRA	27	30	28	6.4	7	6.7	7.6	8.3	8.0	80	160	111	3.2	4.0	3.6	0.15	0.49	0.31				35	50	45	130	170	143
1462	PATALGANGA NEAR INTAKE OF MIDC W/W, MAHARASHTRA	22	31	26	6.1	7.5	6.9	7	7.6	7.3	100	685	229	3.0	5.0	3.8	0.05	3.98	0.68				50	170	108	70	550	257
2162	ULHAS RIVER ATJAMBHUL WATER WORKS.	26	34	29	6.5	7.1	6.8	7.2	8	7.5	94	458	171	3.0	4.2	3.8	0.05	0.71	0.34				7	350	88	25	550	199
2164	VASHISTI RIVER AT U/S OF THREE M PAPER MILLS NEAR M/S MULTIFILMS PLASTIC PVT. LTD. AT KHERDI.	26	32	29	6.2	7.2	6.9	6.7	8.8	7.3	67	632	183	1.8	2.6	2.2	0.56	3.14	1.25				2	2	2	30	90	56
2168	MITHI RIVER	31	39	34	0	5.4	3.3	7.1	8.5	7.6	1483	61030	29464	6.0	50.0	19.4	1.22	3.15	1.78				350	1600	1195	900	1800	1536
2198	KUNDALIKA RIVER AT ARE KHURD (SALINE ZONE)	29	39	32	2.7	7.4	5.4	6.7	7.7	7.2	161	2396	925	4.0	32.0	11.7	0.05	2.20	0.78				25	900	279	35	1600	512
2199	SAVITRI RIVER AT OVALE VILLAGE.	20	28	22	5.5	7	6.2	6.67	7.5	7.2	148	32940	13848	1.8	3.2	2.5	0.68	15.40	4.11				2	12	6	80	170	127
1151	PATALGANGA AT SHILPHATA, MAHARASHTRA	22	31	26	6.5	7.5	7.0	7.1	7.7	7.4	68	536	225	3.0	5.0	3.8	0.05	0.80	0.26				110	350	152	95	900	375
1152	KUNDALIKA AT ROHA CITY, MAHARASHTRA	30	39	35	6.5	7.5	6.6	8	8.2	8.1	99	104	102	3.8	4.0	3.9	0.22	0.30	0.26				80	250	165	140	550	345

TABLE 19.3 :- WATER QUALITY OF MEDIUM & MINOR RIVERS IN KERALA - 2009

STATION CODE	LOCATIONS	TEMPERATURE °C			D.O. (mg/l)			pH			CONDUCTIVITY (µmhos/cm)			B.O.D. (mg/l)			NITRATE- N (mg/l)			NITRITE- N (mg/l)			FECAL COLIFORM (MPN/100ml)			TOTAL COLIFORM (MPN/100ml)		
		Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
					> 4 mg/l			6.5-8.5			< 2250 µmhos/cm			< 3 mg/l									< 2500 MPN/100ml			< 5000 MPN/100ml		
17	PERIYAR NEAR ALWAYE-ELOOR, KERALA	26	32	28	4.7	8	8.1	6	7.6	6.3	59	10200	1414	1.0	2.2	1.1	0.20	1.00	0.31	0.2	0.2	0.0	90	850	100	200	4770	690
18	PERIYAR AT KALADY, KERALA	24	31	27	4.0	7.9	6.9	6.4	7.4	6.8	31	60	41	0.2	2.0	0.8	0.10	0.40	0.22	0.0	0.0	0.0	80	880	261	110	6120	1487
20	CHALIYAR AT KOOLIMADU, KERALA	24	29	27	6.6	7.4	6.9	6.3	7.5	6.9	31	300	78	0.1	1.0	0.5	0.05	0.60	0.23	0.0	0.0	0.0	50	1100	393	150	1700	703
21	CHALIYAR AT CHUNGAPALLY, KERALA	24	29	26	5.2	5.2	6.7	6.4	7.2	6.9	38	25800	5507	0.3	0.9	0.6	0.10	0.10	0.28	0.0	0.0	0.0	90	90	433	220	220	715
42	KALLADA AT PERUMTHOTTAMKADAVU, PUNALOOR, KERALA	26	29	27	6	8	7.3	6.8	7.3	7.0	38	63	49	0.2	1.4	0.7	0.10	1.90	0.66	0.0	0.0	0.0	60	540	228	100	1100	445
43	MUVATTAPUZHA AT VETTIKKATTUMUKKU, KERALA	57	30	28	13.7	7.2	6.7	6	7.9	6.7	144	90	67	2.5	2.3	1.3	0.80	0.70	0.40	0.0	0.0	0.0	880	900	309	2000	2380	1025
1154	CHALAKUDY AT PULICKALKA-DAVU, KERALA	25	33	29	5.4	7.5	6.5	6.2	7	6.6	35	280	109	0.2	2.5	1.2	0.13	1.00	0.37	0.0	0.0	0.0	10	310	142	50	1800	679
1155	KARAMANA AT MOONNATTUMUKKU, KERALA	25	27	26	0	7.5	0.7	6.2	7.2	6.6	810	12900	4235	4.4	24.0	12.5	0.80	3.20	1.48	0.0	0.0	0.0	22000	63000	40833	40000	82000	59417
1156	PAMBA AT CHENGANNUR, KERALA	26	28	27	6.8	7.5	6.9	6	6.7	6.5	35	300	108	0.1	1.8	1.0	0.10	0.56	0.42	0.0	0.0	0.0	490	600	540	850	1500	1083
1338	PERIYAR AT SEWAGE DISCHARGE POINT, KERALA	26	31	28	5.6	7.5	6.4	6.3	7.2	6.6	36	59	48	0.2	2.1	1.0	0.10	0.40	0.25	0.0	0.0	0.0	20	350	154	100	1100	603

TABLE 19.3 :- WATER QUALITY OF MEDIUM & MINOR RIVERS IN KERALA - 2009

STATION CODE	LOCATIONS	TEMPERATURE °C			D.O. (mg/l)			pH			CONDUCTIVITY (µmhos/cm)			B.O.D. (mg/l)			NITRATE- N (mg/l)			NITRITE- N (mg/l)			FECAL COLIFORM (MPN/100ml)			TOTAL COLIFORM (MPN/100ml)		
		Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
					> 4 mg/l			6.5-8.5			< 2250 µmhos/cm			< 3 mg/l									< 2500 MPN/100ml			< 5000 MPN/100ml		
1339	MEENACHIL AT KIDANGOOR, KERALA	26	27	26	6.5	7.5	7.2	6.3	7.1	6.7	43	270	109	0.4	1.5	0.8	0.10	0.68	0.44	0.0	0.0	0.0	900	1100	1000	1300	1600	1400
1340	MANIMALA AT KALLOOPARA, KERALA	27	32	29	6	7.5	6.8	6.9	7.3	7.1	56	68	61	1.0	2.4	1.5	0.20	0.90	0.50	0.0	0.0	0.0	40	200	130	300	600	485
1341	PAMBA AT THAKAZHY, KERALA	26	29	28	4.9	7.5	6.1	6.4	6.9	6.7	46	800	244	0.4	1.4	0.9	0.10	0.50	0.33	0.0	0.0	0.0	540	800	655	900	1200	1113
1342	ACHENKOIL AT THUMPAMON, KERALA	24	29	27	5.3	7.5	6.8	6.3	7.5	7.0	43	100	62	0.2	1.2	0.6	0.20	2.30	0.93	0.0	0.0	0.0	70	540	240	140	920	434
1384	MANIMALA AT THONDRA, KERALA	27	30	28	6.8	7.5	7.1	6.8	7.1	7.0	44	75	59	0.5	1.0	0.8	0.25	1.30	0.71	0.0	0.0	0.0	360	800	540	640	1280	890
1442	VAMANAPURAM, KERALA	26	28	27	6.3	8	7.4	6.4	6.9	6.6	44	100	64	0.2	1.2	0.7	0.10	0.68	0.29	0.0	0.0	0.0	80	500	288	200	3000	1425
1443	ACHENKOIL AT CHENNITHULA, KERALA	26	27	26	4.9	7.3	6.4	6.7	7.4	7.0	65	100	79	0.5	1.3	0.8	0.20	1.90	0.73	0.0	0.0	0.0	115	540	271	260	920	493
1563	NEYYAR AMARAVILA, KERALA	25	26	26	6.4	8.4	7.2	6	7.4	6.7	48	97	73	0.2	2.0	0.9	0.20	0.46	0.28	0.0	0.0	0.0	160	600	335	1200	3400	2150
1564	AYUR, KERALA	25	30	27	3.7	7.7	6.2	6.7	7.4	7.0	57	108	83	0.1	0.8	0.6	0.30	2.10	0.93	0.0	0.0	0.0	16	430	282	40	840	505
1565	PAMBA DOWN, KERALA	27	30	29	3.8	7.3	6.1	6.6	6.8	6.7	45	71	55	1.0	2.0	1.4	0.30	0.90	0.55	0.0	0.0	0.0	700	1000	825	1200	1800	1450
1566	THIRURANGADY, KERALA	28	29	28	6.4	6.7	6.6	6.2	7	6.5	41	140	79	0.6	1.1	0.8	0.05	0.33	0.13	0.0	0.0	0.0	120	260	195	500	820	650
1567	KUTTIYADY ESTATE, KERALA	25	27	26	5.9	7.7	6.9	6.5	7	6.7	31	260	198	0.1	0.4	0.3	0.10	0.40	0.20	0.0	0.0	0.0	0	110	40	60	400	180
1568	MAHI VALAYAM, KERALA	25	29	27	6.6	8	7.3	6.1	6.8	6.5	32	62	44	0.4	0.6	0.5	0.10	0.30	0.21	0.0	0.0	0.0	70	600	233	220	900	400
1569	KUPPAM THALIPARAMBA, KERALA	26	30	28	4.8	7.1	6.2	6.1	6.9	6.6	81	38200	15738	0.7	1.4	1.0	0.10	3.20	0.93	0.0	0.0	0.0	200	280	233	270	500	360
1570	NEELASHWER HOSDURG, KERALA	27	33	29	3.7	6.6	5.2	6.7	7.5	7.1	56	43000	18459	0.3	2.0	1.0	0.10	0.20	0.13	0.0	0.0	0.0	70	1400	518	120	2600	918
1571	KORINGODA KAKKADAVU, KERALA	26	32	28	7.1	8	7.4	6.5	7.5	7.0	32	72	45	0.1	2.0	1.1	0.10	0.15	0.11	0.0	0.0	0.0	270	2000	1043	330	2800	1933
1572	CHANDRIGIRI PADIYATHADKA, KERALA	26	30	28	7.5	7.7	7.6	6.5	7	6.7	43	71	52	0.8	1.4	1.1	0.05	0.20	0.11	0.0	0.0	0.0	250	1100	613	450	1800	963
1573	CHAITRAPUZHA IRUMPANAM, KERALA	27	29	28	1.4	6	2.9	6.1	6.5	6.3	164	2610	841	1.2	2.8	2.0	0.78	1.60	1.07	0.0	0.0	0.0	80	980	430	190	1500	913
2284	R NEYYAR AT ARUVIPURAM	26	27	26	5.7	7.3	6.6	6.5	7.1	6.7	57	86	72	0.1	1.4	0.7	0.10	0.56	0.32	0.0	0.0	0.0	180	750	463	820	2500	1655
2285	R MAMOM AT MAMOM BRIDGE	25	26	26	4.8	8	6.4	6.4	6.9	6.7	62	181	122	0.1	1.3	0.7	0.10	0.63	0.34	0.0	0.0	0.0	50	650	343	120	3600	1630
2286	R AYROOR AT AYROOR BRIDGE	26	26	26	3.7	6.8	5.4	6.3	6.9	6.6	54	126	102	0.4	1.3	0.9	0.10	0.48	0.26	0.0	0.0	0.0	100	480	240	800	3200	1913
2287	R ITHIKKARA AT ITHIKKARA	25	30	27	5.3	7.4	6.2	6.7	7.5	7.0	98	17430	5656	0.6	1.2	0.9	0.30	1.90	1.05	0.0	0.0	0.0	70	280	162	94	540	289
2288	R PALLICKAL AT NELLIMUKAL	26	27	27	6.2	7.3	6.9	6.7	7.3	7.1	51	94	71	0.4	0.6	0.5	0.10	0.44	0.26	0.0	0.0	0.0	18	210	125	42	440	246
2289	R KARUVANNURR AT KARUVANNUR BRIDGE	26	29	28	6.1	7.6	6.7	6.1	6.7	6.5	48	63	55	0.4	1.4	0.9	0.10	1.90	0.60	0.0	0.0	0.0	180	410	265	340	680	500
2290	R PUZHACKAL AT PUZHACKAL BRIDGE	24	32	28	5.2	6.2	5.7	6.2	7.2	6.7	65	250	127	1.0	2.5	1.9	0.10	0.70	0.35	0.0	0.0	0.0	14	380	221	290	620	473
2291	R KEECHERI AT VADAKKANCHERY BRIDGE	26	31	28	4.9	7.1	6.0	6.4	7.1	6.9	56	97	77	1.1	2.8	1.8	0.10	1.50	0.61	0.0	0.0	0.0	180	390	290	300	620	500
2292	R THIRUR AT THALAKKADATHUR BRIDGE	27	29	28	4	7.5	5.2	6	6.4	6.1	80	19500	4968	0.9	1.2	1.1	0.05	0.30	0.14	0.0	0.0	0.0	100	320	235	700	900	820
2293	R KADALUNDI AT HAJIRAPPALLY	28	29	28	6.8	8	7.4	6	6.9	6.4	55	103	78	0.7	1.8	1.2	0.05	0.21	0.12	0.0	0.0	0.0	240	400	280	600	960	720
2294	R KALLAI AT KALLAI BRIDGE	24	28	27	2.1	5.1	3.5	6.3	8	7.3	572	48200	20430	0.7	2.0	1.3	0.10	1.60	0.62	0.0	0.0	0.0	340	800	560	760	1600	1290
2295	R CORAPUZHA AT KANAYANKODE	25	28	27	4.9	6.9	6.0	6.6	7.5	7.1	160	29000	13257	0.7	1.5	1.1	0.10	0.19	0.14	0.0	0.0	0.0	400	1400	750	960	2400	1465
2296	R THALLASSERY AT PATHIPPALAM	26	30	28	4.3	7.3	6.4	6.1	6.1	6.1	55	81	62	0.2	1.2	0.7	0.20	0.30	0.28	0.0	0.0	0.0	90	340	213	200	620	425
2297	R ANCHARAKANDY AT MERUVAMBA	26	30	27	5.8	7.1	6.6	6.3	6.3	6.3	49	80	59	0.5	1.6	1.0	0.05	0.30	0.16	0.0	0.0	0.0	50	500	248	300	610	385
2298	R KUPPAM AT RAYAROM	24	30	27	6.4	7.5	7.1	6.1	6.5	6.4	39	70	59	0.2	1.4	0.9	0.10	0.20	0.13	0.0	0.0	0.0	50	360	178	120	480	275
2299	R RAMAPURAM AT RAMAPURAM BRIDGE	27	30	28	5.1	7.5	6.4	6.9	7.2	7.1	63	23400	7035	0.5	1.0	0.8	0.05	0.50	0.19	0.0	0.0	0.0	50	150	110	100	260	195
2300	R PERUVAMBA AT CHANDAPPURA	25	31	28	7.2	7.6	7.3	6.1	6.3	6.2	40	71	51	0.4	1.2	0.9	0.10	0.34	0.21	0.0	0.0	0.0	0	480	195	200	600	340
2301	R KAVVAI AT KUTTIYOL PALAM	27	31	29	5.8	7.3	6.8	6.5	6.5	6.5	45	159	80	0.3	1.6	0.8	0.10	0.50	0.26	0.0	0.0	0.0	0	100	53	50	150	100
2302	R NEELASWARAM AT NAMBIARKAL DAM	27	30	28	5.9	7	6.4	6.5	7	6.7	40	10140	3131	1.6	3.3	2.2	0.10	0.18	0.12	0.0	0.0	0.0	90	2600	820	120	3200	1055
2303	R PULLUR AT PULLUR BR.	25	30	27	4.5	7.2	5.8	6.5	6.6	6.5	35	119	59	0.1	2.6	1.5	0.10	0.20	0.13	0.0	0.0	0.0	700	2500	1800	950	4000	2788
2304	R MOGRAL AT MOGRAL BR.	27	32	28	3.8	6.1	5.2	6.5	8	7.2	33	43100	19885	0.2	2.6	1.2	0.10	0.31	0.18	0.0	0.0	0.0	0	2200	843	0	5800	2275
2305	R SHRIYA AT ANGADIMOGARU	26	28	27	7.4	8	7.7	6.5	7.3	6.8	44	110	67	0.1	2.0	0.9	0.05	0.10	0.08	0.0	0.0	0.0	20	4000	1740	70	5000	2257
2306	R UPPALA AT UPPALA BR.	25	33	28	3.2	7.5	5.7	7	7.5	7.2	69	43100	19085	0.1	3.3	1.4	0.05	0.10	0.09	0.0	0.0	0.0	80	4000	1845	240	6000	2785
2307	R MANJESWAR AT BAJRAKKARA BR.	24	26	25	5.2	7.6	6.7	6	6.5	6.3	34	273	177	0.4	1.8	1.2	0.10	0.40	0.20	0.0	0.0	0.0	250	4000	1583	700	7000	2807
2319	R ANCHARAKANDY AT MERUVAMBA	26	30	28	5.4	7.5	6.4	6.3	6.5	6.4	50	16500	4165	0.9	1.4	1.2	0.10	0.20	0.13	0.0	0.0	0.0	50	300	168	150	460	303
2326	R KORAYAR AT KANJIKODE	26	28	27	5.5	6.8	6.2	7.4	7.9	7.6	275	662	498	0.3	0.4	0.4	0.10	0.50	0.28	0.0	0.0	0.0	110	1100	613	400	2400	1400
2331	R BHARATHAPUZHA AT KUTTIPPURAM	25	29	27	6.3	7.2	6.8	6.9	8.1	7.5	93	186	119	0.4	0.4	0.4	0.10	0.32	0.18	0.0	0.0	0.0	70	1100	478	170	2200	918
2332	R BHARATHAPUZHA AT PATTAMBI	25	30	27	6.9	7.3	7.1	7.1	8.4	7.6	97	228	161	0.3	0.8	0.5	0.10	0.35	0.19	0.0	0.0	0.0	340	1100	710	600	3000	1675
2333	RIVER PERIYAR AT MUPPATHADAM	26	29	28	4.3	7.2	5.9	6.5	6.8	6.7	57	83	70	1.5	1.9	1.7	0.10	0.95	0.50	0.0	0.0	0.0	45	110	74	60	950	428
2334	RIVER PERIYAR AT PATHALAM	26	32	28	4	7.3	5.8	6.1	6.9	6.5	38	7010	864	0.4	2.8	1.5	0.10	0.80	0.37	0.0	0.0	0.0	100	420	199	170	2380	876
2335	R PERIYAR AT KALAMASSERY	26	33	29	3.5	6.4	4.7	6.2	7.6	6.6	43	96	69	0.7	2.9	1.8	0.00	0.52	0.26	0.0	0.0	0.0	40	1210	234	70	5550	1083
2336	R PERIYAR AT PURAPPALLIKAVU	26	34	28	3.3	7.9	6.5	6.1	7.1	6.6	50	12970	1204	0.5	2.0	1.2	0.05	0.50	0.24	0.0	0.0	0.0	10	370	175	30	1600	689
2337	R KADAMBAYAR AT BRAHMAPURAM	27	31	28	0.3	2.6	1.4	6	6.5	6.2	75	179	129	1.2	3.0	2.2	0.10	1.20	0.48	0.0	0.0	0.0	50	920	351	280	1700	882
2338	R KADAMBAYAR AT MANCKAKADAVU	27	32	28	0.7	2.2	1.5	6	6.8	6.3	53	92	73	0.4	2.4	1.5	0.00	0.26	0.12	0.0	0.0	0.0	120	660	298	280	3100	1225

TABLE 19.4 :- WATER QUALITY OF MEDIUM & MINOR RIVERS IN ANDHRA PRADESH, ORISSA, PONDICHERRY, TAMILNADU & KARNATAKA - 2009

STATION CODE	LOCATIONS	TEMPERATURE °C			D.O. (mg/l)			pH			CONDUCTIVITY (µmhos/cm)			B.O.D. (mg/l)			NITRATE- N (mg/l)			NITRITE- N (mg/l)			FECAL COLIFORM (MPN/100ml)			TOTAL COLIFORM (MPN/100ml)		
		Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
					> 4 mg/l			6.5-8.5			< 2250 µmhos/cm			< 3 mg/l									< 2500 MPN/100ml			< 5000 MPN/100ml		
1448	NAGAVALLI AT THOTAPALLI REGULATOR, A.P.	26	30	28	6.6	7.2	7.0	7.1	7.9	7.5	180	258	226	1.0	1.2	1.1	1.5	3.4	2.3				3	3	3	23	240	83
1455	RUSHIKULYA AT GANJAM U/S, ORISSA	27	37	30	6.9	8.5	7.7	7.8	8.5	8.1	212	546	330	1.0	2.7	1.9	0.5	1.5	0.9	0.02	0.50	0.19	1400	2100	1675	2100	4300	3025
1456	RUSHIKULYA AT GANJAM D/S, ORISSA	26	36	30	6.6	8.7	7.5	7.7	8.1	7.9	212	45870	20786	0.8	2.0	1.3	0.1	1.0	0.6	0.00	0.05	0.03	210	1700	613	320	2200	868
1642	NAGAVALLI AT JAYKAYPUR D/S, ORISSA	22	34	28	6.8	7.7	7.2	7.7	8.5	8.2	226	388	315	1.3	2.1	1.7	0.5	5.2	1.7	0.01	0.05	0.04	1300	4600	2600	1700	7000	4275
1643	NAGAVALLI AT RAYAGADA D/S, ORISSA	24	30	28	7.4	8.1	7.6	7.5	8.5	8.1	263	367	301	1.2	1.7	1.5	0.1	1.1	0.5	0.00	0.05	0.03	700	4600	2360	1100	9400	4175
2422	NAGAVALI PENTA U/S, JAYKAYPUR TOWN	22	32	28	6.7	7.6	7.3	7.5	8.4	8.0	194	254	225	0.8	1.8	1.3	0.4	0.7	0.5	0.01	0.05	0.04	480	2300	1295	1500	3100	2175
2423	BUDHABALANGA, D/S OF BARIPADA TOWN	22	30	27	6.8	7.8	7.4	7.9	8.1	8.0	196	309	238	0.8	2.5	1.9	0.0	0.5	0.2	0.01	0.46	0.17	700	6300	2950	1400	15000	5975
2424	BUDHABALANGA AT BALASORE D/S	22	30	27	6.6	8.0	7.2	7.5	7.9	7.7	181	2560	835	1.8	2.4	2.0	0.2	1.5	0.7	0.00	0.05	0.03	1100	2300	1550	2100	4600	2750
2425	RIVER KERANDI (INTAKE WELL OF NALCO REFINARY, HAL, SUNABEDA)	27	30	29	6.9	7.6	7.2	7.5	8	7.8	143	193	169	0.8	2.5	1.3	0.1	0.9	0.4	0.01	0.50	0.19	270	460	328	400	940	690
2426	Vansdhara MUNIGUDA (D/S OF M/S VEDANTAALUMINA PROJECT)	27	30	28	6.4	7.4	7.0	7.6	8.4	8.1	206	278	240	0.8	1.2	1.0	0.3	0.6	0.4	0.01	0.50	0.19	460	1400	785	1100	2100	1525
2427	Vansdhara GUNUPUR (INTERSTATE BOUNDRY)	25	32	29	6.9	7.8	7.4	7.6	8.4	8.1	71	228	153	0.7	4.0	1.7	0.4	0.6	0.5	0.00	0.50	0.18	230	1100	505	580	1700	1105
2442	GAUTAMI-GODAVARI RIVER	33	33	33	7.7	7.7	7.7	7.8	7.8	7.8	220	220	220	4.0	4.0	4.0	11.0	11.0	11.0	1.00	1.00	1.00						
2443	GAUTAMI-GODAVARI RIVER	33	33	33	7.1	7.1	7.1	7.6	7.6	7.6	406	406	406	3.0	3.0	3.0	15.8	15.8	15.8	1.00	1.00	1.00						
2444	CORINGA RIVER	33	33	33	6.8	6.8	6.8	7.4	7.4	7.4	309	309	309	7.0	7.0	7.0	15.3	15.3	15.3	2.70	2.70	2.70						
2445	MAHE RIVER	28	28	28	5.1	5.1	5.1	8.4	8.4	8.4	4120	4120	4120	3.0	3.0	3.0	109.0	109.0	108.7									
1685	ARASALAR RIVER KARAIKAL REGION, PONDICHERRY	16	25	21	6.9	8.2	7.6	7.9	7.9	7.9	419	473	446	1.5	3.6	2.6	0.4	2.4	1.4	0.10	0.10	0.10						
1159	TAMBIRAPARANI AT BDG.NR. MADURA COATS LTD,PAPAVINASAM,TAMILNADU	23	23	24	7.2	7.5	7.4	6.4	6.4	6.8	88	88	337	0.3	0.3	1.3	0.1	0.1	0.1	0.10	0.10	0.10	70	70	115	110	110	208
1160	TAMBIRAPARANI AT CHERANMADEVI.CAUSE WAY,TAMILNADU	26	29	28	7.1	7.3	7.5	6.1	7	6.7	75	530	180	0.6	1.9	1.3	0.1	0.2	0.1	0.10	0.10	0.10	70	170	100	110	300	176
1161	TAMBIRAPARANI AT TIRUNELVELI,COLLECTORATE,TAMILNADU.	26	30	28	6	7.3	6.9	6.2	7.2	6.8	88	194	127	0.9	5.4	2.4	0.1	0.3	0.1	0.10	0.20	0.11	30	350	222	140	500	357
1162	TAMBIRAPARANI AT MURAPPANADU, TAMILNADU	27	32	30	6	7.5	7.0	6.7	7.6	7.0	116	618	305	0.5	2.1	1.5	0.1	0.2	0.1	0.10	0.10	0.10	80	170	113	130	280	191
1328	TAMBIRAPARANI AT PAPPANKULAM,TAMILNADU	25	29	27	6.8	7.5	7.2	6.1	7.1	6.7	70	640	323	0.7	3.2	1.6	0.1	0.2	0.1	0.10	0.20	0.11	50	170	94	110	280	167
1329	TAMBIRAPARANI AT RAIL BDG. NR. AMBASAMUDAM, TAMILNADU	24	27	26	7.1	7.5	7.4	6.2	6.9	6.7	73	620	364	0.5	3.6	1.6	0.1	0.2	0.1	0.10	0.10	0.10	30	170	91	80	280	150
1330	TAMBIRAPARANI AT ARUMUGANERI, TAMILNADU	27	32	29	6.4	7.5	7.5	6.8	7.6	7.2	388	616	473	1.2	3.0	2.1	0.1	0.3	0.1	0.10	0.30	0.13	110	350	220	200	560	338
1450	PALAR AT VANIYAMBADI WATER SUPPLY HEAD WORK, TAMILNADU	21	28	26	6.2	7.2	6.7	6.7	7.7	7.4	414	598	544	1.0	3.0	2.0	0.1	0.6	0.3	0.10	0.10	0.10	50	300	158	80	500	253
1444	KALI AT D/S WEST COAST PAPER MILL, KARNATAKA	25	29	27	6.5	7.2	7.0	7	7.3	7.2	107	569	286	6.0	14.0	9.5	0.3	1.2	0.9	0.10	0.18	0.12	14	250	85	17	550	189
1892	NETRAVATHI U/S OF DHARMASTALA AT WATER SUPPLY INTAKE POINT	25	29	28	6	6.9	6.4	7	7	7.0	74	610	307	1.0	1.0	1.0							21	1100	457	90	1101	507
1894	KUMARADHARA - U/S OF UPPINAGADY TOWN BEFORE CONFLUENCE WITH RIVER NETHRAVATHI	26	31	29	6.4	7	6.6	6.7	7.6	7.1	76	590	250	1.0	3.0	1.5							39	150	74	240	1100	544
2352	RIVER VAMSHADHARA, KALINGAPATNAM, VIZIANAGARAM	27	30	28	6.2	6.8	6.5	6.9	8.6	7.9	144	1500	566	0.2	1.2	0.9	0.8	7.5	3.8	0.05	0.05	0.05	3	3	3	23	39	32

TABLE 19.5 :- WATER QUALITY OF MEDIUM & MINOR RIVERS IN HIMACHAL PRADESH, PUNJAB, HARYANA, CHANDIGARH & RAJASTHAN - 2009

STATION CODE	LOCATIONS	TEMPERATURE °C			D.O. (mg/l)			pH			CONDUCTIVITY (µmhos/cm)			B.O.D. (mg/l)			NITRATE- N (mg/l)			NITRITE- N (mg/l)			FECAL COLIFORM (MPN/100ml)			TOTAL COLIFORM (MPN/100ml)		
		Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
					> 4 mg/l			6.5-8.5			< 2250 µmhos/cm			< 3 mg/l									< 2500 MPN/100ml			< 5000 MPN/100ml		
1023	GHAGGAR AT MUBARAKPUR REST HOUSE (PATIALA), PUNJAB	20	24	22	5.2	6.7	6.0	7.2	7.3	7.3	610	900	755	6.0	6.0	6.0	1.4	2.8	2.1	0.8	1.2	1.0	500	1500	1000	900	9000	4950
1024	GHAGGAR AT 100M D/S CONF. WITH R. SARASWATI (PATIALA),PUNJAB	20	21	21	4.6	5.2	4.9	7.3	7.4	7.4	763	1020	892	10.0	18.0	14.0	3.8	5.0	4.4	1.4	2.0	1.7	7000	9000	8000	40000	110000	75000
1025	GHAGGAR GH-1 AT ROAD BRDG. SIRSA,DEBWALI ROAD,HARYANA	15	28	22	6	6.8	6.4	6.3	7.8	7.1	920	1250	1085	8.0	9.0	8.5	1.1	15.0	8.1									
1026	GHAGGAR GH-2 AT CHANDARPUR SYPHON, HARYANA	15	25	20	5.2	6	5.6	8.1	8.1	8.1	639	1170	905	11.0	12.0	11.5	1.2	13.0	7.1									
1295	GHAGGAR NEAR BANKARPUR,DERA BASSI,PUNJAB	20	24	22	5	7.5	5.0	6	7.4	6.7	646	980	813	7.0	8.0	7.5	1.4	3.0	2.2	0.8	1.3	1.1	1100	1500	1300	7000	11000	9000
1473	GHAGGAR AT RATANHERI, D/S OF PATIALA NADI (AFTER CONFL.), PUNJAB	20	22	21	5.3	5.8	5.6	7.1	7.5	7.3	698	1230	964	12.0	16.0	14.0	3.2	5.2	4.2	1.6	2.4	2.0	7000	9000	8000	50000	90000	70000
1698	GHAGGAR AT D/S CHHATBIR, PUNJAB	20	20	20	5.6	5.8	5.7	7.4	7.4	7.4	656	1280	968	9.0	10.0	9.5	2.0	4.2	3.1	1.3	1.4	1.4	5000	5000	5000	11000	40000	25500
1699	GHAGGAR AT U/S DHAKANSU NALLAH, PUNJAB	20	22	21	5.2	5.3	5.3	7.3	7.4	7.4	668	890	779	8.0	12.0	10.0	2.4	3.8	3.1	1.4	1.8	1.6	5000	9000	7000	15000	90000	52500
1700	D/S DHAKANSU NALLAH, PUNJAB	20	21	21	4.4	5.2	4.8	7.2	7.6	7.4	640	1010	825	14.0	24.0	19.0	3.0	6.2	4.6	1.8	2.2	2.0	9000	10000	9500	40000	110000	75000
1701	GHAGGAR AT D/S JHARMAL NADI, PUNJAB	21	25	23	0.8	5	2.9	7.2	7.4	7.3	690	1380	1035	10.0	16.0	13.0	2.4	5.4	3.9	1.6	1.6	1.6	1100	5000	3050	15000	40000	27500
1702	GHAGGAR AT U/S JHARMAL NADI, PUNJAB	20	21	21	3.2	5.8	4.5	6.9	7.5	7.2	669	1100	885	9.0	12.0	10.5	2.0	4.6	3.3	1.2	1.4	1.3	1100	1100	1100	9000	15000	12000
1703	GHAGGER AT MOONAK, PUNJAB	20	20	20	4.4	5.1	4.8	7.4	7.5	7.5	812	980	896	9.0	11.0	10.0	2.6	5.6	4.1	1.5	2.0	1.8	5000	9000	7000	50000	90000	70000
1704	GHAGGAR AT D/S SARDULGARH, PUNJAB	22	26	24	2	4.2	3.1	7.3	7.8	7.6	1120	1140	1130	9.0	14.0	11.5	2.8	5.4	4.1	1.6	2.0	1.8	9000	9000	9000	40000	110000	75000
1705	GHAGGAR AT U/S SARDULGARH, PUNJAB	22	27	25	1.6	4.6	3.1	7.5	7.7	7.6	980	1020	1000	8.0	12.0	10.0	2.4	5.0	3.7	1.6	2.0	1.8	5000	7000	6000	35000	90000	62500
1884	GHAGGAR AT KALA AMB D/S MARKANDA RIVER	21	34	28	1.2	2.6	1.9	8.3	8.5	8.4	1713	2660	2187	115	593	354	5.4	5.4	5.4									
1885	RIVER GHAGGAR AT D/S OF SURAJPUR	28	28	28	7	7	7.0	7.8	7.8	7.8	350	350	350	2.5	2.5	2.5												
1887	GHAGGAR BEFORE OTTU WEIR (BEFORE MIXING OF SATLUJ CANAL WATER) (HARYANA)	16	16	16	7.2	7.2	7.2	6.2	6.2	6.2	930	930	930	8.0	8.0	8.0	1.5	1.5	1.5									
1870	RIVER SUKHANA AT PARWANOO, DISTT. SOLAN, H.P.	18	30	22	4.2	6.2	5.48	7.6	8.28	7.82	470	1122	721.5	3.4	15	6.9	1.26	1.26	1.26				35	138	87.25	98	412	249
1717	KODRA DAM, MOUNT ABU, RAJASTHAN	13	30	23	3.72	6.14	4.8	6.87	8.09	7.3	100	420	260	0.2	2.1	0.8	0.1	3.1	1.1				3	4	3	7	7	7

TABLE 19.6 :- WATER QUALITY OF MEDIUM & MINOR RIVERS IN MANIPUR, MIZORAM, MEGHALAYA & TRIPURA - 2008

STATION CODE	LOCATIONS	TEMPERATURE °C			D.O. (mg/l)			pH			CONDUCTIVITY (µmhos/cm)			B.O.D. (mg/l)			NITRATE- N (mg/l)			NITRITE- N (mg/l)			FECAL COLIFORM (MPN/100ml)			TOTAL COLIFORM (MPN/100ml)		
		Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
					> 4 mg/l			6.5-8.5			< 2250 µmhos/cm			< 3 mg/l									< 2500 MPN/100ml			< 5000 MPN/100ml		
1424	IMPHAL AT MAHABALI, MANIPUR	18	28	23	6.8	8.9	7.6	7.5	7.6	7.5	138	568	307	0.6	2.9	1.5										80	295	153
1457	IMPHAL AT KOIRENGEI, MANIPUR	19	27	23	8.1	8.9	8.4	7.3	7.6	7.4	69	125	106	1.2	1.5	1.4										7	55	36
1458	IRIL AT PORAMPET, MANIPUR	19	28	23	8.2	9.9	9.0	7.3	8.1	7.8	216	229	221	0.5	2.1	1.3										50	120	77
1624	IRIL LILONG, MANIPUR	23	28	25	7.9	9.8	8.7	7.1	7.7	7.4	201	521	318	1.1	1.7	1.5										100	180	132
1625	NAMBUL HUMP BRIDGE, MANIPUR	22	29	25	1.3	2.4	1.9	6.8	7.7	7.3	413	619	537	0.9	24.5	9.9										375	600	525
1626	NAMBUL HEIRANGOITHONG, MANIPUR	23	28	25	2	18.2	7.7	6.9	7.6	7.3	505	584	550	0.7	24.0	10.4										425	755	603
1627	KIYAMGI, Imphal, MANIPUR	23	28	25	7.3	8.9	7.9	7.4	7.9	7.6	149	216	185	0.8	1.9	1.3										85	135	115
1628	MINUTHONG IMPHAL RIVER, MANIPUR	23	28	26	7.2	8.8	8.0	7.4	7.7	7.6	155	248	202	1.9	3.1	2.5										80	90	85
1925	KHUGA RIVER (CHURACHANDPUR DIST.)	20	28	25	7	7.8	7.4	7.1	8	7.6	158	321	214	0.9	3.1	1.8										115	175	148
1926	KHUJAIROK RIVER, MOREH (CHANDEL DIST.)	20	28	23	7.6	9	8.3	7.1	8.1	7.7	168	213	185	0.9	3.1	2.0				0.2	0.2	0.2				3	125	75
1427	UMTREW AT BYRNIHAT EAST, MEGHALAYA	18	18	18	9.6	9.6	9.6	7.1	7.1	7.1	225	225	225	4.4	4.4	4.4	3.0	3.0	3.0	0.0	0.0	0.0	310	310	310	460	460	460
1428	KHARKHLA NEAR SUTNGA KHLIERIAT,JAINTIA HILLS DT.,MEGHALAYA	19	19	19	8.8	8.8	8.8	7.2	7.2	7.2	131	131	131	0.9	0.9	0.9										205	205	205
2050	TLAWNG UPSTREAM AIZAWL	20	29	24	6.7	8.4	7.4	7	8.2	7.8	169	491	272	0.8	1.0	0.9				0.1	0.2	0.2	7	9	8	3	1100	295
2051	TLAWNG DOWNSTREAM AIZAWL	17	29	24	6.8	8.2	7.5	6.3	8.6	7.8	183	495	327	0.4	1.6	1.2				0.1	0.2	0.2	0	0	0	3	210	56
2052	TUIRIAL UPPER CATCHMENT	21	31	26	7	9.2	8.1	7.4	8.2	7.8	218	450	365	1.1	1.7	1.3				0.1	0.2	0.1	11	15	13	7	75	33
2053	TUIRIAL LOWER CATCHMENT	22	31	26	6.8	9.5	7.9	6.2	8.4	7.5	220	431	350	1.2	2.4	1.8				0.1	0.2	0.2	29	53	41	7	290	90
1403	GUMTI AT U/S SOUTH TRIPURA,TRIPURA	26	31	28	6.34	6.8	6.6	7.54	7.84	7.7	122	226	143	0.7	2.2	1.3	0.00	0.00	0.00	0.0	0.0	0.0	160	260	201	280	410	322
1404	GUMTI AT D/S SOUTH TRIPURA, TRIPURA	27	31	29	5.52	6.8	6.3	7.55	7.64	7.6	155	186	164	2.0	3.6	2.8	0.00	0.2	0.1	0.0	0.1	0.0	260	580	442	480	660	577
1726	CHANDRAPUR, AGARTALA D/S OF HAORA RIVER, TRIPURA	27	30	28	4.62	6.88	5.7	7.4	7.94	7.8	145	194	170	2.6	3.7	3.4	0.1	0.2	0.2	0.0	0.1	0.1	380	520	469	580	640	608
1631	MYNTDU JAINTIA HILLS MEGHALAYA	16	25	21	1.8	9	6.4	6.8	7.3	7.025	155.5	215	187.625	1.2	7	3.175	1.8	3.5	2.675				1700	2700	2225	2200	3400	2925
1633	SIMSANG, WILLIAMNAGAR, MEGHALAYA	23	27	25	7.4	9.2	8.35	7	7.4	7.125	0	168	110.75	1	2.5	1.525	2	3.7	3.075				170	330	252.5	280	460	355
1632	GANOL, TURA, MEGHALAYA	21	27	24	7.2	9.2	8.45	6.8	7.2	6.95	0	155	104.25	0.9	1.8	1.2	0	4.2	2.6				170	330	222.5	220	460	312.5

TABLE 19.7 :- WATER QUALITY OF CREEK & CANAL - 2008

STATION CODE	LOCATIONS	TEMPERATURE °C			D.O. (mg/l)			pH			CONDUCTIVITY (µmhos/cm)			B.O.D. (mg/l)			NITRATE- N (mg/l)			NITRITE- N (mg/l)			FECAL COLIFORM (MPN/100ml)			TOTAL COLIFORM (MPN/100ml)		
		Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
					> 4 mg/l			6.5-8.5			< 2250 µmhos/cm			< 3 mg/l									< 2500 MPN/100ml			< 5000 MPN/100ml		
	CREEKS AND SEA WATER																											
2267	CREEK AT DANDO MOLLO,VELSAO, MARMUGAO	29	31	30	6.5	7.8	7.2	6.8	8.2	7.7				1.3	3	2.3	0.6	4.6	2	0	0	0	13	33	23	17	49	33
2080	MASMA KHADI- OLPAD- SARAS ROAD	27	30	29.2	4	7	5.8	7.8	8.7	8.2	1180	2012	1436	2	2.9	2.4	0.2	0.8	0.3				900	4300	2944	2000	12000	7667
2081	AMLAKHADI CREEK AT PUNGAM	27	32	28.8	0	0.1	0.01	6.7	7.8	7.2	2890	14800	6673	49	238	115.3	0.1	3.1	1	0.1	0.1	0.1	1700	50000	17438	3000	210000	76308
1316	BASSEIN CREEK AT BASSIN IN THANE DT.	26	27	26.3	3.4	6.5	5	7.8	8.3	8.1	555	62420	37532	3.8	12	8.2	1	1.3	1.2				25	350	162	50	900	433
1317	THANE CREEK AT ELEPHANTA ISLAND.	31	39	33.5	3.4	4.3	3.9	7.4	8.2	7.7	8476	60720	41131	8	14	11	1.2	2.1	1.6				2	550	183	14	900	344
1318	MAHIM CREEK AT MAHIM BAY, MAHARASHTRA	31	39	34.3	3.4	4.4	3.7	7.3	7.8	7.5	20150	53900	40157	7	13	9	0.4	1.5	1				140	900	463	350	1800	900
2184	VASHI CREEK AT AIROLI BRIDGE.	25	35	28.4	3.8	6.7	4.8	7.1	8.4	7.6	182	60770	34953	6	18	10.2	0.1	3.2	1.9				7	350	178	17	900	468
2185	VASHI CREEK AT VASHII BRIDGE.	22	32	27.9	3.7	5.8	4.6	7	7.9	7.5	19890	62730	47386	6	18	11	1.3	3.7	1.9				80	900	342	250	1600	714
2439	PURI	25	30	28.3	5.7	7.2	6.3	7.4	8.3	7.7	32400	46820	38327	1	2	1.4	0.18	3	1.4	0	0.1	0	0	2	1	2	2	2
2440	PARADEEP	24	35	27.8	5.9	7.1	6.6	7.7	8.4	8	36670	47390	40165	0.6	1.4	1	0	1.4	0.7	0	0.1	0	2	220	126	20	330	218
2441	GOPALPUR	26	36	29	6.2	6.9	6.5	7.5	8.1	7.8	36300	48270	43830	1.2	2.4	1.6	0.5	0.9	0.6	0	0.1	0	2	20	9	4	40	18
2165	SEA WATER AT GATEWAY OF INDIA.	31	38	33.1	3.5	6.1	4.43	7.2	8.4	7.7	41280	64140	55889	8	18	11	0.94	1.7	1.3				130	1600	522	550	1800	905
2166	SEA WATER AT CHARNI ROAD CHOUPATHY.	31	38	33.1	3.5	5.7	4.67	7.1	8.2	7.6	40480	63960	54720	7	18	12	0.96	3.9	1.8				110	1600	511	350	1800	786
2167	SEA WATER AT WORLI SEA FACE.	23	38	32.2	3.6	5.7	4.65	7.2	8.2	7.7	40420	63810	54911	6	16	11	0.9	1.9	1.3				110	900	367	350	1600	713
2169	SEA WATER AT VERSOVA.	30	34	32.2	3.6	5.7	4.73	7.6	8.4	7.9	43990	64220	57579	7	18	11.2	0.61	1.82	1.2				50	550	183	130	1600	483
	CANAL																											
1109	W.YAM. CANAL WC-1(Y. NAGAR)100M D/S AFTER RECEIVING IND.&SEW.EFFL.HARYANA.	22	35	28.5	3.5	4.84	4.1	7.52	7.6	7.5	1348	1412	1380	44.9	90	67.4	4.5	4.5	4.5									
1111	W.YAM. CANAL C-3 DELHI BRANCH AT R.D.245250,HARYANA	17	20	18.5	6.4	7.3	6.8	8.2	8.2	8.2	229	263	246	1.4	1.8	1.6	0.1	0.1	0.1									
1112	W.YAM. CANAL C-4 BEFORE ENTER INTO DELHI BRANCH,R.D.282628,HARYANA.	16	20	18	6.7	7.4	7	8.2	8.3	8.2	241	262	251	1.1	1.4	1.2	0.1	0.1	0.1									
1114	W.YAM. CANAL WC-6 SIRSA BRANCH AT RD.BRIDGE JIND KAITHAL ROAD HARYANA				6.2	6.2	6.2	8.3	8.3	8.3	253	253	253	2.6	2.6	2.6												
1115	W.YAM. CANAL C-7 DELHI PARALLEL BRANCH AT KHUBRU FALL RD-145250	16	16	16	7.2	7.2	7.2	8.2	8.2	8.2	262	262	262	2.2	2.2	2.2	0.2	0.2	0.2									
1116	W.YAM. CANAL WC-4 DELHI PARALLEL BRANCH AT PANIPAT HARYANA	10	19	14.5	7.2	7.3	7.2	8.2	8.4	8.3	229	252	240	2.2	2.8	2.5	0.2	0.3	0.3									
1419	GURGAON CANAL. GC-1.(NEAR BADARPUR BORDER), HARYANA	20	20	20	2.6	2.6	2.6	7.4	7.4	7.4	1020	1210	1115	22	22	22	4	4	4									
1479	WESTERN YAMUNA CANAL AT HAIDERPUR WATER WORKS. DELHI	28	28	28	5.9	7.3	6.6	7.6	8.2	7.9	231	395	313	1	2	1.5	0.5	0.8	0.7				42000	1200000	621000	830000	17500000	9165000
1729	NEAR PRAGATI VIDYABHAWAN. AGARTALA, TRIPURA	27.5	30.5	29.5	0.8	1.22	1	7.7	8.2	7.9	290	324	308	12.4	25.5	18	0.5	0.8	0.7	2.5	3.6	3.1	680	720	697	760	920	833
1886	WESTERN YAMUNA CANAL AT TAJEWALA	21	35	28	6.7	7.9	7.3	8.5	8.5	8.5	285	288	286	0.9	8.5	4.7	0	0.1	0.1									
2056	WESTERN YAMUNA CANAL AT DAMLA D/S OF YAMUNA NAGAR	14	32	25.9	0	7.4	3.1	7.3	8	7.6	213	1370	527	1	99	26.3							6900	38000000	6617190	710000	133000000	46171000
2057	AGRA CANAL, MADANPUR KHADAR, DELHI	16	32	24.6				7.3	7.9	7.6	690	1390	1012	12	39	19.3	0.02	1.8	0.7	0	1	0.7	390000	10000000	4825833	2100000	97000000	48875000
2073	NARMADA MAIN CANAL, NR. VILLAGE. LIMBADIA, DIST. GANDHINAGAR.	28	30	29	5.4	8.3	7.1	8.1	8.9	8.5	284	520	364	1	6	2.6	0.1	0.9	0.4				4	15	8	9	21	16
2074	TAPI CANAL AT VILLAGE UMARWADA, NEAR GIDC ESTATE OF PANOLI.	26	30	29.1	5.6	8	6.6	7.4	8.2	7.8	271	433	338	0.5	3.2	1.3	0.05	1.5	0.5	0.1	0.1	0.1	13	170	60	50	400	197
2265	CANAL UP STREAM OF CUNCOLIM INDL.EST. CUNCOLIM,SALCETE (1 KM FROM M/S NICOMENT INDUSTRIES)	26	27	26.5	7.2	7.5	7.3	6.9	7	6.95	4657	4708	4682	0.7	1.3	1	0.07	0.2	0.1				27	540	284	33	920	477
2268	CUMBARJUA CANAL CORLIM (DISCHARGE POINT OF SYNGENTA LIMITED)	28	30	29	4.9	6.2	5.3	6.1	6.9	6.6	353	3860	2661	1	2.9	1.7	0.84	0.8	0.8	0	0	0	49	79	64	70	335	203
2354	SAMARLA KOTA CANAL,KAKINADA, EAST GODAVARI	20	28	24.5	5.8	6.8	6.3	6.6	8.4	7.3	127	1813	399.5	1	1.6	1.2	0.1	10.5	3	0.1	0.1	0.1	3	4	3	4	1100	204
2355	TULJE BAGH CANAL, TEKRI DRAIN,Kakinada,East Godavari.	22	29	25.9	4.2	6.5	5.5	6.4	8.8	7.2	573	29600	3788	1.4	2.8	1.9	1.3	10.2	4.1	0.1	0.1	0.1	3	14	5	150	2400	593
2428	JOBRA(ORIGIN OF TALAGANDA CNAL)	22	27	25	6.1	9.6	8.1	7.1	8.3	7.8	188	208	201	0.9	1.5	1.2	0.1	0.4	0.2	0.1	0.1	0.1	700	1100	863	1100	1700	1367
2429	NAUBAZAR, CUTTACK CITY	21	35	26.3	5.7	8.2	6.7	7.3	8.3	7.7	191	484	319	0.9	7.6	3	0.1	8.5	3.4	0	0.1	0	13000	17000	15250	21000	35000	29750
2430	ATHARABANKI(WATER INTAKE POINT OF PPL, IFFCO & PPT)	24	36	29.3	4.6	8.2	6.5	6.7	7.9	7.4	181	663	422	0.2	4	1.7	0.2	0.9	0.4	0	0.1	0	2100	15000	6200	2600	35000	12700
2512	NOAI CANAL NORTH 24 PARGANAS. NEAR GANGA NAGAR MOTIBRIDGE	28	28	28	0	0.4	0.2	7.2	7.3	7.2	696	898	797	23	25	24	0.5	0.7	0.6				2200000	170000000	86100000	5000000	220000000	112500000
	DRAINS																											
2047	N-CHOE (ATTAWA CHOE)	18	30	24	0.9	0.9	0.9	7.2	7.5	7.4	731	731	731	50	50	50	0.4	1.2	0.8									
2048	PATIALA KI RAO	18	30	25	0.3	0.4	0.3	7.4	7.7	7.5	1031	1031	1031	50	50	50	0.2	3.2	1.3									
2049	SUKHNA CHOE	18	29	23.3	0.8	0.8	0.8	7.1	8	7.5	882	882	882	50	50	50	0.3	2.2	0.9									
2178	CHIKHALI NALLAH MEETS GODAVARI RIVER.	22	32	26.2	3.1	6.2	4.9	6.1	8.9	7.7	800	1639	1188	7	44	19.2	0.1	9.7	1.6	0.2	0.2	0.2	0	20	7	0	45	18

TABLE 20.1 :- WATER QUALITY OF LAKE, POND & TANK IN ANDHRA PRADESH, KARNATAKA, KERALA, TAMILNADU, PONDICHERRY & GOA- 2009

STATION CODE	LOCATIONS	TEMPERATURE °C			D.O. (mg/l)			pH			CONDUCTIVITY (µmhos/cm)			B.O.D. (mg/l)			NITRATE- N (mg/l)			NITRITE- N (mg/l)			FECAL COLIFORM (MPN/100ml)			TOTAL COLIFORM (MPN/100ml)		
		Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
					> 4 mg/l			6.5-8.5			< 2250 µmhos/cm			< 3 mg/l									< 2500 MPN/100ml			< 5000 MPN/100ml		
											4385	4385	4385	1.3	1.3	1.3	0.06	0.06	0.06	-	-	-	2	2	2	5	5	5
1549	SALAULIM LAKE AT SALAULIM - SANGUEM, GOA	27	27	27.0	6.8	6.8	6.8	6.8	6.8	6.8	391	4077	1627	2.3	2.9	2.7	0.01	0.2	0.11	-	-	-	33	9200	4617	79	16000	8040
2269	MAYEM LAKE, BICHOLIM	27	30.5	29.2	6.8	8.1	7.2	6.9	7.4	7.2	291	2619	1497	0.5	19	11.2	1.2	50	11.41	2.43	11.4	6.92	2	510	113	74	1925	613
1391	HUSSAIN SAGAR LAKE, BUDAMERU,A.P.	22	30	27.3	0	9.8	3.8	7	8	7.6	1703	3830	2828	26	38	31.8	5.7	10.5	7.86	-	-	-	3	45	24	208	1000	542
1780	GANDIGUDEM ,MEDAK DISTRICT, A.P	25	29	27.3	1.2	3	2.4	6.8	7.5	7.2	1524	2016	1827	6	23	13.2	2.8	25.8	9.57	0.05	2.4	1.23	0	1865	397	178	2400	1162
1788	SAROONAGAR , RANGA REDDY DIST., A.P	23	27	24.0	0	5.9	2.4	7	7.7	7.4	254	1415	405	0.5	5	1.8	0.37	4.8	2.28	-	-	-	0	160	18	4	922	271
1789	HIMAYAT SAGAR LAKE , R.R.DIST., A.P	20	26	23.4	5	11.8	7.2	7.4	8.7	7.8	2880	100000	56438	0.8	4.8	3.0	0.05	0.43	0.15	0.05	0.1	0.07	2	11	6	1700	5000	3045
1790	PULICATE LAKE , NELLORE DIST., A.P	29	38	32.1	3.4	7.4	5.8	7	8.3	7.5	974	1321	1146	2	10	5.3	2.4	8.9	6.70	-	-	-	2	220	112	395	1425	893
2340	LAXMINARAYANA CHEVURU at Edulabad,Rangareddy	22	29	24.8	0	8.6	4.9	7.3	8.8	7.8	781	1984	1381	0	12	6.1	2.73	13.4	4.97	0.05	0.1	0.08	0	820	192	156	1618	740
2341	MIRALAM LAKE NEAR ZOO PARK, RANGAREDDY	21	39.5	29.6	0	7	4.3	7	9	7.8	2430	4050	3406	7	50	32.1	4	19	9.55	0.1	0.1	0.1	0	1960	850	84	2400	1724
2342	NOOR MD. KUNTA, Kattedan, Rangareddy	20	26	23.8	0	3.7	0.8	6.8	8	7.5	406	1484	1016	1	1.8	1.3	1.3	15.2	6.31	0.05	0.05	0.05	3	4	3	9	460	96
2353	KONDACHARLA-AAVA LAKE,Parawada Pharma city,Vishakhapatnam	26	29	27.4	6	6.8	6.3	6.7	8.9	7.5	988	1724	1497	1.4	22	11.3	7.63	53.7	23.11	1	11.5	6.25	2	175	96	292	1525	729
2344	NALLA CHEVURU,Rangareddy	23	24	23.8	0	6.5	2.5	7.2	8.5	7.7	4600	37000	18138	8.8	50	30.3	2.71	2.71	2.71	-	-	-	2	200	49	40	16000	2218
2345	SAI CHEVURU, NEAR TANNERY INDUSTRIES, DESAIPET, WARANGAL	25	35	29.8	0	6.4	4.0	6.3	8.7	7.6	370	448	408	0.3	6.1	3.6	0.1	1.86	0.54	0.05	0.05	0.05	2	70	29	11	500	228
2346	BHADRAKALI CHEVURU, BHADRAKALI TEMPLE, WARANGAL	24	29	27.0	5.6	8.3	6.7	7.3	8.2	7.7	4040	23744	13505	42	50	49.1	1.5	142.8	44.79	43	43	43.00	4	182	122	240	1022	801
2347	ASANI KUNTA,Kajipally,Medak	22	30	27.6	0	0	0.0	6.3	7.8	7.2	1037	1390	1197	2	45	9.9	1.93	20.88	7.75	-	-	-	0	1200	299	54	2800	881
2357	DURGAM CHEVURU	21	30	25.9	1	11	4.3	6.8	8.2	7.4	1795	3120	2652	4	50	22.0	1	35	10.53	2	2	2.00	0	1925	439	116	2400	1207
2359	PEDDA CHEVURU	20	26	23.7	0	12	5.0	6.1	8.5	7.5	185	528	357	0.6	12	4.3	0.1	0.19	0.13	0.05	0.05	0.05	2	20	7	11	140	85
1447	DHARMASAGAR TANK NEAR WARANGAL, A.P	27	30	28.3	7.2	8.1	7.6	7.3	8	7.6	194	1857	766	1.2	2.2	1.6	0.5	7.6	2.63	-	-	-	3	25	13	128	250	176
1464	BIBINAGAR TANK, A.P	26	32	29.0	3.3	4	3.8	7.5	8.3	7.9	1987	38100	12637	15.6	50	37.2	6.63	52.49	19.83	-	-	-	72	72	72	491	491	491
1783	KISTAREDDYPET TANK,MEDAK DIST., A.P	25	28	26.8	3.9	4.1	4.0	6.6	7.6	7.1	5550	6590	5937	18	22	19.3	9.96	12	10.98	-	-	-	2	720	269	320	1485	970
2343	PREMAJIPET TANK, Kattedan, Rangareddy	22	24	23.3	0	5	2.4	6	7.2	6.7	3200	17330	9679	20	50	28.0	4	77.8	28.51	-	-	-	0	225	144	46	960	584
2348	KAJIPALLY TANK,Kajipally,Medak	22	28	25.3	0	0	0.0	6	7.9	7.1	1810	2475	2004	3	30	10.8	2.2	66	19.26	-	-	-	0	1675	350	240	2400	925
2358	MALLAPUR TANK	22	30	25.0	0	8.5	1.9	7.1	8.4	7.5	387	650	522	2	8	6.0	2.56	2.56	2.56	-	-	-	220	1600	805	500	1600	1325
1388	ULSOOR LAKE TRAINING CENTRE OF FISH BREEDING,KARNATAKA	26	29	27.5	5.2	12.1	9.9	8.3	9.7	8.8	454	767	543	2	10	4.5	0.7	1.78	1.28	-	-	-	-	-	-	-	-	-
1446	HEBALLA VALLEY LAKE AT D/S ROAD BRIDGE NR. MANDYA, KARNATAKA	25	27	26.0	0	6.2	2.9	7.3	8.1	7.7	420	5900	2410	2.9	6.8	4.7	0.1	0.6	0.25	-	-	-	1100	5200	2275	1400	30000	12900
1383	ORUVATHILKOTTA LAKE, KERALA	25	25	25.0	0.8	7.3	2.5	6.4	6.9	6.7	57	101	72	0.3	2.1	1.0	0.3	1.2	0.63	-	-	-	120	220	173	210	440	308
1385	SASTHAMCOTTA LAKE, KERALA	26	31	27.7	5.8	8	7.0	6.7	7.2	6.9	13480	36800	25470	0.7	6	2.9	1	1.8	1.45	-	-	-	17	140	87	26	220	152
1441	ASHTHAMUDI LAKE AT QUILON, KERALA	27	28	27.3	5.7	6.8	6.2	6.9	7.7	7.4	1405	35000	17699	0.5	4.2	1.7	0.7	1.2	0.90	-	-	-	130	180	163	220	360	275
1574	PARAVUR, KERALA	26	29	27.3	5.6	7.4	6.6	6.7	7.7	7.4	3260	42100	15600	2	2.9	2.5	0.3	0.67	0.53	-	-	-	10	340	115	100	860	438
1575	KOCHI (OIL TANKER JETTY), KERALA	27	32.5	29.4	4.8	5.4	5.1	6.7	7.4	7.1	36	290	125	0.6	0.8	0.7	0.05	0.1	0.08	-	-	-	330	1400	843	400	1700	1067
1576	THEKKADY, KERALA	25.5	26	25.8	6.4	8.1	7.1	6.5	7.1	6.9	279	32900	9324	0.6	1.5	1.1	0.12	0.5	0.31	-	-	-	40	800	445	90	1270	860
1577	KODUNGALLOOR, KERALA	27	33	28.8	5.4	6.3	6.0	6.3	7.4	6.9	1770	56000	26993	1.6	3.4	2.5	0.1	0.45	0.21	-	-	-	40	560	273	380	960	670
1578	KAYAMKULAM, KERALA	27	32	29.5	7	7.5	7.2	7.2	7.9	7.5	130	17000	5272	0.5	1.6	0.9	0.15	0.9	0.55	-	-	-	40	320	145	150	1200	518
1579	ALAPPUZHA, KERALA	26	31	28.5	2.1	7	5.7	6.9	7	7.0	210	290	253	0.2	0.4	0.3	0.05	0.1	0.08	-	-	-	0	110	38	50	300	143
1580	POOKOTE, KERALA	24	27	25.3	5	7.7	6.6	6	6.5	6.3	100	13800	3918	0.4	2	1.0	0.05	2.18	0.77	-	-	-	40	440	210	190	1120	618
2312	Lake VEMBANADU AT PATHIRAMANAL (ALAPPUZHA)	26.5	31.5	28.8	5.4	7.5	6.6	6.7	7.2	7.0	38	80	56	0.5	1.3	0.9	0.1	0.2	0.14	-	-	-	60	100	90	150	360	215
2318	PAZHASSI RESERVOIR (KANNUR)	26.5	30	27.5	7.3	7.5	7.4	6.3	6.7	6.5	63	111	88	0.1	0.5	0.4	0.05	0.2	0.12	-	-	-	60	1400	410	140	3000	925
2328	RSVR AT MALAMPUZHA	27	28.5	27.6	6.5	7	6.9	7	7.8	7.2	32	280	97	0.5	0.9	0.7	0.1	0.2	0.13	-	-	-	20	120	48	80	730	355
2329	RSVR AT BHOOTHATHANKETU	23	28	24.8	6.4	8.1	7.5	6.3	6.7	6.6	32	290	216	0.3	0.9	0.5	0.05	0.1	0.09	-	-	-	10	30	23	60	630	258
2330	RSVR AT EDAMALAYAR	25.2	29	27.5	7.4	8.1	7.7	6.3	7.6	6.8	200	370	268	1.9	5.2	3.4	0.05	0.85	0.27	-	-	-	50	400	194	220	2000	1010
2325	POND AT (PADMANABHA) SREE PADMANABHA SWAMY TEMPLE (TVPM)	25	28	26.3	7.1	8.7	7.7	6.2	8.4	7.4	220	262	234	0	3.1	1.9	1.6	3.65	2.48	0.1	0.1	0.1	-	-	-	-	-	-
1396	OSTERI LAKE, PONDICHERRY	27	30	28.2	6.8	9	7.8	8.2	9.7	8.8	379	718	512	0	4	2.2	0.05	5.14	1.83	0.1	0.1	0.1	-	-	-	-	-	-
1686	BAHOUR LAKE, PONDICHERRY	28	30	28.7	5.6	6.9	6.1	7.2	7.8	7.6	76	92	84	1.8	5.4	3.0	0.1	0.33	0.16	0.1	0.1	0.1	2	17	8	6	33	21
1420	KODAI KANAL LAKE, TAMILNADU	15	20	18.3	6.5	7.6	6.9	6.4	7.7	7.3	354	498	428	2.7	11.1	7.8	0.1	0.4	0.23	0.1	20	5.075	170	14000	6375	340	47000	16260
1421	UDHAGAMADALEM LAKE (OOTY), TAMILNADU	15	23	19.5	4.1	7.1	5.3	6.6	7.5	7.2	246	335	303	0.7	2.3	1.7	0.1	0.7	0.25	0.1	0.1	0.1	110	460	205	320	700	423
1452	YERCAUD LAKE, SALEM, TAMILNADU	23	24	23.5	6.9	10.5	8.5	7.1	7.9	7.6																		

TABLE 20.2 :- WATER QUALITY OF LAKE, POND & TANK IN GUJARAT, MADHYA PRADESH & RAJASTHAN - 2009

STATION CODE	LOCATIONS	TEMPERATURE			D.O. (mg/l)			pH			CONDUCTIVITY			B.O.D. (mg/l)			NITRATE- N (mg/l)			NITRITE- N (mg/l)			FECAL COLIFORM (MPN/100ml)			TOTAL COLIFORM (MPN/100ml)		
		Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
					> 4 mg/l			6.5-8.5			< 2250 µmhos/cm			< 3 mg/l									< 2500 MPN/100ml			< 5000 MPN/100ml		
1343	KANKORIA LAKE AT AHMEDABAD, NR. BALVATIKA, GUJARAT	27	30	28.7	4.1	6.9	5.4	8.8	9	8.9	1220	2120	1790	19	38	31.3	0.42	0.55	0.50	-	-	-	150	930	437	430	2100	1093
1344	CHANDOLA LAKE AT AHMEDABAD, GUJARAT	29	30	29.5	4.3	6.1	5.2	8.7	9.2	9.0	308	614	461	11	13	12.0	0.25	0.64	0.45	-	-	-	430	750	590	2100	2400	2250
1345	AJWAH LAKE AT SRI SAYAJI SABVAR,BARODA,GUJARAT	25	29	27.0	4	7.3	6.1	7.9	8.2	8.0	252	268	261	0.1	0.6	0.3	0.48	11	4.05	-	-	-	3	3	3	3	11	7
1346	SURSAGAR LAKE AT BARODA, GUJARAT	25	29	27.3	4.3	9.2	7.0	7.5	7.7	7.6	1842	2010	1918	0.8	1.7	1.2	0.44	0.78	0.63	-	-	-	5	7	6	3	21	14
1972	NALSAROVAR LAKE (SANAND), DIST.AHMEDABAD	26	29	28.0	0	6.1	2.3	8.2	8.6	8.4	1200	14700	6803	14	14	14.0	0.13	0.13	0.13	-	-	-	15	23	18	28	43	33
1973	BINDUSAROVAR, SIDDHPUR (DIST.PATAN)	25	30	28.0	5.1	6.1	5.7	7.8	8.8	8.3	340	680	515	4.5	15	9.8	0.11	0.16	0.14	-	-	-	90	150	110	200	280	237
1976	NARSIMEHTA TALAV- JUNAGADH	28	30	29.0	6.8	11.9	8.8	8.4	8.9	8.7	966	8450	5342	4.8	7.8	5.9	0.11	0.14	0.12	-	-	-	8	17	13	30	50	40
1977	CITY LAKE OF NADIAD	26	30	27.8	0	10	6.9	7.5	8.5	8.0	661	1498	1194	2.8	40	13.4	0.4	0.6	0.49	0	0	0	0	7	4	0	28	16
2075	DHAROI DAM, DIST. MEHSANA	20	29	26.6	5.5	8.9	7.0	7.8	8.7	8.3	328	618	496	1.5	6	3.6	0.11	0.44	0.22	-	-	-	2	15	8	9	21	16
2076	ANKLESHWAR RESERVOIR AT GIDC ANKLESHWAR AT VALIA ROAD	25	33	30.0	6.4	8.6	7.5	7.5	8.4	8.0	242	353	298	0.6	2.5	1.3	0.05	1.35	0.42	0.05	0.05	0.05	4	11	7	12	50	23
2077	MOTICHER LAKE NEAR KAKARPAR ATOMIC POWER STATION, DIST. SURAT.	28	31	29.2	6.2	7.2	6.9	7.4	8.1	7.9	344	458	376	0.8	2.9	1.8	0.32	0.5	0.41	-	-	-	750	2300	1650	2100	7500	4540
2078	KUWADAVA LAKE, VILL. KUWADAVA, DIST. RAJKOT.	23	28	25.8	3.2	7.1	5.6	7.2	8.5	7.9	319	10500	3471	2.3	12	5.9	0.1	0.21	0.18	0.14	0.17	0.16	13	17	16	23	40	29
1979	OLPAD, VILLAGE POND:OLPAD, SURAT	30	30	30.0	5.1	7.7	6.4	8.5	8.6	8.6	596	598	597	3.3	4	3.7	0.78	0.85	0.82	-	-	-	23000	64000	43500	75000	120000	97500
2079	DHUDHIA TALAV AT NAVSARI, DIST. NAVSARI.	22	30	27.3	0	8.2	4.5	7.8	8.2	8.0	404	835	603	9	9	9.0	0.23	1.67	0.95	-	-	-	70	90	83	110	200	153
1971	THOL TANK (KALOL) (DIST. MEHASANA)	28	34	29.3	5.4	7.4	6.4	7.3	8.9	8.1	327	552	399	0.9	3.2	2.5	0.1	0.73	0.42	-	-	-	7	700	194	20	1500	485
1373	UPPER LAKE AT BHOPAL (INTAKE POINT), M.P.	24	32	27.0	6.5	7.4	7.0	7.3	8.3	7.8	200	580	359	2.3	4.8	3.2	0.15	1.2	0.65	-	-	-	0	11	6	13	1600	574
2137	UPPER LAKE AT YATCH CLUB	24.5	34	29.3	5.4	6.9	6.4	7.09	8.2	7.6	217	350	269	2.2	3.8	3.3	0.05	1.01	0.36	-	-	-	0	5	3	8	300	113
2138	UPPER LAKE AT KARBALA CLUB	24	33	28.5	2.4	7.5	5.5	7.2	8.2	7.6	240	364	301	2.4	4	3.0	0.1	0.81	0.30	-	-	-	4	6	5	13	500	201
2139	UPPER LAKE AT BAIRAGARH CLUB	23.8	34	28.8	6.3	6.7	6.5	7.11	8.42	7.9	300	410	373	1.5	2.8	2.3	0.04	1	0.66	-	-	-	6	7	7	220	1600	910
1374	LOWER LAKE AT BHOPAL OUTLET M.P.	24	34	29.0	6.8	9.1	7.4	7.2	8.6	7.9	290	580	434	4.3	5.2	4.7	0.1	1.3	0.70	-	-	-	23	23	23	170	2400	1285
1466	MULTAI TANK LAKE AT VILLA. KHARI ON BETUL-AMRAVATI ROAD M.P.	26	26	26.0	6.5	7.4	7.0	7.5	7.7	7.6	266	370	318	0.4	2.2	1.3	0.2	1	0.60	-	-	-	-	-	-	130	130	130
2128	KHANDARI RESERVOIR WATER OFF TAKE POINT	17	29	23.7	-	-	-	7.2	7.9	7.5	257	1307	453	1.1	2.2	1.5	0.21	2.88	1.15	-	-	-	0	7	1	11	1100	178
2129	PERIAT TANK JABALPUR	18	30	23.6	-	-	-	7	7.8	7.6	286	1220	534	1.1	2.4	1.6	0.22	3.12	1.33	-	-	-	0	11	1	11	1100	175
2131	YASHWANT SAGAR AT INDORE	21	21	21.0	6.8	8.8	7.5	7.5	8	7.7	365	774	542	1.1	1.2	1.2	0.72	2.6	1.48	0.002	0.03	0.012	0	2	1	220	1600	580
2132	BILAWALI TALAB AT INDORE	22.5	26	24.3	6.8	10.5	8.3	7.5	9	8.2	226	330	264	0.7	2.4	1.3	0.1	0.9	0.60	0.002	0.04	0.021	0	2	1	50	220	133
2133	SIRPUR TALAB AT INDORE	26	26	26.0	6	7.8	7.1	7.5	8	7.8	260	370	309	0.7	1.2	0.9	0.8	1.029	0.91	0.001	0.09	0.03	0	2	1	70	280	200
2134	NAGCHUN TALAB AT KHANDWA	22.2	27	24.1	5.3	9.4	7.5	7.2	8.9	8.1	180	502	315	1.1	3	1.8	0.18	1.82	0.79	0.08	0.08	0.08	0	4	1	18	240	97
2135	GOVINDGARH TANK	25	26	25.5	5.6	7.1	6.4	6.95	7.4	7.2	324	585	455	3.5	4.4	4.0	0.68	0.92	0.80	0.02	0.15	0.09	60	90	75	500	2800	1650
2136	SHAHPURA LAKE AT WEIR NEAR AYUSHMAN HOSPITAL, BHOPAL	24	36	28.7	5.2	7.6	6.1	7.51	8.51	7.8	480	810	575	1.9	2.9	2.5	0.12	1.4	0.49	-	-	-	8	200	59	50	1600	1213
2140	KERWA DAM NEAR REST HOUSE, BPL	23.5	23.5	23.5	7.2	7.6	7.4	7.1	7.83	7.5	244	480	356	1.3	4.2	2.5	0.13	1	0.42	-	-	-	0	2	1	24	90	55
2141	JANUNIA TALAB NEAR W/S	24	33	28.5	5.8	8.5	7.1	7.2	8.6	7.9	234	520	341	1.4	4.2	2.4	0.05	1.3	0.67	-	-	-	0	8	4	0	350	113
1285	PICHOLA LAKE AT UDAIPUR (WATER INTAKE POINT), RAJASTHAN	23	29	25.8	5.04	6.44	5.9	7.34	8.8	8.2	500	810	628	0.35	3.23	1.2	0.41	0.84	0.66	-	-	-	4	7	6	21	28	26
1286	UDAISAGAR LAKE AT UDAIPUR (INTAKE PT.) RAJASTHAN	24	30	26.3	0	3.53	2.2	8.35	8.68	8.5	2200	2700	2475	6.93	12.4	9.7	0.14	0.72	0.40	-	-	-	4	7	5	14	150	88
1414	PUSHKAR LAKE, RAJASTHAN	24	25.5	24.7	0	1.95	1.0	7.37	7.96	7.6	590	1060	750	2.98	12.18	8.0	0.16	0.58	0.43	0.1	0.1	0.1	7	14	11	28	460	197
1481	FATEH SAGAR LAKE AT UDAIPUR INTAKE POINT OF PHED,RAJASTHAN	25	30	26.5	5.12	8.02	6.2	8.57	9.2	9.0	520	670	588	0.6	1.89	1.2	0.32	0.58	0.44	-	-	-	4	4	4	4	14	8
1714	KAYALANA JHEEL JODHPUR, RAJASTHAN	16.3	24.6	20.9	6.2	8.3	7.0	7.6	8.31	7.9	290	330	310	0.34	2.13	0.8	0.22	0.48	0.39	-	-	-	3	7	4	4	150	41
1716	NAKKI LAKE, MT. ABU, RAJASTHAN	12	28	21.5	2.59	4.93	4.0	7.04	8.78	7.7	340	460	383	0.13	1.35	0.8	0.22	2.36	0.84	-	-	-	3	4	4	4	14	9

TABLE 20.3 :- WATER QUALITY OF LAKE, POND & TANK IN CHANDIGARH, HARYANA, HIMACHAL PRADESH, PUNJAB, UTTARAKHAND, UTTAR PRADESH, BIHAR, ORISSA & WEST BENGAL - 2009

STATION CODE	LOCATIONS	TEMPERATURE °C			D.O. (mg/l)			pH			CONDUCTIVITY (µmhos/cm)			B.O.D. (mg/l)			NITRATE- N (mg/l)			NITRITE- N (mg/l)			FECAL COLIFORM (MPN/100ml)			TOTAL COLIFORM (MPN/100ml)		
		Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
					> 4 mg/l			6.5-8.5			< 2250 µmhos/cm			< 3 mg/l									< 2500 MPN/100ml			< 5000 MPN/100ml		
2046	SUKHNA LAKE	18	31	24.3	6.8	7.9	7.2	7.9	8.5	8.2	208	280	245	2	3	2.3	0.05	1	0.64	-	-	-	-	-	-	-	-	-
1291	GOBINDSAGAR LAKE AT BILASPUR, H.P.	12	26	19.5	7.8	10	8.7	7.8	8.1	8.0	175	371	248	0.4	1.1	0.7	0.166	0.166	0.17	-	-	-	33	240	137	280	2400	1340
1292	PONGDAM LAKE AT PONG VILLAGE,H.P.	16.4	29	24.1	7.4	9.6	8.5	7.6	8.3	8.0	142	245	188	0.2	0.4	0.3	0.43	0.43	0.43	-	-	-	2	23	9	8	240	73
1429	RENUKA LAKE , 35 KM FROM PATNA SAHIB NORTH , H.P.	14.5	26	22.6	6.2	7.7	6.9	7.6	8.24	8.0	455	776	552	1.2	1.9	1.7	0.32	0.32	0.32	-	-	-	16	20	18	30	36	33
2650	KHAZIAR LAKE	21	21	21.0	2.6	2.6	2.6	6.46	6.46	6.5	30.9	30.9	31	13	13	13.0	0.67	0.67	0.67	-	-	-	9	9	9	-	-	-
1349	BRAHMSAROVAR LAKE AT KURUKSHETRA, HARYANA	20	35	27.5	7.2	7.9	7.6	8	8.4	8.2	212	422	317	2	2.2	2.1	0	0.33	0.17	-	-	-	-	-	-	-	-	-
1382	HARIKE LAKE D/S FROM CANAL, PUNJAB	17	18	17.7	5.9	6.4	6.1	7.3	7.4	7.3	368	399	379	1	1.4	1.3	1.4	2.4	1.80	1	1.6	1.27	50	100	83	500	500	500
1362	NAINI LAKE AT NAINITAL (WATER INTAKE POINT), U.P.	13	16	15.0	5.4	8.8	7.8	7.94	8.2	8.0	520	580	557	2.2	3.2	2.5	-	-	-	-	-	-	-	-	-	-	-	-
1364	RAMGARH LAKE, U.P.	14	29	23.2	7.9	10.8	9.3	8.14	8.26	8.2	520	638	551	4.2	5.2	4.7	1.4	2.8	2.21	0.2	1.4	0.76	140	220	172	310	480	378
2499	SAMARPUR JHEEL, RAEBARELI	25	25	25.0	7.2	7.2	7.2	7.8	7.8	7.8	561	561	561	3.7	3.7	3.7	0.56	0.56	0.56	-	-	-	4600	4600	4600	6300	6300	6300
2500	MAAHIL POND, URAI TEHSIL, JALAUN	19	19	19.0	8.1	8.1	8.1	8	8	8.0	1963	1963	1963	5.3	5.3	5.3	-	-	-	-	-	-	200	200	200	600	600	600
2501	LAXMI POND, JHANSI	22	22	22.0	3.6	3.6	3.6	7.9	7.9	7.9	1263	1263	1263	3.6	3.6	3.6	-	-	-	-	-	-	6300	6300	6300	92000	92000	92000
2557	KAWAR LAKE, BEGUSARAI	18.5	28	23.2	6.5	6.8	6.6	7.5	7.6	7.6	232	245	237	2.8	3.2	3.1	0.66	0.72	0.69	-	-	-	1300	3000	2433	2400	9000	5467
2571	MOTI JHEEL AT MOTIHARII	22	22	22.0	1.2	1.2	1.2	8.4	8.4	8.4	372	372	372	1.2	1.2	1.2	0.88	0.88	0.88	-	-	-	1700	1700	1700	3500	3500	3500
2573	TIGHI TALAB AT GAYA	22	22	22.0	6.1	6.1	6.1	6.4	6.4	6.4	1040	1040	1040	12	12	12.0	0.96	0.96	0.96	-	-	-	800	800	800	2400	2400	2400
2574	SURAJ KUND AT GAYA	21	21	21.0	8.5	8.5	8.5	7.5	7.5	7.5	702	702	702	3.2	3.2	3.2	0.82	0.82	0.82	-	-	-	1100	1100	1100	2800	2800	2800
2394	TOP CHACHI LAKE	18	41	30.3	7.5	7.8	7.7	7.4	7.5	7.5	-	-	-	1	2.1	1.4	-	-	-	-	-	-	-	-	-	-	-	-
2431	BINDUSAGAR (RELIGIOUS POND OF BHUBANESWAR CITY)	27	35	29.5	8.1	16.8	13.9	7.2	7.8	7.5	386	429	409	3.7	29	10.8	0.499	2.59	1.53	0.008	0.05	0.04	1700	9400	3975	2100	15000	6375
2432	NARENDRA POKHARI (RILIGIOUS POND OF PURI CITY)	27	34	29.8	9.9	23.1	16.8	7.7	8.5	8.3	722	1443	1010	3.5	15	9.1	0.66	4.29	2.35	0.032	0.05	0.04	220	92000	23930	480	160000	41545
2433	MARKANDA POKHARI (RILIGIOUS POND OF PURI CITY)	24	31	28.3	8.5	21.9	16.0	8.4	8.5	8.5	677	1244	870	2.7	8	5.5	1.06	7.1	5.02	0.016	0.05	0.03	220	14000	3938	340	21000	5870
2434	INDRADYUMNA TANK (RILIGIOUS POND OF PURI CITY)	26	32	28.3	9.2	21.6	15.5	8.4	8.8	8.6	559	1047	754	2.2	8.5	5.6	1.153	7.14	3.53	0.024	0.05	0.04	460	11000	3223	840	17000	5110
2435	SWETAGANGA (RILIGIOUS POND OF PURI CITY)	26	31	28.0	4.8	20.2	11.5	7.9	8.5	8.2	1007	2770	1561	12	20.5	15.1	0.76	3.478	2.62	0.008	0.05	0.04	490	13000	3855	1100	22000	6700
2436	PARVATI SAGAR (RILIGIOUS POND OF PURI CITY)	26	32	28.3	6.6	9.3	8.4	7.6	8.4	8.0	466	643	581	4	12.5	6.7	1.02	1.87	1.40	0.007	0.05	0.04	490	4900	1668	790	7900	2848
2437	CHILKA LAKE (RAMSAR SITE)	28	31	29.5	5.9	8.4	7.0	7.8	8.3	8.1	18160	46410	27223	1.2	3.2	2.5	0.206	1.14	0.66	0.05	0.05	0.05	110	790	425	250	1400	740
2438	ANSHUPA	23	33	28.5	7.3	10.7	9.2	6.8	8.2	7.5	121	300	189	1	4.4	2.4	0.19	2.967	0.99	0.009	0.05	0.04	130	700	405	250	1100	630
1765	RABINDRASAROVAR NATIONAL LAKE, CALCUTTA, WEST BENGAL	23	33	29.3	7.8	9.6	8.4	7.9	8.2	8.0	305	357	333	2.6	6.1	4.5	0.1	0.1	0.10	-	-	-	7000	110000	35500	9000	220000	66000
2503	HATISHALA GHAT ON DUDHPUKUR AT TARAKESHWAR	33	33	33.0	7.3	7.3	7.3	7.8	7.8	7.8	656	656	656	4.6	4.6	4.6	0.1	0.1	0.10	-	-	-	8000	8000	8000	14000	14000	14000
2504	MAINH GHAT ON DUDHPUKUR AT TARAKESHWAR	34	34	34.0	6.8	6.8	6.8	7.8	7.8	7.8	671	671	671	5.2	5.2	5.2	0.1	0.1	0.10	-	-	-	50000	50000	50000	110000	110000	110000
2505	HANUMAN GHAT ON DUDHPUKUR AT TARAKESHWAR	33	33	33.0	3.9	3.9	3.9	7.6	7.6	7.6	676	676	676	4.9	4.9	4.9	0.1	0.1	0.10	-	-	-	50000	50000	50000	80000	80000	80000
2519	KOCHBIHAR LAKE (SAGAR DIGHI)	28	28	28.0	7.4	7.4	7.4	6.7	6.7	6.7	490	490	490	3.8	3.8	3.8	0.1	0.1	0.10	-	-	-	17000	17000	17000	30000	30000	30000
2520	MIRIKH LAKE	16	16	16.0	7.9	7.9	7.9	6.4	6.4	6.4	64	64	64	4.8	4.8	4.8	0.31	0.31	0.31	-	-	-	11000	11000	11000	30000	30000	30000
2521	WATER RESERVIOR AT DELO	16	16	16.0	8.5	8.5	8.5	7	7	7.0	320	320	320	3.5	3.5	3.5	0.21	0.21	0.21	-	-	-	11000	11000	11000	22000	22000	22000
2522	SINCHAL LAKE FOR DARJEELING	11	11	11.0	8	8	8.0	7.7	7.7	7.7	300	300	300	2	2	2.0	0.13	0.13	0.13	-	-	-	4000	4000	4000	7000	7000	7000
2539	BELBONI LAKE NEAR BARJORA	32	32	32.0	-	-	-	7.5	7.5	7.5	99	99	99	1.8	1.8	1.8	0.26	0.26	0.26	-	-	-	130	130	130	170	170	170
2544	SAHEBBANDH AT PURULIA	26	26	26.0	8	8	8.0	8	8	8.0	409	409	409	3.4	3.4	3.4	0.66	0.66	0.66	-	-	-	8000	8000	8000	13000	13000	13000

TABLE 20.4 :- WATER QUALITY OF LAKE, POND & TANK IN ASSAM, MANIPUR, TRIPURA & MEGHALAYA - 2009

STATION CODE	LOCATIONS	TEMPERATURE			D.O. (mg/l)			pH			CONDUCTIVITY			B.O.D. (mg/l)			NITRATE- N (mg/l)			NITRITE- N (mg/l)			FECAL COLIFORM (MPN/100ml)			TOTAL COLIFORM (MPN/100ml)		
		Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
					> 4 mg/l			6.5-8.5			< 2250 µmhos/cm			< 3 mg/l									< 2500 MPN/100ml			< 5000 MPN/100ml		
2205	MER BEEL AT MADHABPUR	19	28	23.3	5.9	6.6	6.3	6.3	7.6	7.0	68	630	295	2.2	10.6	4.9	0.1	0.11	0.10	-	-	-	0	1500	558	1	2300	940
2206	DALONI BEEL NEAR JOGIGHOPA	23	30	26.5	5.5	7.6	6.5	7.2	7.4	7.3	67	149	111	0.4	1.8	0.9	0.1	0.1	0.10	-	-	-	0	0	0	1	730	348
1263	ELANGABEEL SYSTEM POND (CONNECTED TO R. KOLANG), ASSAM	25	32	28.3	0	1.3	0.8	6.3	7.4	7.0	1095	3220	2056	25	42	36.3	0.18	1.1	0.59	-	-	-	0	360	90	360	1100	820
2207	BOR BEEL AT JAKAI	18	28	23.0	6.1	8.2	6.9	6.7	7.4	7.0	92	128	110	3.2	7.8	4.9	0.1	0.3	0.16	-	-	-	0	360	165	300	1500	908
2208	BORPUKHURI, NAZIRA	18	26	23.0	4.8	6.8	5.7	6	7	6.7	280	350	308	0.9	5	3.1	0.1	0.1	0.10	-	-	-	0	360	180	1	1500	833
2209	GAURISAGAR TANK, GAURISAGAR	18	28	23.8	5.2	6.5	6.0	6.3	7.4	6.9	200	240	220	1.3	8	3.2	0.1	0.1	0.10	-	-	-	0	0	0	360	700	445
2210	RAJMAW PUKHURI, JORHAT	18	28	23.8	4.2	7.2	5.3	6.3	6.9	6.7	80	86	83	0.9	4.4	2.7	0.1	0.1	0.10	-	-	-	0	0	0	300	1100	710
2211	PADUMPUKHURI, TEZPUR	19	30	25.0	7.3	8	7.6	7.3	8.7	7.9	269	373	334	3.6	26.5	12.8	0.1	0.3	0.20	-	-	-	0	360	120	300	730	583
2212	GOPHUR TANK, GOPHUR	19	32	27.3	1.2	7.6	5.8	6.9	8	7.4	82	156	113	2.6	7.2	4.5	0.1	0.37	0.17	-	-	-	0	0	0	300	730	423
2213	JAIPAL PUKHURI, SIPAJHAR	19	32	25.5	5	8.3	6.1	6.6	8.2	7.6	200	330	273	6.8	14	9.6	0.1	0.1	0.10	-	-	-	0	0	0	1	700	340
2214	BOTODRIVA SATRA POND, NAGAON	28	32	30.0	4.5	8.6	6.2	6.2	8.1	7.0	71	600	438	4	12.5	6.7	0.1	0.15	0.11	-	-	-	0	0	0	360	730	628
2215	SARAN BEEL	24	29	26.5	4.5	8.4	6.3	6.6	7.7	7.0	73	107	94	0.8	3.1	2.2	0.1	0.15	0.13	-	-	-	0	360	90	300	1100	713
2216	DIGHALI PUKHURI, GUWAHATI	22	32	28.8	5.3	12.5	9.3	6.6	8.8	7.8	181	255	205	3.2	8.2	6.2	0.1	0.23	0.15	-	-	-	360	360	360	1100	1500	1367
2217	SUBHAGYA KUNDA POND KAMAKHYA TEMPLE, GUWAHATI	19	30	26.3	4.9	10.7	8.7	7	7.8	7.3	538	738	641	5	9.4	7.7	0.1	0.34	0.19	-	-	-	0	360	240	910	15000	5803
2218	DEEPAR BEEL AT BORAGAON NEAR IASST, GUWAHATI	20	32	28.0	4.3	13	9.6	6.8	8.1	7.5	226	456	328	0.7	11	6.0	0.1	0.14	0.11	-	-	-	0	730	243	730	1100	977
2219	BISHNU PUSKAR PUKHURI OF HAYAGRIB MADHAB TEMPLE, HAJO	22	31	26.3	5.6	9.5	7.6	7	8.1	7.5	126	309	253	3.8	10.6	7.6	0.1	0.11	0.10	-	-	-	0	730	243	360	1500	864
2220	CHAND DUBI BEEL, CHAND DUBI	20	32	27.3	6.5	9.1	8.4	6.2	7.1	6.8	155	450	296	1.2	9.4	3.4	0.1	0.14	0.11	-	-	-	0	0	0	1	1100	487
2221	GANGA PUKHURI, NALBARI (GORDON SCHOOL)	23	34	27.8	6.5	7.7	7.2	7.2	7.7	7.4	73	77	75	1.8	11.2	5.6	0.1	0.1	0.10	-	-	-	0	360	120	1	730	487
2222	RAJADINIA PUKHURI AT ABHAYAPURI	25	30	27.7	5.4	6.7	6.2	6	7.4	6.8	119	200	163	1.7	6.7	4.2	0.1	0.3	0.17	-	-	-	0	360	120	1100	1100	1100
2223	MAHAMAYA MANDIR PUKHURI	21.5	29	26.1	5.6	7.3	6.3	6.4	7	6.7	107	570	424	3.4	7.6	5.2	0.1	0.1	0.10	-	-	-	0	0	0	1	1100	685
2224	RAJAPUKHURI AT GAURIPUR	23	28	26.0	5.5	6.7	6.0	6.5	7.3	7.0	92	580	272	4.2	13	8.6	0.1	0.2	0.13	-	-	-	0	0	0	1	1100	630
2225	BASKANDI POND INSIDE THE BASKANDI MADRASA, BASKANDI	10	10	10.0	7.2	7.4	7.3	6.1	7.4	6.8	143	240	196	1.3	6	2.8	0.1	0.25	0.16	-	-	-	0	360	120	720	1100	850
2226	SIVASAGAR TANK (BORPUKHURI) NEAR SIVADOL	19	28	25.3	4.5	7	5.3	6.3	7.3	6.8	160	260	205	0.6	3.6	2.3	0.1	0.1	0.10	-	-	-	0	360	165	300	1100	808
2227	HORDAI PUKHURI, CHARAIDEW	19	27	24.3	3.8	6.5	5.1	6	7	6.6	200	310	250	0.5	2.6	2.0	0.1	0.1	0.10	-	-	-	0	0	0	360	720	450
2228	GALA BEEL AT DERGAON	24	31	28.5	5.2	7.4	6.7	6.8	7.2	7.1	104	223	171	0.8	4.6	2.3	0.1	0.2	0.13	-	-	-	0	360	90	700	1500	1008
1532	*GOYSAGAR TANK, SIBSAGAR, ASSAM	15	28	23.5	5	7.8	6.6	6.1	8	7.0	170	230	200	1.3	2.8	2.1	0.1	0.3	0.15	-	-	-	0	0	0	300	1100	623
1425	LOKTAK LAKE AT THANA, MANIPUR	20	28	23.6	5.2	8.7	7.1	7.2	7.4	7.3	129	157	142	0.8	2.5	1.8	-	-	-	-	-	-	-	-	-	95	115	103
1426	LOKTAK LAKE AT BISHNUPUR, MANIPUR	20	29	24.0	5.4	7.9	6.3	7.1	7.3	7.2	115	124	120	0.2	23	8.8	-	-	-	-	-	-	-	-	-	110	200	145
1629	SENDRA (LOKTAK LAKE),MANIPUR	20	29	24.0	5.6	8	6.9	7.1	7.6	7.4	91	119	103	0.7	2.1	1.6	-	-	-	-	-	-	-	-	-	80	235	155
1630	KARANG ISLAND(LOKTAK LAKE),MANIPUR	20	29	24.0	2.8	8.8	5.9	6.9	8	7.5	128	152	137	0.2	2.4	1.5	-	-	-	1.4	1.4	1.4	-	-	-	95	170	125
1727	LAXMI NARAYAN BARI PALACE COMPOUND, TRIPURA	26	30.5	28.4	5.12	6.8	5.9	7.65	7.94	7.8	210	285	259	2.1	3.2	2.5	0.25	0.7	0.41	0	0.08	0.04	220	480	390	360	580	477
1728	RUDRASAGAR, SONUMURA, TRIPURA	27	30.5	28.8	5.42	7.2	6.1	7.35	7.6	7.5	154	182	168	1.82	2.94	2.4	0.012	0.22	0.11	0.04	0.1	0.06	320	460	388	440	540	493
1347	UMIAM LAKE AT BARAPANI, MEGHALAYA	18	24	21.0	5.4	6.2	5.8	6.8	7.6	7.2	266	305	286	8.4	10.5	9.5	3	4.5	3.75	0	0	0	3100	3300	3200	4300	4600	4450
1459	THADLASKEIN LAKE, MEGHALAYA	22	22	22.0	8.4	8.4	8.4	7.1	7.1	7.1	85	85	85	1.4	1.4	1.4	2.5	2.5	2.50	0	0	0	46	46	46	70	70	70

TABLE 21.1 : - WATER QUALITY OF GROUND WATER IN ANDHRA PRADESH - 2009

STATION CODE	LOCATIONS	TEMPERATURE °C			pH			CONDUCTIVITY (µmhos/cm)			B.O.D. (mg/l)			NITRATE- N (mg/l)			NITRITE- N (mg/l)			FECAL COLIFORM (MPN/100ml)			TOTAL COLIFORM (MPN/100ml)		
		Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
	Water quality criteria				**6.5-8.5**			**< 2250 µmhos/cm**			**< 3 mg/l**									**< 2500 MPN/100ml**			**< 5000 MPN/100ml**		
15	WELL AT KUYYURA, A.P.	27	27	27	7.2	7.4	7.3	169	236	203	0.8	0.8	0.8	0.1	0.66	0.38	0.05	0.05	0.05	2	40	21	72	930	501
16	WELL AT TADAVAI A.P.	28	32	30	7	7.9	7.45	884	957	921	1.4	1.8	1.6	2.9	11.9	7.4	0.05	0.05	0.05	2	90	46	930	1700	1315
26	WELL AT VIJAYWADA, A.P.	26	30	27.7	7.6	8.1	7.9	1104	1468	1291	0.3	2	1.03	0.05	0.05	0.05	0.05	0.05	0.05	2	4	3	1300	1400	1367
27	WELL AT PEDDAVOORA, A.P.	28	30	29	8.2	8.6	8.4	806	961	884	1	1	1	1.6	1.78	1.69	-	-	-	0	0	0	25	25	25
1791	B/W. - EAST OF SAICHERUVU ,PAIDIPALLY (V),WARANGAL	30	30	30	7.3	7.4	7.35	1560	1817	1689	0.2	0.3	0.25	11.7	41	26.35	0.05	0.05	0.05	2	20	11	40	230	135
1792	B/W -NEAR CKM COLLEGE , ENUMAMULA (V) ,WARANGAL	30	30	30	6.9	7.2	7.05	2280	4480	3380	0.3	0.7	0.5	12	16.2	14.1	0.05	0.05	0.05	20	90	55	60	280	170
1793	O/W - BHOOMAIAH NEAR ASHPONDS OF NTPC , KUNDANPALLY (V) RAMAGUNDAM , KARIMNAGAR	26	27	26.5	7.4	8.3	7.85	1420	1912	1666	0.4	0.6	0.5	1.5	8.4	4.95	0.05	0.05	0.05	2	19	11	72	210	141
1794	B/W - MANAKONDUR (V) , KARIMNAGAR DIST.	26	27	26.5	7	7.4	7.2	973	1761	1367	1.9	2.6	2.25	3	4.26	3.63	-	-	-	2	240	121	170	2400	1285
1525	B/W - IDA , NEAR CHAITANYA CHLORIDES ,PASHAMAYLAM , MEDAK DIST.	29	29	29	7.8	8	7.9	848	1254	1051	4	4	4	1.57	1.97	1.77	-	-	-	0	45	23	25	125	75
1811	B/W - PRIMARY SCHOOL - RUDRAVELLI (V) , BIBINAGAR (M), NALGONDA DIST. , A.P.	29	30	29.5	7.7	7.9	7.8	1532	1857	1695	3.5	3.5	3.5	1.1	3.1	2.1	-	-	-	0	1	1	10	62	36
1810	B/W - SRI RAMNAGAR COLONY, SAKKAR NAGAR, BODHAN, NIZAMABAD DIST. , A.P.	26	29	27.7	7.4	7.8	7.63	1074	1660	1324	0.4	2	1.2	0.5	4.73	2.33	-	-	-	0	3	1	26	100	75
1513	B.W. - KRISHNA MURTHY, D.NO. 48-16-43 AUTONAGAR VIJJAYAWADA, KRISNA	26	30	27.3	7.8	8.3	8.1	1137	4560	2490	1.2	2.2	1.7	0.05	0.2	0.125	0.05	0.05	0.05	2	4	3	800	1300	1133
1514	B/W. - VIJAY KUMAR AUTONAGAR VIJAYAWADA, KRISHNA DIST., A.P.	26	30	27.3	7.3	8.1	7.8	1209	1505	1320	0.2	2.2	1.4	1	1	1	0.05	0.05	0.05	2	4	3	800	1300	1067
1515	B/W. - NAGARAM(V), PALVONCHA, KHAMMAM	25	27	26.1	7.1	8	7.6	257	2520	1882	0	4	1.7	0.15	18.4	10.03	0.05	0.7	0.27	2	4	3	300	1100	823
1516	B.W.OF NAVLOK GARDENS NELLORE AP	28	29	28.5	6.8	8	7.4	1082	3080	2081	0.5	2.8	1.65	0.1	4.38	2.24	-	-	-	2	4	3	1300	1300	1300
1517	B/W. - TUNGBHADRA RIVER NEAR KURNOOL, A.P.	27	27	27	6.9	6.9	6.9	1635	1635	1635	1.4	1.4	1.4	14	14	14	0.05	0.05	0.05	2	2	2	9	9	9
1518	B/W. - NANDYAL, KURNOOL DIST	28	28	28	7.2	7.2	7.2	2040	2040	2040	2	2	2	6.8	6.8	6.8	0.05	0.05	0.05	4	4	4	14	14	14
1519	B/W. - NAGIRI, CHITTOOR DIST	25	29	27.5	6.6	7.5	7.13	613	2740	1999	1.2	1.8	1.46	6.8	25	15.89	0.05	0.1	0.09	2	4	3	6	12	9
1520	B/W - SWARNAMUKHI RIVER, SRIKALAHASTI, CHITTOOR DIST	25	28	26.7	6.6	7.1	6.77	903	1748	1425	1.2	1.8	1.47	6.4	14	9.47	0.05	0.1	0.075	2	4	3	6	14	9
1521	O/W - NEAR RAMA TEMPLE , WARD No 2 , MINDI , VISAKHAPATNAM, A.P.	24	25	24.5	8.1	8.3	8.2	4210	4550	4380	0.8	1	0.9	31	52	41.5	0.05	0.05	0.05	3	3	3	4	9	7
1522	O/W. PEDDANUYYI - VIZIANAGARAM, A.P.	26	32	27.4	7	7.6	7.2	672	1502	984	1	1.8	1.34	8	26	13.93	0.05	0.05	0.05	3	3	3	4	150	53
1523	B/W - NEAR M/S ANDHRA SUGARS LTD . KOVVUR , W.G.DIST., A.P.	23.5	24	23.8	7	7.9	7.45	240	312	276	0.6	1	0.8	0.11	0.51	0.31	0.05	0.05	0.05	3	3	3	21	23	22
1524	O/W -NEAR PARTAP NAGAR BRIIDGE -KAKINADA , E.G.	20	22	21	7.2	8.4	7.8	1113	1592	1353	1.2	1.4	1.3	15.3	21	18.15	0.05	0.05	0.05	3	3	3	4	21	13
1795	B/W - PANCHAYAT OFFICE ,,BOLLARAM (V) MEDAK	27	28	27.5	6.7	7.4	7.05	5540	5700	5620	35	40	37.5	36.26	54	45.13	-	-	-	0	1	1	59	106	83

TABLE 21.2 : - WATER QUALITY OF GROUND WATER IN ASSAM- 2009

STATION CODE	LOCATIONS	TEMPERATURE °C			pH			CONDUCTIVITY (µmhos/cm)			B.O.D. (mg/l)			NITRATE- N (mg/l)			NITRITE- N (mg/l)			FECAL COLIFORM (MPN/100ml)			TOTAL COLIFORM (MPN/100ml)		
		Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
	Water quality criteria				6.5-8.5			< 2250 µmhos/cm			< 3 mg/l									< 2500 MPN/100ml			< 5000 MPN/100ml		
1533	*DIGBOI, TINSUKIA DISTT.,	20	26	23	6.4	6.7	6.55	130	139	135	1.9	2	1.95	0.1	0.1	0.1	-	-	-	0	0	0	1	1	1
1534	*KARBI ANGLONG DISTT.	31	32	31.5	7.3	7.3	7.3	460	917	689	0.5	4.6	2.55	0.1	0.1	0.1	-	-	-	0	0	0	1	1	1
1535	*SIBSAGAR , ASSAM	23	25	24	6	6.2	6.1	208	387	298	1.5	2.4	1.95	0.1	0.11	0.11	-	-	-	0	0	0	1	1	1
1536	*SIBSAGAR, ASSAM	25	25	25	6	7.1	6.55	129	212	171	0.7	1.6	1.15	0.1	0.1	0.1	-	-	-	0	0	0	1	1	1
1537	*JORHAT, ASSAM	24	26	25	6.5	6.8	6.65	259	322	291	0.8	1.4	1.1	0.1	0.1	0.1	-	-	-	0	0	0	1	1	1
1538	*SILCHAR, ASSAM	11	12	11.5	6.8	6.8	6.8	534	888	711	0.5	2.2	1.35	0.1	0.21	0.16	-	-	-	0	0	0	1	360	181
1539	*BARPETA, ASSAM	24	27.5	25.8	6.6	7.7	7.15	360	500	430	2.2	3.5	2.85	0.12	0.16	0.14	-	-	-	0	0	0	1	1	1
1540	*BONAIGAON, ASSAM	25	26	25.5	6.3	6.3	6.3	121	240	181	0.7	3.2	1.95	0.7	1.21	0.96	-	-	-	0	0	0	1	1	1
1541	*GUWAHATI, ASSAM	24	26	25	6.3	7	6.65	628	1254	941	1.5	50	25.75	0.22	11.8	6.01	-	-	-	0	0	0	700	730	715
1542	*GUWAHATI, ASSAM	26	28	27	7.1	7.3	7.2	374	408	391	2.5	3	2.75	0.15	1.02	0.59	-	-	-	0	0	0	0	1	1
2243	GROUND WATER FROM LEDO, MARGHERITA	20	28	24	6.1	6.6	6.35	544	573	559	0.6	1.5	1.05	0.1	0.2	0.15	-	-	-	0	0	0	1	1	1
2244	GROUND WATER FROM NAZIRA	23	23	23	6.8	6.8	6.8	257	257	257	1.6	1.6	1.6	0.1	0.1	0.1	-	-	-	0	0	0	1	1	1
2245	GROUND WATER FROM NUMALIGARH (NEAR NRL TE LABOR COLONY)	28	30	29	7.3	7.3	7.3	450	524	487	0.8	1.2	1	0.51	0.59	0.55	-	-	-	0	0	0	1	1	1
2246	GROUND WATER FROM SEMENCHAPARI	20	26	23	7.1	7.3	7.2	291	372	332	1.6	2.5	2.05	0.1	0.16	0.13	-	-	-	0	0	0	1	1	1
2247	GROUND WATER FROM SILAPATHAR	20	28	24	6.8	7.1	6.95	370	430	400	0.6	2.1	1.35	0.11	0.14	0.125	-	-	-	0	0	0	1	1	1
2248	GROUND WATER FROM LAKHIMPUR TOWN	25	27	26	7	7.2	7.1	67	270	169	0.5	14.6	7.55	0.1	0.1	0.1	-	-	-	0	0	0	1	1	1
2249	GROUND WATER FROM TEZPUR (MISSION CHARIALI)	25	25	25	6.1	6.7	6.4	138	236	187	2.2	13.4	7.8	0.1	0.17	0.14	-	-	-	0	0	0	1	1	1
2250	GROUND WATER FROM NAGAON (PANIGAON)	18	27	22.5	6.6	6.9	6.75	775	835	805	1.3	1.3	1.3	0.1	0.2	0.15	-	-	-	0	0	0	1	1	1
2251	GROUND WATER FROM JAGIROAD NEAR HPC EFFLUENT DISCHARGE POINT	23	24	23.5	6.4	6.4	6.4	388	432	410	1	1.4	1.2	0.38	0.41	0.40	-	-	-	0	0	0	1	360	181
2252	GROUND WATER NEAR MSW DUMPING SITE AT GARCHUK-GUWAHATI	26	28	27	6.9	7.1	7	263	278	271	0.3	0.8	0.55	0.1	0.26	0.18	-	-	-	0	0	0	1	1	1
2253	GROUND WATER FROM NALBARI	26	26	26	6.8	7	6.9	239	388	314	4	4.2	4.1	0.1	0.1	0.1	-	-	-	0	0	0	1	1	1
2254	GROUND WATER FROM BARPETA ROAD(RLY STATION)	25	28	26.5	6.9	7.1	7	138	773	456	3.2	3.4	3.3	0.1	0.1	0.1	-	-	-	0	0	0	1	1	1
2255	NEAR BPRL, DHALIGAON	21	27	24	6.3	6.5	6.4	288	527	408	1.5	2.4	1.95	0.21	0.29	0.25	-	-	-	0	0	0	1	730	366
2256	GROUND WATER FROM KOKRAJHAR DISTRICT (HS SCHOOL)	25	28	26.5	6.2	6.7	6.45	119	246	183	0.5	3.8	2.15	0.1	0.12	0.11	-	-	-	0	0	0	1	1	1
2257	GROUND WATER FROM DHUBRI DISTRICT (COLLEGE NAGAR)	24	27	25.5	6.5	6.8	6.65	327	387	357	1	4.8	2.9	0.1	0.1	0.1	-	-	-	0	0	0	1	1	1
2258	GROUND WATER FROM GOALPARA DIST. (GOALPARA COLLEGE)	26.5	27.5	27	6.4	6.8	6.6	406	442	424	0.5	1.9	1.2	0.1	0.31	0.21	-	-	-	0	0	0	1	1	1
2259	GROUND WATER FROM DIPHU (GOVT. COLLEGE)	31	31	31	7.3	7.3	7.3	353	927	640	0.4	2.8	1.6	0.1	0.15	0.125	-	-	-	0	0	0	1	360	181
2260	GROUND WATER FROM HAMREN	11	11.3	11.15	6.8	7.1	6.95	186	530	358	0.9	1.8	1.35	0.1	0.1	0.1	-	-	-	0	0	0	1	1	1
2261	GROUND WATER FROM HAFLONG	11	11	11	6.4	6.5	6.45	134	144	139	0.9	1.6	1.25	0.1	0.11	0.11	-	-	-	0	0	0	1	1	1
2262	GROUND WATER FROM KARIMGANJ (COLLEGE)	12	12	12	6.9	6.9	6.9	168	844	506	0.8	2	1.4	0.1	0.1	0.1	-	-	-	0	0	0	1	1	1
2263	GROUND WATER FROM HIALAKANDI (NEAR ASTC BUS STAND)	20	24	22.2	6	8.1	6.825	114	434	332	2	2.6	2.35	-	-	-	0.13	0.24	0.20	3	11	7	7	1100	287
2264	GROUND WATER IN PANCHGRAM MARKET NEAR CACHAR PAPER MILL	20	25	22	6.7	6.9	6.8	136	813	484	1.4	2.7	2.23	-	-	-	0.1	0.26	0.19	3	35	19	11	2400	636

TABLE 21.3 : - WATER QUALITY OF GROUND WATER IN MIZORAM- 2009

STATION CODE	LOCATIONS	TEMPERATURE °C			pH			CONDUCTIVITY (µmhos/cm)			B.O.D. (mg/l)			NITRATE- N (mg/l)			NITRITE- N (mg/l)			FECAL COLIFORM (MPN/100ml)			TOTAL COLIFORM (MPN/100ml)		
		Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
	Water quality criteria				6.5-8.5			< 2250 µmhos/cm			< 3 mg/l									< 2500 MPN/100ml			< 5000 MPN/100ml		
2054	RAMHLUM (NORTHERN PART)	22	29	25.5	7	7.5	7.25	298	589	444	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2055	MISSION VENGTHLANG (SOUTHERN PART)	28	28	28	7	7	7	568	568	568	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

TABLE 21.4 : - WATER QUALITY OF GROUND WATER IN MANIPUR- 2009

STATION CODE	LOCATIONS	TEMPERATURE °C			pH			CONDUCTIVITY (µmhos/cm)			B.O.D. (mg/l)			NITRATE- N (mg/l)			NITRITE- N (mg/l)			FECAL COLIFORM (MPN/100ml)			TOTAL COLIFORM (MPN/100ml)		
		Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
	Water quality criteria				6.5-8.5			< 2250 µmhos/cm			< 3 mg/l									< 2500 MPN/100ml			< 5000 MPN/100ml		
1920	KAKCHING (THOUBAL DIST.)	21	29	25	6.7	8	7.35	298	398	348	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1921	HEIROK (THOBAL DIST.)	21	28	24.5	7.1	7.8	7.45	420	530	475	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1922	LAMKA (CHURACHANDPUR DIST.)	-	-	-	6.9	6.9	6.9	376	376	376	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1923	MOREH (CHANDEL DIST.)	26	29	27.5	7.64	7.76	7.685	480	530	498	0	0	0	0	1.12	0.38	0	0.04	0.01	0	0	0	0	0	0
1924	PALLEL (CHANDEL DIST.)	26	28.5	27.3	7.43	7.72	7.56	260	288	280	0	0	0	0	0.14	0.03	0	0.09	0.04	0	0	0	0	0	0

TABLE 21.5 : - WATER QUALITY OF GROUND WATER IN TRIPURA- 2009

STATION CODE	LOCATIONS	TEMPERATURE °C			pH			CONDUCTIVITY (µmhos/cm)			B.O.D. (mg/l)			NITRATE- N (mg/l)			NITRITE- N (mg/l)			FECAL COLIFORM (MPN/100ml)			TOTAL COLIFORM (MPN/100ml)		
		Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
	Water quality criteria				6.5-8.5			< 2250 µmhos/cm			< 3 mg/l									< 2500 MPN/100ml			< 5000 MPN/100ml		
1405	WELL AT UDAIPUR (TUBEWELL)	26	29	27.5	7.64	7.76	7.685	480	530	498	0	0	0	0	1.12	0.38	0	0.04	0.01	0	0	0	0	0	0
1406	WELL AROUND UDAIPUR (TUBEWELL), TRIPURA	26	28.5	27.3	7.43	7.72	7.56	260	288	280	0	0	0	0	0.14	0.03	0	0.09	0.04	0	0	0	0	0	0
1730	KUNJBAN, AGARTALA, TRIPURA	27	27.5	27.2	6.4	6.6	6.51	168	180	173	0	0	0	0	0.04	0.02	0	0.08	0.05	0	0	0	0	0	0
1731	LANKAMURA, TRIPURA	27	27.5	27.2	7.1	7.2	7.17	68	620	271	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1732	A.D.NAGAR, AGARTALA	27.5	27.5	27.5	6.65	6.8	6.73	89	182	127	0	0	0	0	0.04	0.02	0	0.05	0.02	0	0	0	0	0	0
1733	SHIBNAGAR, AGARTALA.	27	28	27.5	6.4	7.1	6.71	165	172	168	0	0	0	0	0	0	0	0.12	0.04	0	0	0	0	0	0
1734	GANDHIGRAM, AGARTALA	26	28	27.2	7.48	7.6	7.53	152	220	184	0	0	0	0	0	0	0	0.2	0.08	0	0	0	0	0	0

TABLE 21.6 : - WATER QUALITY OF GROUND WATER IN CHATTISGARH - 2009

STATION CODE	LOCATIONS	TEMPERATURE °C			pH			CONDUCTIVITY (µmhos/cm)			B.O.D. (mg/l)			NITRATE- N (mg/l)			NITRITE- N (mg/l)			FECAL COLIFORM (MPN/100ml)			TOTAL COLIFORM (MPN/100ml)		
		Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
	Water quality criteria				6.5-8.5			< 2250 µmhos/cm			< 3 mg/l									< 2500 MPN/100ml			< 5000 MPN/100ml		
1620	AT RAIPUR REGION, CHHATISSGARH	23	27	25.3	7.6	7.9	7.8	465	950	637	0.4	0.4	0.4	-	-	-	1.4	1.4	1.4	-	-	-	2	23	13
1621	AT RAIPUR REGION,CHHATISSGARH	22	33	27.0	8.1	8.3	8.2	534	3664	1322	0.8	0.8	0.8	-	-	-	2.5	2.6	2.55	-	-	-	6	23	15
1622	AT BILASPUR REGION, CHHATISSGARH	23	24	23.5	7.23	7.46	7.35	693	1873	1283	0.1	0.2	0.15	2.18	2.58	2.38	0.08	0.08	0.08	-	-	-	-	-	-
1623	AT BILASPUR REGION, CHHATISSGARH	23	24	23.5	7.24	7.27	7.26	2120	2500	2310	0.2	0.4	0.3	3.58	4.76	4.17	0.08	0.08	0.08	-	-	-	-	-	-

TABLE 21.7 : - WATER QUALITY OF GROUND WATER IN MADHYA PRADESH - 2009

STATION CODE	LOCATIONS	TEMPERATURE °C			pH			CONDUCTIVITY (µmhos/cm)			B.O.D. (mg/l)			NITRATE- N (mg/l)			NITRITE- N (mg/l)			FECAL COLIFORM (MPN/100ml)			TOTAL COLIFORM (MPN/100ml)		
		Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
	Water quality criteria				6.5-8.5			< 2250 µmhos/cm			< 3 mg/l									< 2500 MPN/100ml			< 5000 MPN/100ml		
1617	OPEN WELL/TUBE WELL INDUSTRIAL AREA MANDIDEEP, DISTT RAISEN, M.P	-	-	-	7.4	7.7	7.55	200	810	505	1.9	13	7.45	0.12	1.4	0.76	-	-	-	0	12	6	27	350	189
1897	TUBE WELL AT JAINABAD, NEAR TAPTI RIVER BRIDGE, PUMPING STN BURHANPUR, M.P.	23.2	25	24.1	7.7	8.3	7.93	760	894	810	0.8	1	0.9	2.5	7.55	5.03	0.00	0.01	0.006	0	2	1	2	9	6
2143	KATHODA, JABALPUR	22	29	25.5	7.5	7.9	7.7	829	928	879	1	1	1	3.1	3.1	3.1	-	-	-	0	0	0	11	28	20
2144	MADAI GRAM, JABALPUR	18	28	23	7.3	7.7	7.5	388	911	650	1.1	1.1	1.1	1.18	4.2	2.69	-	-	-	0	0	0	11	11	11
2145	MEHATWAS, NAGDA	-	-	-	7.4	8.3	7.85	1750	1860	1805	-	-	-	7.7	8.6	8.15	0.02	0.02	0.02	-	-	-	-	-	-
2146	BHAGATPURI VILLAGE, NAGDA	27	27	27	7.4	8.1	7.75	830	1070	950	-	-	-	4.24	5.28	4.76	0.03	0.03	0.03	-	-	-	-	-	-
2147	PRATAL NAGAR, DEWAS	-	-	-	7.4	7.4	7.4	3070	3070	3070	-	-	-	8.15	8.15	8.15	-	-	-	-	-	-	-	-	-
2148	DOSIGAON, RATLAM, MP	-	-	-	7.3	8.1	7.7	2210	3560	2885	-	-	-	8.4	10.87	9.64	0.18	0.18	0.18	-	-	-	-	-	-
2149	CULVERT ON A.B. ROAD, MAKSI	-	-	-	7.4	7.4	7.4	679	679	679	-	-	-	7.9	7.9	7.9	-	-	-	-	-	-	-	-	-
2150	TRENCHING GROUND, NEAR GARDEN, DEV GURADIYA ROAD, INDORE	21.6	29.2	25.6	7.1	8.2	7.66	1360	1686	1479	0.4	1	0.825	0.05	3.25	2.11	0	0.02	0.01	0	0	0	2	9	6
2151	TRENCHING GROUND IN THE PREMISES OF M/S RISHABH MASALA UDYOG, INDORE	21.5	29.4	26.1	7.1	8	7.61	2052	3118	2567	0.6	2.2	1.38	0.05	3.74	2.47	0	0.09	0.05	0	0	0	4	9	6
2152	TRENCHING GROUND IN THE PREMISES OF M/S LAKHANI FOOT WEAR, INDORE	21	29.2	25.9	6.8	8	7.43	2186	3688	3007	0.8	1.9	1.22	0.05	3.75	2.56	0	0	0	0	0	0	4	7	6
2153	IBRAHIMGANJ NEAR BUS STAND, BHOPAL	30	30	30	7.42	7.7	7.56	336	610	473	1.2	2.3	1.75	0.11	1.2	0.66	-	-	-	0	0	0	6	14	10

TABLE 21.8 : - WATER QUALITY OF GROUND WATER IN HIMACHAL PRADESH - 2009

STATION CODE	LOCATIONS	TEMPERATURE °C			pH			CONDUCTIVITY (µmhos/cm)			B.O.D. (mg/l)			NITRATE- N (mg/l)			NITRITE- N (mg/l)			FECAL COLIFORM (MPN/100ml)			TOTAL COLIFORM (MPN/100ml)		
		Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
	Water quality criteria				6.5-8.5			< 2250 µmhos/cm			< 3 mg/l									< 2500 MPN/100ml			< 5000 MPN/100ml		
1555	AT KALA AMB, H.P	25	25	25	7.58	8.2	7.89	526	691	609	0.6	0.6	0.6	0.23	0.23	0.23	-	-	-	14	14	14	29	29	29
1556	AT PAONTA SAHIB, H.P	25	25	25	7.31	7.5	7.41	642	676	659	0.3	0.3	0.3	0.2	0.2	0.2	-	-	-	14	14	14	30	30	30
1557	AT PARWANOO, H.P	24	24	24	7.7	7.84	7.77	494	755	625	0.1	0.1	0.1	0.202	0.202	0.20	-	-	-	-	-	-	4	4	4
1558	AT BADDI, H.P	21	27	24	7.9	8.33	8.12	380	416	398	0.3	0.3	0.3	0.22	0.22	0.22	-	-	-	2	2	2	8	8	8
1559	AT BAROTIWALA, H.P	22.5	26.5	24.5	7.9	8.64	8.27	440	534	487	0.2	0.2	0.2	0.26	0.26	0.26	-	-	-	2	2	2	7	7	7
1560	AT NALAGARH, H.P	23.5	27	25.3	8.52	8.8	8.66	1273	1292	1283	0.2	0.2	0.2	0.312	0.312	0.31	-	-	-	-	-	-	5	5	5
1561	AT DAMTAL, H.P	20	22	21.0	7.63	8.2	7.92	691	731	711	0.2	0.7	0.45	5.4	5.4	5.4	-	-	-	4	4	4	17	17	17
1562	AT UNA, H.P	19	23	21.0	7.2	7.36	7.28	495	542	519	0.1	0.1	0.1	0.148	0.148	0.15	-	-	-	-	-	-	-	-	-
1872	SHIMLA D/S OF MSW DUMPING SIOT	11	22	15.8	6.5	7.8	7.31	256	1003	573	1.4	9.5	5.3	0.646	0.646	0.65	-	-	-	48	240	143	136	560	337
1873	DHARAMSHALA KANGRA D/S OF MSW DUMPING SIOT	18	19	18.5	7.8	8.12	7.96	167	232	200	0.5	0.6	0.55	4.32	4.32	4.32	-	-	-	7	8	8	17	26	22
1874	SOLAN-D/S OF MSW DUMPING SIOT-	20	20	20.0	8.2	8.2	8.2	524	524	524	19	19	19	-	-	-	-	-	-	117	117	117	341	341	341
1875	MANDI-D/S OF MSW DUMPING SIOT	19	22	20.5	7.6	8.21	7.91	297	333	315	-	-	-	0.802	0.802	0.80	-	-	-	-	-	-	-	-	-
1876	PARWANOO INDUSTRIAL AREA	25	26	25.5	7.7	7.97	7.84	665	927	796	0.1	0.1	0.1	0.292	0.292	0.29	-	-	-	3	3	3	10	10	10
1877	BADDI INDUSTRIAL AREA	22	26.5	24.3	7.6	8.65	8.13	438	757	598	0.2	0.2	0.2	0.19	0.19	0.19	-	-	-	4	4	4	12	12	12
1878	BAROTIWALA INDUSTRIAL AREA	22	26	24.0	7.98	8.2	8.09	296	372	334	-	-	-	0.31	0.31	0.31	-	-	-	4	4	4	9	9	9
1879	NALAGARH INDUSTRIAL AREA	23	31	27.0	7.7	7.74	7.72	839	1194	1017	0.2	0.2	0.2	0.32	0.32	0.32	-	-	-	-	-	-	6	6	6
1880	KALA AMB INDUSTRIAL AREA	26	26	26.0	7.88	8.2	8.04	384	488	436	0.9	0.9	0.9	0.24	0.24	0.24	-	-	-	13	13	13	26	26	26
1881	PAONTA SAHIB INDUSTRIAL AREA	25	25	25.0	7.2	8.09	7.65	339	530	435	0.5	0.5	0.5	0.22	0.22	0.22	-	-	-	11	11	11	26	26	26
1882	MEHATPUR INDUSTRIAL AREA	18	23.5	20.8	7	7.33	7.17	564	721	643	0.1	0.1	0.1	0.18	0.18	0.18	-	-	-	-	-	-	4	4	4
1883	UNA INDUSTRIAL AREA	19.5	24	21.8	6.87	8.2	7.54	291	773	532	0.1	0.1	0.1	0.206	0.206	0.21	-	-	-	-	-	-	-	-	-
2628	HAND PUMP AT SHAMSHI, HP	18	18	18	7.04	7.04	7.04	308	308	308	-	-	-	0.983	0.983	0.98	-	-	-	-	-	-	-	-	-
2629	HAND PUMP AT MANDI TOWN	22.5	22.5	22.5	8.36	8.36	8.36	545	545	545	-	-	-	0.029	0.029	0.03	-	-	-	-	-	-	-	-	-
2630	HAND PUMP AT HAMIRPUR TOWN,	20.5	20.5	20.5	7.18	7.18	7.18	923	923	923	-	-	-	0.148	0.148	0.15	-	-	-	-	-	-	2	2	2
2631	HAND PUMP AT NADAUN TOWN	20.5	20.5	20.5	6.83	6.83	6.83	777	777	777	0.1	0.1	0.1	0.214	0.214	0.21	-	-	-	-	-	-	-	-	-
2632	HAND PUMP AT BILASPUR TOWN, HP	28	28	28	7.47	7.47	7.47	592	592	592	-	-	-	0.059	0.059	0.06	-	-	-	-	-	-	-	-	-
2633	HAND PUMP AT RECONGPEO	11.5	11.5	11.5	8.48	8.48	8.48	51.7	51.7	52	0.1	0.1	0.1	0.18	0.18	0.18	-	-	-	-	-	-	-	-	-
2634	HAND PUMP AT SHIMLA, HP	14	14	14	7.45	7.45	7.45	298	298	298	0.1	0.1	0.1	0.142	0.142	0.14	-	-	-	-	-	-	-	-	-
2635	HAND PUMP AT RAMPUR, HP	10	10	10	8.18	8.18	8.18	705	705	705	-	-	-	0.168	0.168	0.17	-	-	-	-	-	-	-	-	-
2636	HAND PUMP AT KANGRA TEMPLE/ TOWN, HP	-	-	-	7.05	7.05	7.05	392	392	392	0.8	0.8	0.8	1.12	1.12	1.12	-	-	-	-	-	-	-	-	-
2637	HAND PUMP AT JWALAJI TEMPLE, HP	-	-	-	7.4	7.4	7.4	605	605	605	0.7	0.7	0.7	0.84	0.84	0.84	-	-	-	-	-	-	-	-	-
2638	HAND PUMP AT CHINTPURNI TEMPLE/ TOWN, HP	-	-	-	7.91	7.91	7.91	319	319	319	0.5	0.5	0.5	5.87	5.87	5.87	-	-	-	-	-	-	-	-	-
2639	HAND PUMP AT CHAMUNDA DEVI TEMPLE/ TOWN, HP	-	-	-	7.64	7.64	7.64	117	117	117	0.5	0.5	0.5	0.49	0.49	0.49	-	-	-	-	-	-	-	-	-
2640	HAND PUMP AT SANSARPUR TERRACE IA, HP	26	26	26	8.17	8.17	8.17	305	305	305	0.4	0.4	0.4	1.35	1.35	1.35	-	-	-	-	-	-	-	-	-
2641	HAND PUMP AT CHAMBA TOWN, HP	24	24	24	7.48	7.48	7.48	505	505	505	0.5	0.5	0.5	0.16	0.16	0.16	-	-	-	-	-	-	-	-	-
2643	HAND PUMP AT SOLAN, HP	19.5	19.5	19.5	7.87	7.87	7.87	505	505	505	0.1	0.1	0.1	0.224	0.224	0.22	-	-	-	-	-	-	-	-	-
2645	HAND PUMP AT NAHAN, HP	23.5	23.5	23.5	7.02	7.02	7.02	1388	1388	1388	-	-	-	0.27	0.27	0.27	-	-	-	-	-	-	-	-	-

TABLE 21.9 : - WATER QUALITY OF GROUND WATER IN CHANDIGARH - 2009

STATION CODE	LOCATIONS	TEMPERATURE °C			pH			CONDUCTIVITY (µmhos/cm)			B.O.D. (mg/l)			NITRATE- N (mg/l)			NITRITE- N (mg/l)			FECAL COLIFORM (MPN/100ml)			TOTAL COLIFORM (MPN/100ml)		
		Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
	Water quality criteria				6.5-8.5			< 2250 µmhos/cm			< 3 mg/l									< 2500 MPN/100ml			< 5000 MPN/100ml		
2039	SECTOR 15	25	25	25	7.9	7.9	7.9	880	880	880	0.1	0.1	0.1	9.1	9.1	9.1	-	-	-	-	-	-	-	-	-
2040	SECTOR 22	23	26	24.5	7.1	7.3	7.2	803	819	811	0	0.5	0.25	0.1	0.9	0.5	-	-	-	-	-	-	-	-	-
2041	SECTOR 34	-	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-	-	-	-	-	-
2042	SECTOR 47	26	26	26	7.3	7.3	7.3	856	856	856	0.1	0.1	0.1	1	1	1	-	-	-	-	-	-	-	-	-
2043	PALSORA VILLAGE	24	24	24	7.1	7.3	7.2	617	747	682	0.4	0.4	0.4	0.1	1	0.55	-	-	-	-	-	-	-	-	-
2044	DHANAS VILLAGE	24	25	24.5	6.7	7.2	6.95	1051	1268	1160	0	0.3	0.15	13.33	13.5	13.415	-	-	-	-	-	-	-	-	-
2045	DADU MAJRA	24	25	24.5	7	7.3	7.15	1036	1169	1103	0.4	0.7	0.55	0.36	6.8	3.58	-	-	-	-	-	-	-	-	-

TABLE 21.10 : - WATER QUALITY OF GROUND WATER IN PUNJAB - 2009

STATION CODE	LOCATIONS	TEMPERATURE °C			pH			CONDUCTIVITY (µmhos/cm)			B.O.D. (mg/l)			NITRATE- N (mg/l)			NITRITE- N (mg/l)			FECAL COLIFORM (MPN/100ml)			TOTAL COLIFORM (MPN/100ml)		
		Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
	Water quality criteria				6.5-8.5			< 2250 µmhos/cm			< 3 mg/l									< 2500 MPN/100ml			< 5000 MPN/100ml		
1898	PETROL PUMP OPP. HERO CYCLE, LUDHIANA	-	-	-	7.1	7.1	7.1	-	-	-	-	-	-	1.8	1.8	1.8	-	-	-	-	-	-	-	-	-
1899	BHAGWAN SINGH, H.NO.907, DASMESH NAGAR, GALI NO. 6, LUDHIANA	-	-	-	7.2	7.2	7.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1900	GURCHAARAN SINGH HAIBOWAL DAIRY COMPLEX, LUDHIANA	-	-	-	7.2	7.2	7.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1901	DUSSHERA GROUND INDUSTRIAL ESTATE, LUDHIANA	-	-	-	7.3	7.3	7.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1902	SHUKLA TEA STAL POINT, LUDHIANA	-	-	-	7.3	7.3	7.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1903	PUNJAB AGRICULTUREAL UNIVERSITY, LUDHIANA	-	-	-	7	7.4	7.2	-	-	-	-	-	-	1.3	1.3	1.3	-	-	-	-	-	-	-	-	-

TABLE 21.11 : - WATER QUALITY OF GROUND WATER IN KERALA - 2009

STATION CODE	LOCATIONS	TEMPERATURE °C			pH			CONDUCTIVITY (µmhos/cm)			B.O.D. (mg/l)			NITRATE- N (mg/l)			NITRITE- N (mg/l)			FECAL COLIFORM (MPN/100ml)			TOTAL COLIFORM (MPN/100ml)		
		Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
	Water quality criteria				6.5-8.5			< 2250 µmhos/cm			< 3 mg/l									< 2500 MPN/100ml			< 5000 MPN/100ml		
19	WELL AT ELOOR, KERALA	26	28	27.3	6.4	7.1	6.8	116	253	175	0.3	1.6	0.72	0.8	3.5	2.20	-	-	-	0	170	33	8	1510	226
22	WELL AT CHUNGAPALLY	26	26	26.0	6.1	6.1	6.1	89	134	112	0.4	0.4	0.4	0.1	1.5	0.8	-	-	-	0	110	55	40	300	170
35	WELL AT PUNALUR, KERALA	25.9	27	26.5	6.5	6.5	6.5	298	400	349	0.4	0.7	0.55	2.9	9.4	6.15	-	-	-	130	210	170	170	440	305
1581	PAPPANAMKODE,THIRUVANANTHAPURAM, KERALA	26	26	26.0	-	-	-	200	220	210	0.6	1.1	0.85	0.4	1.68	1.04	-	-	-	0	2	1	10	80	45
1582	NEDUMANGAD,THIRUVANANTHAPURAM, KERALA	25	28	26.5	6.5	6.5	6.5	184	300	242	0.6	1.9	1.25	0.6	1.76	1.18	-	-	-	0	0	0	10	60	35
1583	KUNDARA,KOLLAM DISTT .	25.6	27	26.3	-	-	-	148	182	165	0.8	2.3	1.55	3.2	4.9	4.05	-	-	-	350	400	375	540	880	710
1584	CHERTHALA,ALLEPPY, KERALA	30	32	31.0	7	7.6	7.3	152	153	153	1.2	2	1.6	0.46	0.5	0.48	-	-	-	50	240	145	330	700	515
1585	VYTTILA,ERNAKULAM DISTT.	27	27.5	27.3	6.8	7.2	7	468	523	496	1.1	1.5	1.3	2.56	7.6	5.08	-	-	-	0	420	210	10	850	430
1586	EDAYAR ERNAKULAM DISTT	28	28	28.0	6.2	6.2	6.2	174	192	183	0.4	0.5	0.45	2.6	3.2	2.9	-	-	-	0	140	70	80	310	195
1587	KALAMASSERY ERNAKULAM	28	28	28.0	-	-	-	180	286	233	0.8	1.2	1	0.6	8.4	4.5	-	-	-	0	10	5	6	80	43
1588	PUNKUNNAM TRISSUR DISTT	26	28	27.0	6	6.4	6.2	92	118	105	0.4	0.4	0.4	2.1	2.85	2.48	-	-	-	0	220	110	30	370	200
1589	MALAPURAM , KERALA	27	27.5	27.3	-	-	-	290	560	425	0.3	0.6	0.45	0.4	0.61	0.51	-	-	-	200	380	290	720	1000	860
1590	MAVOOR, KOZHIKKODE DISTT	26	26	26.0	6.3	6.3	6.3	101	119	110	0.4	0.5	0.45	2.7	3.3	3	-	-	-	120	140	130	220	240	230
1591	KANNUR (MUNICIPALITY) KANNUR DISTTM , KERALA	28	29	28.5	-	-	-	100	162	131	0.7	0.9	0.8	3.5	4.92	4.21	-	-	-	0	70	35	200	200	200
1592	PAYYANNUR, KANNUR DISTT	28	29	28.5	-	-	-	180	229	205	0.4	1.6	1	2.2	4.1	3.15	-	-	-	80	250	165	200	600	400
2308	FATHIMAPURAM (CHANGANASSERY)	26	26	26.0	7.2	7.2	7.2	111	111	111	0.2	0.2	0.2	0.7	0.7	0.7	-	-	-	3	3	3	10	10	10
2309	KAROOR (PALA)	26	26.5	26.3	6.4	6.4	6.4	66	110	88	0.3	0.4	0.35	0.9	2.9	1.9	-	-	-	6	60	33	10	90	50
2310	VAIKOM	26	26.5	26.3	6.1	6.4	6.25	136	139	138	0.4	0.4	0.4	0.1	0.9	0.5	-	-	-	440	800	620	600	1100	850
2311	VADAVATHOOR (KOTTAYAM)	26	27	26.5	7.2	7.2	7.2	106	111	109	0.3	0.5	0.4	3.06	3.5	3.28	-	-	-	100	400	250	160	500	330
2313	SARVODAPURAM, ALAPPUZHA	30	31	30.5	7	7.1	7.05	180	192	186	0.5	1.2	0.85	0.22	0.6	0.41	-	-	-	50	400	225	240	1600	920
2314	KUREEPUZHA (KOLLAM)	27	27	27.0	6.5	6.5	6.5	238	543	391	0.4	0.7	0.55	4.1	8.2	6.15	-	-	-	140	170	155	280	1000	640
2315	K.M.M.L. (KOLLAM)	26	28	27.0	7.4	7.9	7.65	495	2380	1438	0.8	0.8	0.8	1.5	6.8	4.15	-	-	-	240	860	550	400	1800	1100
2316	CHELLORA TRENCHING GROUND (KANNUR)	28	29	28.5	-	-	-	50	90	70	0.2	0.4	0.3	0.19	1.8	0.995	-	-	-	0	0	0	0	80	40
2317	PUNNALPETTIPPALAM (TELLICHERRY MUNICIPALITY	28	29.5	28.8	-	-	-	268	455	362	0.9	1.1	1	8.3	8.3	8.3	-	-	-	150	240	195	700	760	730
2320	MANJERI	27	28	27.5	-	-	-	119	210	165	0.4	0.7	0.55	0.3	0.98	0.64	-	-	-	60	120	90	320	620	470
2321	LALOOR (THRISSUR)	26	28	27.0	-	-	-	54	260	157	0.5	0.8	0.65	0.6	12	6.3	-	-	-	160	380	270	270	640	455
2322	OLLUR (THRISSUR)	26	27	26.5	-	-	-	200	290	245	0.6	0.6	0.6	7.4	10.5	8.95	-	-	-	20	240	130	70	420	245
2323	BRAHMAPURAM M.S.W. DUMPARK (ERNAKULAM)	24.6	26	25.3	6.3	6.6	6.45	372	900	636	1.2	1.8	1.5	0.56	1	0.78	-	-	-	120	340	230	280	1600	940
2324	HAZARDOUS WASTE DUMP (AMBALAMUGHAL)	24.8	28	26.4	6	6	6	68	173	121	0.3	1.2	0.75	0.05	0.1	0.075	-	-	-	80	700	390	160	1260	710
2327	KARUKAMANI	26.5	28	27.3	6.9	8	7.45	609	735	672	0.4	0.7	0.55	0.3	2.7	1.5	-	-	-	110	300	205	300	500	400

TABLE 21.12 : - WATER QUALITY OF GROUND WATER IN TAMILNADU - 2009

STATION CODE	LOCATIONS	TEMPERATURE °C			pH			CONDUCTIVITY (µmhos/cm)			B.O.D. (mg/l)			NITRATE- N (mg/l)			NITRITE- N (mg/l)			FECAL COLIFORM (MPN/100ml)			TOTAL COLIFORM (MPN/100ml)		
		Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
	Water quality criteria				6.5-8.5			< 2250 µmhos/cm			< 3 mg/l									< 2500 MPN/100ml			< 5000 MPN/100ml		
32	WELL AT MUSIRI, TAMIL NADU	28	30	29	6.9	7	6.93	1772	2360	2006	0.3	0.5	0.4	0.1	1	0.43	0.1	0.1	0.1	20	140	90	90	400	277
1449	COLLECTOR WELL AT THIRUPUVANAM FOR MADURAI WAT. SUPPLY SCHEME	30	30	30	7.5	7.5	7.5	848	1633	1241	2.6	3	2.8	0.1	1	0.55	0.1	0.1	0.1	2	2	2	6	6	6

TABLE 21.13 : - WATER QUALITY OF GROUND WATER IN PONDICHERRY - 2009

STATION CODE	LOCATIONS	TEMPERATURE °C			pH			CONDUCTIVITY (µmhos/cm)			B.O.D. (mg/l)			NITRATE- N (mg/l)			NITRITE- N (mg/l)			FECAL COLIFORM (MPN/100ml)			TOTAL COLIFORM (MPN/100ml)		
		Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
	Water quality criteria				6.5-8.5			< 2250 µmhos/cm			< 3 mg/l									< 2500 MPN/100ml			< 5000 MPN/100ml		
1397	WELL AT MUTHIALPET AREA(I), PONDICHERRY	30	31.8	30.9	6.6	6.9	6.75	1932	2430	2181	0	0	0	7.98	21.9	14.94	0.1	0.1	0.1	-	-	-	-	-	-
1398	WELL AT THENGAITHITTU AREA,(II) PONDICHERRY	31	33	32	6.5	6.8	6.65	1110	1244	1177	0	0	0	0.33	0.5	0.415	0.1	0.1	0.1	-	-	-	-	-	-
1453	WELL AT MUTHARAPLATYAM (PWD), PONDICHERRY	28	30	29	6.3	6.7	6.5	513	553	533	0	0	0	59.57	66.98	63.28	0.1	0.1	0.1	-	-	-	-	-	-
1454	WELL AT KALAPET,PONDI UNIVER. ADMN. BLOCK	31	32.5	31.8	6	6.4	6.2	164	169	167	0	0	0	15.2	17.72	16.46	0.1	0.1	0.1	-	-	-	-	-	-
1688	KATTERIKUPPAM, PODICHERRY	29	30	29.5	7	7.2	7.1	621	649	635	0	0	0	4.23	12.14	8.19	0.1	0.1	0.1	-	-	-	-	-	-
1689	CHUNMBAR RIVER, PONDICHERRY	27	30	28.0	7.5	8.8	8.27	618	963	754	0	2	0.67	0.05	6.74	3.56	0.1	0.1	0.1	-	-	-	-	-	-
2009	KURUMBAPET	28	30	29.0	6.1	6.5	6.3	310	381	346	0	0	0	38.57	48.13	43.35	0.1	0.1	0.1	-	-	-	-	-	-
2010	METTUPALAYAM	28	30	29.0	6.5	6.5	6.5	444	493	469	0	0	0	89.11	101.25	95.18	0.1	0.1	0.1	-	-	-	-	-	-
2011	URUVAIYAR	31	33	32.0	6	7.3	6.65	1517	1623	1570	0	0	0	0.05	0.43	0.24	0.1	0.1	0.1	-	-	-	-	-	-
2012	KARUVADIKUPPAM	33.9	33.9	33.9	-	-	-	975	975	975	0	0	0	55.6	55.6	55.6	-	-	-	-	-	-	-	-	-
2013	T.R.PATTINAM, KARAIKAL	26	33	29.5	8.4	8.5	8.45	1275	1608	1442	0	0	0	3.13	5.98	4.56	0.1	0.1	0.1	-	-	-	-	-	-
2014	VADAMATTAM, KARAIKAL	25.5	33.4	29.5	8	8.3	8.15	1281	1321	1301	0	0	0	0.05	2.48	1.27	0.1	0.1	0.1	-	-	-	-	-	-
2446	PALLUR	28	28	28	-	-	-	227	227	227	0	0	0	2.86	2.86	2.86	-	-	-	-	-	-	-	-	-

TABLE 21.14 : - WATER QUALITY OF GROUNDWATER IN DAMAN- 2009

STATION CODE	LOCATIONS	TEMPERATURE °C			pH			CONDUCTIVITY (µmhos/cm)			B.O.D. (mg/l)			NITRATE- N (mg/l)			NITRITE- N (mg/l)			FECAL COLIFORM (MPN/100ml)			TOTAL COLIFORM (MPN/100ml)		
		Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
	Water quality criteria				6.5-8.5			< 2250 µmhos/cm			< 3 mg/l									< 2500 MPN/100ml			< 5000 MPN/100ml		
1440	WELL AT SOMNATH INDUSTRIAL ESTATE, DAMAN	-	-	-	7.1	7.6	7.25	1031	2140	1404.9	4.4	4.4	4.4	0.7	37.2	7.9	-	-	-	-	-	-	-	-	-
2448	VILLAGE BHIMPORE,DAMAN	-	-	-	6.8	6.9	6.85	621	828	704.25	-	-	-	3.2	5.4	4.68	-	-	-	-	-	-	-	-	-
2449	VILLAGE RINGANWADA,DAMAN	-	-	-	7	7.1	7.05	1456	2648	1981.75	-	-	-	1.9	4	3.15	-	-	-	-	-	-	-	-	-
2450	VILLAGE DUNETHA,DAMAN	-	-	-	6.9	7.5	7.1	542	752	630.25	-	-	-	0.7	1.6	1.1	-	-	-	-	-	-	-	-	-
2451	VILLAGE DABHEL,DAMAN	-	-	-	6.9	7.4	7.2	956	1935	1326.5	6	6	6	1.3	3.3	2.03	-	-	-	-	-	-	-	-	-
2452	VILLAGE KACHIGAM,DAMAN	-	-	-	6.9	7.2	7.03	2784	3134	2945	8	8	8	7.2	10	8.43	-	-	-	-	-	-	-	-	-

TABLE 21.15 : - WATER QUALITY OF GROUNDWATER IN DADRA NAGAR HAVELI - 2009

STATION CODE	LOCATIONS	TEMPERATURE °C			pH			CONDUCTIVITY (µmhos/cm)			B.O.D. (mg/l)			NITRATE- N (mg/l)			NITRITE- N (mg/l)			FECAL COLIFORM (MPN/100ml)			TOTAL COLIFORM (MPN/100ml)		
		Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
	Water quality criteria				6.5-8.5			< 2250 µmhos/cm			< 3 mg/l									< 2500 MPN/100ml			< 5000 MPN/100ml		
2453	VILLAGE KHANVEL, DADRA	-	-	-	6.7	6.9	6.775	455	3898	1396	-	-	-	0.4	1	0.68	-	-	-	-	-	-	-	-	-
2454	VILLAGE ATHAL, DADRA	-	-	-	7.1	7.3	7.15	945	2160	1367	6	6	6	0.2	0.2	0.2	-	-	-	-	-	-	-	-	-
2455	VILLAGE MASAT, DADRA	-	-	-	6.8	7.2	7	1465	19145	6034	10	10	10	0.2	1	0.43	-	-	-	-	-	-	-	-	-
2456	VILLAGE PIPERIA, DADRA	-	-	-	7.1	7.6	7.33	878	2340	1335	4	4	4	0.3	3.3	1.4	-	-	-	-	-	-	-	-	-
2457	VILLAGE GALONDA, DADRA	-	-	-	6.7	7.3	6.93	563	4688	2083	-	-	-	0.6	1.1	0.85	-	-	-	-	-	-	-	-	-
2458	VILLAGE, DADRA	-	-	-	7.3	7.4	7.35	1935	3211	2570	4	4	4	0.2	1.2	0.55	-	-	-	-	-	-	-	-	-

TABLE 21.16 : - WATER QUALITY OF GROUNDWATER IN MAHARASHTRA- 2009

STATION CODE	LOCATIONS	TEMPERATURE °C			pH			CONDUCTIVITY (µmhos/cm)			B.O.D. (mg/l)			NITRATE- N (mg/l)			NITRITE- N (mg/l)			FECAL COLIFORM (MPN/100ml)			TOTAL COLIFORM (MPN/100ml)		
		Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
					6.5-8.5			< 2250 µmhos/cm			< 3 mg/l									< 2500 MPN/100ml			< 5000 MPN/100ml		
	Water quality criteria	28	30	29	7.3	7.7	7.5	604	1171	888	3.6	6	4.8	4.2	4.2	4.2	-	-	-	0	80	40	4	170	87
1984	INDL. ESTATE TARAPUR	26	27	26.5	7.4	8.2	7.8	949	6585	3767	3.4	7	5.2	0.32	1.41	0.87	-	-	-	14	170	92	20	550	285
1985	MIRA-BHAYANDER	28	31	29.5	8	8.1	8.05	933	978	956	3.4	6	4.7	0.12	5.41	2.77	-	-	-	13	13	13	35	35	35
1986	DAHANU	26	27	26.5	8.3	8.4	8.35	697	801	749	3.6	5	4.3	0.29	0.47	0.38	0.37	0.37	0.37	8	80	44	17	275	146
1987	VASAI	29	30	29.5	7.3	8	7.73	2363	4020	3192	3.4	5	4.2	0.66	3.13	1.90	-	-	-	8	8	8	25	25	25
1988	PALGHAR	27.4	27.4	27.4	7.2	7.2	7.2	943	943	943	6	6	6	0.1	0.1	0.1	-	-	-	2	2	2	12	12	12
1991	MSW SITE, PATHARDI, NASIK	27	31	29	7.8	7.8	7.8	856	1040	948	5.6	6.3	5.95	0.14	0.68	0.41	-	-	-	17	45	31	275	275	275
1992	MSW SITE, PIMPRI-CHINCHWAD, PUNE	24	34	29	7.4	7.9	7.65	758	1903	1331	4.4	4.8	4.6	10.9	11.69	11.30	-	-	-	4	6	5	240	280	260
1993	PHANDARPUR, GANGAPUR, AURANGABAD	21	21	21	7.5	7.5	7.5	211	211	211	7	7	7	1.9	1.9	1.9	-	-	-	14	14	14	26	26	26
1995	KHAPERKHEDA, NAGPUR	20	20	20	7.8	7.8	7.8	1267	1267	1267	6.9	6.9	6.9	6.98	6.98	6.98	-	-	-	17	17	17	110	110	110
1997	RAIPUR, NAGPUR	21	21	21	7.6	7.6	7.6	1006	1006	1006	14	14	14	3.67	3.67	3.67	-	-	-	11	11	11	27	27	27
1998	BHAHMNI, KALMESHWAR, NAGPUR	28	33	30.5	7.5	7.6	7.55	237	328	283	6	7.4	6.7	0.33	3.12	1.73	-	-	-	2	17	9.5	17	22	19.5
1999	SANGERA GONDIA	28	32	30	7.8	7.9	7.85	486	571	529	6	7.2	6.6	5.69	9	7.35	-	-	-	4	40	22	21	60	40.5
2001	SUKALI, AMRAVATI	28	28	28	8.4	8.5	8.45	292	1823	1058	5.8	6	5.9	1.98	9.74	5.86	-	-	-	2	11	6.5	22	26	24
2002	AKOT, AKOLA	22	36	26.8	6.6	7.8	7.28	2188	4831	3482	2	2.4	2.2	4.8	5.02	4.89	-	-	-	2	2	2	4	10	6.5
2007	SAVALI, SANGLI	21	37	28.7	7	7.7	7.27	2586	3180	2904	2.4	2.8	2.67	4.91	5.28	5.07	-	-	-	2	4	2.67	50	90	76.67
2008	RASULWADI-SAMBARWADI, SANGLI	24	24	24	7.3	8	7.65	4528	6257	5393	2	3.8	2.9	3.12	4.75	3.94	-	-	-	7	7	7	240	300	270
2200	BORE WELL AT KATPUR, NEAR Z.P.SCHOOL	24	24	24	7.2	7.9	7.55	1992	2885	2439	4.8	5.2	5	11.96	12.62	12.29	-	-	-	4	5	4.5	220	280	250
2201	DUG WELL AT RANJANGAON.	24	24	24	8	8	8	6257	6257	6257	2	2	2	4.75	4.75	4.75	-	-	-	7	7	7	240	240	240
2202	DUG WELL AT GHANE KUNT, NEAR AWASTHI, OWNED BY SHRI RAJENDRA AMRE																								

TABLE 21.17 : - WATER QUALITY OF GROUNDWATER IN GUJRAT- 2009

STATION CODE	LOCATIONS	TEMPERATURE °C			pH			CONDUCTIVITY (µmhos/cm)			B.O.D. (mg/l)			NITRATE- N (mg/l)			NITRITE- N (mg/l)			FECAL COLIFORM (MPN/100ml)			TOTAL COLIFORM (MPN/100ml)		
		Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
					6.5-8.5			< 2250 µmhos/cm			< 3 mg/l									< 2500 MPN/100ml			< 5000 MPN/100ml		
	Water quality criteria	30	32	31	7.7	7.8	7.75	1640	1690	1665	2	3	2.5	0.74	2.24	1.49	-	-	-	-	-	-	-	-	-
3	WELL AT AHMEDABAD, GUJARAT	28	30	29	7.6	7.6	7.6	1840	2120	1980	2.2	2.4	2.3	0.44	0.48	0.46	-	-	-	-	-	-	-	-	-
1226	WELL AT NAROL, AHMEDABAD, GUJARAT	27	27	27	7.6	7.6	7.6	10400	10400	10400	0.8	0.8	0.8	0.1	0.1	0.1	-	-	-	2	2	2	2	2	2
1950	JUNAGADH	28	28	28	7.5	7.5	7.5	1358	1358	1358	2.2	2.2	2.2	-	-	-	-	-	-	0	0	0	2	2	2
1951	RAJKOT	29	29	29	7.8	7.8	7.8	30300	30300	30300	0.9	0.9	0.9	-	-	-	0.1	0.1	0.1	0	0	0	2	2	2
1952	SURENDRANAGAR	26	26	26	7.6	7.6	7.6	321	321	321	0.5	0.5	0.5	0.1	0.1	0.1	-	-	-	2	2	2	4	4	4
1955	PALANPUR	29	30	29.5	7.6	8.3	7.95	1590	2010	1800	2.2	10	6.1	3.26	3.88	3.57	-	-	-	-	-	-	-	-	-
1956	MEHASANA	28	30	29	7.9	8.5	8.2	475	751	613	2	2	2	0.82	2.65	1.74	-	-	-	-	-	-	-	-	-
1957	SIDDHPUR (DIST.PATAN)	29	30	29.5	7.2	8.5	7.85	539	2860	1700	1.6	15	8.3	3.42	4.28	3.85	-	-	-	-	-	-	-	-	-
1958	HIMATNAGAR	29	38	33.5	7.7	8.3	8	857	1120	989	2.4	3.5	2.95	2.61	4.08	3.35	0.19	0.19	0.19	-	-	-	-	-	-
1959	NADIAD	27	28	27.5	8	8.2	8.1	2102	2470	2286	0.1	0.8	0.45	0.01	0.7	0.36	0	0	0	3	3	3	3	3	3
1960	DAHOD	26	30	28	8.2	8.2	8.2	1892	1989	1941	0.3	0.4	0.35	0.77	0.84	0.81	-	-	-	-	-	-	-	7	5
1961	GODHARA	28	29	28.5	7.6	7.9	7.75	200	321	261	0.5	0.6	0.55	0.05	2.1	1.08	-	-	-	1	2	2	2	4	3
1962	VADODARA (INDUSTRIAL-NANDESARI)	29	33	31	7.4	8.1	7.75	4074	10960	7517	0.8	1	0.9	0.17	0.4	0.29	-	-	-	4	7	6	11	20	16
1963	ANKLESHWAR (INDUSTRIAL AREA)	30	30	30	8.4	8.6	8.5	1416	1796	1606	1.1	1.2	1.15	0.26	0.8	0.53	-	-	-	3	4	4	7	14	11
1964	PANDESARA (INDSTRIAL) SURAT	30	30	30	8.7	8.7	8.7	1120	1120	1120	2.1	2.1	2.1	0.5	0.5	0.5	-	-	-	300	300	300	1100	1100	1100
1965	MORA-HAJIRA (INDUSTRIAL), HAJIRA	28	30	29	7.7	7.9	7.8	1600	1820	1710	2.4	2.4	2.4	3.06	3.28	3.17	-	-	-	-	-	-	-	-	-
1966	GABHENI VILLAGE, SURAT (INDUSTRIAL)	28	30	28.8	7.5	8.5	8.075	1356	2110	1782	1	2	1.4	0.2	1.38	0.66	-	-	-	7	7	7	15	21	18
2083	BORE WELL OF CHHATRAL GIDC	29	32	30.5	8	8	8	1820	3690	2755	1.8	2	1.9	0.82	0.98	0.9	-	-	-	-	-	-	-	-	-
2084	BORE WELL OF PALSANA VILLAGE	29	30	29.5	8.2	8.7	8.45	5780	7495	6638	1.1	1.8	1.45	0.16	0.2	0.18	-	-	-	4	7	6	11	20	16
2085	BORE WELL OF SANTEJ VILLAGE	28	30	29	8.3	8.6	8.45	2310	2320	2315	1.1	1.1	1.1	0.25	0.27	0.26	-	-	-	4	7	6	14	20	17
2088	BORE WELL OF SACHIN GIDC	30	30	30	7.6	7.6	7.6	7483	7483	7483	1.3	1.3	1.3	0.18	0.18	0.18	-	-	-	9	9	9	20	20	20
2090	WELL AT OLPAD	29	33	31	8.1	8.8	8.45	2240	2310	2275	1.2	1.3	1.25	0.26	0.33	0.30	-	-	-	4	7	6	14	14	14
2091	FROM BORE WELL OF NAVSARI GIDC INDUSTRIES ASSOCIATION OFFICE	29	29	29	8.3	8.3	8.3	880	880	880	1	1	1	0.22	0.22	0.22	-	-	-	11	11	11	28	28	28
2092	FROM WATER WORKS OF NAVSARI NEAR DHUDIA TALAV.	29	31	30	8.3	8.8	8.55	1830	1950	1890	0.8	1.1	0.95	0.11	0.28	0.20	-	-	-	3	7	5	11	28	20
2093	BORE WELL OF BARDOLI AT REST HOUSE	27	29	28	7.5	8.1	7.8	290	314	302	0.3	0.7	0.5	0.2	3.6	1.9	-	-	-	2	2	2	3	4	4
2094	WELL AT ANKLESHWAR INDUSTRIAL AREA (BORE WELL OF M/S INDUSTRIAL CARBON AT ANKLESHWAR- RAJPIPLA ROAD.	26	26	26	7.6	7.6	7.6	2135	2135	2135	2	2	2	-	-	-	0.05	0.05	0.05	0	0	0	2	2	2
2095	BORE WELL AT STP MADHAPAR, DIST. RAJKOT	28	31	29.5	7.4	7.6	7.5	3670	4590	4130	1	1.4	1.2	1.16	1.79	1.48	-	-	-	-	-	-	-	-	-
2096	B/W, SNR VINAYAK JAL SUDDHIKARAN SAHAKARI MANDALI LTD.(CETP), BAVLA, AHMEDABAD.	29	31	30	7.8	7.9	7.85	2170	2430	2300	2	5.5	3.75	2.28	2.53	2.41	-	-	-	-	-	-	-	-	-
2097	BORE WELL OF SOMESHWAR RICE MILL, NR. BAVLA ECO PROJECT, (CETP), VILL. BAVLA, AHMEDABAD.	29	29	29	7.3	7.6	7.45	3520	3660	3590	1.9	3	2.45	2.77	4.89	3.83	0.26	0.28	0.27	-	-	-	-	-	-
2098	BORE WELL OF PIRANA TERMINAL PUMPING STATION, PIRANA, NR. V. N. BRIDGE, AHMEDABAD.																								

TABLE 21.18 : - WATER QUALITY OF GROUND WATER IN RAJASTHAN - 2009

STATION CODE	LOCATIONS	TEMPERATURE °C			pH			CONDUCTIVITY (µmhos/cm)			B.O.D. (mg/l)			NITRATE- N (mg/l)			NITRITE- N (mg/l)			FECAL COLIFORM (MPN/100ml)			TOTAL COLIFORM (MPN/100ml)		
		Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
					6.5-8.5			< 2250 µmhos/cm			< 3 mg/l									< 2500 MPN/100ml			< 5000 MPN/100ml		
	Water quality criteria																			7	9	8	14	28	21
1415	WELL OF LOOMJI, CHAUDHARY, NEAR NAYAGAON, PALI, (U/S 1 KM. FROM PALI TOWN)	22	25	23.5	8	8.16	8.08	7400	28000	17700	6.28	9.41	7.85	0.62	2.1	1.36	-	-	-	4	4	4	23	75	49
1416	WELL OF BHOPAL SINGH, 24 Km FROM PALI TOWN	21	25	23	8.18	8.74	8.46	19000	22000	20500	1.68	6.13	3.91	0.74	1.34	1.04	-	-	-	7	9	8	14	150	82
1417	WELL (U/S 1 KM FROM JODHPUR TOWN)	20.6	25.2	22.9	7.56	8.16	7.86	3500	18000	10750	2.3	20.4	11.35	0.38	0.58	0.48	0.24	0.24	0.24	4	4	4	9	9	9
1706	RIICO PUMP HOUSE NEAR MONTO MOTORS, MIA, ALWAR	28.5	30	29.3	7.28	7.54	7.41	1280	1570	1425	0.26	0.59	0.43	0.38	0.42	0.4	-	-	-	3	3	3	4	4	4
1707	BORE WELL IN MODI ALKALIS & CHEMICALS, MIA, ALWAR	29.5	34	31.8	7.21	7.4	7.31	1110	1470	1290	0.34	0.63	0.49	0.72	1.02	0.87	-	-	-	3	3	3	4	7	6
1708	WELL KOTHI IN VILLAGE BAGAR RAJPUT, ALWAR	27	28	27.5	7.41	7.55	7.48	3600	4600	4100	0.04	0.21	0.125	0.54	2.68	1.61	-	-	-	3	3	3	7	7	7
1709	WELL AT VILLAGE SANTHLA VERY NEAR BHIWADI INDUSTRIAL AREA, BHIWADI	28	29	28.5	7.18	7.36	7.27	2800	3000	2900	0.09	0.17	0.13	0.38	7.88	4.13	-	-	-	3	3	3	4	14	9
1710	WELL AT VILLAGE ALUPUR, VERY NEAR BHIWADI INDUSTRIAL AREA, BHIWADI	28	29	28.5	7.62	7.8	7.71	620	800	710	0.17	0.47	0.32	0.74	0.74	0.74	-	-	-	3	3	3	4	7	6
1711	WELL AT VILLAGE HARCHANDPUR, VERY NEAR, BHIWADI TO BHIWADI INDUSTRIAL AREA, BHIWADI	28	29	28.5	7.41	7.42	7.42	1800	2200	2000	0.08	0.26	0.17	0.22	0.48	0.35	-	-	-	3	4	4	4	7	6
1712	WELL AT VILLAGE BHIWADI , VERY NEAR, BHIWADI TO BHIWADI INDUSTRIAL AREA, BHIWADI	28	29	28.5	7.38	7.47	7.43	1240	1540	1390	0.35	0.38	0.37	0.62	3.14	1.88	-	-	-	3	3	3	4	4	4
1713	WELL AT VILLAGE GATTAL, NEAR, BHIWADI TO BHIWADI INDUSTRIAL AREA, BHIWADI	28	29	28.5	7.64	7.95	7.80	1620	1640	1630	0.54	0.55	0.55	0.54	4.4	2.47	-	-	-	3	3	3	4	4	4
1715	HAND PUMP NEAR SECONDARY SCHOOL ABOUT 300mt. FROM KANSUA NALLAH KOTA	29	29	29.0	7.7	7.86	7.78	1790	2200	1995	0.19	0.97	0.58	0.32	10	5.16	0.1	0.1	0.1	7	7	7	7	28	18
1720	CHAUDHARY KA WELL VILLAGE PANIALA, KOTAPUTALI NEAR ASSOCIATED ALCOHOL BREVERIES LTD JAIPUR	19	26	22.5	7.65	8.34	8.00	1240	1590	1415	0.12	0.5	0.31	0.6	0.62	0.61	0.74	0.74	0.74	4	4	4	4	7	6
1721	PHED WELL NEAR RAILWAY LINE JHOTAWARA, JAIPUR	29	31	30.0	7.8	8.11	7.96	890	2100	1495	0.15	0.67	0.41	1.14	2.04	1.59	-	-	-	3	4	4	4	14	9
1722	PHED WELL NEAR NEI, KHATIPURA, RAJASTHAN	27	30	28.5	7.43	7.71	7.57	1120	1440	1280	0.51	0.92	0.72	1.54	1.66	1.6	0.1	0.1	0.1	3	3	3	4	7	6
1723	HAND PUMP OF VIDHANI VILLAGE GONER ROAD JAIPUR	27	28	27.5	7.36	7.71	7.54	3100	4300	3700	0.33	0.92	0.63	1.7	6.7	4.2	-	-	-	3	3	3	4	7	6
1724	WELL OF GOOJARON KI TALAI, MOHANA ROAD SANGANER JAIPUR, RAJASTHAN	26	27	26.5	7.61	8.38	8.00	1500	4200	2850	0.46	0.5	0.48	0.72	6.7	3.71	-	-	-	4	7	6	7	28	18
1725	PUBLIC HAND PUMP BEFORE SANGANER PULIA, RAJASTHAN	27	30	28.5	7.21	7.25	7.23	1240	2900	2070	0.28	0.42	0.35	0.58	4.25	2.415	-	-	-	3	4	4	7	7	7
2015	PABUPURA ROAD NEAR CIVIL AIR PORT, JODHPUR (MANGILAL RATHOR)	20.6	24.6	22.6	7.39	8	7.70	3800	4000	3900	0.38	3.74	2.06	0.74	7.5	4.12	0.52	0.52	0.52	4	4	4	9	14	12
2016	VILLAGE VINAYAKIA, JODHPUR (HIRALAL KUMHAR)	20.5	24.7	22.6	7.06	8.07	7.57	1900	2000	1950	1.02	1.93	1.48	0.54	13.1	6.82	-	-	-	7	9	8	14	23	19
2017	VILLAGE VINAYAKIA, JODHPUR (BADRI KUMHAR)	20.3	24.3	22.3	7.28	7.38	7.33	2900	3900	3400	0.26	0.67	0.47	0.48	13.1	6.79	-	-	-	4	21	13	7	93	50
2018	VILL VINAYAKIA, JODHPUR (HUKUM SINGH RATHORE)	20.4	24	22.2	7.44	7.84	7.64	5500	5900	5700	0.51	1.43	0.97	1.34	11.8	6.57	-	-	-	7	9	8	21	28	25
2019	NEAR UIT BRIDGE, UDAIPUR	26	29	27.5	7.22	7.84	7.53	1320	1800	1560	0.67	0.78	0.73	0.62	0.74	0.68	-	-	-	4	4	4	7	9	8
2020	NEW FATEHPURA, 200 FT FROM PANCHWATI NALLAH, UDAIPUR	25	28	26.5	7.07	7.59	7.33	1900	2400	2150	0.38	0.88	0.63	1.02	3.64	2.33	-	-	-	3	4	4	7	20	14
2021	NEAR ARVIND GENERAL STORE, ALOO FACTORY, KACCHI BASTI, SARDARPURA, UDAIPUR	26	29	27.5	7.26	7.97	7.62	1200	2000	1600	0.21	0.3	0.26	0.14	0.48	0.31	-	-	-	3	4	4	4	7	6
2022	NR RANA PRATAP NAGAR, RAILWAY STN, UDAIPUR	26	29	27.5	7.21	7.95	7.58	2600	3500	3050	0.42	0.47	0.45	2.3	7.28	4.79	0.62	0.62	0.62	3	7	5	4	14	9
2023	HOTEL ORIENT PLACE, SUBHAS NAGAR, UDAIPUR	25	28	26.5	7.54	7.77	7.66	1680	2500	2090	0.17	0.29	0.23	0.38	2.3	1.34	-	-	-	4	4	4	7	20	14
2024	IN SIDE SHIV TEMPLE NEAR AIR FORCE STATION AJMER ROAD, JAIPUR	25	28	26.5	7.4	7.74	7.57	2700	3600	3150	0.17	0.33	0.25	0.54	0.62	0.58	0.1	0.1	0.1	3	3	3	4	4	4
2025	NEAR SHREE KALYANESHWAR MAHADEV TEMPLE, JAI SINGH PURA KHURD, JAIPUR	26	27	26.5	6.97	7.39	7.18	3100	3700	3400	0.34	0.67	0.51	1.34	3.12	2.23	-	-	-	4	4	4	7	7	7
2026	NR FOJI NAGAR, KACCHI BASTI, AMBABARI, JAIPUR.	28	28	28.0	7.28	7.43	7.36	960	1040	1000	0.16	0.21	0.19	0.8	4	2.4	-	-	-	4	4	4	11	11	11
2027	NR ABN CENTRAL ACADEMY, SUSILPURA, SODALA, JAIPUR.	26	29	27.5	7.85	8.15	8	620	860	740	0.36	0.92	0.64	1.14	5.7	3.42	-	-	-	3	3	3	7	7	7
2028	NEAR SAMSHAN VISHWAKARMA NAGAR, MAHARANIFARM, JAIPUR	29	29	29.0	8.1	8.1	8.10	700	700	700	0.67	0.67	0.67	0.62	0.62	0.62	-	-	-	4	4	4	14	14	14
2029	NEAR GANDHI BHWAN, AJMER	24	24.5	24.3	7.8	7.85	7.83	840	1100	970	0.34	0.42	0.38	0.48	3.14	1.81	-	-	-	4	7	6	7	20	14
2030	OPPOSITE PRIVATE BUS STAND, AJMER	26.3	27.1	26.7	7.46	7.59	7.53	1670	3100	2385	0.13	0.6	0.37	0.62	7.75	4.185	-	-	-	3	3	3	4	9	7
2031	NEAR 9 NO. PETROL PUMP, NEAR ADARSH NAGAR GATE, AJMER	25.5	25.7	25.6	7.97	8.17	8.07	1010	1720	1365	0.17	0.63	0.4	0.58	5	2.79	-	-	-	4	4	4	7	14	11
2032	NEAR KHANPURA TALAB, AJMER	24	26.5	25.3	7.14	7.43	7.29	3900	6500	5200	0.43	1.18	0.81	1.02	4.4	2.71	-	-	-	3	4	4	4	20	12
2033	OUTSIDE JLN HOSPITAL, AJMER	25	25.9	25.5	7.38	7.58	7.48	1510	2400	1955	0.43	0.92	0.68	0.74	4.6	2.67	-	-	-	3	3	3	4	7	6

TABLE 21.19 : - WATER QUALITY OF GROUND WATER IN UTTAR PRADESH - 2009

STATION CODE	LOCATIONS	TEMPERATURE °C			pH			CONDUCTIVITY (µmhos/cm)			B.O.D. (mg/l)			NITRATE- N (mg/l)			NITRITE- N (mg/l)			FECAL COLIFORM (MPN/100ml)			TOTAL COLIFORM (MPN/100ml)		
		Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
	Water quality criteria				6.5-8.5			< 2250 µmhos/cm			< 3 mg/l									< 2500 MPN/100ml			< 5000 MPN/100ml		
1736	G WATER QUALITY STATION SARDARNAGAR, U.P	20	25	23	6.76	6.88	6.83	1040	1194	1118	4.4	5.6	4.87	2.4	3	2.73	1.1	1.2	1.15	20	60	40	60	120	93
1737	GROUND WATER QUALITY STATION CAPTANGANJ	22	26	23.7	6.66	6.86	6.79	814	920	885	3.9	4.2	4.1	2.4	3.4	3.07	1.2	1.4	1.27	20	40	27	60	100	73
1738	SITE 1, INDUSTRIAL AREA NEAR M/S WOODWARM CHEMICAL LTD., UNNAO, U.P	-	-	-	7.17	8.5	7.84	831.5	886	859	-	-	-	1	2.1	1.55	0.13	0.13	0.13	-	-	-	-	-	-
1739	SITE 2, INDUSTRIAL AREA NEAR M/S AMIN SONS, UNNAO,U.P	-	-	-	7	7	7	1921	1921	1921	-	-	-	4.1	4.1	4.1	-	-	-	-	-	-	-	-	-
1740	AT ROADWAYS BUS STATION, UNNAO, U.P	-	-	-	6.86	7.1	6.98	2635	2641	2638	-	-	-	8.6	28.4	18.5	0.08	0.08	0.08	-	-	-	-	-	-
1741	MAGAWARA INDUSTRIAL AREA NEAR M/S JAMJAM TANNERS, UNNAO, U.P	-	-	-	7.04	7.2	7.12	877	977.1	927	0.3	0.3	0.3	5.2	7.7	6.45	0.06	0.06	0.06	-	-	-	-	-	-
1742	CHINHAT INDUSTRIAL AREA IN LUCKNOW NEAR M/S INDIA PESTICIDES LUCKNOW, U.P	-	-	-	7.3	7.63	7.47	685	1388	1037	-	-	-	0.7	6	3.35	0.08	0.08	0.08	-	-	-	-	-	-
1743	AISHBAGH INDUSTRIAL AREA AT LUCKNOW NEAR M/S EVEREADY INDUSTRIES LTD. LUCKNOW, U.P	-	-	-	7.34	7.4	7.37	687.6	1185	936	-	-	-	9.2	28	18.6	0.1	0.1	0.1	-	-	-	-	-	-
1744	JAJMAU INDUSTRIAL AREA No. 6 KANPUR, U.P	-	-	-	6.9	6.9	6.9	1631	1631	1631	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1745	PANKI INDUSTRIAL AREA NEAR INDUSTRY OF AMMONIA FERTIZER KANPUR, U.P	-	-	-	7.2	7.2	7.2	983	983	983	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1746	NAGAR PALIKA TUBE WELL, SULTANPUR, U.P	26	27	26.5	7.6	7.8	7.7	926	1102	1014	-	-	-	0.28	0.28	0.28	-	-	-	-	-	-	-	-	-
1747	INDIA MARKA HAND PUMP IN SAROWNI BLOCK AT RAIBAREILLY, U.P	26	26	26	7.6	7.8	7.7	1024	1260	1142	-	-	-	0.26	0.26	0.26	-	-	-	-	-	-	-	-	-
1748	HANDPUMP IN VILLAGE DAMAUDA AT KASHIPUR NEAR M/S INDIA GLYCOLES LTD., U.P	23	23	23	7.32	7.59	7.46	400	420	410	1.6	2.4	2	-	-	-	-	-	-	-	-	-	-	-	-
1749	TUBE WELL AT MEERUT CITY, U.P	18	24	21	7.6	7.9	7.75	754	780	767	0.2	0.3	0.25	-	-	-	-	-	-	-	-	-	-	-	-
1750	TUBE WELL AT BAGPAT CITY, U.P	18	24	21	7.6	7.8	7.7	840	860	850	0.4	0.5	0.45	-	-	-	-	-	-	0	0	0	10	10	10
1752	SAHIBABAD INDUSTRIAL AREA, GHAZIABAD, U.P	-	-	-	7.5	7.5	7.5	2730	3640	3185	-	-	-	-	-	-	-	-	-	0	0	0	10	12	11
1753	MEERUT ROAD INDUSTRIAL AREA GHAZIABAD, U.P	-	-	-	7.5	7.5	7.5	1861	1945	1903	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1754	HAPUR ROAD INDUSTRIAL AREA GHAZIABAD, U.P	-	-	-	7.5	7.5	7.5	570	711	641	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1755	PILKHUA INDUSTRIAL AREA GHAZIABAD, U.P	-	-	-	7	7.5	7.25	2270	2732	2501	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1757	MIRZAPUR INDUSTRIAL AREA	24.5	25	24.8	6.4	6.58	6.49	785	960	873	0.7	0.7	0.7	4.36	4.36	4.36	-	-	-	-	-	-	-	-	-
1759	IFFCO, PHOOLPUR,ALLAHABAD	25	26	25.5	7	7.3	7.15	989	1000	995	0.8	0.8	0.8	5.69	5.69	5.69	-	-	-	-	-	-	-	-	-
1760	M/S KANORIA CHEMICAL SONBHADRA, U.P	25	25.5	25.3	6	6.35	6.18	670	799	735	1	1	1	4.95	4.95	4.95	-	-	-	-	-	-	-	-	-
1761	TUBE WELL IN SINGRAULI INDUSTRIAL AREA, U.P	25	25	25	6.47	7	6.74	516	1470	993	1.1	1.1	1.1	4.42	4.42	4.42	-	-	-	-	-	-	-	-	-
2474	UNCHAHAAR (NEAR THERMAL POWER PLANT)	24	24	24	7.9	7.9	7.9	961	961	961	-	-	-	0.3	0.3	0.3	-	-	-	-	-	-	-	-	-

TABLE 21.20 WATER QUALITY OF GROUND WATER IN ORISSA - 2009

STATION CODE	LOCATIONS	TEMPERATURE °C			pH			CONDUCTIVITY (µmhos/cm)			B.O.D. (mg/l)			NITRATE- N (mg/l)			NITRITE- N (mg/l)			FECAL COLIFORM (MPN/100ml)			TOTAL COLIFORM (MPN/100ml)		
		Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
	Water quality criteria				6.5-8.5			< 2250 µmhos/cm			< 3 mg/l									< 2500 MPN/100ml			< 5000 MPN/100ml		
1644	JAGATPUR INDUSTRIAL AREA, CUTTACK ORISSA	22	35	28.5	6.9	8.1	7.5	519	595	557	0.8	1.1	0.95	4.82	5.03	4.93	0.05	0.09	0.07	1	2	2	2	2	2
1645	MADHUPATNA- KALYAN NAGAR AREA, CUTTACK	24	35	29.5	8.1	8.4	8.25	320	357	339	1.2	2.2	1.7	2.59	4.63	3.61	0.02	0.05	0.03	2	2	2	4	10	7
1646	BIDANASHI - TULASIPUR AREA, CUTTACK, ORISSA	23	34	28.5	7.6	8.2	7.9	85	120	103	0.6	0.6	0.6	0.43	0.71	0.57	0.02	0.05	0.03	1	2	2	2	2	2
1647	BADAMBARI AREA, CUTTACK	25	35	30	8.1	8.4	8.25	305	335	320	0.9	1.7	1.3	0.1	1.20	0.65	0.01	0.05	0.03	1	2	2	2	2	2
1648	RANIHAT- MANGALABAGH AREA, CUTTACK, ORISSA	25	35	30	7.9	8.3	8.1	200	219	210	0.7	1.8	1.25	0.21	0.50	0.35	0.01	0.05	0.03	1	2	2	2	2	2
1649	KHANDAGIRI AREA, BHUBANESWAR, ORISSA	27	33	30	-	-	-	290	533	412	0.8	1.8	1.3	7.49	9.99	8.74	0.04	0.3	0.17	1	2	2	2	2	2
1650	CAPITAL HOSPITAL AREA, BHUBANESWAR, ORISSA	26	32	29	7.5	7.5	7.5	224	273	249	0.2	1.9	1.05	0.31	5.87	3.09	0.04	0.05	0.05	1	2	2	2	5	4
1651	OLD TOWN- SAMANTARAAIPUR AREA, BHUBANESWAR,ORISSA	27	32	29.5	7.9	8.3	8.1	266	947	607	0.8	1.4	1.1	7.8	8.03	7.91	0.05	0.05	0.05	1	2	2	2	2	2
1652	KALPNA - LAXMINAGAR AREA, BHUBANESWAR	27	32	29.5	7.2	7.2	7.2	327	359	343	0.6	1.1	0.85	4.82	5.30	5.06	0.03	0.05	0.04	2	2	2	2	4	3
1653	MANCHESWAR INDUSTRIAL AREA, BHUBANESWAR	26	26	26	7.3	7.3	7.3	240	240	240	0.3	0.3	0.3	0.31	0.31	0.31	0.05	0.05	0.05	1	1	1	2	2	2
1654	SECRETARIAT- GOVERNOR HOUSE- OLDBUS STAND AREA, BHUBANESWAR, ORISSA	25	32	28.5	6.8	7.1	6.95	148	175	162	0.8	1.3	1.05	1.94	2.81	2.37	0.01	0.05	0.03	1	2	2	2	2	2
1655	NEAR SEA BEACH, PURI, ORISSA	26	31	28.5	7.6	8.2	7.9	968	1173	1071	0.5	0.9	0.7	8.74	9.35	9.04	0.5	0.5	0.5	1	2	2	2	2	2
1656	NEAR JAGANNATH TEMPLE, PURI, ORISSA	26	31	28.5	8.1	8.1	8.1	1055	1143	1099	0.8	1	0.9	8.6	9.28	8.94	-	-	-	1	2	2	2	2	2
1657	HOSPITAL BUSSTAND-MAUSHIMA TEMPLE AREA, PURI	26	31	28.5	7.8	8.1	7.95	940	1060	1000	0.9	1.1	1	8.99	9.38	9.19	0.05	0.05	0.05	1	2	2	2	2	2
1658	NEAR RIVER KUSHABHADRA, PURI, ORISSA	26	31	28.5	7.9	8.5	8.2	270	316	293	0.6	0.7	0.65	1.34	1.67	1.51	-	-	-	2	2	2	4	4	4

TABLE 21.21 WATER QUALITY OF GROUND WATER IN BIHAR - 2009

STATION CODE	LOCATIONS	TEMPERATURE °C			pH			CONDUCTIVITY (µmhos/cm)			B.O.D. (mg/l)			NITRATE- N (mg/l)			NITRITE- N (mg/l)			FECAL COLIFORM (MPN/100ml)			TOTAL COLIFORM (MPN/100ml)		
		Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
	Water quality criteria				6.5-8.5			< 2250 µmhos/cm			< 3 mg/l									< 2500 MPN/100ml			< 5000 MPN/100ml		
1825	PATNA	20	20	20	7.2	7.2	7.2	652	652	652	-	-	-	-	-	-	-	-	-	4	4	4	7	7	7
1826	PATNA	21	23	22	7.1	7.6	7.35	372	680	526	-	-	-	-	-	-	-	-	-	2	2	2	4	4	4
1827	PATNA	21	24	22.5	7.2	7.7	7.45	504	705	605	-	-	-	-	-	-	-	-	-	2	4	3	4	8	6
1828	PATNA	20	24	22	7.4	7.7	7.55	564	716	640	-	-	-	-	-	-	-	-	-	2	2	2	4	4	4
1829	PATNA	20	23	21.5	7.4	7.6	7.5	562	562	562	-	-	-	-	-	-	-	-	-	2	2	2	4	4	4
1830	MUZAFFARPUR	25	25	25	7.5	8	7.75	665	943	804	-	-	-	-	-	-	-	-	-	4	8	6	12	14	13
1831	MUZAFFARPUR	25	27	26	7.3	7.8	7.55	772	872	822	-	-	-	-	-	-	-	-	-	4	4	4	7	12	10
1832	BEGUSARAI	26	27	26.5	7.3	7.6	7.45	872	1024	948	-	-	-	-	-	-	-	-	-	4	8	7	12	23	16
1833	BEGUSARAI	23	25.5	24.3	7.8	8.2	8	482	979	731	-	-	-	-	-	-	-	-	-	4	8	7	9	14	12
1834	PURNEA	22	26	24	7	8.1	7.55	331	372	352	-	-	-	-	-	-	-	-	-	4	14	9	9	22	17
1835	PURNEA	23	26	24.5	7	7.9	7.45	341	671	506	-	-	-	-	-	-	-	-	-	4	8	7	8	21	14
1836	BEGUSARAI	22	23	22.5	7.5	8	7.75	460	478	469	-	-	-	-	-	-	-	-	-	4	8	7	8	23	16
1837	BEGUSARAI	22	22	22	7.8	8.1	7.95	276	436	356	-	-	-	-	-	-	-	-	-	7	8	8	11	17	14
1838	MUNGER	20	23	21.5	7.9	8.2	8.05	272	472	372	-	-	-	-	-	-	-	-	-	8	11	9	11	17	14
1839	MUNGER	20	24	22	7.5	8.4	7.95	446	473	460	-	-	-	-	-	-	-	-	-	2	11	7	4	23	15
1840	MOTIHARI	23	31	27	7.8	8	7.9	361	763	562	-	-	-	-	-	-	-	-	-	8	23	13	13	50	29
1841	GAYA	24	24	24	7	7	7	1075	1075	1075	-	-	-	-	-	-	-	-	-	2	23	9	4	50	19
1842	GAYA-	22	22	22	8.1	8.4	8.25	510	538	524	-	-	-	-	-	-	-	-	-	2	8	4	4	22	10
1843	RAJGIR	21	22	21.5	8.1	8.1	8.1	475	536	506	-	-	-	-	-	-	-	-	-	4	30	14	7	80	36
1844	CHAPRA	24	25	24.5	7.1	7.8	7.45	416	956	686	1.4	1.4	1.4	-	-	-	-	-	-	4	62	25	7	136	51
2576	AURANGABAD	22	22	22	7.2	7.2	7.2	1068	1068	1068	-	-	-	0.22	0.22	0.22	-	-	-	8	8	8	23	23	23
2577	ARRARIA	26	26	26	7.2	7.2	7.2	364	364	364	-	-	-	1.6	1.6	1.6	-	-	-	23	23	23	50	50	50
2578	BHOJPUR	21	21	21	7	7	7	921	921	921	-	-	-	0.38	0.38	0.38	-	-	-	23	23	23	50	50	50
2579	WELL AT BUXAR	21	21	21	7.1	7.1	7.1	983	983	983	-	-	-	0.54	0.54	0.54	-	-	-	2	2	2	4	4	4
2580	BHABHUA	22	22	22	7.1	7.1	7.1	935	935	935	-	-	-	-	-	-	-	-	-	13	13	13	30	30	30
2581	WELL-1 AT DARBHANGA	25	25	25	7.4	7.4	7.4	533	533	533	-	-	-	0.26	0.26	0.26	-	-	-	17	17	17	50	50	50
2582	WELL-2 AT DARBHANGA	25.5	25.5	25.5	8	8	8	474	474	474	-	-	-	0.28	0.28	0.28	-	-	-	30	30	30	80	80	80
2583	WELL-1 AT GOPALGANJ	25	25	25	8.2	8.2	8.2	514	514	514	-	-	-	-	-	-	-	-	-	4	4	4	7	7	7
2584	WELL-2 AT GOPALGANJ	27	27	27	7.4	7.4	7.4	1091	1091	1091	-	-	-	0.98	0.98	0.98	-	-	-	7	7	7	11	11	11
2585	JAHANABAD	24	24	24	8.2	8.2	8.2	924	924	924	-	-	-	1	1	1	-	-	-	8	8	8	13	13	13
2586	KATIHAR	27	27	27	7	7	7	934	934	934	-	-	-	1	1	1	-	-	-	8	8	8	23	23	23
2587	KHAGARIA	26	26	26	7.8	7.8	7.8	959	959	959	-	-	-	1.4	1.4	1.4	-	-	-	2	2	2	4	4	4
2588	KISHANGANJ	27	27	27	7	7	7	732	732	732	-	-	-	1.4	1.4	1.4	-	-	-	23	23	23	30	30	30
2589	MADHEPURA	25	25	25	7.4	7.4	7.4	294	294	294	-	-	-	1.8	1.8	1.8	-	-	-	8	8	8	11	11	11
2590	WELL AT MADHUBANI	25	25	25	8.2	8.2	8.2	547	547	547	-	-	-	1	1	1	-	-	-	4	4	4	11	11	11
2591	WELL-1 AT NALANDA	21	21	21	8.2	8.2	8.2	692	692	692	-	-	-	1.8	1.8	1.8	-	-	-	8	8	8	23	23	23
2592	WELL-2 AT NALANDA	22	22	22	7.1	7.1	7.1	712	712	712	-	-	-	1.4	1.4	1.4	-	-	-	11	11	11	27	27	27
2593	NAWADAH	21	21	21	7.1	7.1	7.1	1105	1105	1105	-	-	-	0.26	0.26	0.26	-	-	-	17	17	17	30	30	30
2594	SAHARSA	25	25	25	7.6	7.6	7.6	771	771	771	-	-	-	1.6	1.6	1.6	-	-	-	4	4	4	7	7	7
2595	SAMASTIPUR	25	25	25	6.8	6.8	6.8	985	985	985	-	-	-	0.26	0.26	0.26	-	-	-	23	23	23	30	30	30
2596	SITAMARHI	24	24	24	7.8	7.8	7.8	922	922	922	-	-	-	0.26	0.26	0.26	-	-	-	2	2	2	4	4	4
2597	SIWAM	24	24	24	8	8	8	352	352	352	-	-	-	1	1	1	-	-	-	2	2	2	4	4	4
2598	WELL-1 ROHTAS	30	30	30	8.6	8.6	8.6	367	367	367	-	-	-	0.32	0.32	0.32	-	-	-	4	4	4	8	8	8
2599	WELL-2 ROHTAS	21	21	21	7.9	7.9	7.9	1008	1008	1008	-	-	-	0.36	0.36	0.36	-	-	-	4	4	4	7	7	7
2600	VAISHALI	25	25	25	8.1	8.1	8.1	582	582	582	-	-	-	1.2	1.2	1.2	-	-	-	1	1	1	2	2	2

TABLE 21.22 WATER QUALITY OF GROUND WATER IN WEST BENGAL - 2009

STATION CODE	LOCATIONS	TEMPERATURE °C			pH			CONDUCTIVITY (µmhos/cm)			B.O.D. (mg/l)			NITRATE- N (mg/l)			NITRITE- N (mg/l)			FECAL COLIFORM (MPN/100ml)			TOTAL COLIFORM (MPN/100ml)		
		Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
	Water quality criteria				6.5-8.5			< 2250 µmhos/cm			< 3 mg/l									< 2500 MPN/100ml			< 5000 MPN/100ml		
1766	MINE PIT WATER ASSANSOL	27	35	31	8.2	8.6	8.4	701	752	727	1.5	2.1	1.8	0.23	1.16	0.70	-	-	-	30	80	55	50	130	90
1767	DURGAPUR TOWN,NEAR IISCO, BURDWAN	28	30	29	7.1	7.5	7.3	1079	1088	1084	0.1	0.6	0.35	0.31	1.43	0.87	-	-	-	0	0	0	0	0	0
1768	DURGAPUR TOWN, BURDWAN	28	30	29	6.6	7.5	7.05	941	994	968	0.2	0.5	0.35	0.56	1.57	1.07	-	-	-	2	11	6.5	4	30	17
1769	INSIDE HINDUSTAN LIVER FACTORY, HALDIA	29	32	30.5	7.4	7.8	7.6	447	21200	10824	0	3	1.5	0.1	0.1	0.1	-	-	-	0	0	0	0	0	0
1770	NEAR IOC REFINERY HALDIA,	29	34	31.5	7.3	7.8	7.55	422	20600	10511	0.8	0.8	0.8	0.1	0.18	0.14	-	-	-	0	0	0	0	0	0
1771	KALYANI INDUSTRIAL AREA, NADIA, WEST BENGAL	27	28	27.5	8	8.1	8.05	678	806	742	0.3	0.5	0.4	0.1	0.1	0.1	-	-	-	0	0	0	0	0	0
1772	BARSAT MUNICIPALITY NORTH 24-P, WEST BENGAL	27	28	27.5	7.7	8	7.85	1071	1110	1090.5	0.5	0.6	0.55	0.1	0.17	0.14	-	-	-	0	0	0	0	0	0
1773	TANGRA, CALCUTTA	30	31	30.5	7.5	7.9	7.7	1951	2020	1985.5	0.1	0.6	0.35	0.1	0.13	0.12	-	-	-	0	0	0	0	0	0
1774	TOPSIA CALCUTTA	27	28	27.5	7.6	8.2	7.9	1692	1804	1748	0.3	1.5	0.9	0.1	0.1	0.1	-	-	-	0	0	0	0	0	0
1775	DHAPA CALCUTTA	28	28	28	7.5	8.3	7.9	1658	1734	1696	0.3	1.6	0.95	0.05	0.1	0.08	-	-	-	0	0	0	0	0	0
1776	GARIA CALCUTTA	28	28	28	7.7	8.5	8.1	892	1113	1002.5	0.6	2.3	1.45	0.1	0.1	0.1	-	-	-	0	2	1	0	4	2
1777	BEHALA CALCUTTA	28	30	29	8.4	8.4	8.4	700	981	841	0.7	0.9	0.8	0.1	0.1	0.1	-	-	-	2	14	8	4	34	19
1778	DOMJUR HOWRAH	27	28	27.5	7.9	8.2	8.05	1081	1124	1103	1	1.5	1.25	0.1	0.1	0.1	-	-	-	0	0	0	0	0	0
1779	DANKUNI (NEAR COAL COMPLEX), WEST BENGAL	29	30	29.5	7	7	7	986	987	987	0.2	0.5	0.35	0.1	0.18	0.14	-	-	-	0	0	0	0	0	0
1813	RISHRA, WEST BENGAL	28	28	28	6.9	6.9	6.9	919	919	919	0.7	0.7	0.7	0.1	0.1	0.1	-	-	-	0	0	0	0	0	0
1931	COSSIPORE - NORTH KOLKATA	29	29	29	8.3	8.3	8.3	2300	2300	2300	0.8	0.8	0.8	0.1	0.1	0.1	-	-	-	0	0	0	0	0	0
1932	CENTRAL KOLKATA	28	28	28	8.2	8.2	8.2	1624	1624	1624	0.2	0.2	0.2	0.1	0.1	0.1	-	-	-	33	33	33	140	140	140
1933	NEAR GALVANISATION UNIT, HOWRAH	27	27	27	7.9	7.9	7.9	1157	1157	1157	1.5	1.5	1.5	0.1	0.1	0.1	-	-	-	2	2	2	4	4	4
1934	CENTRAL HOWRAH-RESIDENTAIL AREA	27	27	27	8	8	8	2300	2300	2300	2.4	2.4	2.4	0.1	0.1	0.1	-	-	-	0	0	0	0	0	0
1935	INSIDE KOLKATA LEATHER COMPLEX	28	28	28	7.8	7.8	7.8	1313	1313	1313	0.3	0.3	0.3	0.1	0.1	0.1	-	-	-	0	0	0	0	0	0
1936	RESIDENTIAL AREA - SONARPUR	27	27	27	8	8	8	2510	2510	2510	1.3	1.3	1.3	0.1	0.1	0.1	-	-	-	0	0	0	0	0	0
1937	RAJARHAT - NEW TOWNSHIP	27	27	27	8	8	8	2070	2070	2070	2.2	2.2	2.2	0.1	0.1	0.1	-	-	-	2	2	2	4	4	4
1938	BSIRHAT MUNICIPALITY	28	30	29	8.2	8.3	8.25	2014	2080	2047	0.7	0.8	0.75	0.16	0.2	0.18	-	-	-	0	2	1	0	6	3
1939	BARRAKPORE MUNICIPALITY	28	31	29.5	8.1	8.4	8.25	441	450	446	0.3	0.3	0.3	0.1	0.1	0.1	-	-	-	0	0	0	0	0	0
1940	NEAR THE PHOSPHATE COMPANY-RISHRA	30	30	30	7	7.1	7.05	728	789	759	0.7	0.9	0.8	0.05	0.1	0.075	-	-	-	0	2	1	0	4	2
1941	NEAR FLY ASH DUMPING SITE-KUNTIGHAT, BANDEL	28	28.5	28.3	6.8	7	6.9	430	468	449	0.5	0.8	0.65	0.1	0.13	0.115	-	-	-	0	0	0	0	1	0.5
1942	NEAR EXIDE INDUSTRIES-HALDIA	29	30	29.5	7.4	7.7	7.55	351	1912	1132	0.8	1	0.9	0.1	0.19	0.145	-	-	-	0	0	0	0	0	0
1943	INSIDE TATA METALIKS, KHARAGPUR	29	31	30	7.4	8.4	7.9	132	632	382	0	0.1	0.05	0.1	0.1	0.1	-	-	-	0	0	0	0	0	0
1944	KHARAGPUR INDUSTRIAL AREA	30	31.5	30.8	6.3	8.4	7.35	126	140	133	1.2	1.6	1.4	0.1	0.1	0.1	-	-	-	0	0	0	0	0	0
1945	ENGLISH BAZAR- MALDAH	28	28	28	7.5	7.5	7.5	587	587	587	1	1	1	0.12	0.12	0.12	-	-	-	0	0	0	2	2	2
2510	GEOKHALI BUNGLOW MIDNAPUR-EAST	27.5	27.5	27.5	7.8	7.8	7.8	984	984	984	0.2	0.2	0.2	0.1	0.1	0.1	-	-	-	0	0	0	0	0	0
2515	SDO OFFICE, RANAGHAT	28	28	28	7.9	7.9	7.9	623	623	623	1	1	1	0.1	0.1	0.1	-	-	-	0	0	0	0	0	0
2516	SDO OFFICE, KRISHNANAGAR	29	29	29	7.7	7.7	7.7	767	767	767	1.1	1.1	1.1	0.1	0.1	0.1	-	-	-	0	0	0	0	0	0
2526	FULBARI BARRAGE	22	22	22	-	-	-	156	156	156	2.1	2.1	2.1	0.1	0.1	0.1	-	-	-	110	110	110	280	280	280
2528	GROUND WATER POINT INSIDE BURDWAN UNIVERSITY	26	26	26	7	7	7	362	362	362	1.2	1.2	1.2	0.33	0.33	0.33	-	-	-	8	8	8	11	11	11
2529	GROUND WATER POINT NEAR BURDWAN STATION	24	24	24	7	7	7	428	428	428	1.5	1.5	1.5	0.26	0.26	0.26	-	-	-	0	0	0	0	0	0
2530	HOT SPRING AT BAKRESHWAR	45	45	45	9.5	9.5	9.5	565	565	565	0.4	0.4	0.4	0.84	0.84	0.84	-	-	-	0	0	0	0	0	0
2535	VISVA BHARATI	21	21	21	7.6	7.6	7.6	455	455	455	0.4	0.4	0.4	0.23	0.23	0.23	-	-	-	0	0	0	0	0	0
2536	NALHATI RAILWAY STATION OF BIRBHUM	29	29	29	6.7	6.7	6.7	788	788	788	0.1	0.1	0.1	0.63	0.63	0.63	-	-	-	0	0	0	0	0	0
2537	BOLPUR NEAR RAILWAY STATION	22	22	22	6.6	6.6	6.6	282	282	282	0.3	0.3	0.3	0.55	0.55	0.55	-	-	-	0	0	0	0	0	0
2538	MOREGRAM CROSSING	25	25	25	6.8	6.8	6.8	345	345	345	0.4	0.4	0.4	-	-	-	0.19	0.19	0.19	0	0	0	0	0	0
2540	SATI GHAT AT BANKURA TOWN	29	29	29	7.2	7.2	7.2	2030	2030	2030	0.4	0.4	0.4	1.08	1.08	1.08	-	-	-	0	0	0	0	0	0
2542	DWARIKA AT BISHNUPUR TOWN	31	31	31	6.9	6.9	6.9	548	548	548	0	0	0	0.1	0.1	0.1	-	-	-	0	0	0	0	0	0
2543	SDO OFFICE AT BISHNUPUR TOWN	31	31	31	6.7	6.9	6.78	178	178	178	0.4	0.4	0.4	0.31	0.31	0.31	-	-	-	0	0	0	0	0	0
2545	GROUND WATER POINT AT PURULIA RK MISSION	27	27	27	7.2	7.2	7.2	367	367	367	7.2	7.2	7.2	1	1	1	-	-	-	22	22	22	170	170	170
2546	ULUBERIA COLLEGE AT HOWRAH	31	31	31	8.2	8.2	8.2	1051	1051	1051	0.2	0.2	0.2	0.1	0.1	0.1	-	-	-	14	14	14	22	22	22
2547	AMTOLA ON DIAMOND HARBOUR ROAD, 24 PARGANAS (S)	28	28	28	7.7	7.7	7.7	1907	1907	1907	0.2	0.2	0.2	0.1	0.1	0.1	-	-	-	0	0	0	0	0	0
2548	HIDCO OFFICE, RAJARHAT	28	28	28	7.7	7.7	7.7	1285	1285	1285	0.1	0.1	0.1	0.1	0.1	0.1	-	-	-	0	0	0	0	0	0