IN THE HON'BLE NATIONAL GREEN TRIBUNAL

PRINCIPAL BENCH AT NEW DELHI

O.A. No. 262 OF 2022

IN THE MATTER OF:

Sanjay Sharma **...Applicant**

Versus

Union of India & Others ...Respondents

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2.	**Annexure-I:** A copy of letter dated 13/05/2021 from CPCB to UPPCB & BSPCB to investigate the matter of disposal of dead bodies into River Ganga and Yamuna.	
3.	**Annexure-II:** A copy of letter issued by UPPCB to all District Magistrates of Uttar Pradesh to ensure necessary action to prevent further disposal of dead bodies into River Ganga and Yamuna.	
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Ajit kumar Vidyarthi

(A.K.Vidyarthi)
Scientist-F
Central Pollution Control Board
Parivesh Bhawan, East Arjun Nagar
Delhi- 110032

Place: Delhi
Date: 20.09.2022

IN THE HON'BLE NATIONAL GREEN TRIBUNAL
PRINCIPAL BENCH AT NEW DELHI
O.A. No. 262 of 2022

IN THE MATTER OF:

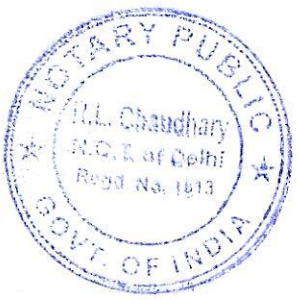
Sanjay Sharma ...Applicant

Versus

Union of India & Others ...Respondents

REPLY ON BEHALF OF RESPONDENT NO. 06 (CENTRAL POLLUTION CONTROL BOARD)

I, A. K. Vidyarthi s/o Late. Vikrama Singh, aged about 52 years, working as Scientist-F in Central Pollution Control Board, Parivesh Bhawan, East Arjun Nagar, Delhi, do hereby solemnly affirm and declare as under:



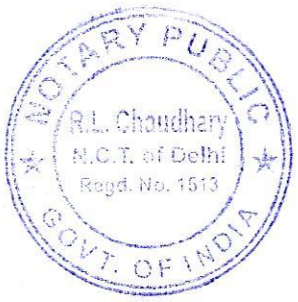
1. That I am fully conversant with the facts of the case and hence, competent and authorized to depose and swear the present affidavit as under:

2. That Central Pollution Control Board (CPCB) issued D.O. letter dated 13/05/2021 to Chairman, Uttar Pradesh Pollution Control Board (hereinafter referred as UPPCB) and Bihar State Pollution Control Board (hereinafter referred as BSPCB) to direct the concerned local administrations of the districts located on River Ganga and Yamuna in Uttar Pradesh and on Ganga in Bihar to investigate the matter of disposal of dead bodies into River Ganga and Yamuna as Covid-19 cases surge in the nation and ensure necessary action to prevent further occurrence of such events. Copy of the letter dated 13/05/2021 is annexed to this reply as **Annexure-I**.

Pursuant to CPCB letter dated 13/05/2021, following actions were taken by concerned State Boards:

a. UPPCB issued letter dated 13/05/2021 to all District Magistrates of Uttar Pradesh to ensure necessary action to prevent further disposal of dead bodies into River Ganga and Yamuna. Copy of the letter issued by UPPCB is annexed as **Annexure-II**.

b. BSPCB vide letter dated 18/05/2021 informed that BSPCB had requested District Magistrate, Buxar on 10/05/2021 to look into the matter and take immediate action regarding disposal of dead bodies into River Ganga. Subsequently, BSPCB also requested to all the District Magistrates and concerned local bodies of districts on the bank of River Ganga to investigate the matter of floating dead bodies in River Ganga and its tributaries in their jurisdiction and take necessary action to prevent further occurrence of such events. Copy of the letter dated 18/05/2021 from BSPCB is annexed as **Annexure-III.**



3. That CSIR-Indian Institute of Toxicology Research (IITR), Lucknow conducted a study funded by NMCG on "*Detection of SARS-CoV-2 Virus contamination and analysis of water quality due to disposal of dead bodies at selected sites in River Ganga*" during May-June, 2021. A copy of report is annexed to this reply as **Annexure-IV.**

The major findings of the report are as follows:

a. The water samples collected from the River Ganga at Kannauj, Unnao, Kanpur, Prayagraj, Mirzapur, Varanasi, Buxar, Hamirpur, Ghazipur, Ballia, Patna, Saran and Bhojpur were analyzed for detection of SARS-CoV-2 virus. Of total of 132 samples (378 sample triplicates/ 1134 technical triplicates) analysed, none of the sample was found positive for presence of SARS-CoV-2 virus.

4. That Guidelines have been issued on 10/06/2021 to UPPCB & BSPCB for "Raising awareness among riverside communities regarding measures to prevent disposal of dead bodies into River Ganga and Yamuna as Covid-19 cases surge in the nation and use of river water". A copy of the guidelines issued is annexed to this reply as **Annexure-V.**

   Steps taken by UPPCB & BSPCB pursuant to issuance of guidelines are as follows:

   a. UPPCB issued letter dated 24/06/2021 to Environment, Forest & Climate Change Department, Government of Uttar Pradesh to direct concerned departments to take necessary action to ensure effective implementation of CPCB guidelines. Copy of the letter dated 24/06/2021 is annexed as **Annexure-VI.**

   b. BSPCB issued letter dated 18/06/2021 to local administrations /police authorities/ULBs to start conducting awareness amongst the communities located on the banks of river about the do's/don'ts of the use of river water to prevent the spread of infection during surge of Covid-19. Copy of the letter dated 18/06/2021 is annexed as **Annexure-VII.**

5. CPCB also issued letter dated 06/12/2021 to UPPCB regarding pollution in River Ganga in Kanpur & Unnao region. Directions under section 5 of Environment (Protection) Act, 1986, dated 22/02/2022 were also issued by CPCB to UP Jal Nigam (Urban & Rural). Copies of letter dated 06/12/2021 and directions dated 22/02/2022 are collectively annexed to this reply as **Annexure-VIII**.

6. In view of the supra stated facts and circumstances, it is most respectfully prayed that this Hon'ble Tribunal may be pleased to pass such or further orders as it may deem fit.

Ajit Kumar Vidyarthi

DEPONENT

NOTARY PUBLIC R.L. Chaudhary N.C.T. of Delhi Regd. No. 1513 GOVT. OF INDIA

ए. के. Vidyarthi
Scientist 'F'
केन्द्रीय प्रदूषण नियंत्रण बोर्ड
Central Pollution Control Board
पर्यावरण, वन एवं जलवायु परिवर्तन मंत्रालय, भारत सरकार
Min of Environment, Forest & Climate Change, Govt. of India
परिवेश भवन, अर्जुन नगर, दिल्ली-110032
Paryavas Bhawan, Arjun Nagar, Delhi-110032

NOTARY PUBLIC
S.L. Chaudhary
N.C.T. of Delhi
Regd. No. 1513
GOVT. OF INDIA

VERIFICATION

Verified at Delhi on this 20th day of September 2022 that the contents of the above reply affidavit are correct to the best of my knowledge and belief. Nothing material has been concealed therein.

Ajit Kumar Vidyarthi

DEPONENT

ATTESTED
NOTARY PUBLIC
GOVT. OF INDIA
20 SEP 2022

ए. के. विद्यार्थी / A. K. Vidyarthi
वैज्ञानिक 'एफ' / Scientist 'F'
केंद्रीय प्रदूषण नियंत्रण बोर्ड
Central Pollution Control Board
पर्यावरण, वन एवं जलवायु परिवर्तन मंत्रालय, भारत सरकार
M/o Env. Forest & Climate Change, Govt. of India
परिवेश भवन, पूर्वी अर्जुन नगर, दिल्ली 110032
Parivesh Bhawan, East Arjun Nagar, Delhi-110032

शिव दास मीना, भा.प्र.से.
अध्यक्ष
Shiv Das Meena, I. A. S.
Chairman

सत्यमेव जयते

केन्द्रीय प्रदूषण नियंत्रण बोर्ड
पर्यावरण, वन एवं जलवायु परिवर्तन मंत्रालय, भारत सरकार
CENTRAL POLLUTION CONTROL BOARD
MINISTRY OF ENVIRONMENT, FOREST & CLIMATE CHANGE, GOVT. OF INDIA

DO. No. 19110/ WQ/WQM-II/CPCB/2021-22
Date: May 13th , 2021

Dear shri Rathore,

Sub: Disposal of dead bodies into river Ganga and Yamuna as Covid-19 cases surge in the nation.

Recently the news of floating dead bodies in River Ganga in the stretches of Uttar Pradesh and Bihar and in river Yamuna in the stretch of Uttar Pradesh have been reported amid the surge in coronavirus infection in the country. There is also a speculation that the bodies might be infected with the highly contagious covid-19 virus, and may lead to infection among the residents and their cattle living along the banks of these rivers. The decomposition of dead bodies in rivers may also affect the river quality.

I would, therefore, request you to kindly direct the concerned local administrations of the districts located on the banks of river Ganga and Yamuna in your State to investigate the matter, provide details of such events, and also ensure necessary action to prevent further occurrence of such events.

You are further requested to assess the impact of these incidences on the water quality of the rivers in your State and submit status report to CPCB within 15 days.

With regards

Yours sincerely

(Shiv Das Meena)

To,
Shri J.P.S. Rathore
Chairman, Uttar Pradesh Pollution Control Board
Building No. TC-12V,Vibhuti Khand, Gomti Nagar
Lucknow – 226 010

'परिवेश भवन' पूर्वी अर्जुन नगर दिल्ली-110 032, भारत
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शिव दास मीना, भा.प्र.से.
अध्यक्ष
Shiv Das Meena, I. A. S.
Chairman

केन्द्रीय प्रदूषण नियंत्रण बोर्ड
पर्यावरण, वन एवं जलवायु परिवर्तन मंत्रालय, भारत सरकार
CENTRAL POLLUTION CONTROL BOARD
MINISTRY OF ENVIRONMENT, FOREST & CLIMATE CHANGE, GOVT. OF INDIA

DO. No. 19110/ WQ/WQM-II/CPCB/2021-22
Date: May 13th , 2021

Dear Dr. Ghosh,

Sub: Disposal of dead bodies into river Ganga and Yamuna as Covid-19 cases surge in the nation.

Recently the news of floating dead bodies in River Ganga in the stretches of Uttar Pradesh and Bihar and in river Yamuna in the stretch of Uttar Pradesh have been reported amid the surge in coronavirus infection in the country. There is also a speculation that the bodies might be infected with the highly contagious covid-19 virus, and may lead to infection among the residents and their cattle living along the banks of these rivers. The decomposition of dead bodies in rivers may also affect the river quality.

I would, therefore, request you to kindly direct the concerned local administrations of the districts located on the banks of river Ganga and Yamuna in your State to investigate the matter, provide details of such events, and also ensure necessary action to prevent further occurrence of such events.

You are further requested to assess the impact of these incidences on the water quality of the rivers in your State and submit status report to CPCB within 15 days.

Yours sincerely

With regards

(Shiv Das Meena)

To,
Dr. Ashok Kumar Ghosh
Chairman, Bihar State Pollution Control Board
Beltron Bhawan, Shastri Nagar, Jawahar Lal Nehru Marg
Patna – 800 023

'परिवेश भवन' पूर्वी अर्जुन नगर दिल्ली-110 032, भारत
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उत्तर प्रदेश प्रदूषण नियंत्रण बोर्ड
UTTAR PRADESH POLLUTION CONTROL BOARD

संदर्भ सं0
Ref. No. : H61807/C-2/Ganga/2021

दिनॉक
Date : 13-05-2021

सेवा में,
समस्त जिलाधिकारी,
उ0प्र0।

विषयः–कोविड–19 महामारी के दौरान उत्तर प्रदेश में शवों को गंगा एवं यमुना नदी में बहाये जाने से रोके जाने के सम्बंध में।

महोदय,

कृपया अध्यक्ष, केन्द्रीय प्रदूषण नियंत्रण बोर्ड, दिल्ली के अर्द्धशासकीय पत्र सं0 19110/WQ/WQM-II/CPCB/2021-22 दिनांक 13.05.2021 का संदर्भ ग्रहण करें (प्रति संलग्न)। उक्त पत्र द्वारा सूचित किया गया है कि कोविड–19 महामारी के दौरान उत्तर प्रदेश में गंगा एवं यमुना नदियों में शवों को प्रवाहित किये जाने की घटनाये प्रकाश में आयी हैं, जिसे केन्द्रीय प्रदूषण नियंत्रण बोर्ड द्वारा गम्भीरता से लिया गया है। उक्त शवों का कोविड–19 वायरस से ग्रसित होना सम्भावित है। केन्द्रीय प्रदूषण नियंत्रण बोर्ड द्वारा शवों को नदियो में बहाये जाने के कारण नदियों के कैचमेंट क्षेत्र में कोविड–19 वायरस से जनमानस में बीमारी फैलने एवं नदियों का जल प्रदूषित होने की आशंका व्यक्त की गयी।

अतः इस सम्बंध में आपसे अनुरोध है कि अपने क्षेत्रान्तर्गत आने वाली गंगा नदी/यमुना नदी एवं इसकी सहायक नदियों में शवों के बहाये जाने से रोकने हेतु प्रभावी कार्यवाही करने का कष्ट करें। साथ ही इसका नियमित रूप से सतत् अनुश्रवण कराते हुए यह सुनिनिश्चत करें कि नदियों में शवों के बहाये जाने की घटनाओं की पुनरावृत्ति न हो। इस सम्बंध में कृत कार्यवाही की रिपोर्ट उ0प्र0 प्रदूषण नियंत्रण बोर्ड को प्रेषित करने का कष्ट करें।

संलग्नक–उपरोक्तानुसार।

भवदीय,

(आशीष तिवारी)
सदस्य सचिव

प्रतिलिपि–

1. अध्यक्ष, केन्द्रीय प्रदूषण नियंत्रण बोर्ड, दिल्ली को अर्द्धशासकीय पत्र सं0 19110/WQ/WQM-II/CPCB/2021-22 दिनांक 13.05.2021 के संदर्भ में सादर सूचनार्थ प्रेषित।
2. समस्त वरिष्ठ पुलिस अधीक्षक को इस अनुरोध के साथ कि प्रदेश में शवों को गंगा एवं यमुना नदी में बहाये जाने से रोके जाने हेतु प्रभावी कार्यवाही कराने का कष्ट करें।
3. समस्त क्षेत्रीय अधिकारी, उ0प्र0 प्रदूषण नियंत्रण बोर्ड को इस निर्देश के साथ कि अपने क्षेत्रान्तर्गत आच्छादित नदियों का नियमित रूप से अनुश्रवण सुनिश्चित करें तथा शवों के प्रवाहित होने की घटना प्रकाश में आने पर जिला प्रशासन के सहयोग से आवश्यक कार्यवाही सुनिश्चित करायें।

सदस्य सचिव

टी.सी. - 12 वी, विभूति खण्ड, गोमती नगर,
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शिव दास मीना, भा.प्र.से.
अध्यक्ष
Shiv Das Meena, I. A. S.
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केन्द्रीय प्रदूषण नियंत्रण बोर्ड
पर्यावरण, वन एवं जलवायु परिवर्तन मंत्रालय, भारत सरकार
CENTRAL POLLUTION CONTROL BOARD
MINISTRY OF ENVIRONMENT, FOREST & CLIMATE CHANGE, GOVT. OF INDIA

सत्यमेव जयते

DO. No. 19110/ WQ/WQM-II/CPCB/2021-22
Date: May 13th , 2021

Dear shri Rathore,

Sub: Disposal of dead bodies into river Ganga and Yamuna as Covid-19 cases surge in the nation.

Recently the news of floating dead bodies in River Ganga in the stretches of Uttar Pradesh and Bihar and in river Yamuna in the stretch of Uttar Pradesh have been reported amid the surge in coronavirus infection in the country. There is also a speculation that the bodies might be infected with the highly contagious covid-19 virus, and may lead to infection among the residents and their cattle living along the banks of these rivers. The decomposition of dead bodies in rivers may also affect the river quality.

I would, therefore, request you to kindly direct the concerned local administrations of the districts located on the banks of river Ganga and Yamuna in your State to investigate the matter, provide details of such events, and also ensure necessary action to prevent further occurrence of such events.

You are further requested to assess the impact of these incidences on the water quality of the rivers in your State and submit status report to CPCB within 15 days.

With regards

Yours sincerely

(Shiv Das Meena)

To,
Shri J.P.S. Rathore
Chairman, Uttar Pradesh Pollution Control Board
Building No. TC-12V,Vibhuti Khand, Gomti Nagar
Lucknow – 226 010

'परिवेश भवन' पूर्वी अर्जुन नगर दिल्ली-110 032, भारत
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Tel. +91-11-22307233, Tele Fax : +91-11-22304948, e-mail: ccb.cpcb@nic.in

Annexure-III

Prof. Ashok Kumar Ghosh
Ph.D, Erasmus Mundus Fellow
Chairman

Bihar State Pollution Control Board

D.O. no. 860

dated-18.05.2021

Sub:- **Disposal of dead bodies into river Ganga as Covid-19 cases surge in the nation.**

Dear Shree Meena,

With reference to your D.O. letter dated 13-05-21 related to the issue of dead bodies floating in the river Ganga at Mahadeva Ghat, Chausa, Buxar, it is to inform that this Board had requested the District Magistrate, Buxar, to look into the matter and take immediate action in this regard through an e.mail on 10-05-21 as soon as the matter was brought to the notice of Board. It was informed by the District Magistrate, Buxar that altogether 81 dead bodies were found dumped in the river which were taken out by the Districts Administration and properly disposed after conducting post-mortem. Several steps have been taken by the District Administration to prevent recurrence of such incidence in future such as strict vigil by the Magistrates/ Police officers in the river through boats, sensitization of the masses by all B.D.Os/C.Os/SHOs in their jurisdictions, placing of 'Mahajal ' at the boundary of the Gajipur-Buxar in the river Ganga and deputation of personnel for the performance of last rites/disposal of unclaimed dead bodies.

Subsequently, all the District Magistrates and concerned local bodies of districts on the bank of the river Ganga, were requested to kindly investigate the recent matter of floating dead bodies, if any, in the river Ganga and its tributaries in their jurisdiction, provide their details and take necessary action to prevent further occurrence of such events.

It is also to inform that a team of officials of the Board had visited the site at Buxar and the water samples of the river were also collected to assess the water quality. A copy of analysis report is enclosed for reference.

Best Regards,

Encl: As above.

Yours sincerely,

(Ashok Kumar Ghosh) 18/05/21

To,
Shri Shiv Das Meena, I.A.S.,
Chairman,
Central Pollution Control Board,
Delhi-110032.

Parivesh Bhawan, Patliputra Industrial Area, Patna - 800 010
Phone No. : +91 612 2261776, (Direct) EPABX - 2261250 / 2262265, Fax: +91 612 2261050
E-mail : chairmanbspcb@gmail.com Website http://bspcb.bih.nic.in

Detection of SARS-CoV-2 Virus contamination and analysis of water quality due to disposal of dead bodies at selected sites in river Ganga

Final Progress Report

Submitted to

National Mission for Clean Ganga
Department of Water Resources
River Development & Ganga Rejuvenation
Ministry of Jal Shakti, Government of India, New Delhi

Submitted by

सीएसआईआर-भारतीय विषविज्ञान अनुसंधान संस्थान
CSIR-INDIAN INSTITUTE OF TOXICOLOGY RESEARCH
विषविज्ञान भवन, 31 महात्मा गाँधी मार्ग, पोस्ट बाक्स नं० 80, लखनऊ-226001, उ०प्र०, भारत
VISHVIGYAN BHAWAN, 31 MAHATMA GANDHI MARG, POST BOX NO 80, LUCKNOW-226001, U.P. INDIA

CONTENTS

Title:	Detection of SARS-CoV-2 Virus contamination due to disposal of dead bodies at selected sites in river Ganga	
Laboratory:	CSIR-Indian Institute of Toxicology Research, Lucknow, UP	
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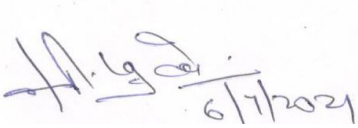
	Dr. K.C. Khulbe Chief Scientist and Head Research Planning and Business Development Division (RPBD) CSIR-Indian Institute of Toxicology Research Vishvigyan Bhawan, 31, Mahatma Gandhi Marg Lucknow - 226 001. Uttar Pradesh, India. Phone: +91-522- 2627586 Ext: 721 (Office) FAX: +91-522-2628227 Email: kclhulbe@iitr.res.in	

1. SARS-CoV-2: An Introduction

The onset of the pandemic caused by Severe Acute Respiratory Syndrome Corona virus 2 (SARS-CoV-2) has remarkably affected the living population globally. The infection was declared as a pandemic by WHO in March 2020. Worldwide 172,052,776 cases with 3,578,290 deaths have been reported till date. The first wave of the infection was marked with stringent practice of "Social Distancing" and home confinement to hold the community spread of the COVID-19. However, the recent introduction and administration of the vaccine has generated hope in restricting the spread the virus globally. In spite of taking all remedial measures, the COVID-19 cases are rising in India exponentially. The second wave has affected the country drastically recording more than 25 million cases and 275,000 deaths. The second wave displayed a higher proportion of patients with breathlessness, high oxygen requirements and asymptomatic features. As per the available reports/data the infection rate during the second wave lead to the shortage of oxygen, beds and medical facilities in the hospitals thereby taking away many lives in the country. The crematorium grounds were observed to be occupied day and night with people waiting in lines to get the deceased cremated/buried. The large number of deaths, cremation grounds running out of space, limited resources, and lack of financial resources were restraining factors for bidding farewell to the pandemic victims. Dead bodies being buried along the banks and floating in river Ganga has been reported from cities like Kannauj, Kanpur, Unnao, Prayagraj, Varanasi, Ghazipur, Ballia districts in U.P. and Buxar in Bihar.

Problem

The river Ganges is a sacred river of the nation and holds a high cultural esteem among the Hindu population of the country. Being a perennial river, Ganga and its tributaries are the main source of water for domestic as well as irrigation purposes for the North Indian states. The large

number of deaths due to persisting pandemic situations with limited burial places and financial strains, reportedly led to disposal of the dead bodies in the rivers. This has been reported in national daily newspapers that there has been a fear psychosis amongst the population because of reportedly disposal and burial of dead bodies in river Ganga.

In order to collect scientific evidence against the aforesaid fear, a need of detailed scientific study was felt to assess the water quality and contamination of SARS-CoV-2 virus due to disposal of dead bodies in river Ganga. On the initiative of NMCG, various government agencies such as CPCB, SPCB's joined hands and, CSIR-Indian Institute of Toxicology Research (CSIR-IITR), Lucknow was commissioned to investigate the presence/ absence of SARS CoV-2 virus in river Ganga from the reported sites. A detailed study was entrusted and CSIR-IITR joined the responsibility of "**Detection of SARS-CoV-2 virus contamination and analysis of water quality due to disposal of dead bodies in selected sites in river Ganga"** with NMCG, MoJS, and GoI.

2. CSIR-Indian Institute of Toxicology Research (CSIR-IITR): Capabilities and Capacities for Combating Covid-19

CSIR-Indian Institute of Toxicology Research (CSIR-IITR), Lucknow, a constituent laboratory of the Council of Scientific and Industrial Research, Delhi, is established in 1965 with the motto, "**Safety to Environment and Health and Service to Industry**". The Institute addresses problems critical to human health and the environment. It is the only Institute of toxicology in India and among a few in the world. Being a **GLP and NABL certified Laboratory**, CSIR-IITR has a great emphasis on the quality control, quality assurance, and data archiving as per the international standards/ Regulations. The institute has more than five decades of experience of

handling all the issues associated with health, environment and natural disaster management. Institute has a glorious past to keep itself in the forefront in combating against natural calamities such as Bhopal Gas tragedy, Odisha super cyclone, Dropsy crises, occupational health hazards in mine workers, Litchi-Methylenecyclopropyl glycine (MCPG) induced hypoglycaemic encephalopathy deaths in Muzaffarpur, Bihar, etc.

Under this Pandemic, CSIR-IITR offered its interdisciplinary strength of scientists and research students, and joined the national mission of diagnostic testing to identify persons infected with SARS–CoV-2. The institute developed state of the art **RT-PCR based COVID-19 testing facility** within the campus. The facility is well equipped to **ensure BSL2+ level safety, quality control and quality assurance, efficacy, and real-time data reporting.** CSIR-IITR is a VRDL as can be viewed in Aarogya Setu App and has been approved by **CSIR, New Delhi vide letter no. 6/1/IITR-Covid/2020-RPBD** dated April 18, 2020 to conduct testing of the COVID-19 samples at the institute as per the instructions issued by **ICMR vide letter no. VIR/4/2020/ECD-I dated 2nd April 2020.**

The disposal of wastes is been done through Waste Management Rules 2016, Government of India as per CPCSEA guidelines. The COVID-19 testing facility of CSIR-IITR is linked to the ten districts viz., **Amethi, Ambedkar Nagar, Sultanpur, Unnao, Raebareli, Banda, Saharanpur, Siddhartha Nagar, Gonda, Lucknow in the state of Uttar Pradesh, and reported over 3,38,000 test results so far**.

CSIR-IITR also holds expertise in conducting various water-related studies and several industry/ government sponsored projects are being undertaken in this facility. The institute was previously involved in the monitoring of important national programs for various rivers:

Ganga River	1986-1991	Ganga Action Plan
Yamuna River	1989-1990	Yamuna Biomonitoring Plan (Indo- Dutch collaborative project)
Gomti River	1993-2013	Gomti Action Plan
Ganga River	2014-2015	Namami Gange Program, NMCG
Ganga-Yamuna River	2018-2019	Namami Gange Program, NMCG (Maha Kumbh)
Hindon River	2019	Snapshot assessment of water quality of river Hindon, NMCG
Ganga River	2019	Ganga Aamantran Abhiyan (Devprayag to Ganga Sagar), NMCG
Hindon Basin	2019-2020	Ground Water Department, MoJS, GoUP
Ganga River	2020	Ganga Yatra in U.P. (January 27-31, 2020), MoJS, GoUP
Central Ganga Basin, Ramganga Basin, Yamuna Basin	2020-2021	Assessment of ground water quality through samples collected from Piezometers and Monitoring Wells, Ground Water Department, MoJS, GoUP
Ghaghara basin	2020-2021	Ground Water Department, MoJS, GoUP

3. The Project And Its Objectives

Aim: Detection of SARS-CoV-2 virus contamination and analysis of water quality due to disposal of dead bodies in river Ganga.

Objectives:

i. **Collection of water samples from river Ganga and Yamuna near the sites where the activity of disposal of dead bodies were recorded in cities like Kannauj, Hamirpur, Unnao, Kanpur, Prayagraj, Varanasi, Mirzapur, Ghazipur, Ballia, Buxar, Saran, Patna, Bhojpur and other hotspots where dead bodies were found floating/accumulated (Table 1).**

ii. **Testing of water samples for the detection SARS-CoV-2 virus contamination in river Ganga.**

iii. **Analysis of physico-chemical parameters like pH, Color, Dissolved Oxygen (DO), Biochemical Oxygen Demand (BOD), Chemical Oxygen Demand (COD), Nitrate, Chloride, Ammonical nitrogen and Total phosphorus for analyzing water quality of river Ganga.**

iv. **Analysis of bacteriological parameters: Total coliforms, fecal coliforms, *E.coli*, Fecal *Streptococci* for analyzing water quality of river Ganga.**

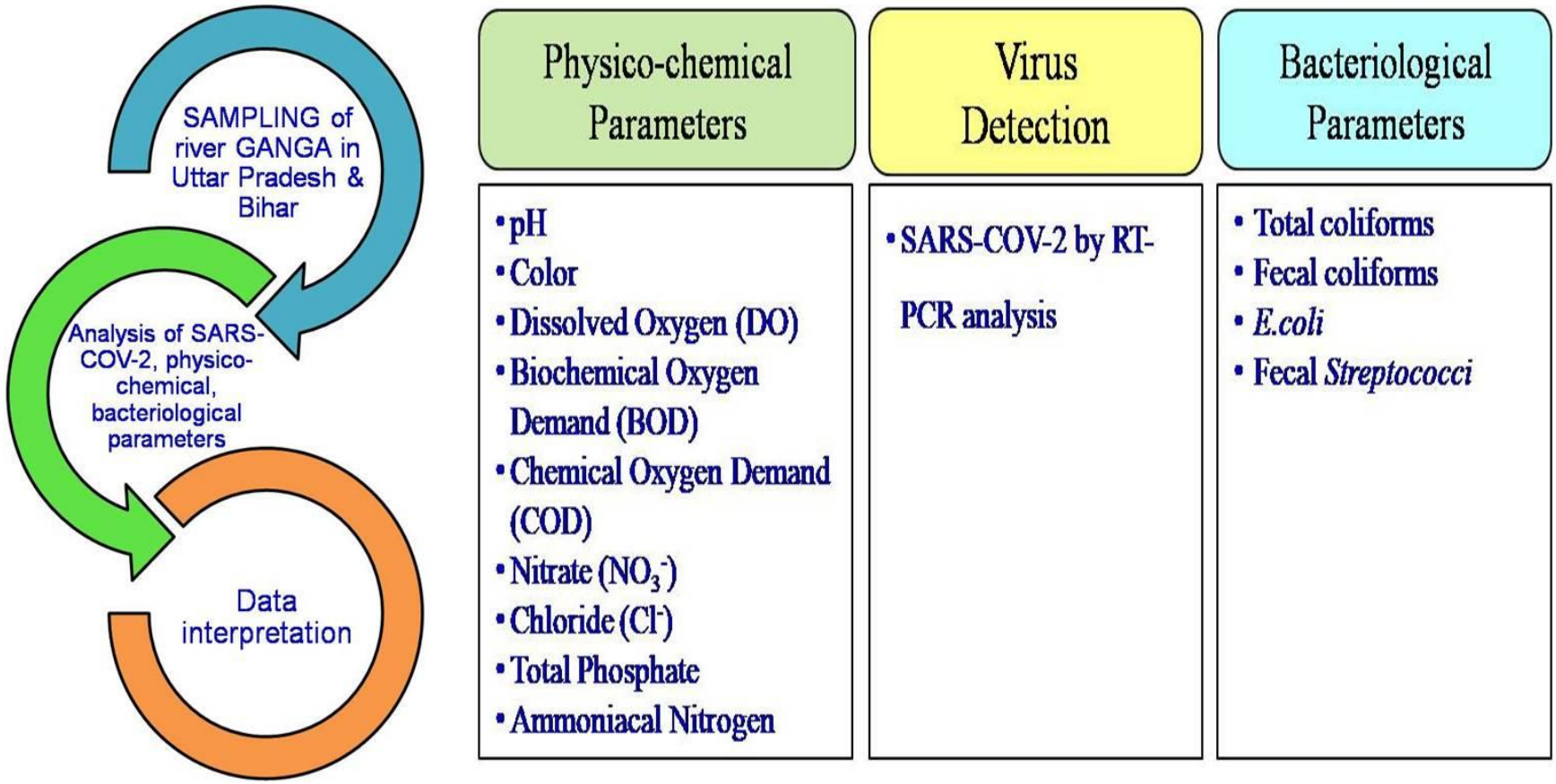


Figure 1: Water quality assessment and parameters analyzed by CSIR-IITR in river Ganga

4. Sample Collection, Storage and Transportation

Sampling sites: The water samples were collected in triplicates from downstream of identified sites of river Ganga banks ranging from District **Kannauj, Unnao, Kanpur, Hamirpur, Prayagraj, Varanasi, Ballia, Ghazipur, Buxar, Patna and Chapra (Saran).** Further, the team also tried to collect samples from the mid-stream, other side of the bank and confluence of some drains at hotspots region or at strategic points as discussed with the SPCBs, District administration or Health Departments of the concerned districts. Apart, from that samples were also collected at few kilometres upstream of the sampling sites and are regarded as district control sample. The water samples were collected from the different sites of river Ganga, at the confluence of major drains and at the sites identified/approved by local district administration and National Mission for Clean Ganga (NMCG), New Delhi, Ministry of Jal Shakti. The sampling was done as per IS 3025 (Part 1): Methods of Sampling and Test for water and wastewater (1987) and EPA guidelines: Regulatory monitoring and testing water and wastewater sampling (2007). Samples were collected in two parts:

Part A: **COVID parameters**, and Part B: **Water quality parameters**

For microbiological analysis the samples were collected in 100ml of heat resistant, sterilized glass bottles whereas for physico-chemical parameters the samples were collected in 1litre of polypropylene plastic bottles as per BIS guidelines. Each bottle was labeled with necessary information such as site, source, date, time and GPS coordinates. Sample filled bottles were immediately transferred into ice box (below 10°C) and transported to laboratory. Samples were properly sealed to avoid breakage and cross-contamination and preserved properly to reduce degradation. Once the samples are received in the laboratory the samples were subjected to QC/QA.

Table 1: Details of sampling sites and their geo-coordinates

S. No.	City	Collection site	River	Geo-coordinates	
				Latitude	Longitude
1.	Kanpur	Saraiyya Ghat	Ganga	26.717914	80.159588
		Saraiyya Ghat Horizontal		26.718543	80.160502
2	Unnao	Rautpur		26.563157	80.303487
		Rautpur Horizontal		26.563300	80.299207
		Shuklaganj		26.476236	80.373119
		Shuklaganj Horizontal		26.471112	80.37139
		Buxar bridge		26.136944	80.664444
		Buxar bridge Horizontal		26.136656	80.662921
		City Control		26.724724	80.156214
3	Prayagraj	Shringverpur Shavdah Ghat		25.588759	81.636543
		Shringverpur Horizontal		25.586919	81.632891
		Fafamau shavdah Ghat		25.506594	81.867307
		Fafamau Horizontal		25.504588	81.867282
		Gangoli Shivalay Drain		25.437137	81.901486
		Bela Kacchar Fafamau		25.520756	81.860435
		Sangam		25.427054	81.884655
		City Control (Dhimi)		25.591139	81.546488
4	Varanasi	Markandey Mahadev Kaithi		25.501849	83.167563
		Markandey Horizontal		25.500846	83.171031
		Assi Nala		25.285148	83.003702
		Assi Ghat		25.288966	83.007435
		City Control 1		25.491798	83.162586
		City Control 2		25.511591	83.172255
5.	Mirzapur	Chunar Ghat		25.131584	82.879411
		Chunar Ghat Horizontal		25.133950	82.873791
		City Control 1(Bhairamganj)		25.112866	82.859888
		City Control 2(Barahpathar)		25.138381	82.885677
6.	Ghazipur	Tari Ghat		25.582215	83.602492
		Tari Ghat Horizontal		25.585391	83.601079
		City Control		25.584845	83.600072

7.	Kannauj	Mehndi Ghat		27.020750	79.972389
		Mehndi Ghat Horizontal		27.013367	79.990448
		Kothi Ghat		26.930902	80.034747
		City Control (Tirva Kali)		27.044586	79.999032
8.	Hamirpur	Yamuan Bridge	Yamuna	25.95818	80.16065
		Yamuan Bridge Horizontal		25.957887	80.158095
		City Control (Maunk Ghat)		26.037665	80.112118
		Singh Maheshwari Mandir		25.949463	80.179259
9.	Ballia	Shri Rampur Ganga Bridge	Ganga	25.717212	84.20479
		Shri Rampur Horizontal		25.719332	84.205471
		City Control		25.719406	84.205564
10.	Buxar	Jail Ghat		25.562293	83.949313
		Jail Ghat Horizontal		25.566553	83.946763
		Ram Rekha Ghat		25.576482	83.971127
		Ram Rekha Ghat Horizontal		25.580047	83.967924
		Chausa Ghat		25.530882	83.909404
		Chausa Ghat Horizontal		25.531887	83.906102
		Nath Baba Drain		25.572996	83.967323
		City Control		25.521881	83.895237
11.	Patna	GaiGhat main site		25.614285	85.202269
		GaiGhat Horizontal		25.618205	85.211098
		GaiGhat down stream		25.614109	85.214472
		GaiGhat up stream		25.61689	85.593025
		khurji digha main site		25.652990	85.088741
		khurji digha Horizontal		25.652995	85.085186
		City control		25.656634	85.085539
12.	Saran	Doriganj near balaGhat,		25.729721	84.829207
		Doriganj Horizontal		25.727594	84.831785
13.	Bhojpur	Ara-Chapra road bridge		25.715609	84.809943
		Ara-Chapra Horizontal		25.722007	84.812360
		Mauzampur Ghat		25.689508	84.588801
		Mauzampur Horizontal		25.693635	84.594129
		City control		25.700139	84.593025

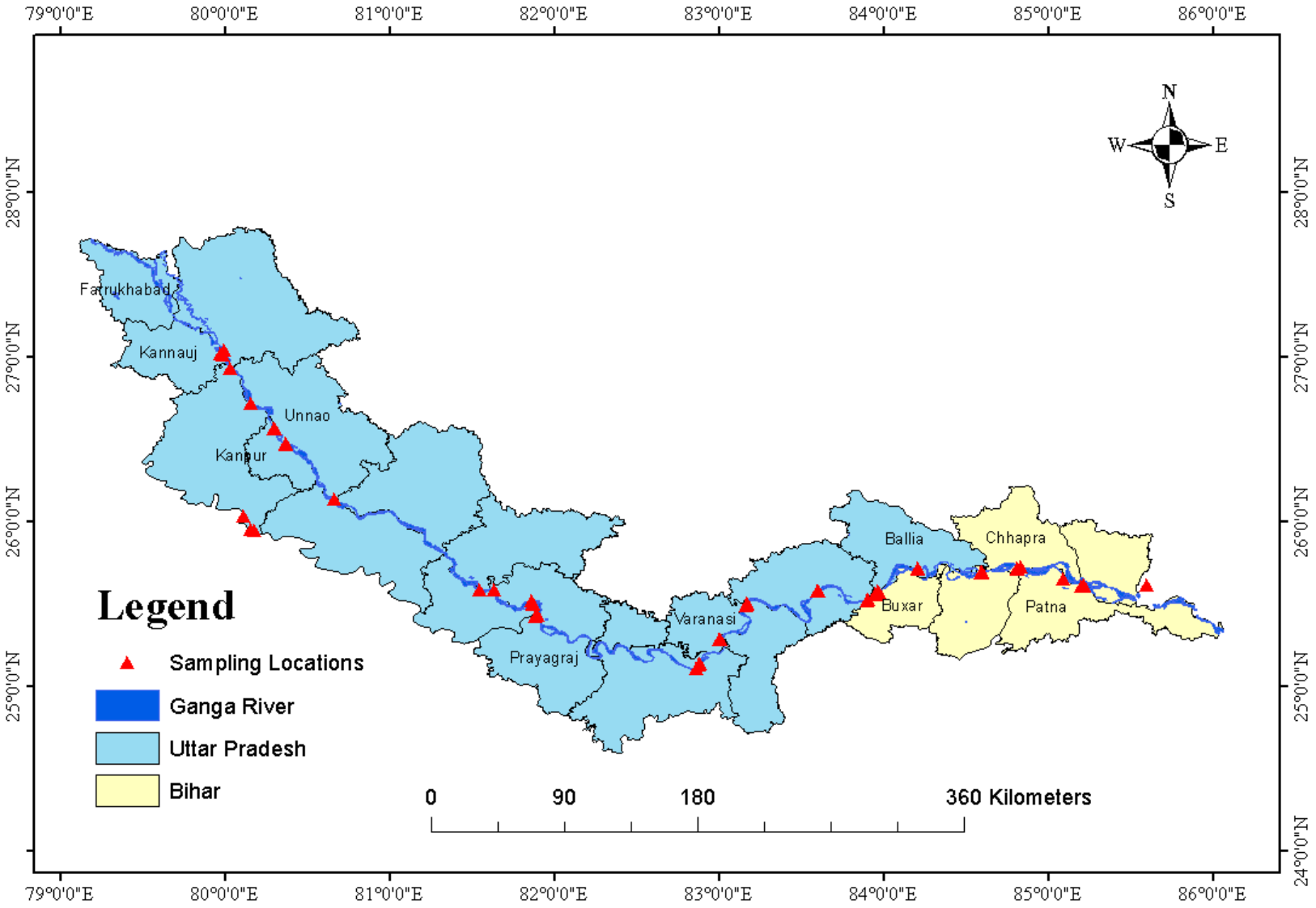


Figure 2: Sampling sites across river Ganga in Uttar Pradesh and Bihar, India

Photographs of water samples taken by CSIR-IITR, Lucknow team with geo-coordinates in Uttar Pradesh and Bihar

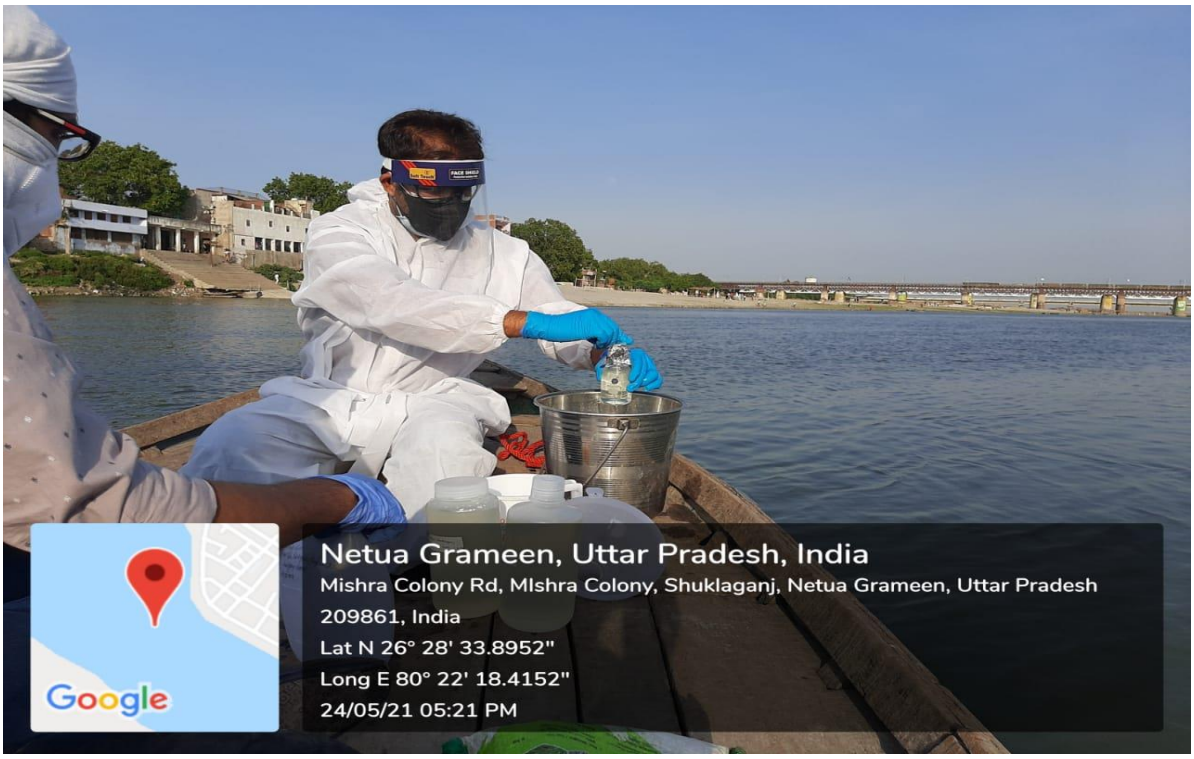
Fafamau Shavdah Ghat, Prayagraj, Uttar Pradesh

Sangam, Prayagraj, Uttar Pradesh

Varanasi, Uttar Pradesh


Latitude: 25.521881
Longitude: 83.895237
Elevation: 48.67m
Accuracy: 4.7m
Time: 06-01-2021 10:53
Note: City control.. Buxar Bihar

Buxar, Bihar



Shuklaganj, Uttar Pradesh

Mirzapur, Uttar Pradesh

Kannauj, Uttar Pradesh

Tirva kulli, Kannauj, Uttar Pradesh

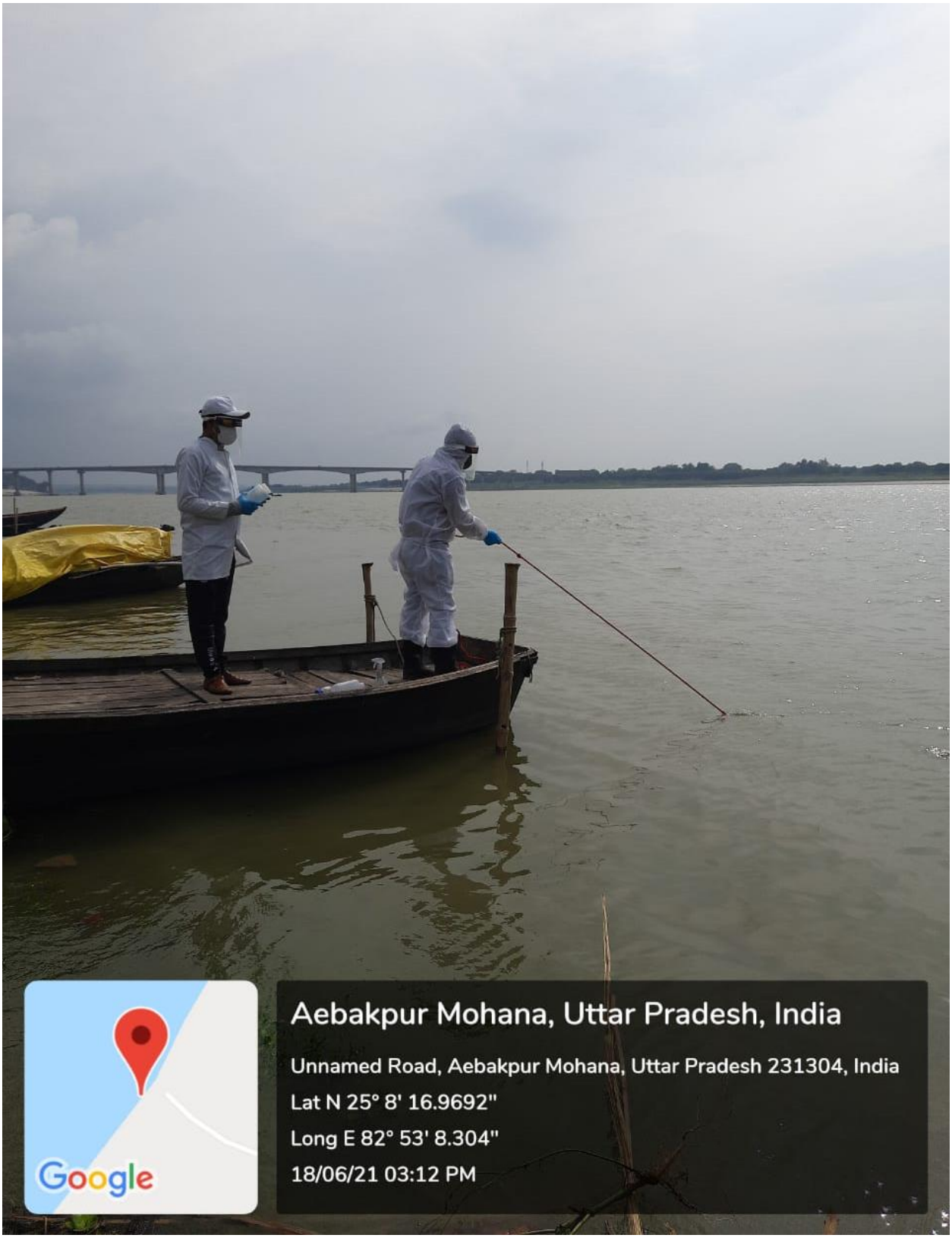
Yamuna Bridge, Hamirpur, Uttar Pradesh

Khurji Digha Ghat, Patna, Bihar

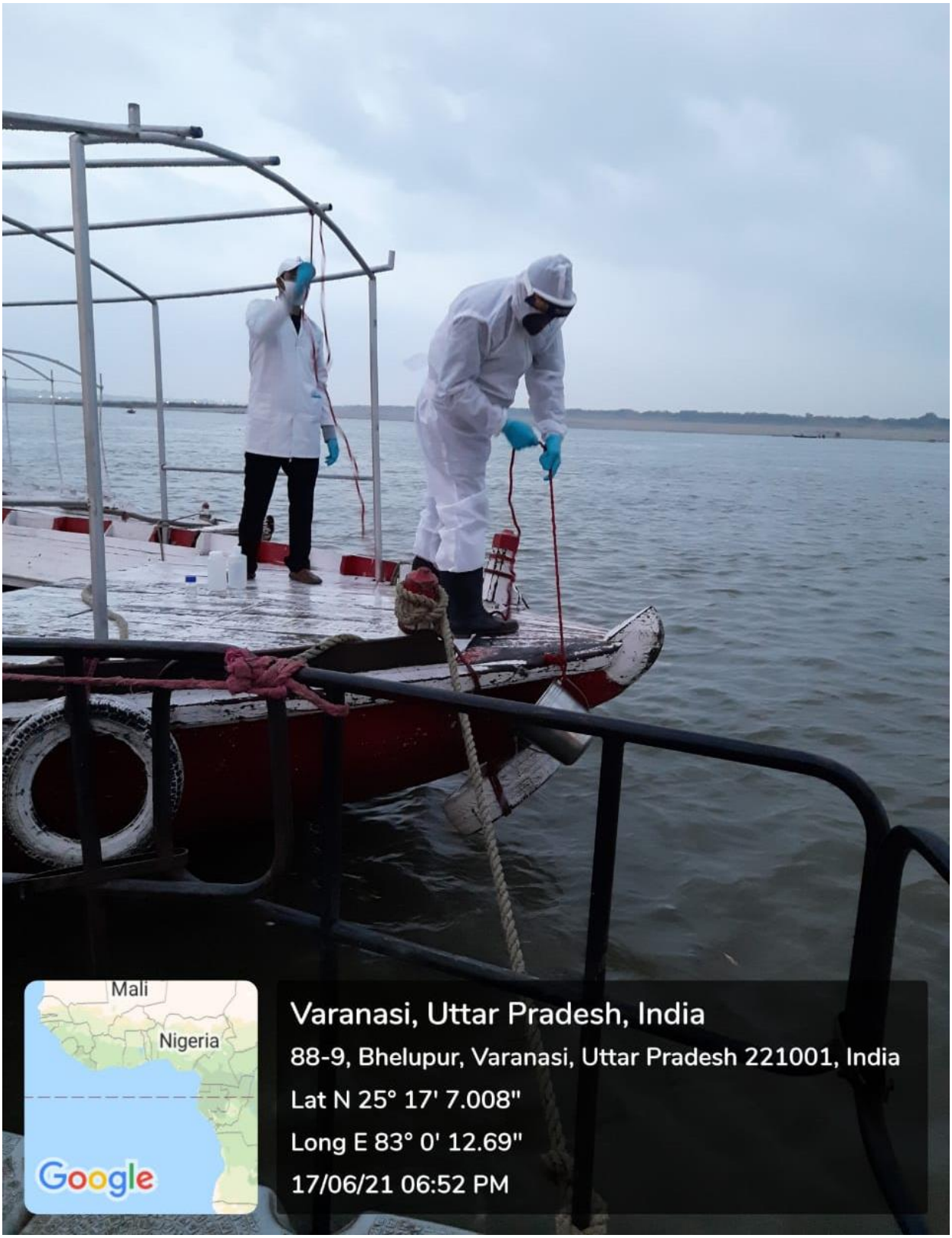
River Ganga in Patna, Bihar

Kaithi, Uttar Pradesh

Bhelupur, Varanasi, Uttar Pradesh



Aebakpur Mohana, Mirzapur, Uttar Pradesh



Assi Ghat, Varanasi, Uttar Pradesh

Tari Ghat, Ghazipur, Uttar Pradesh

Methodology

- *COVID-19 Testing*
- *Water Quality Analysis*

Detection of SARS-CoV-2 virus contamination due to disposal of dead bodies in river Ganga

A. COVID-19 Testing

Sample collection and processing: The water samples collected from identified and approved sampling sites of river Ganga at Kannauj, Unnao, Kanpur, Prayagraj, Mirzapur, Varanasi, Buxar, Hamirpur, Ghazipur and Ballia were analyzed for detection of SARS-CoV-2 virus and parameter associated with water quality. The water samples were collected in triplicate from each site and transported immediately to COVID-19 Testing Facility, CSIR-Indian Institute of Toxicology Research, Lucknow, by maintaining the cold chain as desired. The validation and optimization of sample processing protocol was done following two different protocols provided by Guerrero-Latorre, *et al.* (2020) and M. Kumar *et al.* (2020). The brief descriptions of validation of processing protocols are as follows:

Protocol-1: Laura, *et al.* (2020): The water sample (40ml) was preconditioned at pH 3.5 with 1N HCl. The pre-flocculated skim milk 1% (200 µl) was then added to the water sample and stirred for 8 hours at 4°C. The concentrated sample was then centrifuged at 8,000xg for 40 minutes at 4°C. The pallet was re-suspended in 200µl of sterile phosphate saline buffer and stored at -80°C till the processed for RNA extraction.

Protocol-2: M. Kumar *et al.* (2020): The water samples (40ml) were centrifuged at 4500 xg for 30 minutes at 4°C followed by filtration through 0.22 µM filters. The supernatant of each water sample (25ml) was then concentrated using 80g/L of Poly-Ethylene Glycol-6000 (PEG-6000) and 17.5g/L Sodium Chloride (NaCl) for overnight in a shaker incubator set for 100 RPM at 4°C. Thereafter, the concentrated samples were centrifuged at 12000 xg for 2 hours. The supernatant was discarded and pellet re-suspended in 200 µl RNase free water. Re-suspended pallet was stored at -80°C till the processed for RNA extraction.

Based on the sensitivity and efficacy, the protocol provided by M. Kumar et al. (2020) (Protocol No. 2) was adopted to proceed for all the collected water samples.

RNA extraction: The viral RNA extraction was done following the protocol provided by the manufacturer along with RNA isolation kit (Extract RNA with Magmax Viral Pathogen kit, Thermo Fisher Scientific). In brief, the concentrated water samples (200 µl) was mixed with proteinase K (5 µl), binding solution (265 µl) and magnetic beads (10 µl)and incubated for 10 minutes at 65^{o}C. Followed by a wash with wash buffer (500 µl) and ethanol 80% (500 µl). The supernatant was discarded, and beads were re-suspended in 50 µl of elution buffer. This was incubated for 10 minutes at 65^{o}C. Thereafter, the extracted RNA was stored at -80^{0}C till further processing for Real Time-PCR.

Real Time-PCR: Prior the starting the RNA extraction in the collected water samples, the optimization of the process was done using two ICMR/ WHO approved SARS-CoV-2 detection Real-Time RT-PCR kits viz., "COVID-19 Real Time RT-PCR Kit, CoviSure" and "GBSARS-CoV2 Real Time- RT PCR Kit". The RT-PCR was done following the protocols provided by the manufacturers. Presence of SARS-CoV-2 was confirmed by detecting open reading frame (ORF). Since, the cut-off cycle threshold (Ct) for scoring is set for clinical samples, so the standardization and validation of kits for water samples was done, and Ct score was decided accordingly. The quality control and quality assurance of the data generated was ensured by putting parallel sets with positive clinical and negative samples, samples with and without spiked RNA under the identical experimental conditions. Real Time-PCR System-7500 (Applied Biosystems, USA) was used for validation and further sample analysis in the entire study. Samples showing sigmoid curves of increasing fluorescence intensity in E/ N and ORF genes segments were considered positive for the presence of SARS-CoV-2 virus.

Following the validation, the Real Time-PCR was carried out using COVID-19 Real Time RT-PCR Kit, CoviSure as per the manufacturer's protocol. In brief, the reaction mixture was prepared by adding 2 µl of each primer probe (Mix A, Mix B and Mix C) in 6 µl of master mix. The reaction mixtures (12 µl) were dispensed in each well of RT-PCR 96 well plate, followed by addition of RNA samples (8 µl). RT-PCR was performed using Real Time-PCR System-7500 (Applied Biosystems, USA).

Results:

Protocol optimization for sample processing: The optimization of processing protocol was done using a clinically positive sample for SARS-CoV-2 with Ct value of 15.00. The sterilized Milli Q water samples were taken as negative control. The other group was No Templet Control (NTC) to check the efficacy of the RT-PCR kit. The samples were processed using both protocols 1 and 2 and compared the data using both the RT-PCR kits viz., COVID-19 Real Time RT-PCR Kit, CoviSure and GBSARS-CoV2 Real Time- RT PCR Kit. The data obtained through this experiment are summarized in the table-1. The data showed that both the processing protocols are efficient to isolate the RNA from the collected water samples. Nevertheless, the protocol-2 was found to have a better sensitivity as Ct values were 17.092 and 17.797 with COVID-19 Real Time RT-PCR Kit, CoviSure and GBSARS-CoV2 Real Time- RT PCR Kit respectively, which is very close to the original Ct value of 15 in clinical sample. The negative results for sterilize Milli Q water sample shows that protocols are working fine and system is fit for analysis.

Table 2: The data analysis for the optimization of sample processing protocols

S. No.	Sample name	Ct Value of ORF1ab		Result
		COVID-19 Real Time RT-PCR Kit, CoviSure	**GBSARS-CoV2 Rael Time- RT PCR Kit**	
1	NTC	Undetermined	Undetermined	Negative
2	Standard Control	31.324	22.427	Positive
3	**Protocol-1:** SARS-CoV-2 spiked in sterile water	18.972	18.914	Positive
5	**Protocol-2:** SARS-CoV-2 spiked in sterile water	17.092	17.797	Positive
6	**Protocol-1:** Sterile water	41.890	40.822	Negative
7	**Protocol-2:** Sterile water	36.281	36.676	Negative

Efficacy and sensitivity assay: Spiked virus from positive clinical sample with a Ct value of 15 was diluted in sterile Milli Q water to investigate the efficacy and sensitivity for recovery of the virus RNA. These findings provide information that up-to what lowest level of contamination of SARS-CoV-2 can be detected in the collected water samples. The spiking of SARS-CoV-2 virus was done at an inoculation of 500 µl in 25 mL sterile Milli Q water, as the highest concentration. The spiking samples were further diluted at a ratio of 2 and went up-to the minimum of 31.25 µl in 25 mL. Un-spiked sterile Milli Q water was kept as control.

The data highlights of the experiment are summarized in Table-2. The data indicate that the recovery of virus RNA is efficient without the loss of impact, as there was no significant change in the Ct value between the inoculum 500 to 31.25 µl under experimental conditions. The standard and control samples ran parallel also confirms the efficiency and sensitivity of the kits, machine and sample processing protocols.

Table 3: Recovery profile of SARS-CoV-2 virus RNA in spiked experimental samples

Sample	Replicate-1 Ct value of ORF	Replicate-2 Ct value of ORF	Replicate-3 Ct value of ORF	Mean Ct Value
NTC	Undetermined	Undetermined	Undetermined	0.00
Standard	30.736	26.859	26.224	27.93955358
500	16.465	15.499	17.864	16.60915502
250	18.239	17.338	19.242	18.27299054
125	19.783	19.479	20.652	19.97157987
62.5	19.921	19.501	20.787	20.0697511
31.25	20.497	20.167	22.071	20.91182518
Control	37.952	37.840	Undetermined	37.8963623

Analysis of collected water samples (Batch-01): Phase-I:

Sample details:

City of sample collection: Unnao, Kanpur, Prayagraj, Mirzapur, Varanasi

Number of water samples in triplicate: 81

Positive Control: SARS-CoV-2 spiked in sterile Milli-Q water

Negative Control: Sterile Milli-Q water

Date of samples received in Laboratory: May 25, 2021

Date of samples processed: May 31, 2021

Date of RNA isolation: June 3, 2021

Date of RT-PCR: June 3-4, 2021

The triplicate water samples were collected from each site and all the samples were processed for detection of SARS-CoV-2. Each replicate was processed in three technical replicates for RT-PCR, so the results presented are of three sample replicates and three technical replicates for each sample collection site. The result highlights for the analysis of RT-PCR assay for detection of SARS-CoV-2 are summarized in table-3. Of total 81 replicates of collected Ganga water samples in batch-1, none was positive for the presence of SARS-CoV-2 under experimental conditions.

Table 4: RT-PCR analysis report of the collected water samples (Batch No. 1) from approved sites of different cities viz., Unnao, Kanpur, Prayagraj, Mirzapur and Varanasi

S.No.	**Sample Name**	**Ct Value of ORF1ab**
1	**No Template Control**(PCR negative control provided with kit)	Undetermined
2	**Standard**(PCR positive control provided with kit) Plate-1 Plate-2 Plate-3	 29.934 30.145 31.918
3	**Positive Control**(Inoculum size31.25 µl SARS-Cov-2 virus in 25 mL sterile Milli Q Water**)**	21.322
4	**Negative Control**(Unspiked sterile Milli Q Water**)**	Undetermined

S. No.	**City**	**Collection Sites/Date**	**Processing ID**	**RT-PCR Result**
1	Kanpur	Safipur/24.05.2021	S1	Negative
			S2	Negative
			S3	Negative
2	Unnao	Saraiyya Ghat/24.05.2021	S4	Negative
			S5	Negative

			S6	Negative
		Raut Pur/24.05.2021	S7	Negative
			S8	Negative
			S9	Negative
		Raut Pur/24.05.2021	S10	Negative
			S11	Negative
			S12	Negative
		Shukla Ganj/24.05.2021	S13	Negative
			S14	Negative
			S15	Negative
		Shukla Ganj/24.05.2021	S16	Negative
			S17	Negative
			S18	Negative
		Buxar/24.05.2021	S19	Negative
			S20	Negative
			S21	Negative
		Buxar/24.05.2021	S22	Negative
			S23	Negative
			S24	Negative
		City Control/24.05.2021	S25	Negative
			S26	Negative
			S27	Negative
3	Prayagraj	Shringver PurShavdah Ghat/24.05.2021	S28	Negative
			S29	Negative
			S30	Negative
		Shringver Pur Shavdah	S31	Negative

		Ghat/24.05.2021	S32	Negative
			S33	Negative
		Fafamau Shavdah Ghat/24.05.2021	S34	Negative
			S35	Negative
			S36	Negative
		Fafamau Shavdah Ghat/24.05.2021	S37	Negative
			S38	Negative
			S39	Negative
		Gangoli Shivalay Drain/24.05.2021	S40	Negative
			S41	Negative
			S42	Negative
		Bela Kaccha Fafamau Drain/24.05.2021	S43	Negative
			S44	Negative
			S45	Negative
		City Control Dhimi/24.05.2021	S46	Negative
			S47	Negative
			S48	Negative
4	Varanasi	City Control I/24.05.2021	S49	Negative
			S50	Negative
			S51	Negative
		Markandey Mahadev Kaithi/24.05.2021	S52	Negative
			S53	Negative
			S54	Negative
		Markandey Mahadev Kaithi/24.05.2021	S55	Negative
			S56	Negative
			S57	Negative

		City Control II/24.05.2021	S58	Negative
			S59	Negative
			S60	Negative
		Assi Nala/24.05.2021	S61	Negative
			S62	Negative
			S63	Negative
		Assi Ghat/24.05.2021	S64	Negative
			S65	Negative
			S66	Negative
5	Mirzapur	City Control II Barahpathar/24.05.2021	S67	Negative
			S68	Negative
			S69	Negative
		Chunar Ghat/24.05.2021	S70	Negative
			S71	Negative
			S72	Negative
		Chunar Ghat/24.05.2021	S73	Negative
			S74	Negative
			S75	Negative
		City Control I (Baihram Ganj)/24.05.2021	S76	Negative
			S77	Negative
			S78	Negative
6	Prayagraj	Sangam/24.05.2021	S79	Negative
			S80	Negative
			S81	Negative

Analysis of collected water samples (Batch-02):

Sample details:

City of sample collection: Kannauj, Buxar, Hamirpur, Ghazipur, Ballia

Number of water samples in triplicate: 66

Positive Control: SARS-CoV-2 spiked in sterile Milli-Q water

Negative Control: Sterile Milli-Q water

Date of samples received in Laboratory: June 2, 2021

Date of samples processed: June 2, 2021

Date of RNA isolation: June 7, 2021

Date of RT-PCR: June 8, 2021

The triplicate water samples were collected from each site and all the samples were processed for detection of SARS-CoV-2. Each replicate was processed in three technical replicates for RT-PCR, so the results presented are of three sample replicates and three technical replicates for each sample collection site. The result highlights for the analysis of RT-PCR assay for detection of SARS-CoV-2 are summarized in table-4. Of total 81 replicates of collected Ganga water samples in batch-1, none was positive for the presence of SARS-CoV-2 under experimental conditions.

Table 5: RT-PCR analysis report of the collected water samples (Batch No. 2) from approved sites of different cities viz., Kannauj, Buxar, Hamirpur, Ghazipur, Ballia

S. No.	Sample Name	Ct Value of ORF1ab
1	**No Template Control**(PCR negative control provided with kit)	Undetermined
2	**Standard**(PCR positive control provided with kit) Plate-1 Plate-2 Plate-3	 28.761 31.110 29.698
3	**Positive Control**(Inoculum size31.25 µl SARS-Cov-2 virus in 25 mL sterile Milli Q Water**)**	22.174
4	**Negative Control**(Unspikedsterile Milli Q Water**)**	Undetermined

S. No.	City	Collection Sites/Date	Processing ID	RT-PCR Result
7	Ghazipur	City Control/31.05.2021	S82	Negative
			S83	Negative
			S84	Negative
		Tari Ghat/31.05.2021	S85	Negative
			S86	Negative
			S87	Negative
		Tari Ghat/31.05.2021	S88	Negative
			S89	Negative
			S90	Negative
8	Buxar	City Control/01.06.2021	S91	Negative
			S92	Negative
			S93	Negative
		Chausa Ghat/01.06.2021	S94	Negative
			S95	Negative
			S96	Negative
		Chausa Ghat/01.06.2021	S97	Negative
			S98	Negative
			S99	Negative
		Jail Ghat/01.06.2021	S100	Negative
			S101	Negative
			S102	Negative
		Jail Ghat/01.06.2021	S103	Negative
			S104	Negative
			S105	Negative
		Ram Rekha Ghat/01.06.2021	S106	Negative
			S107	Negative
			S108	Negative

		Ram Rekha Ghat/01.06.2021	S109	Negative
			S110	Negative
			S111	Negative
		Nath Baba Drain/01.06.2021	S112	Negative
			S113	Negative
			S114	Negative
9	Ballia	City Control/02.06.2021	S115	Negative
			S116	Negative
			S117	Negative
		Shri Ram Pur Ganga Bridge/02.06.2021	S118	Negative
			S119	Negative
			S120	Negative
		Shri Ram Pur Ganga Bridge/02.06.2021	S121	Negative
			S122	Negative
			S123	Negative
10	Kannauj	Kothi Ghat/01.06.2021	S124	Negative
			S125	Negative
			S126	Negative
		MehadiGhat/01.06.2021	S127	Negative
			S128	Negative
			S129	Negative
		Mehadi Ghat/01.06.2021	S130	Negative
			S131	Negative
			S132	Negative
		Tirva Kali/01.06.2021	S133	Negative
			S134	Negative
			S135	Negative
11	Hamirpur	Maunk Ghat/01.06.2021	S136	Negative
			S137	Negative
			S138	Negative
		Yamuna Bridge/01.06.2021	S139	Negative
			S140	Negative
			S141	Negative
		Yamuna Bridge/01.06.2021	S142	Negative
			S143	Negative
			S144	Negative
		Singh Maheshwar Mandir/01.06.2021	S145	Negative
			S146	Negative
			S147	Negative

Analysis of collected water samples (Batch-03):

Sample details:

City of sample collection:	Patna, Saran and Bhojpur
Number of water samples in triplicate:	42
Positive Control:	SARS-CoV-2 spiked in sterile Milli-Q water
Negative Control:	Sterile Milli-Q water
Date of samples received in Laboratory:	June10, 2021
Date of samples processed:	June11, 2021
Date of RNA isolation:	June 14, 2021
Date of RT-PCR:	June 14, 2021

The triplicate water samples were collected from each site and all the samples were processed for detection of SARS-CoV-2. Each replicate was processed in three technical replicates for RT-PCR, so the results presented are of three sample replicates and three technical replicates for each sample collection site. The result highlights for the analysis of RT-PCR assay for detection of SARS-CoV-2 are summarized in table-5. Of total 42 replicates of collected Ganga water samples in batch-3, none was positive for the presence of SARS-CoV-2 under experimental conditions.

Table 6: RT-PCR analysis report of the collected water samples (Batch No. 3) from approved sites of different cities viz., Patna, Saran and Bhojur

S.No.	**Sample Name**	**Ct Value of ORF1ab**
1	**No Template Control**(PCR negative control provided with kit)	Undetermined
2	**Standard**(PCR positive control provided with kit) Plate-1 Plate-2	 28.831 30.103
3	**Positive Control**(Inoculum size31.25 µl SARS-Cov-2 virus in 25 mL sterile Milli Q Water**)**	20.913
4	**Negative Control**(Unspikedsterile Milli Q Water**)**	Undetermined

S. No.	**City**	**Collection Sites/Date**	**Processing ID**	**Result**
12	Patna	Ganga river at GaiGhat Patna downstream/05.06.2021	S148	Negative
			S149	Negative
			S150	Negative
		Ganga river at GaiGhat Patna main site/05.06.2021	S151	Negative
			S152	Negative
			S153	Negative
		Ganga river at GaiGhat Patna horizontal/05.06.2021	S154	Negative
			S155	Negative
			S156	Negative
		Ganga river at GaiGhat Patna up stream/05.06.2021	S157	Negative
			S158	Negative
			S159	Negative
		Ganga river at khurjidigha main site/05.06.2021	S160	Negative
			S161	Negative
			S162	Negative
		Ganga river at khurjidigha	S163	Negative

		horizontal/05.06.2021	S164	Negative
			S165	Negative
		City control Patna/05.06.2021	S166	Negative
			S167	Negative
			S168	Negative
13	Saran	Doriganj near balaGhat, Saran main site/05.06.2021	S169	Negative
			S170	Negative
			S171	Negative
		Doriganj near balaGhat, Saran horizontal/05.06.2021	S172	Negative
			S173	Negative
			S174	Negative
14	Bhojpur	Ganga river at Ara-Chapra road bridge Bhojpur, main site/05.06.2021	S175	Negative
			S176	Negative
			S177	Negative
		Ganga river at Ara-Chapra road bridge Bhojpur, horizontal/05.06.2021	S178	Negative
			S179	Negative
			S180	Negative
		Mauzampur Ghat at river Ganga, Bhojpur, main Ghat/05.06.2021	S181	Negative
			S182	Negative
			S183	Negative
		MauzampurGhat at river Ganga, Bhojpur, horizontal/05.06.2021	S184	Negative
			S185	Negative
			S186	Negative
		City control/05.06.2021	S187	Negative
			S188	Negative
			S189	Negative

Analysis of collected water samples (Batch-04): Phase-II

Sample details:

City of sample collection:	Unnao and Prayagraj
Number of water samples in triplicate:	51
Positive Control:	SARS-CoV-2 spiked in sterile Milli-Q water
Negative Control:	Sterile Milli-Q water
Date of samples received in Laboratory:	June14, 2021
Date of samples processed:	June15, 2021
Date ofRNA isolation:	June 21, 2021
Date of RT-PCR:	June 21, 2021

The triplicate water samples were collected from each site and all the samples were processed for detection of SARS-CoV-2. Each replicate was processed in three technical replicates for RT-PCR, so the results presented are of three sample replicates and three technical replicates for each sample collection site. The result highlights for the analysis of RT-PCR assay for detection of SARS-CoV-2 are summarized in table-6. Of total 51 replicates of collected Ganga water samples in batch-4, none was positive for the presence of SARS-CoV-2 under experimental conditions.

Table 7: RT-PCR analysis report of the collected water samples (Batch No. 4) from approved sites of different cities viz., Unnao and Prayagraj

S.No.	Sample Name	Ct Value of ORF1ab
1	**No Template Control**(PCR negative control provided with kit)	Undetermined
2	**Standard**(PCR positive control provided with kit) Plate-1 Plate-2	 30.740 29.920
3	**Positive Control**(Inoculum size31.25 µl SARS-Cov-2 virus in 25 mL sterile Milli Q Water**)**	20.896
4	**Negative Control**(Unspikedsterile Milli Q Water**)**	Undetermined

S. No.	City	Collection Sites/Date	Processing ID	Result
15	Unnao	Saraiyya Ghat Main site/08.06.2021	S190	Negative
			S191	Negative
			S192	Negative
		Saraiyya Ghat Opposite site/08.06.2021	S193	Negative
			S194	Negative
			S195	Negative
		Rautpur Main Site/08.06.2021	S196	Negative
			S197	Negative
			S198	Negative
		Rautpur Opposite Site/08.06.2021	S199	Negative
			S200	Negative
			S201	Negative
		Shukla Ganj main Site/08.06.2021	S202	Negative
			S203	Negative
			S204	Negative
		Shukla Ganj Opposite Site/08.06.2021	S205	Negative
			S206	Negative
			S207	Negative
		Buxar main Site/08.06.2021	S208	Negative
			S209	Negative

			S210	Negative
		Buxar Opposite Site/08.06.2021	S211	Negative
			S212	Negative
			S213	Negative
		City Control/08.06.2021	S214	Negative
			S215	Negative
			S216	Negative
16	Prayagraj	Shringverpur Main Site/08.06.2021	S217	Negative
			S218	Negative
			S219	Negative
		Shringverpur Opposite Site/08.06.2021	S220	Negative
			S221	Negative
			S222	Negative
		Fafamau Main Site/08.06.2021	S223	Negative
			S224	Negative
			S225	Negative
		Fafamau Horizontal/08.06.2021	S226	Negative
			S227	Negative
			S228	Negative
		Bela Kaccha Fafamau Drain/08.06.2021	S229	Negative
			S230	Negative
			S231	Negative
		Sangam/08.06.2021	S232	Negative
			S233	Negative
			S234	Negative
		Gangoli Shivalay/08.06.2021	S235	Negative
			S236	Negative
			S237	Negative
		City Control Dhimi/08.06.2021	S238	Negative
			S239	Negative
			S240	Negative

Analysis of collected water samples (Batch-05):

Sample details:

City of sample collection:	Ballia, Buxar, Bhojpur, Saran, Patna, Kannauj, Hamirpur, Gazipur, Varanasi and Mirzapur
Number of water samples in triplicate:	138
Positive Control:	SARS-CoV-2 spiked in sterile Milli-Q water
Negative Control:	Sterile Milli-Q water
Date of samples received in Laboratory:	June21, 2021
Date of samples processed:	June21, 2021
Date of RNA isolation:	June 24, 2021
Date of RT-PCR:	June 25, 2021

The triplicate water samples were collected from each site and all the samples were processed for detection of SARS-CoV-2. Each replicate was processed in three technical replicates for RT-PCR, so the results presented are of three sample replicates and three technical replicates for each sample collection site. The result highlights for the analysis of RT-PCR assay for detection of SARS-CoV-2 are summarized in table-7. Of total 138 replicates of collected Ganga water samples in batch-5, none was positive for the presence of SARS-CoV-2 under experimental conditions.

Table 8: RT-PCR analysis report of the collected water samples (Batch No. 5) from approved sites of different cities viz., Ballia, Buxar, Bhojpur, Saran, Patna, Kannauj, Hamirpur, Gazipur, Varanasi and Mirzapur

S.No.	Sample Name	Ct Value of ORF1ab
1	**No Template Control** (PCR negative control provided with kit)	Undetermined
2	**Standard** (PCR positive control provided with kit)	
	Plate-1	30.094
	Plate-2	31.424
	Plate-3	33.785
	Plate-4	32.127
	Plate-5	31.976
3	**Positive Control** (Inoculum size31.25 µl SARS-Cov-2 virus in 25 mL sterile Milli Q Water**)**	22.509
4	**Negative Control** (Unspikedsterile Milli Q Water**)**	Undetermined

S. No.	City	Collection Sites/Date	Processing ID	RT-PCR Result
17	Ballia	Shri Rampur Ganga Bridge Main/16.06.2021	S241	Negative
			S242	Negative
			S243	Negative
		Shri Rampur Ganga Bridge horizontal/16.06.2021	S244	Negative
			S245	Negative
			S246	Negative
		City Control/16.06.2021	S247	Negative
			S248	Negative
			S249	Negative
18	Buxar	Jail Ghat Main/17.06.2021	S250	Negative
			S251	Negative
			S252	Negative
		Jail Ghat Horizontal/17.06.2021	S253	Negative
			S254	Negative
			S255	Negative
		Ram RekhaGhat Main/17.06.2021	S256	Negative
			S257	Negative
			S258	Negative

		Ram RekhaGhat Horizontal/17.06.2021	S259	Negative
			S260	Negative
			S261	Negative
		ChausaGhat Main/17.06.2021	S262	Negative
			S263	Negative
			S264	Negative
		ChausaGhat Horizontal/17.06.2021	S265	Negative
			S266	Negative
			S267	Negative
		Nath Baba Drain/17.06.2021	S268	Negative
			S269	Negative
			S270	Negative
		City Control/17.06.2021	S271	Negative
			S272	Negative
			S273	Negative
19	Bhojpur	City Control/17.06.2021	S274	Negative
			S275	Negative
			S276	Negative
		Muazampur Main/17.06.2021	S277	Negative
			S278	Negative
			S279	Negative
		Muazampur Horizontal/17.06.2021	S280	Negative
			S281	Negative
			S282	Negative
		Ara-Chapra road bridge Main/17.06.2021	S283	Negative
			S284	Negative
			S285	Negative
		Ara-Chapra road bridge Horizontal/17.06.2021	S286	Negative
			S287	Negative
			S288	Negative
20	Saran	Doriganj Main/17.06.2021	S289	Negative
			S290	Negative
			S291	Negative
		Doriganj Horizontal/17.06.2021	S292	Negative
			S293	Negative
			S294	Negative
21	Patna	GaiGhat Main/18.06.2021	S295	Negative
			S296	Negative
			S297	Negative
		GaiGhat Horizontal/18.06.2021	S298	Negative
			S299	Negative

			S300	Negative
		GaiGhat Down Stream/18.06.2021	S301	Negative
			S302	Negative
			S303	Negative
		GaiGhat Up Stream/18.06.2021	S304	Negative
			S305	Negative
			S306	Negative
		Khurjidigha Rail Bridge Main Ghat/18.06.2021	S307	Negative
			S308	Negative
			S309	Negative
		Khurjidigha Rail Bridge Horizontal/18.06.2021	S310	Negative
			S311	Negative
			S312	Negative
		City control/18.06.2021	S313	Negative
			S314	Negative
			S315	Negative
22	Kannauj	KothiGhat Down Stream/15.06.2021	S316	Negative
			S317	Negative
			S318	Negative
		MehadiGhat/15.06.2021	S319	Negative
			S320	Negative
			S321	Negative
		MehadiGhat Opposite/15.06.2021	S322	Negative
			S323	Negative
			S324	Negative
		Tirva Kali/15.06.2021	S325	Negative
			S326	Negative
			S327	Negative
23	Hamirpur	Hamirpur/15.06.2021	S328	Negative
			S329	Negative
			S330	Negative
		Yamuna Bridge/15.06.2021	S331	Negative
			S332	Negative
			S333	Negative
		Yamuna Bridge Opposite/15.06.2021	S334	Negative
			S335	Negative
			S336	Negative
		Singh Maheshwari Mandir/15.06.2021	S337	Negative
			S338	Negative
			S339	Negative
24	Gazipur	City Control/16.06.2021	S340	Negative

			S341	Negative
			S342	Negative
		Tari Ghat/16.06.2021	S343	Negative
			S344	Negative
			S345	Negative
		Tari Ghat Opposite/16.06.2021	S346	Negative
			S347	Negative
			S348	Negative
25	Varanasi	Assi Nala/17.06.2021	S349	Negative
			S350	Negative
			S351	Negative
		Assi Ghat/17.06.2021	S352	Negative
			S353	Negative
			S354	Negative
		City Control I/18.06.2021	S355	Negative
			S356	Negative
			S357	Negative
		Markandey Mahadev Ghat/18.06.2021	S358	Negative
			S359	Negative
			S360	Negative
		Markandey Mahadev Ghat Opposite/18.06.2021	S361	Negative
			S362	Negative
			S363	Negative
		City Control II/18.06.2021	S364	Negative
			S365	Negative
			S366	Negative
26	Mirzapur	City Control I/18.06.2021	S367	Negative
			S368	Negative
			S369	Negative
		Chunar Ghat/18.06.2021	S370	Negative
			S371	Negative
			S372	Negative
		Chunar Ghat Opposite/18.06.2021	S373	Negative
			S374	Negative
			S375	Negative
		City Control II/18.06.2021	S376	Negative
			S377	Negative
			S378	Negative

Result summary: The water samples collected from the river Ganga at Kannauj, Unnao, Kanpur, Prayagraj, Mirzapur, Varanasi, Buxar, Hamirpur, Ghazipur, Ballia, Patna, Saran and Bhojpur were analyzed for detection of SARS-CoV-2 virus in the COVID-19 Testing Facility, CSIR-Indian Institute of Toxicology, Lucknow. Of total of 132 samples (378 sample triplicates/ 1134 technical triplicates) analyzed, none of the sample was found positive for SARS-CoV-2 virus infection.

Water Quality Analysis of River Ganga

1. Bacteriological parameters

Tests for bacteriological parameters such as- Total coliforms, fecal coliforms, fecal *Streptococci, E. coli* was performed using multiple tube fermentation method as per BIS (2012); IS 1622:1981 (Reaffirmed 2009), IS 15186:2002 & APHA (2017). The enumeration of total coliform along with differential count of *E.coli* was also done using multifunctional readymade mini plates especially developed for microbial testing as well as in the laboratory by approved methods.

2. Physico-chemical parameters

Tests for physico-chemical parameters: pH, Color, Dissolved Oxygen (DO), Biochemical Oxygen Demand (BOD), Chemical Oxygen Demand (COD), Nitrate, Chloride, Ammonical nitrogen and Total phosphorus were conducted in the laboratory using validated and approved methods by American Public Health Association (APHA) 23rd Ed. (2017) and Bureau of Indian Standards BIS, (2012).

Table 9: Standard methods used to assess the water quality of river Ganga, Uttar Pradesh

S. no.	Test Parameters	Unit	Methodology	Method No.
1.	pH	-	Multiparameter Probe on site/ pH meter in lab	4500-H^+ B
2.	Color	Hazen	Spectrophotometric- Single Wavelength method	2120-C
3.	Dissolved oxygen (DO)	mg/L	Azide Modification of Winkler Method	5210-B
4.	Biochemical Oxygen Method (BOD)			
5.	Chemical Oxygen Demand (COD)	mg/L	Closed Reflux Method	5220-C
6.	Nitrate	mg/L	Ultraviolet Spectrophotometric Screening Method	4500-NO_3^- B
7.	Ammonical nitrogen (NH_3-N)	mg/L	Phenate method	4500-NH_3-F
8.	Chloride	mg/L	Argentometric method	4500-Cl^-B
9.	Total Phosphorus	mg/L	Stannous Chloride Method	4500-PO_4 D
10.	Total Coliform & Faecal Coliform	MPN/ 100 mL	Multiple Tube Fermentation Technique	9221
11.	Fecal *Streptococci*	-	Membrane filtration method	IS 15186:2002

Results

1. **Color:** Color of river Ganga in Uttar Pradesh and Bihar ranged between 3.33-16.67 Hazen Units and 3.33-10.0 Hazen units respectively during phase 1 and between 3.33-13.33 Hazen Units and 3.33-20.0 respectively during phase 2.

2. **pH** of river Ganga ranged between 7.17-8.47 in Uttar Pradesh and 6.83-8.5 in Bihar during phase-1 whereas during phase 2 it ranged from 6.89-8.54 in Uttar Pradesh and 7.56-7.95 in Bihar.

3. During the study **Dissolved Oxygen** (DO) values was present between 3.7-10.4 mg/L in Uttar Pradesh and 7.2-10.7 mg/L in Bihar during Phase 1, whereas during Phase-2 it ranged between 2.9-8.8 mg/L in Uttar Pradesh and 4.7-8.5 mg/L in Bihar.

4. **Biochemical Oxygen Demand** (**BOD**): During the study BOD values was present between 3.4-14.0 mg/L in Uttar Pradesh and 3.0-6.0 mg/L in Bihar during Phase 1, whereas during Phase-2 it ranged between 3.0-28.0 mg/L in Uttar Pradesh and 3.3-16.0 mg/L in Bihar.

5. **Chemical Oxygen Demand (COD)** values during Phase-1 study in Uttar Pradesh and Bihar were between 8.0-40.0 mg/L and 8.0-16.0 mg/L respectively whereas during Phase-2 it was present between 7.2-88.0 mg/L in Uttar Pradesh and 8.0-52.0 mg/L in Bihar.

6. **Total Phosphate (TP)** of river Ganga ranged between 0.06-0.9 mg/L and 0.03-2.71 mg/L during phase-1 in Uttar Pradesh and Bihar whereas during phase-2 the values ranged between 0.08-0.98 mg/L and 0-0.55 mg/L in Uttar Pradesh and Bihar, respectively.

7. **Chloride (Cl^-)** of river Ganga in Uttar Pradesh and Bihar ranged between 11.99-239.92 mg/L and 1.99-73.98 mg/L respectively during phase 1 and between 6.0-209.9 mg/L and 4.0-39.9 mg/L respectively during phase 2.

8. **Nitrate (NO_3^-)** of river Ganga ranged between 0.03-10.98 mg/L in Uttar Pradesh and 0.17-3.09 mg/L in Bihar during phase-1 whereas during phase 2 it ranged from 0.29-24.39 mg/L in Uttar Pradesh and 0.59-17.27 mg/L in Bihar.

9. **Ammoniacal nitrogen** (**NH_3-N**) of river Ganga ranged between 0-1.06 mg/L in Uttar Pradesh and 0-0.85 mg/L in Bihar during phase-1 whereas during phase 2 it ranged from 0.01-3.57 mg/L in Uttar Pradesh and 0.01-0.81 mg/L in Bihar.

Bacteriological parameters: In the study the coliforms were present at all the sites but their distribution varied along the entire stretch of the river in Uttar Pradesh and Bihar. Fecal *Streptococci* were detected only at few sites during phase-1 whereas during phase-2 Fecal *Streptococci* were present at most of the sites**.**

Table 10: Results of physico-chemical parameters analyzed during Phase-I study of river Ganga

S. No.	City	Collection site	Geo-coordinates		Sample Code	pH	Color (Hazen)	DO (mg/L)	BOD (mg/L)	COD (mg/L)	TP (mg/L)	Cl^- (mg/L)	NO_3^- (mg/L)	NH_3-N (mg/L)
			Latitude	Longitude										
1.	Kanpur	Saraiyya Ghat	26.717914	80.159588	S1	7.40	3.33	5.1	10.0	24.0	0.27	19.99	0.34	0.18
		Saraiyya Ghat Horizontal	26.718543	80.160502	S2	7.3	13.33	5.5	12.0	32.0	0.06	17.99	0.54	0.14
2	Unnao	Rautpur	26.563157	80.303487	S3	7.49	10.00	6.0	8.0	24.0	0.29	11.99	0.43	0.25
		Rautpur Horizontal	26.563300	80.299207	S4	7.47	6.67	5.7	10.0	16.0	0.12	59.98	0.09	0.14
		Shuklaganj	26.476236	80.373119	S5	7.39	3.33	5.3	8.0	24.0	0.17	15.99	0.43	0.13
		Shuklaganj Horizontal	26.471112	80.37139	S6	7.43	3.33	6.7	12.0	40.0	0.15	19.99	0.81	0.09
		Buxar bridge	26.136944	80.664444	S7	7.36	10.00	5.0	14.0	24.0	0.37	35.99	3.94	0.13
		Buxar bridge Horizontal	26.136656	80.662921	S8	7.35	16.67	4.8	10.0	32.0	0.37	43.98	3.50	0.02
		City Control	26.724724	80.156214	S9	7.36	13.33	5.2	12.0	40.0	0.49	39.98	3.80	0.05
3	Prayagraj	Shringverpur Shavdah Ghat	25.588759	81.636543	S10	7.17	13.33	4.0	6.0	16.0	0.16	37.98	0.52	0.00
		Shringverpur Horizontal	25.586919	81.632891	S11	7.53	10.00	5.0	10.0	40.0	0.21	39.98	0.43	0.04
		Fafamau shavdah Ghat	25.506594	81.867307	S12	7.69	6.67	3.8	6.0	16.0	0.25	43.98	0.38	0.08
		Fafamau Horizontal	25.504588	81.867282	S13	7.47	16.67	4.6	8.0	16.0	0.38	45.98	0.50	0.06
		Gangoli Shivalay Drain	25.437137	81.901486	S14	7.25	40.00	1.5	18.0	24.0	0.79	259.92	9.96	0.13
		Bela Kacchar Fafamau	25.520756	81.860435	S15	7.22	36.67	3.4	8.0	24.0	1.25	33.98	12.95	0.08
		Sangam	25.427054	81.884655	S16	7.44	6.67	4.1	6.0	20.0	0.15	47.98	0.81	0.06
		City Control (Dhimi)	25.591139	81.546488	S17	7.72	6.67	3.7	4.0	12.0	0.25	43.98	0.71	0.09
4	Varanasi	Markandey Mahadev Kaithi	25.501849	83.167563	S18	8.06	6.67	7.8	7.1	20.0	0.19	45.98	0.94	0.03
		Markandey Horizontal	25.500846	83.171031	S19	8.10	3.33	7.3	6.0	12.0	0.21	47.98	0.17	0.04
		Assi Nala	25.285148	83.003702	S20	7.02	50.00	0	21.0	88.0	2.67	119.96	20.71	0.13
		Assi Ghat	25.288966	83.007435	S21	7.79	10.00	8.6	7.2	20.0	0.16	61.98	1.38	0.02
		City Control 1	25.491798	83.162586	S22	8.02	6.67	7.8	6.5	16.0	0.29	49.98	0.85	0.01
		City Control 2	25.511591	83.172255	S23	7.88	6.67	8.0	5.1	16.0	0.24	45.98	2.09	0.12
5.	Mirzapur	Chunar Ghat	25.131584	82.879411	S24	8.14	10.00	7.8	6.6	20.0	0.15	31.99	0.45	0.09
		Chunar Ghat Horizontal	25.133950	82.873791	S25	8.22	9.90	8.3	7.2	24.0	0.16	33.98	0.33	0.04
		City Control 1(Bhairamganj)	25.112866	82.859888	S26	8.29	13.33	7.8	6.8	20.0	0.06	41.98	0.03	0.04
		City Control 2(Barahpathar)	25.138381	82.885677	S27	8.04	3.33	7.7	7.0	24.0	0.08	35.98	0.71	0.01

S. No.	City	Collection site	Geo-coordinates		Sample Code	pH	Color (Hazen)	DO (mg/L)	BOD (mg/L)	COD (mg/L)	TP (mg/L)	Cl^- (mg/L)	NO_3^- (mg/L)	AN (mg/L)
			Latitude	Longitude										
6	Ghazipur	Tari Ghat	25.582215	83.602492	S28	7.98	6.67	7.1	5.7	16.0	0.20	49.98	0.71	0.76
		Tari Ghat Horizontal	25.585391	83.601079	S29	8.00	3.33	7.8	5.2	16.0	0.19	83.97	0.31	0.64
		City Control	25.584845	83.600072	S30	7.93	3.33	7.2	6.3	20.0	0.20	49.98	0.26	0.74
7	Kannauj	Mehndi Ghat	27.020750	79.972389	S31	7.78	10.00	9.0	4.4	8.0	0.90	41.98	10.98	0.09
		Mehndi Ghat Horizontal	27.013367	79.990448	S32	7.96	3.33	7.2	4.1	12.0	0.29	23.99	1.65	0.13
		Kothi Ghat	26.930902	80.034747	S33	8.09	3.33	8.2	4.2	8.0	0.75	17.99	6.31	0.04
		City Control (Tirva Kali)	27.044586	79.999032	S34	7.94	3.33	8.1	4.9	16.0	0.27	11.99	1.21	0.16
8	Hamirpur	Yamuan Bridge	25.95818	80.16065	S35	8.38	3.33	7.4	4.1	12.0	0.18	169.94	0.49	0.71
		Yamuan Bridge Horizontal	25.957887	80.158095	S36	8.46	3.33	7.2	4.2	12.0	0.20	219.93	0.61	0.58
		City Control (Maunk Ghat)	26.037665	80.112118	S37	8.39	6.67	8.4	6.2	20.0	0.17	199.93	1.07	1.06
		Singh Maheshwari Mandir	25.949463	80.179259	S38	8.47	6.667	7.3	5.3	16	0.23	239.92	0.35	0.64
9	Ballia	Shri Rampur Ganga Bridge	25.717212	84.20479	S39	7.79	3.33	10.4	3.4	8.0	0.20	33.99	0.26	0.37
		Shri Rampur Horizontal	25.719332	84.205471	S40	7.55	6.67	7.7	5.3	16.0	0.22	43.99	2.76	0.29
		City Control	25.719406	84.205564	S41	7.98	3.33	10.0	3.5	8.0	0.23	55.98	3.02	0.29
10	Buxar	Jail Ghat	25.562293	83.949313	S42	7.78	3.33	10.3	3.2	8.0	0.28	43.99	1.80	0.34
		Jail Ghat Horizontal	25.566553	83.946763	S43	7.79	6.67	10.5	3.0	8.0	0.03	73.98	1.21	0.01
		Ram Rekha Ghat	25.576482	83.971127	S44	7.91	3.33	10.0	3.4	12.0	0.11	47.98	2.25	0.00
		Ram Rekha Ghat Horizontal	25.580047	83.967924	S45	7.78	6.67	8.5	4.5	12.0	2.71	47.98	3.09	0.01
		Chausa Ghat	25.530882	83.909404	S46	7.65	6.67	7.9	6.0	12.0	0.19	41.99	0.17	0.41
		Chausa Ghat Horizontal	25.531887	83.906102	S47	7.65	3.33	10.7	3.2	8.0	0.42	43.99	0.24	0.29
		Nath Baba Drain	25.572996	83.967323	S48	8.49	20.00	4.8	20.0	56.0	0.26	47.98	0.73	6.04
		City Control	25.521881	83.895237	S49	7.66	6.67	10.1	3.3	8.0	0.13	55.98	1.51	0.30

S. No.	City	Collection site	Geo-coordinates		Sample Code	pH	Color (Hazen)	DO (mg/L)	BOD (mg/L)	COD (mg/L)	TP (mg/L)	Cl^- (mg/L)	NO_3^- (mg/L)	NH_3-N (mg/L)
			Latitude	Longitude										
11	Patna	GaiGhat main site	25.614285	85.202269	50	6.96	6.67	7.4	4.6	12	0.67	7.998	1.37	0.85
		GaiGhat Horizontal	25.618205	85.211098	51	7.07	10.00	7.5	4.4	12	0.29	1.999	2.38	0.57
		GaiGhat down stream	25.614109	85.214472	52	6.83	3.33	7.4	4.2	8	0.31	5.998	1.65	0.14
		GaiGhat up stream	25.61689	85.593025	53	7.20	6.67	7.5	4.1	8	0.33	3.999	1.56	0.60
		Khurji digha main site	25.652990	85.088741	54	7.32	6.67	7.2	4.7	16	0.33	3.999	1.49	0.44
		Khurji digha Horizontal	25.652995	85.085186	55	7.37	10.00	7.6	4.6	12	0.30	7.998	2.31	0.46
		City control	25.656634	85.085539	56	7.44	6.67	7.2	4.4	12	0.34	3.999	1.39	0.50
12	Saran	Doriganj near balaGhat,	25.729721	84.829207	57	7.51	3.33	7.5	4.3	11.88	0.29	1.999	2.55	0.56
		Doriganj Horizontal	25.727594	84.831785	58	7.44	6.67	7.8	4.5	15.84	0.34	11.996	1.54	0.17
13	Bhojpur	Ara-Chapra road bridge	25.715609	84.809943	59	7.72	6.67	7.7	4.5	11.88	0.33	27.991	1.37	0.14
		Ara-Chapra Horizontal	25.722007	84.812360	60	7.81	10.00	7.5	4.4	12	0.38	3.999	1.70	0.16
		Mauzampur Ghat	25.689508	84.588801	61	8.19	10.00	7.4	4.5	14.4	0.44	33.989	0.61	0.17
		Mauzampur Horizontal	25.693635	84.594129	62	8.24	6.67	7.7	4.2	10.8	0.29	51.984	0.69	0.43
		City control	25.700139	84.593025	63	8.50	6.67	7.8	4	8	0.35	35.989	0.57	0.24

Table 11: Results of Bacteriological parameters analyzed during Phase-I study of river Ganga

S. No.	City	Collection site	Sample Code	Total Coliforms (MPN/100mL)	Fecal Coliforms (MPN/100mL)	*E. coli*	Fecal *Streptococci*
1	Kanpur	Saraiyya Ghat	S1	41600	6400	**Present**	**Present**
		Saraiyya Horizontal	S2	44800	9600	**Present**	**Present**
2	Unnao	Rautpur	S3	48000	19200	**Present**	**Present**
		Rautpur Horizontal	S4	54400	16000	**Present**	**Present**
		Shuklaganj	S5	41600	22400	**Present**	**Present**
		Shuklaganj Horizontal	S6	38400	16000	**Present**	**Present**
		Buxar bridge	S7	48000	22400	**Present**	**Present**
		Buxar bridge Horizontal	S8	51200	32000	**Present**	**Present**
		City control	S9	35200	6400	**Present**	**Absent**
3	Prayagraj	Shringverpur Shavdah Ghat	S10	54400	19200	**Present**	**Present**
		Shringverpur Horizontal	S11	57600	25600	**Present**	**Absent**
		Fafamau shavdah Ghat	S12	60800	35200	**Present**	**Present**
		Fafamau Horizontal	S13	64000	32000	**Present**	**Present**
		Gangoli Shivalay Drain	S14	57600	19200	**Present**	**Present**
		Bela Kacchar Fafamau	S15	70400	32000	**Present**	**Present**
		Sangam	S16	73600	22400	**Present**	**Present**
		City control (Dhimi)	S17	64000	19200	**Present**	**Absent**
4	Varanasi	Markandey Mahadev Kaithi	S18	57600	12800	**Present**	**Present**
		Markandey Horizontal	S19	76800	25600	**Present**	**Present**
		Assi Nala	S20	73600	22400	**Present**	**Present**
		Assi Ghat	S21	57600	32000	**Present**	**Absent**
		City control 1	S22	51200	16000	**Present**	**Absent**
		City control 2	S23	57600	19200	**Present**	**Absent**
5	Ghazipur	Tari Ghat	S24	73600	22400	**Present**	**Present**
		Tari Ghat Horizontal	S25	70400	28800	**Present**	**Absent**
		City control	S26	54400	19200	**Present**	**Present**

S. No.	City	Collection site	Sample Code	Total Coliforms (MPN/100mL)	Fecal Coliforms (MPN/100mL)	*E.coli*	Fecal *Streptococci*
6	Mirzapur	Chunar Ghat	S27	73600	22400	**Present**	**Present**
		Chunar Horizontal	S28	57600	12800	**Present**	**Present**
		City control 1 (Bhairamganj)	S29	51200	16000	**Present**	**Absent**
		City control 2 (Barahpathar)	S30	41600	22400	**Present**	**Absent**
7	Kannauj	Mehndi Ghat	S31	73600	25600	**Present**	**Present**
		Mehndi Ghat Horizontal	S32	48000	22400	**Present**	**Present**
		Kothi Ghat	S33	51200	32000	**Present**	**Present**
		City control (Tirva Kali)	S34	48000	22400	**Present**	**Present**
8	Hamirpur	Yamuan Bridge	S35	54400	19200	**Present**	**Absent**
		Yamuan Bridge Horizontal	S36	57600	25600	**Present**	**Absent**
		City control (Maunk Ghat)	S37	60800	35200	**Present**	**Present**
		Singh Maheshwari Mandir	S38	64000	32000	**Present**	**Present**
9	Ballia	Shri Rampur Ganga Bridge	S39	41600	22400	**Present**	**Absent**
		Shri Rampur Horizontal	S40	38400	16000	**Present**	**Absent**
		City Control	S41	54400	12800	**Present**	**Absent**
10	Buxar	Jail Ghat	S42	76800	25600	**Present**	**Absent**
		Jail Ghat Horizontal	S43	73600	22400	**Present**	**Absent**
		Ram Rekha Ghat	S44	48000	22400	**Present**	**Absent**
		Ram Rekha Ghat Horizontal	S45	51200	32000	**Present**	**Absent**
		Chausa Ghat	S46	67200	25600	**Present**	**Absent**
		Chausa Ghat Horizontal	S47	54400	22400	**Present**	**Absent**
		Nath Baba Drain	S48	57600	28800	**Present**	**Present**
		City Control	S49	51200	22400	**Present**	**Absent**

Bacteriological parameters continued

S. No.	City	Collection site	Sample Code	Total Coliforms (MPN/100mL)	Fecal Coliforms (MPN/100mL)	*E. coli*	Fecal *Streptococci*
11	Patna	GaiGhat main site	50	67200	35200	**Present**	**Absent**
		GaiGhat Horizontal	51	64000	32000	**Present**	**Absent**
		GaiGhat down stream	52	76800	28800	**Present**	**Present**
		GaiGhat up stream	53	70400	41600	**Present**	**Present**
		Khurji digha main site	54	80000	38400	**Present**	**Absent**
		Khurji digha Horizontal	55	76800	35200	**Present**	**Absent**
		City control	56	41600	32000	**Present**	**Absent**
12	Saran	Doriganj near balaGhat,	57	60800	28800	**Present**	**Absent**
		Doriganj Horizontal	58	64000	35200	**Present**	**Absent**
13	Bhojpur	Ara-Chapra road bridge	59	80000	41600	**Present**	**Absent**
		Ara-Chapra Horizontal	60	76800	38400	**Present**	**Absent**
		Mauzampur Ghat	61	60800	35200	**Present**	**Absent**
		Mauzampur Ghat Horizontal	62	64000	32000	**Present**	**Absent**
		City control	63	41600	25600	**Present**	**Absent**

Table 12: Results of physico-chemical parameters analyzed during Phase-II study of river Ganga

S. No.	City	Collection site	Geo-coordinates		Sample Code	pH	Color (Hazen)	DO (mg/L)	BOD (mg/L)	COD (mg/L)	TP (mg/L)	Cl^- (mg/L)	NO_3^- (mg/L)	NH_3-N (mg/L)
			Latitude	Longitude										
1.	Kanpur	Saraiyya Ghat	26.717914	80.159588	S1	S1	7.90	3.33	5.0	10.0	32.0	0.31	31.99	24.39
		Saraiyya Ghat Horizontal	26.718543	80.160502	S2	S2	7.75	3.33	5.2	12.0	24.0	0.48	6.00	0.35
2	Unnao	Rautpur	26.563157	80.303487	S3	S3	7.32	6.67	5.1	10.0	32.0	0.50	6.00	0.31
		Rautpur Horizontal	26.563300	80.299207	S4	S4	7.22	10.00	7.4	4.6	8.0	0.30	8.00	0.54
		Shuklaganj	26.476236	80.373119	S5	S5	7.37	6.67	7.0	4.7	12.0	0.32	10.00	1.63
		Shuklaganj Horizontal	26.471112	80.37139	S6	S6	7.46	3.33	7.5	4.5	12.0	0.35	6.00	2.12
		Buxar bridge	26.136944	80.664444	S7	S7	7.67	6.67	6.1	8.0	20.0	0.36	25.99	4.32
		Buxar bridge Horizontal	26.136656	80.662921	S8	S8	7.90	6.67	5.9	10.0	32.0	0.50	27.99	1.47
		City Control	26.724724	80.156214	S9	S9	7.79	3.33	6.6	8.0	24.0	0.63	19.99	4.35
3	Prayagraj	Shringverpur Shavdah Ghat	25.588759	81.636543	S10	S10	8.54	3.33	8.7	3.0	7.2	0.30	16.00	1.42
		Shringverpur Horizontal	25.586919	81.632891	S11	S11	8.45	6.67	8.4	3.2	8.0	0.33	16.00	0.29
		Fafamau shavdah Ghat	25.506594	81.867307	S12	S12	7.80	10.00	8.3	3.7	12.0	0.35	16.00	0.49
		Fafamau Horizontal	25.504588	81.867282	S13	S13	7.75	6.67	8.8	3.2	8.0	0.84	17.99	0.68
		Gangoli Shivalay Drain	25.437137	81.901486	S14	S14	7.26	3.33	4.9	22.0	40.0	0.98	25.99	0.97
		Bela Kacchar Fafamau	25.520756	81.860435	S15	S15	7.41	6.67	8.9	3.1	8.0	0.95	16.00	0.43
		Sangam	25.427054	81.884655	S16	S16	7.57	6.67	2.9	28.0	88.0	0.90	129.96	1.70
		City Control (Dhimi)	25.591139	81.546488	S17	S17	7.70	10.00	8.0	3.9	12.0	0.50	12.00	1.65
4	Varanasi	Markandey Mahadev Kaithi	25.501849	83.167563	S18	S18	7.49	3.33	7.1	4.8	16.0	0.31	43.99	2.83
		Markandey Horizontal	25.500846	83.171031	S19	S19	7.80	3.33	7.1	4.7	16.0	0.08	49.98	0.50
		Assi Nala	25.285148	83.003702	S20	S20	7.32	23.33	4.0	18.0	64.0	0.94	17.99	5.95
		Assi Ghat	25.288966	83.007435	S21	S21	7.55	13.33	7.1	4.6	12.0	0.29	41.99	3.59
		City Control 1	25.491798	83.162586	S22	S22	7.75	3.33	7.0	4.9	16.0	0.14	45.99	1.39
		City Control 2	25.511591	83.172255	S23	S23	7.75	6.67	7.8	3.9	12.0	0.72	35.99	4.63
5.	Mirzapur	Chunar Ghat	25.131584	82.879411	S24	S24	7.79	3.33	7.2	4.6	12.0	0.98	51.98	2.10
		Chunar Ghat Horizontal	25.133950	82.873791	S25	S25	8.00	6.67	7.2	4.8	8.0	0.63	49.98	1.77
		City Control 1(Bhairamganj)	25.112866	82.859888	S26	S26	7.99	3.33	7.1	4.8	16.0	0.27	49.98	0.42
		City Control 2(Barahpathar)	25.138381	82.885677	S27	S27	7.99	3.33	7.2	4.7	12.0	0.45	47.99	1.13

S. No.	City	Collection site	Geo-coordinates		Sample Code	pH	Color (Hazen)	DO (mg/L)	BOD (mg/L)	COD (mg/L)	TP (mg/L)	Cl^- (mg/L)	NO_3^- (mg/L)	AN (mg/L)
			Latitude	Longitude										
6	Ghazipur	Tari Ghat	25.582215	83.602492	S28	7.99	13.33	5.5	14.0	44.0	0.38	57.98	4.01	0.06
		Tari Ghat Horizontal	25.585391	83.601079	S29	8.11	10.00	6.5	10.0	16.0	0.23	67.98	0.56	0.55
		City Control	25.584845	83.600072	S30	8.02	6.67	7.2	4.0	12.0	0.16	55.98	4.84	0.10
7	Kannauj	Mehndi Ghat	27.020750	79.972389	S31	7.46	3.33	5.9	12.0	32.0	0.51	12.00	2.78	0.73
		Mehndi Ghat Horizontal	27.013367	79.990448	S32	7.59	3.33	5.8	12.0	40.0	0.34	10.00	0.62	0.95
		Kothi Ghat	26.930902	80.034747	S33	6.90	6.67	5.6	14.0	40.0	0.61	17.99	1.82	0.22
		City Control (Tirva Kali)	27.044586	79.999032	S34	7.55	6.67	5.0	16.0	48.0	0.60	16.00	0.90	1.27
8	Hamirpur	Yamuan Bridge	25.95818	80.16065	S35	7.79	10.00	4.5	18.0	60.0	0.19	199.94	4.22	0.09
		Yamuan Bridge Horizontal	25.957887	80.158095	S36	8.03	6.67	5.8	12.0	40.0	0.22	149.95	3.78	0.05
		City Control (Maunk Ghat)	26.037665	80.112118	S37	7.80	6.67	6.7	10.0	16.0	0.65	209.93	3.23	0.23
		Singh Maheshwari Mandir	25.949463	80.179259	S38	7.99	10.00	5.3	14.0	24.0	0.96	179.94	4.94	0.03
9	Ballia	Shri Rampur Ganga Bridge	25.717212	84.20479	S39	8.01	6.67	5.0	12.0	32.0	0.11	73.98	2.95	0.01
		Shri Rampur Horizontal	25.719332	84.205471	S40	7.18	6.67	4.9	12.0	24.0	0.10	29.99	3.33	0.03
		City Control	25.719406	84.205564	S41	7.57	3.33	4.1	18.0	56.0	0.19	37.99	3.35	0.01
10	Buxar	Jail Ghat	25.562293	83.949313	S42	7.61	6.67	5.0	10.0	32.0	0.14	39.99	2.12	0.02
		Jail Ghat Horizontal	25.566553	83.946763	S43	7.61	3.33	5.5	12.0	36.0	0.33	31.99	2.03	0.02
		Ram Rekha Ghat	25.576482	83.971127	S44	7.65	6.67	8.5	3.3	8.0	0.44	29.99	2.97	0.30
		Ram Rekha Ghat Horizontal	25.580047	83.967924	S45	7.56	10.00	5.0	14.0	32.0	0.34	27.99	2.98	0.04
		Chausa Ghat	25.530882	83.909404	S46	7.71	13.33	6.1	10.0	28.0	0.55	37.99	2.27	0.04
		Chausa Ghat Horizontal	25.531887	83.906102	S47	7.76	20.00	5.1	12.0	24.0	0.16	35.99	2.32	0.01
		Nath Baba Drain	25.572996	83.967323	S48	7.76	6.67	3.6	22.0	64.0	0.21	21.99	4.49	1.25
		City Control	25.521881	83.895237	S49	7.62	3.33	4.7	16.0	52.0	0.33	31.99	2.48	0.14

S. No.	City	Collection site	Geo-coordinates		Sample Code	pH	Color (Hazen)	DO (mg/L)	BOD (mg/L)	COD (mg/L)	TP (mg/L)	Cl^- (mg/L)	NO_3^- (mg/L)	NH_3-N (mg/L)
			Latitude	Longitude										
11	Patna	GaiGhat main site	25.614285	85.202269	50	7.87	3.33	7.3	4.8	16.0	0.13	10.00	3.45	0.04
		GaiGhat Horizontal	25.618205	85.211098	51	7.82	6.67	7.6	4.0	12.0	0.16	6.00	0.59	0.50
		GaiGhat down stream	25.614109	85.214472	52	7.87	10.00	7.5	4.1	12.0	0.00	14.00	9.66	0.57
		GaiGhat up stream	25.61689	85.593025	53	7.90	6.67	7.6	4.1	12.0	0.27	10.00	17.27	0.81
		khurji digha main site	25.652990	85.088741	54	7.95	10.00	7.1	4.8	16.0	0.13	17.99	2.53	0.06
		khurji digha Horizontal	25.652995	85.085186	55	7.94	13.33	7.6	4.2	12.0	0.15	12.00	1.73	0.09
		City control	25.656634	85.085539	56	7.85	3.33	8.5	3.5	8.0	0.16	16.00	1.75	0.03
12	Saran	Doriganj near balaGhat,	25.729721	84.829207	57	7.96	6.67	7.8	4.0	12.0	0.11	4.00	3.14	0.40
		Doriganj Horizontal	25.727594	84.831785	58	7.94	6.67	7.8	3.9	8.0	0.12	6.00	2.31	0.04
13	Bhojpur	Ara-Chapra road bridge	25.715609	84.809943	59	7.85	6.67	7.2	4.8	16.0	0.11	14.00	1.25	0.01
		Ara-Chapra Horizontal	25.722007	84.812360	60	7.76	3.33	7.3	4.3	12.0	0.14	29.99	3.47	0.03
		Mauzampur Ghat	25.689508	84.588801	61	7.77	3.33	5.7	12.0	40.0	0.29	35.99	1.80	0.01
		Mauzampur Horizontal	25.693635	84.594129	62	7.85	6.67	5.9	14.0	40.0	0.39	39.99	2.13	0.08
		City control	25.700139	84.593025	63	7.75	3.33	5.5	14.0	44.0	0.08	39.99	1.79	0.01

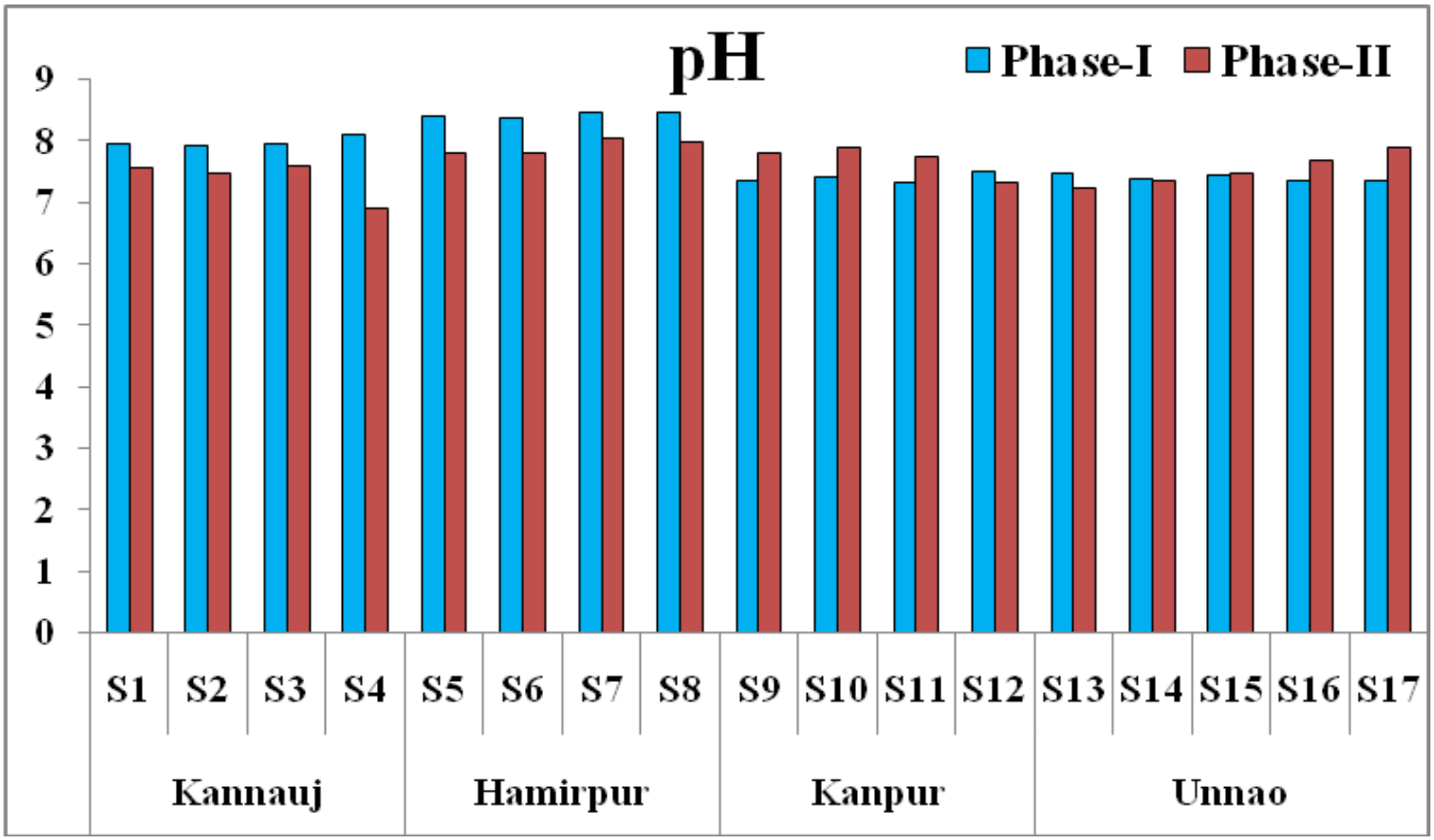
Table 13: Results of Bacteriological parameters analyzed during Phase-II study of river Ganga

S. No.	City	Collection site	Sample Code	Total Coliforms (MPN/100mL)	Fecal Coliforms (MPN/100mL)	*E. coli*	Fecal *Streptococci*
1	Kanpur	Saraiyya Ghat	S1	76800	25600	**Present**	**Present**
		Saraiyya Horizontal	S2	54400	12800	**Present**	**Present**
2	Unnao	Rautpur	S3	54400	19200	**Present**	**Present**
		Rautpur Horizontal	S4	44800	25600	**Present**	**Present**
		Shuklaganj	S5	70400	28800	**Present**	**Absent**
		Shuklaganj Horizontal	S6	76800	25600	**Present**	**Present**
		Buxar bridge	S7	54400	12800	**Present**	**Present**
		Buxar bridge Horizontal	S8	54400	19200	**Present**	**Present**
		City control	S9	44800	25600	**Present**	**Present**
3	Prayagraj	Shringverpur Shavdah Ghat	S10	70400	28800	**Present**	**Absent**
		Shringverpur Horizontal	S11	76800	25600	**Present**	**Present**
		Fafamau shavdah Ghat	S12	54400	12800	**Present**	**Present**
		Fafamau Horizontal	S13	54400	19200	**Present**	**Present**
		Gangoli Shivalay Drain	S14	44800	25600	**Present**	**Present**
		Bela Kacchar Fafamau	S15	70400	28800	**Present**	**Absent**
		Sangam	S16	76800	25600	**Present**	**Present**
		City control (Dhimi)	S17	54400	12800	**Present**	**Present**
4	Varanasi	Markandey Mahadev Kaithi	S18	54400	19200	**Present**	**Present**
		Markandey Horizontal	S19	44800	25600	**Present**	**Present**
		Assi Nala	S20	70400	28800	**Present**	**Absent**
		Assi Ghat	S21	76800	25600	**Present**	**Present**
		City control 1	S22	54400	12800	**Present**	**Present**
		City control 2	S23	54400	19200	**Present**	**Present**
5	Ghazipur	Tari Ghat	S24	44800	25600	**Present**	**Present**
		Tari Ghat Horizontal	S25	70400	28800	**Present**	**Absent**
		City control	S26	76800	25600	**Present**	**Present**

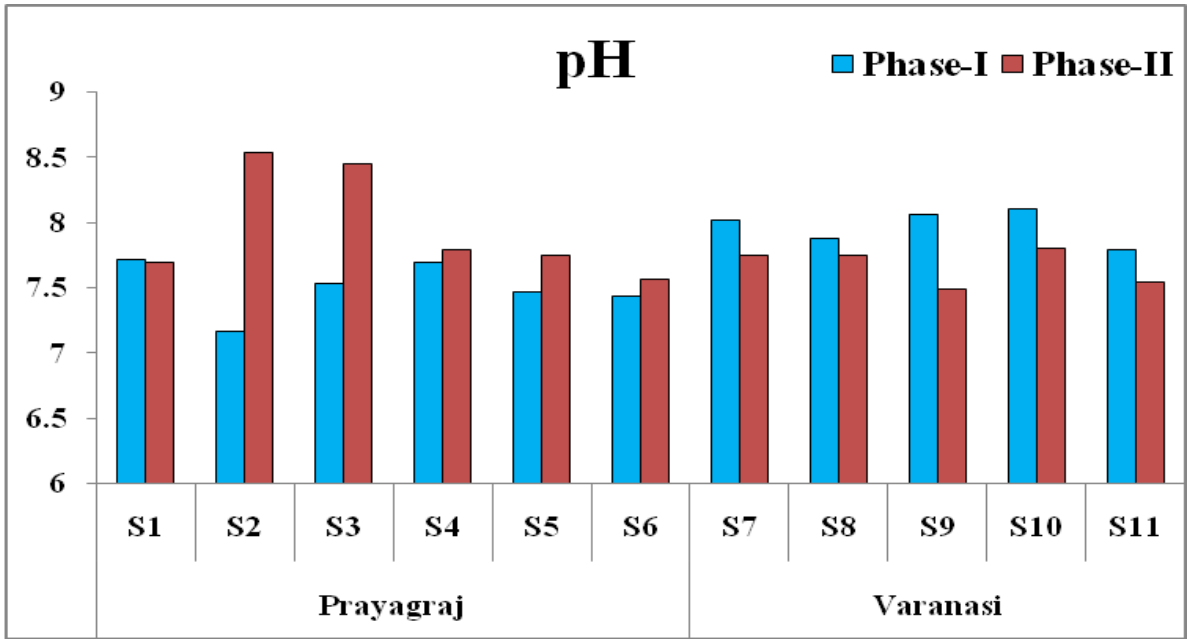
S. No.	City	Collection site	Sample Code	Total Coliforms (MPN/100mL)	Fecal Coliforms (MPN/100mL)	*E.coli*	Fecal *Streptococci*
6	Mirzapur	Chunar Ghat	S27	76800	25600	**Present**	**Present**
		Chunar Horizontal	S28	54400	12800	**Present**	**Present**
		City control 1 (Bhairamganj)	S29	54400	19200	**Present**	**Present**
		City control 2 (Barahpathar)	S30	44800	25600	**Present**	**Present**
7	Kannauj	Mehndi Ghat	S31	70400	28800	**Present**	**Absent**
		Mehndi Ghat Horizontal	S32	44800	25600	**Present**	**Present**
		Kothi Ghat	S33	48000	28800	**Present**	**Present**
		City control (Tirva Kali)	S34	51200	19200	**Present**	**Absent**
8	Hamirpur	Yamuan Bridge	S35	57600	25600	**Present**	**Present**
		Yamuan Bridge Horizontal	S36	60800	22400	**Present**	**Present**
		City control (Maunk Ghat)	S37	64000	38400	**Present**	**Present**
		Singh Maheshwari Mandir	S38	67200	35200	**Present**	**Present**
9	Ballia	Shri Rampur Ganga Bridge	S39	44800	19200	**Present**	**Present**
		Shri Rampur Horizontal	S40	35200	12800	**Present**	**Present**
		City Control	S41	48000	19200	**Present**	**Present**
10	Buxar	Jail Ghat	S42	73600	22400	**Present**	**Present**
		Jail Ghat Horizontal	S43	70400	25600	**Present**	**Present**
		Ram Rekha Ghat	S44	41600	19200	**Present**	**Present**
		Ram Rekha Ghat Horizontal	S45	48000	22400	**Present**	**Present**
		Chausa Ghat	S46	70400	28800	**Present**	**Present**
		Chausa Ghat Horizontal	S47	67200	19200	**Present**	**Present**
		Nath Baba Drain	S48	60800	16000	**Present**	**Present**
		City Control	S49	44800	25600	**Present**	**Present**

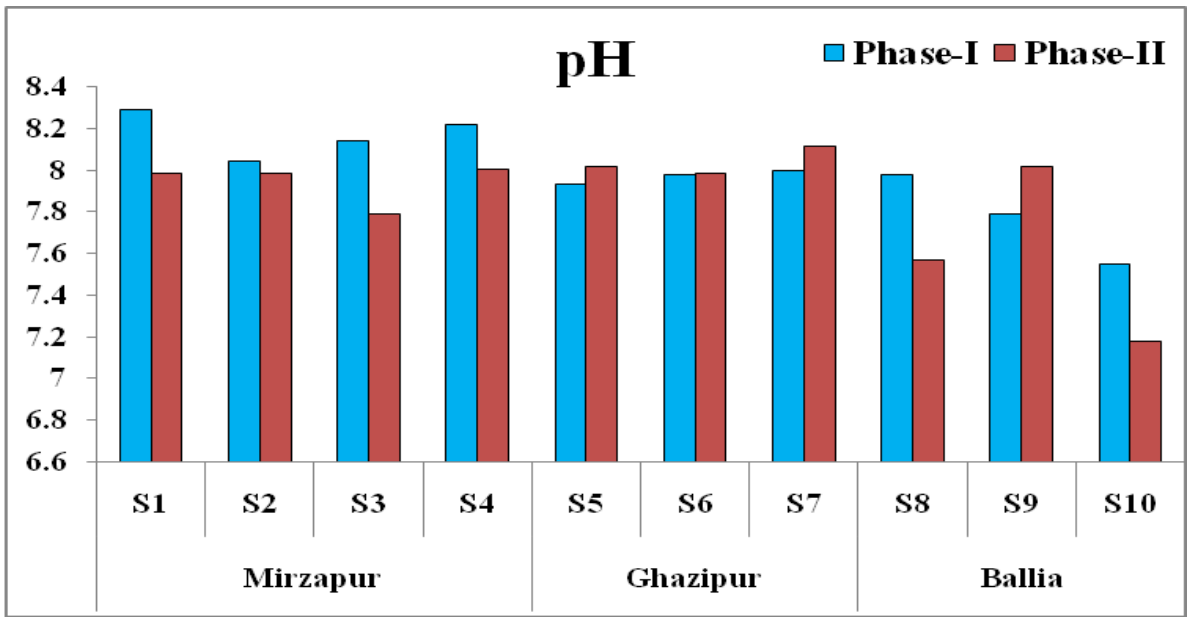
S. No.	City	Collection site	Sample Code	Total Coliforms (MPN/100mL)	Fecal Coliforms (MPN/100mL)	*E. coli*	Fecal *Streptococci*
11	Patna	GaiGhat main site	S50	70400	32000	**Present**	**Present**
		GaiGhat Horizontal	S51	60800	28800	**Present**	**Present**
		GaiGhat down stream	S52	73600	25600	**Present**	**Present**
		GaiGhat up stream	S53	67200	35200	**Present**	**Present**
		khurji digha main site	S54	83200	35200	**Present**	**Present**
		khurji digha Horizontal	S55	70400	32000	**Present**	**Present**
		City control	S56	44800	25600	**Present**	**Present**
12	Saran	Doriganj near balaGhat,	S57	64000	32000	**Present**	**Absent**
		Doriganj Horizontal	S58	60800	28800	**Present**	**Present**
13	Bhojpur	Ara-Chapra road bridge	S59	83200	38400	**Present**	**Present**
		Ara-Chapra Horizontal	S60	73600	35200	**Present**	**Present**
		Mauzampur Ghat	S61	57600	32000	**Present**	**Absent**
		Mauzampur Ghat Horizontal	S62	60800	28800	**Present**	**Absent**
		City control	S63	38400	22400	**Present**	**Absent**

Graphical representation of parameters analyzed in river Ganga Uttar Pradesh

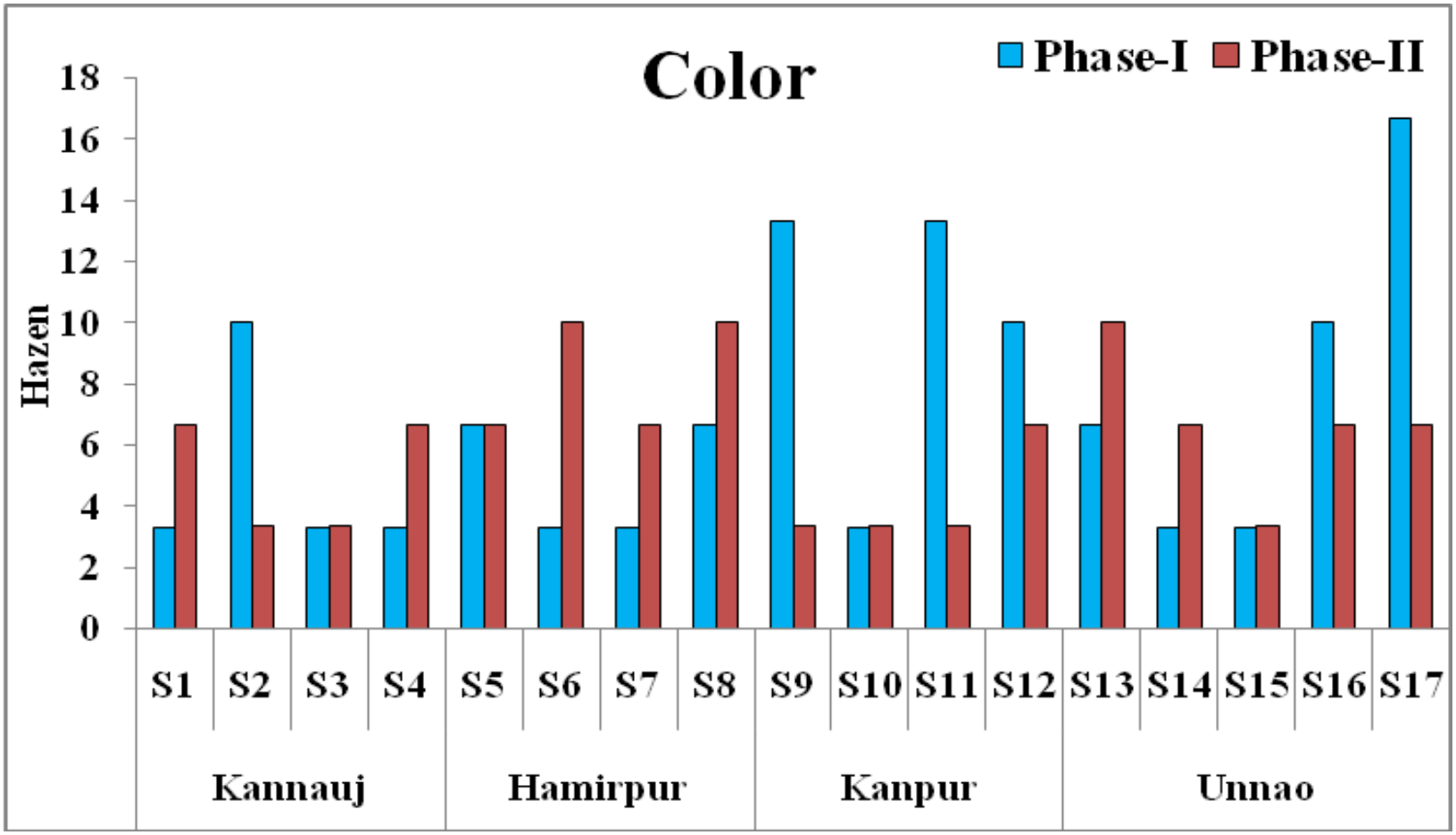


Graphical analysis of pH at sampling locations of river Ganga in Kannauj, Hamirpur, Kanpur and Unnao (Uttar Pradesh)

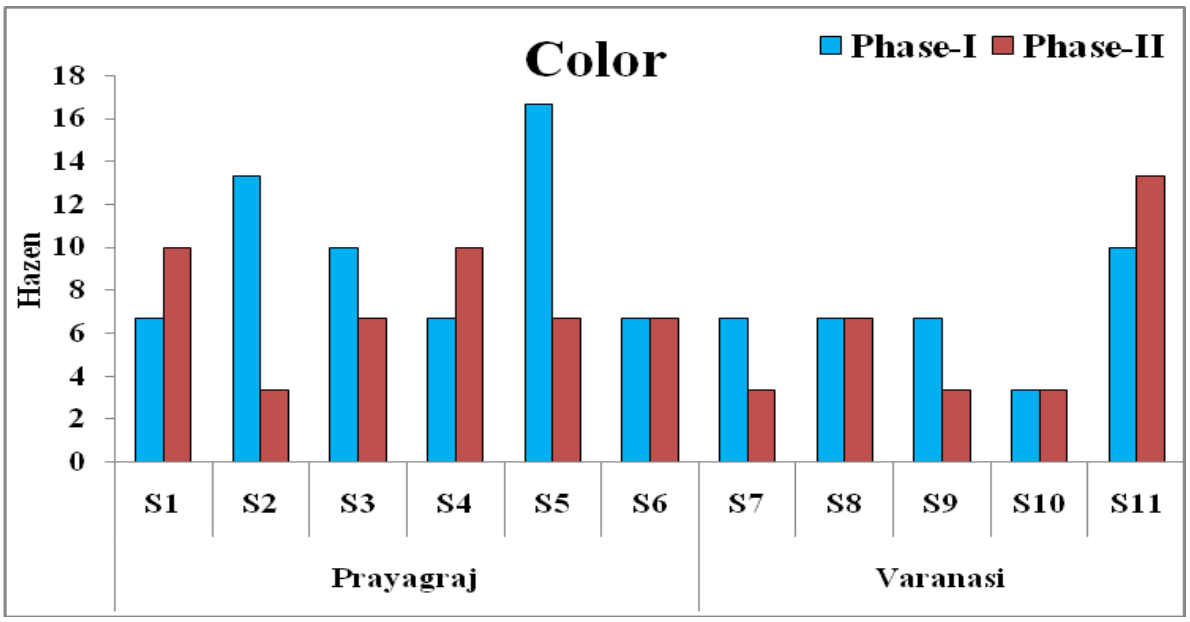


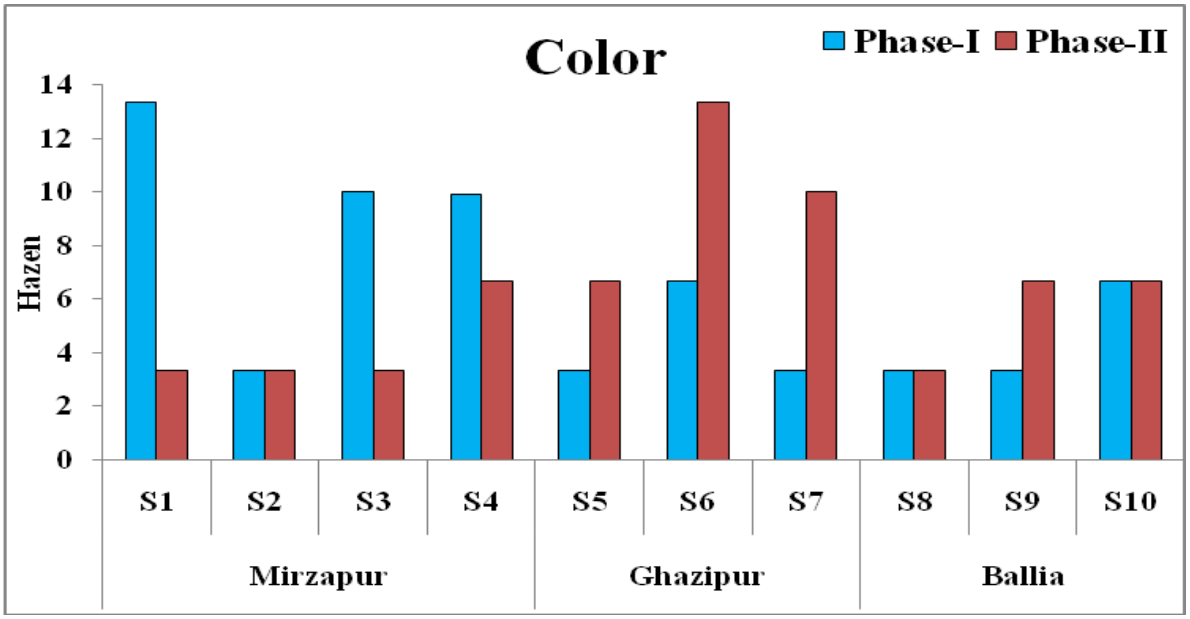


Graphical analysis of pH at sampling locations of river Ganga in Prayagraj, Varanasi, Mirzapur, Ghazipur and Ballia (Uttar Pradesh)

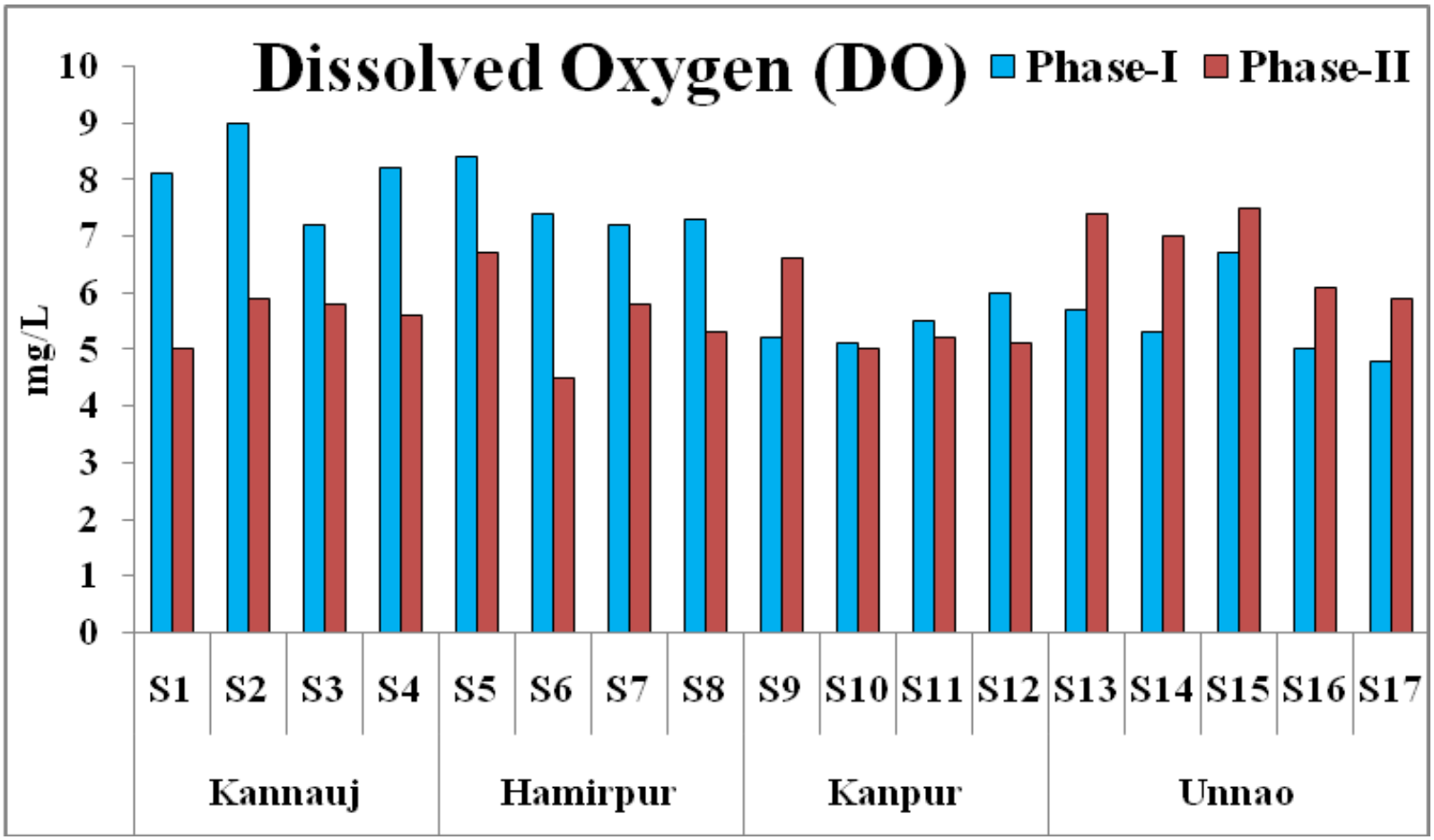


Graphical analysis of Color at sampling locations of river Ganga in Kannauj, Hamirpur, Kanpur and Unnao (Uttar Pradesh)

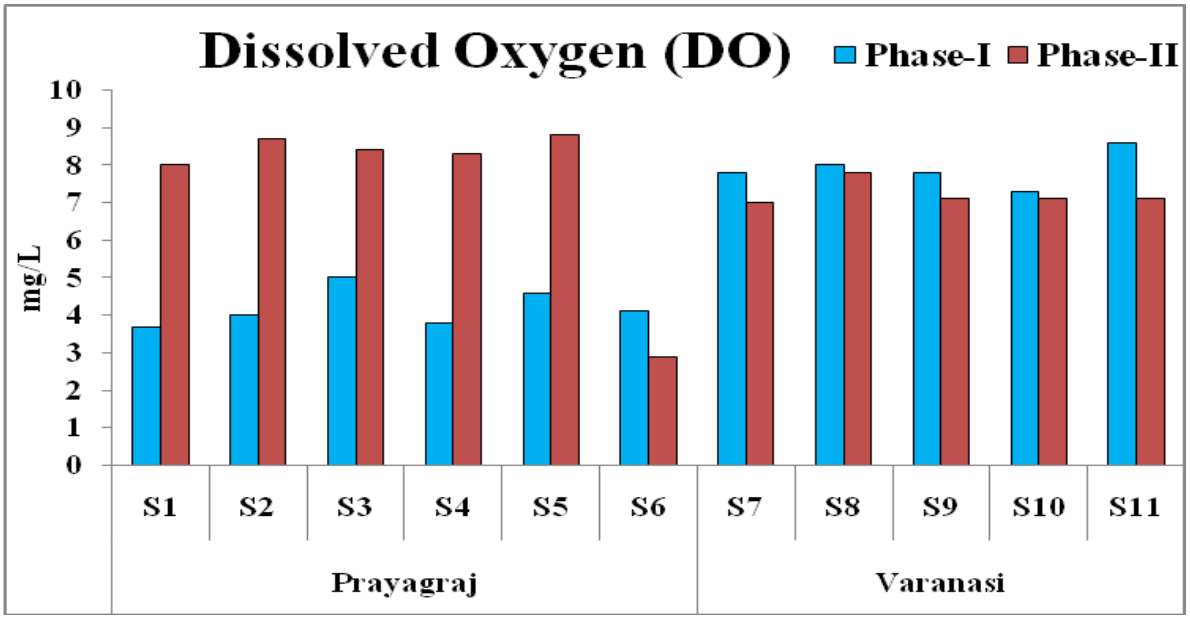


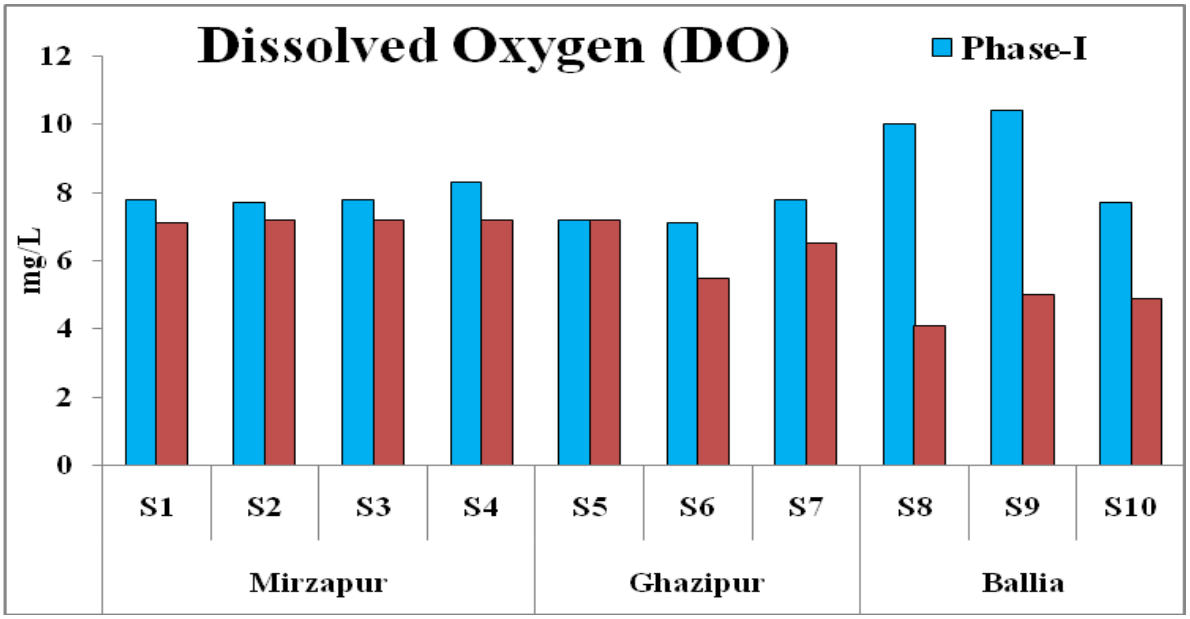


Graphical analysis of Color at sampling locations of river Ganga in Prayagraj, Varanasi, Mirzapur, Ghazipur and Ballia (Uttar Pradesh)

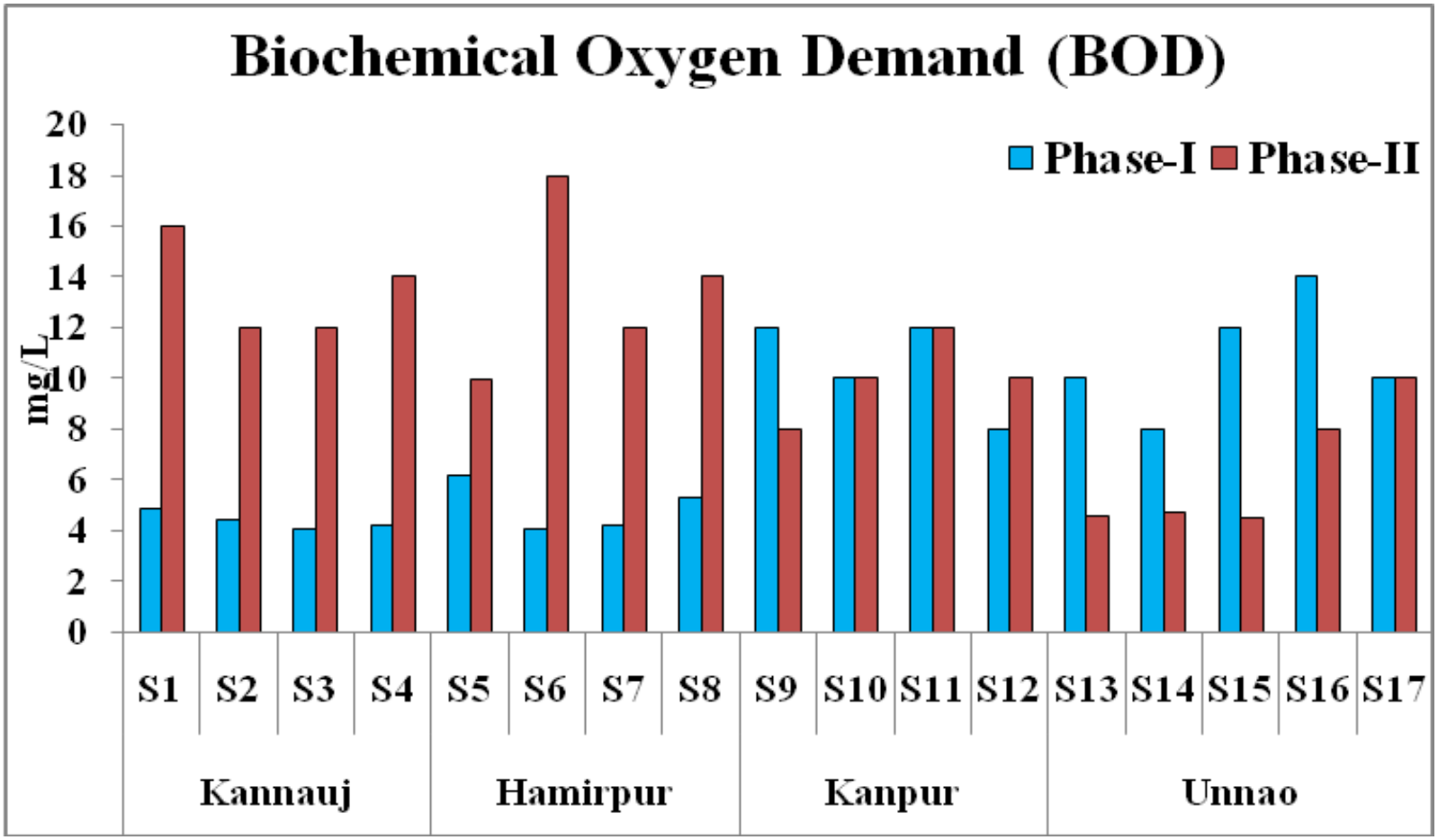


Graphical analysis of Dissolved Oxygen at sampling locations of river Ganga in Kannauj, Hamirpur, Kanpur and Unnao (Uttar Pradesh)

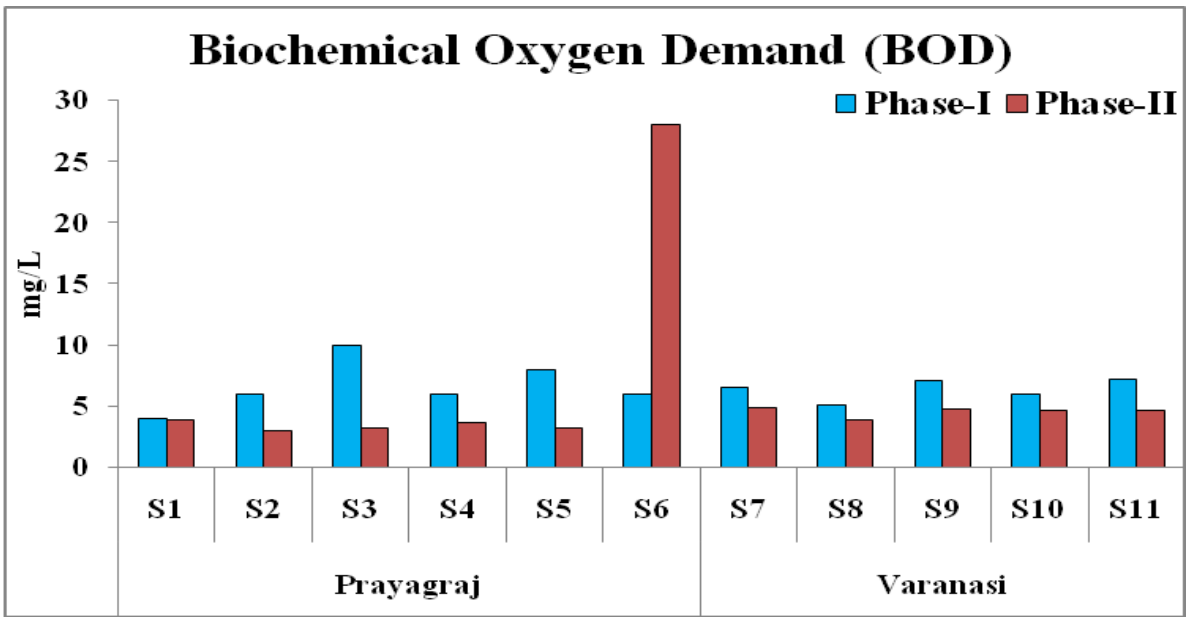


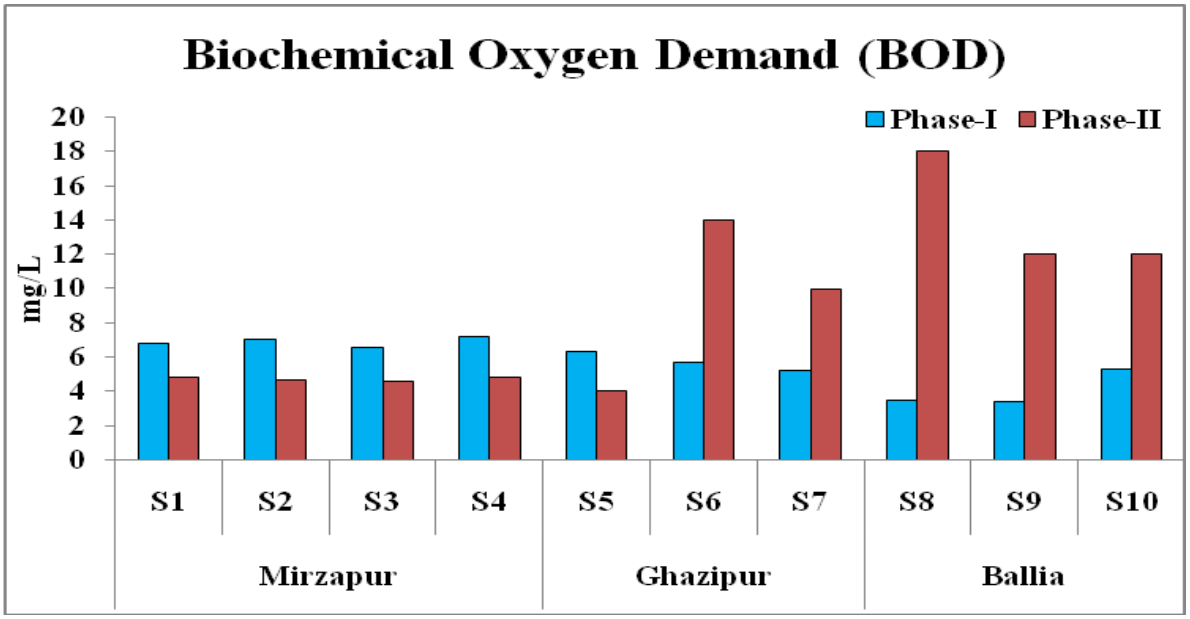


Graphical analysis of Dissolved Oxygen at sampling locations of river Ganga in Prayagraj, Varanasi, Mirzapur, Ghazipur and Ballia (Uttar Pradesh)

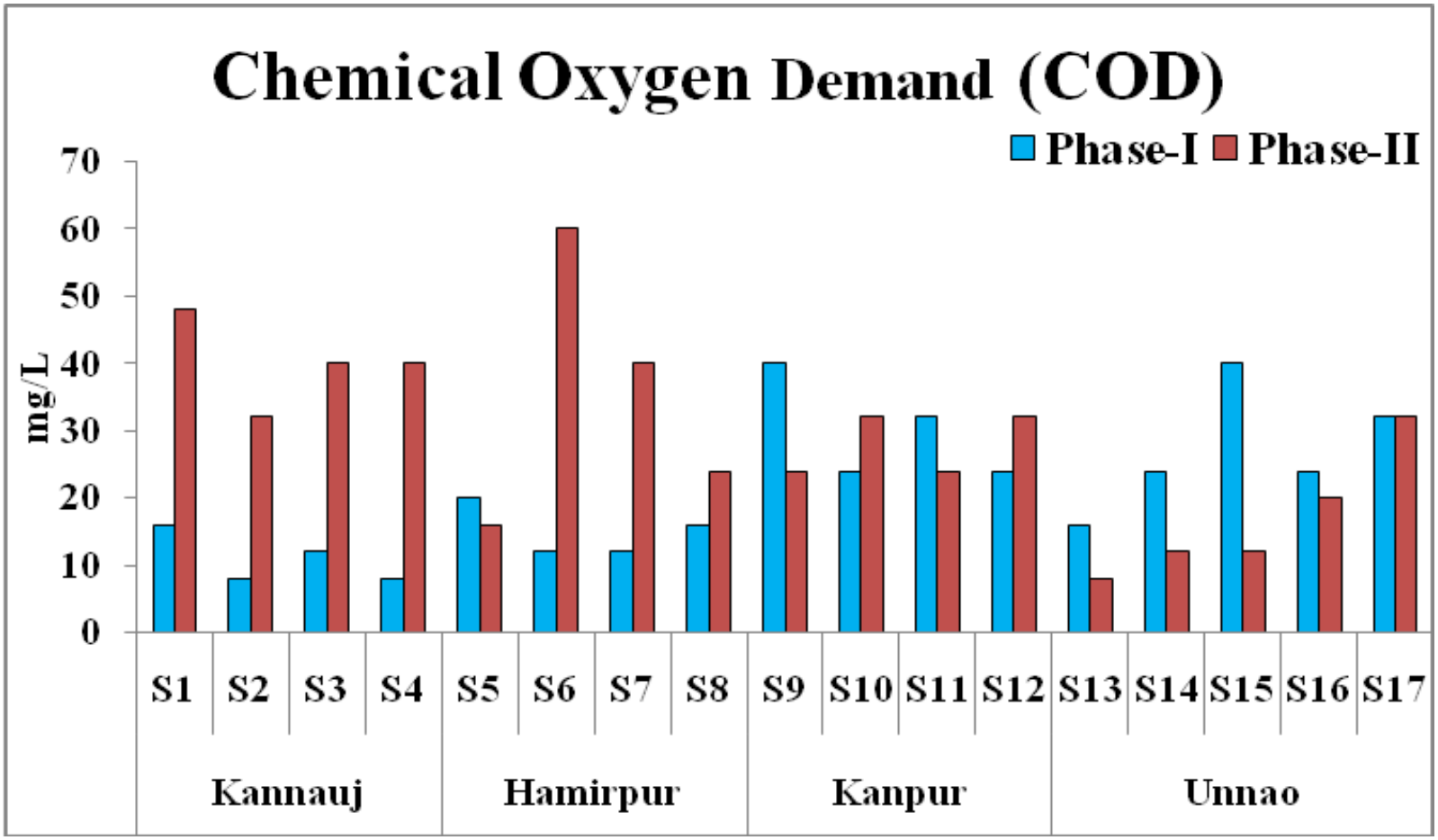


Graphical analysis of Biochemical Oxygen Demand at sampling locations of river Ganga in Kannauj, Hamirpur, Kanpur and Unnao (Uttar Pradesh)

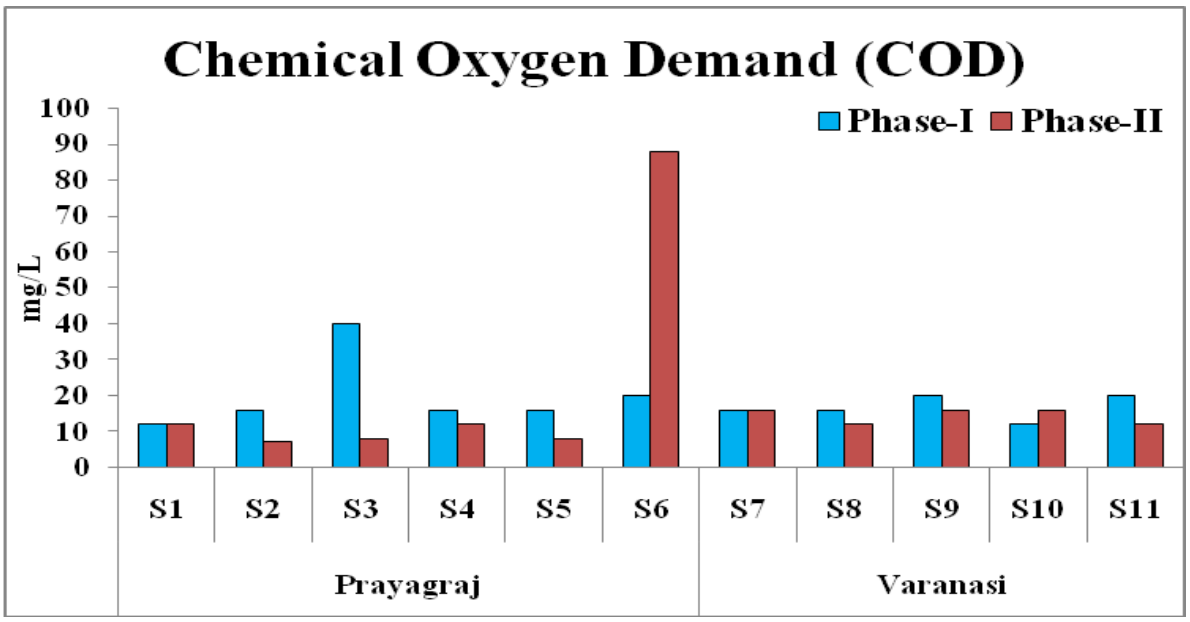


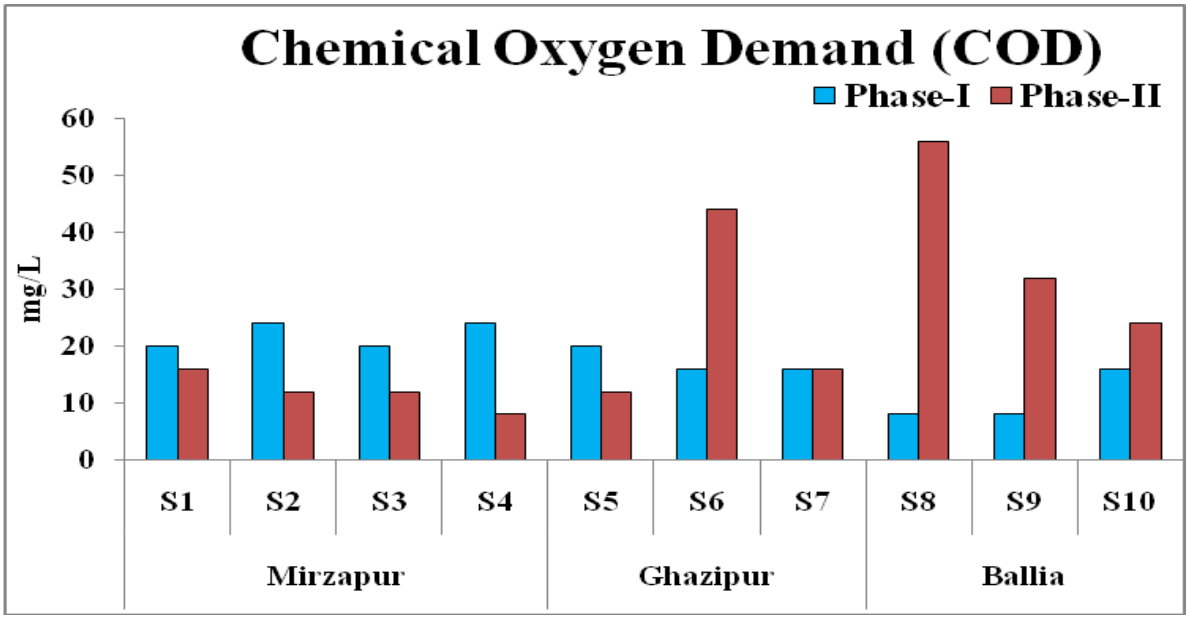


Graphical analysis of Biochemical Oxygen Demand at sampling locations of river Ganga in Prayagraj, Varanasi, Mirzapur, Ghazipur and Ballia (Uttar Pradesh)

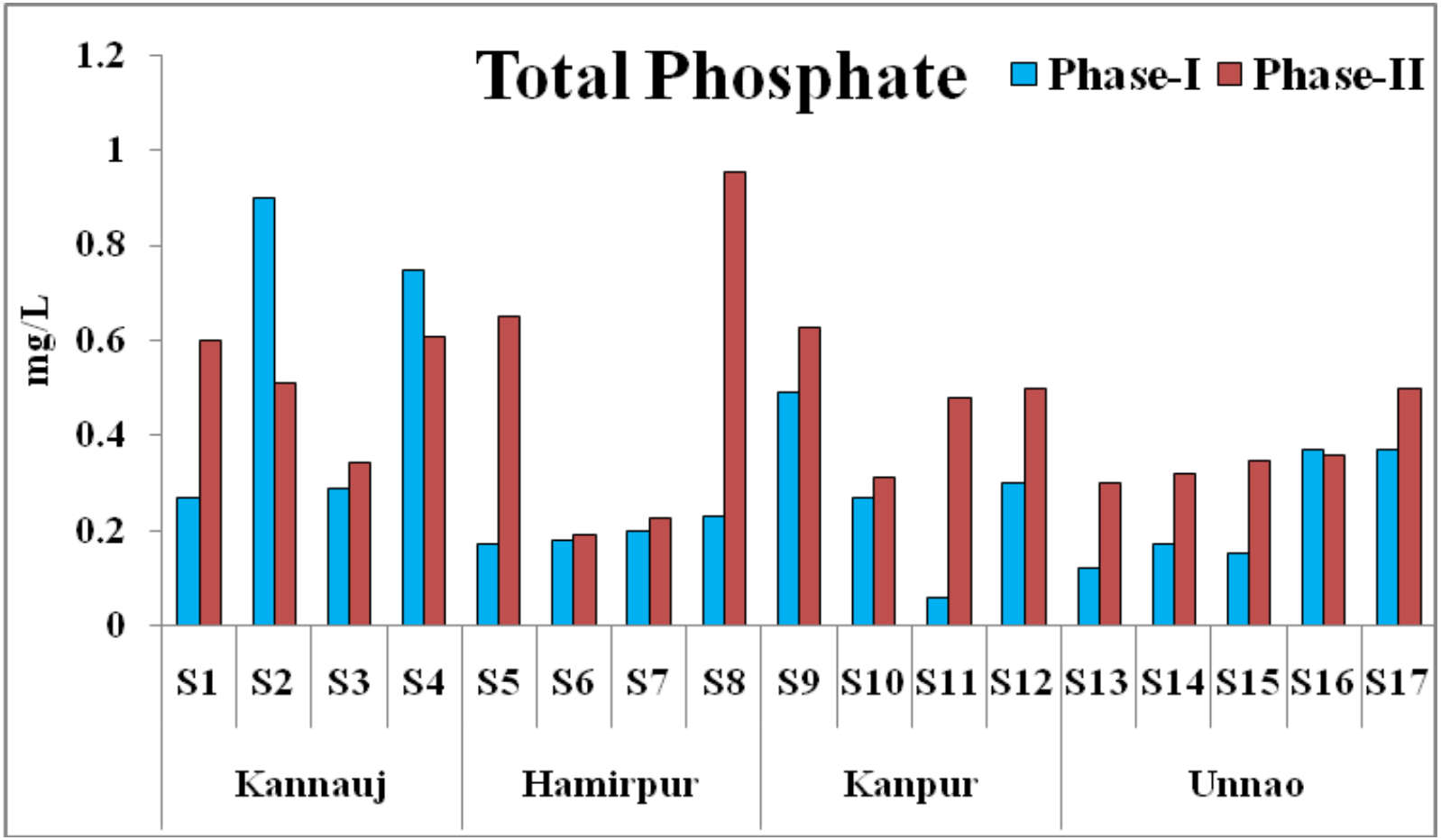


Graphical analysis of Chemical Oxygen Demand at sampling locations of river Ganga in Kannauj, Hamirpur, Kanpur and Unnao (Uttar Pradesh)

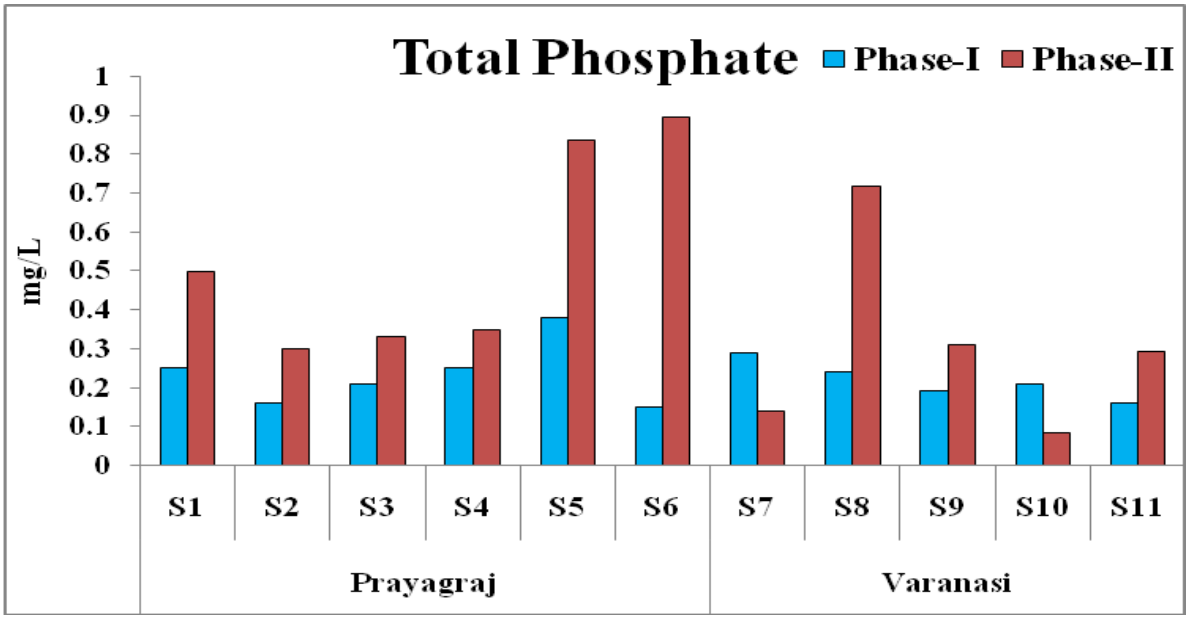


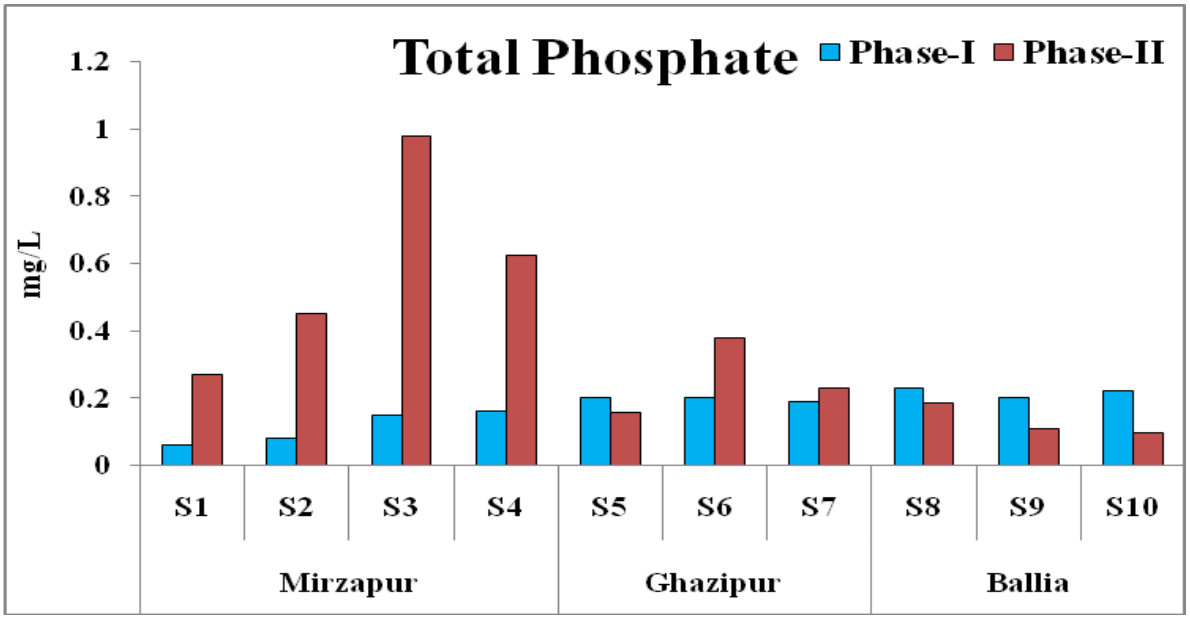


Graphical analysis of Chemical Oxygen Demand at sampling locations of river Ganga in Prayagraj, Varanasi, Mirzapur, Ghazipur and Ballia (Uttar Pradesh)

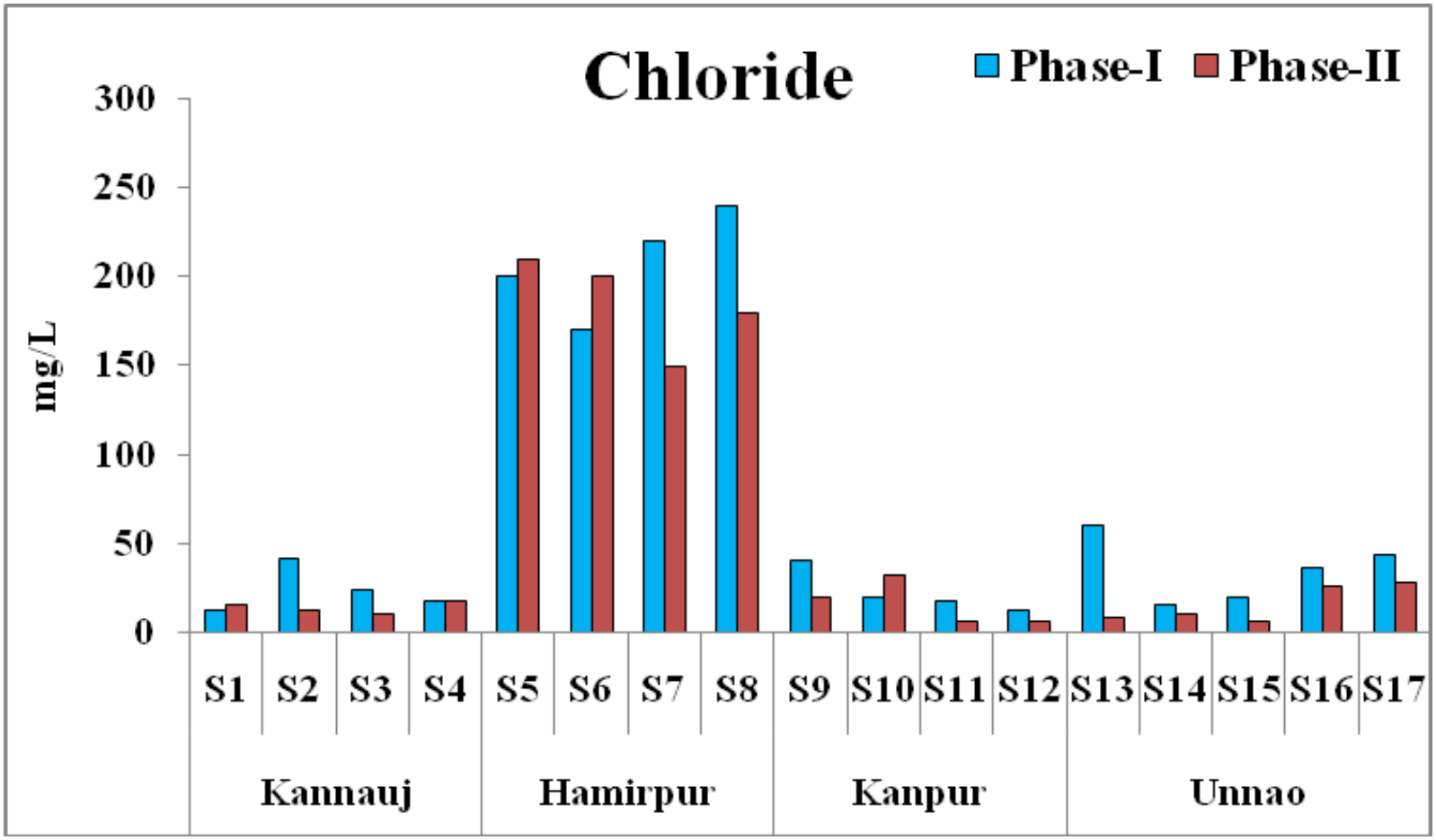


Graphical analysis of Total Phosphate at sampling locations of river Ganga in Kannauj, Hamirpur, Kanpur and Unnao (Uttar Pradesh)

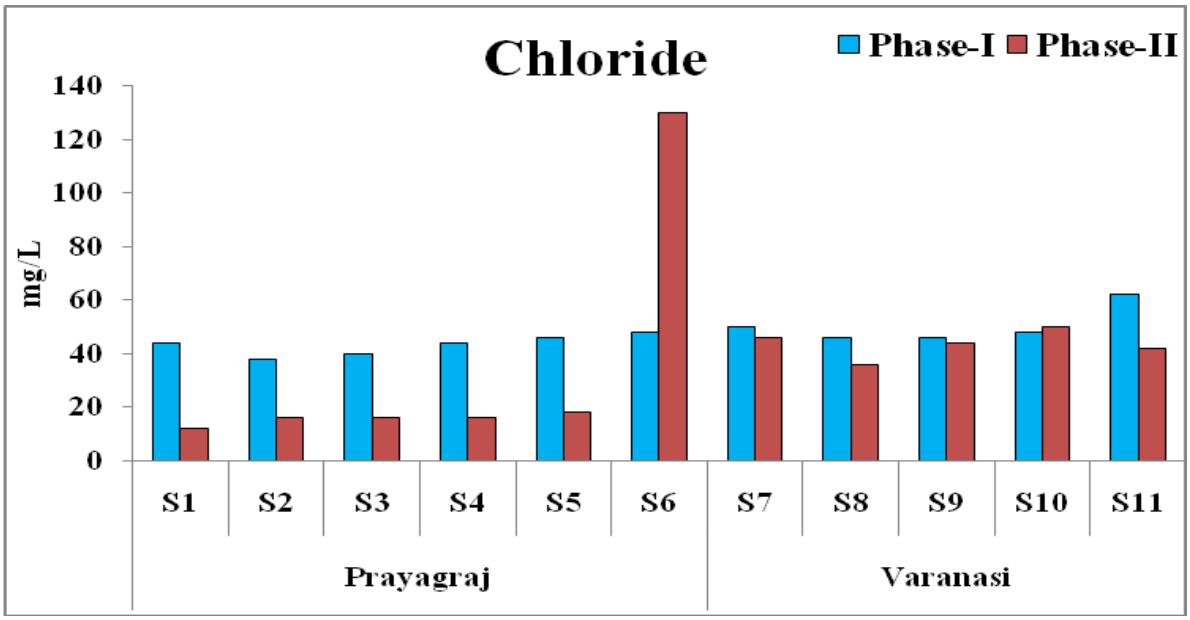


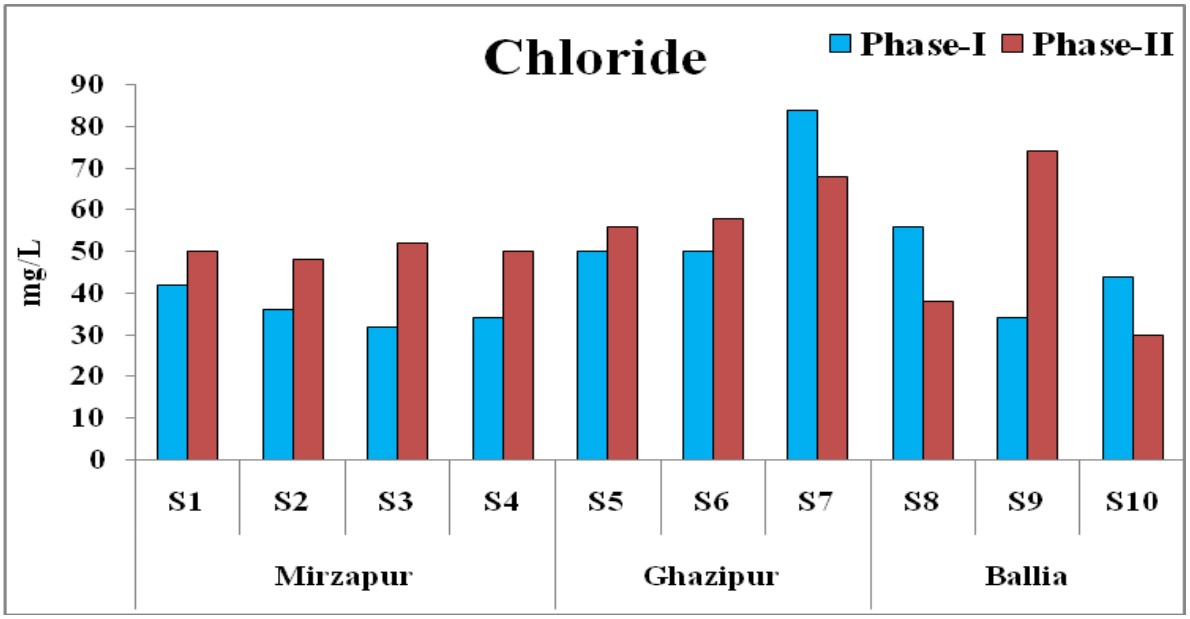


Graphical analysis of Total Phosphate at sampling locations of river Ganga in Prayagraj, Varanasi, Mirzapur, Ghazipur and Ballia (Uttar Pradesh)

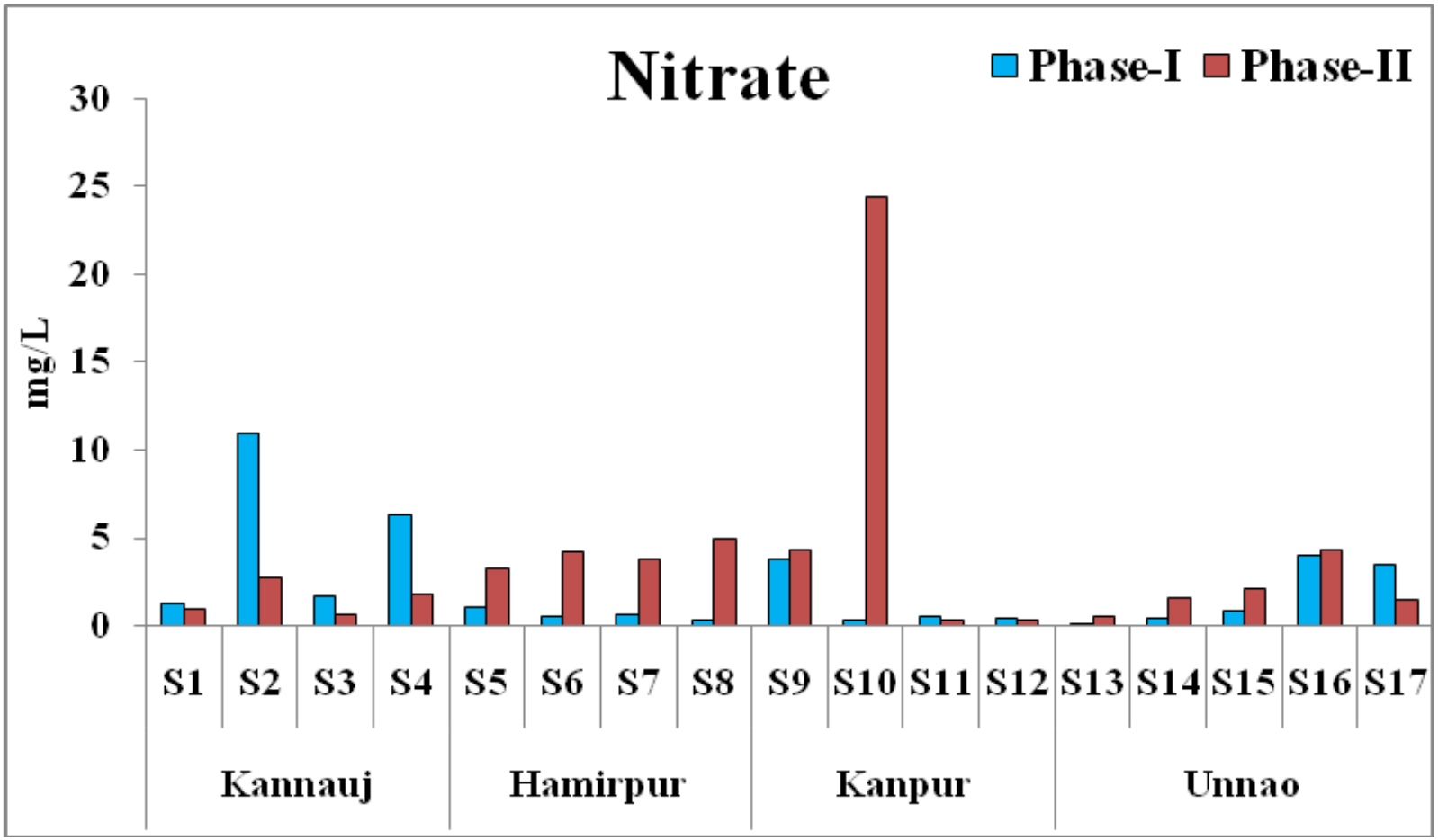


Graphical analysis of Chloride at sampling locations of river Ganga in Kannauj, Hamirpur, Kanpur and Unnao (Uttar Pradesh)

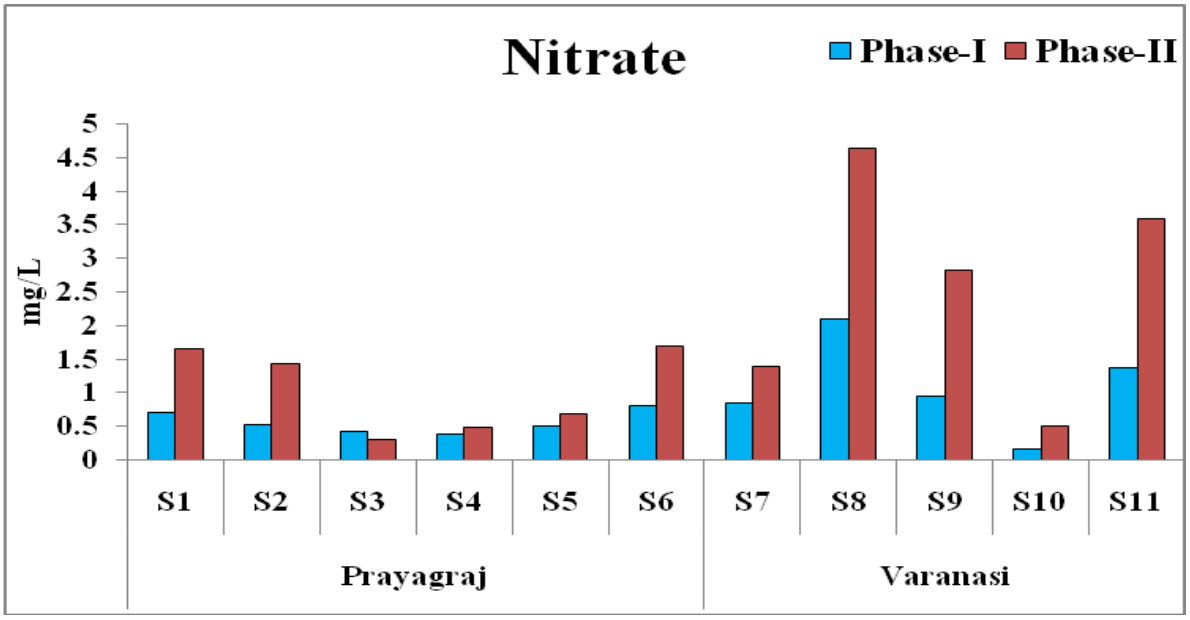


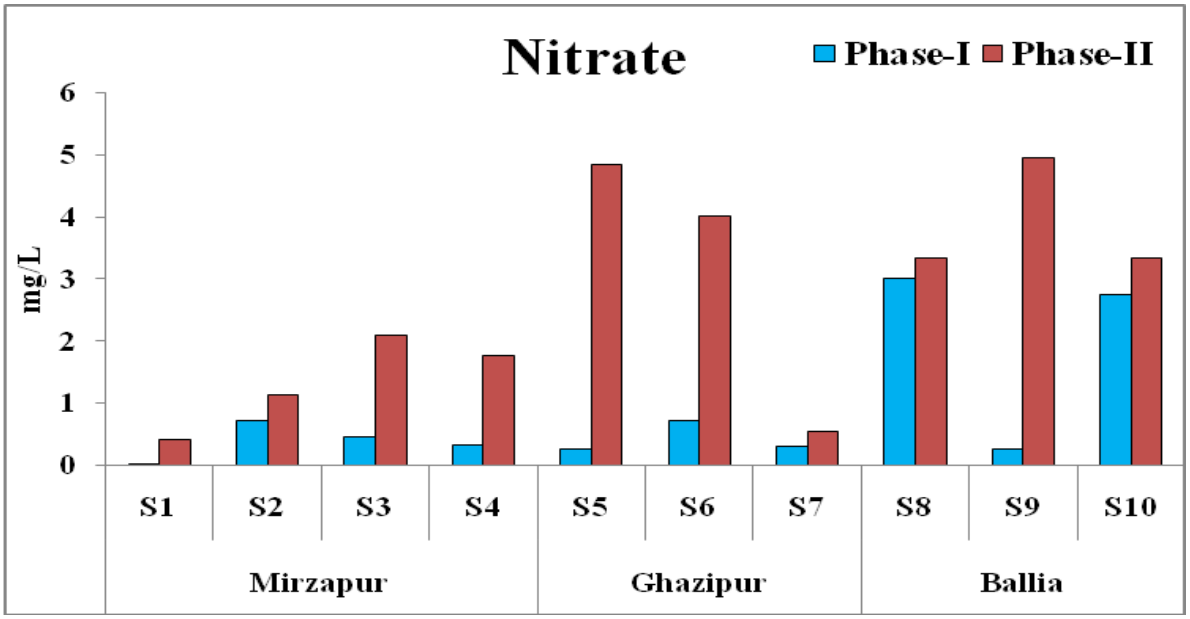


Graphical analysis of Chloride at sampling locations of river Ganga in Prayagraj, Varanasi, Mirzapur, Ghazipur and Ballia (Uttar Pradesh)

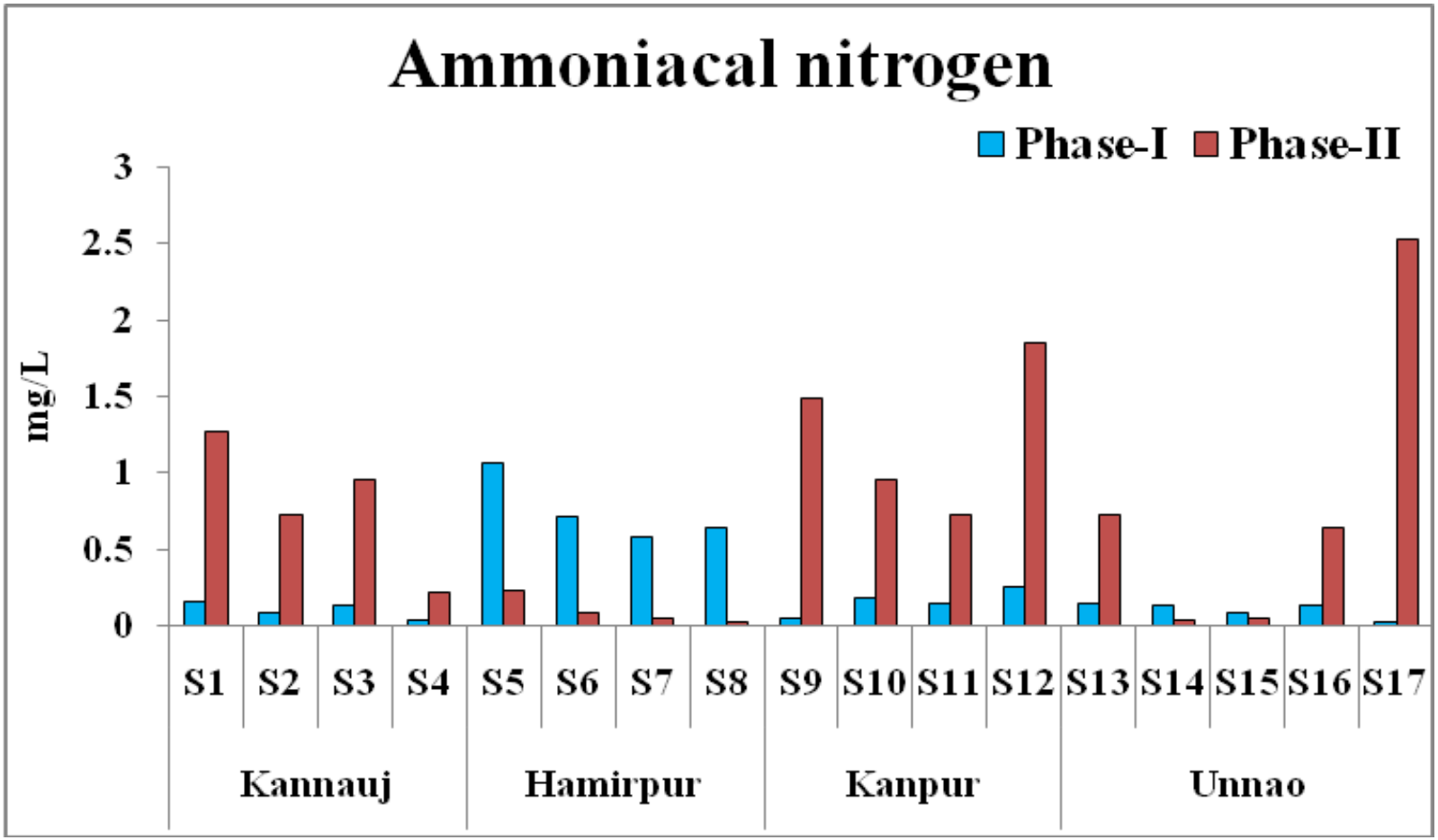


Graphical analysis of Nitrate at sampling locations of river Ganga in Kannauj, Hamirpur, Kanpur and Unnao (Uttar Pradesh)

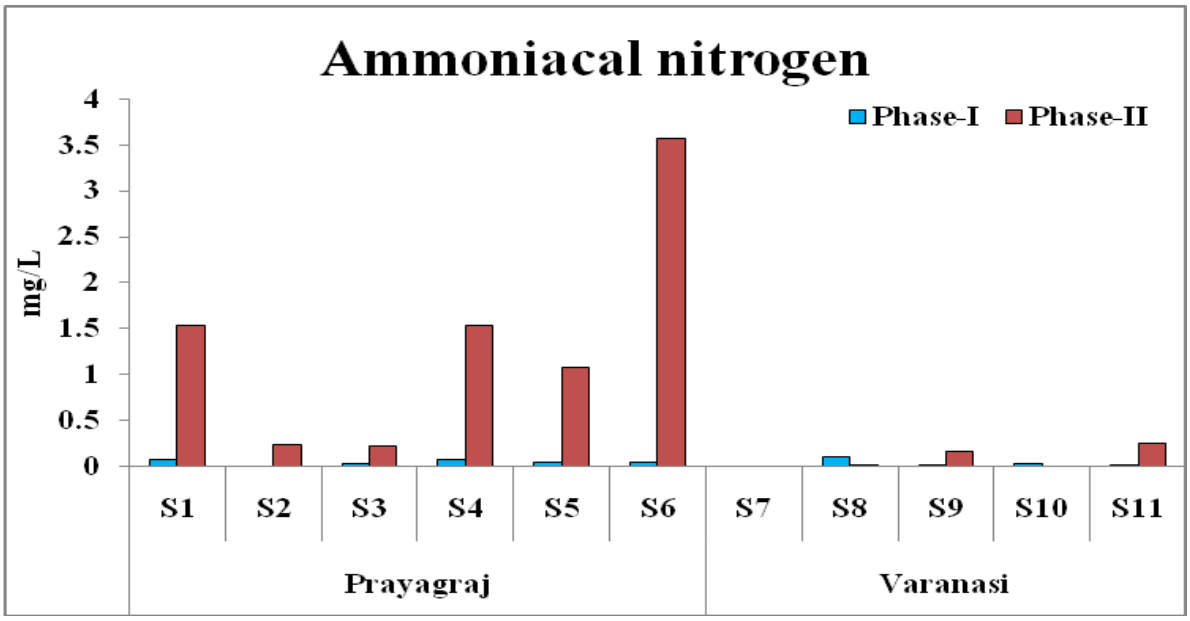


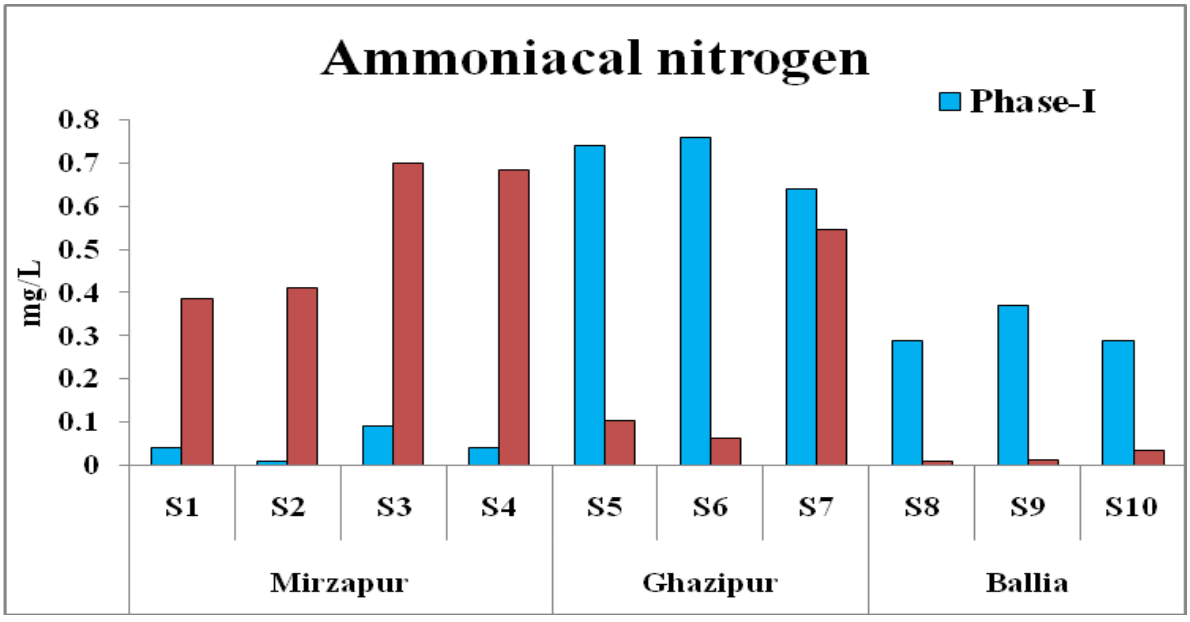


Graphical analysis of Nitrate at sampling locations of river Ganga in Prayagraj, Varanasi, Mirzapur, Ghazipur and Ballia (Uttar Pradesh)



Graphical analysis of Ammoniacal nitrogen at sampling locations of river Ganga in Kannauj, Hamirpur, Kanpur and Unnao (Uttar Pradesh)

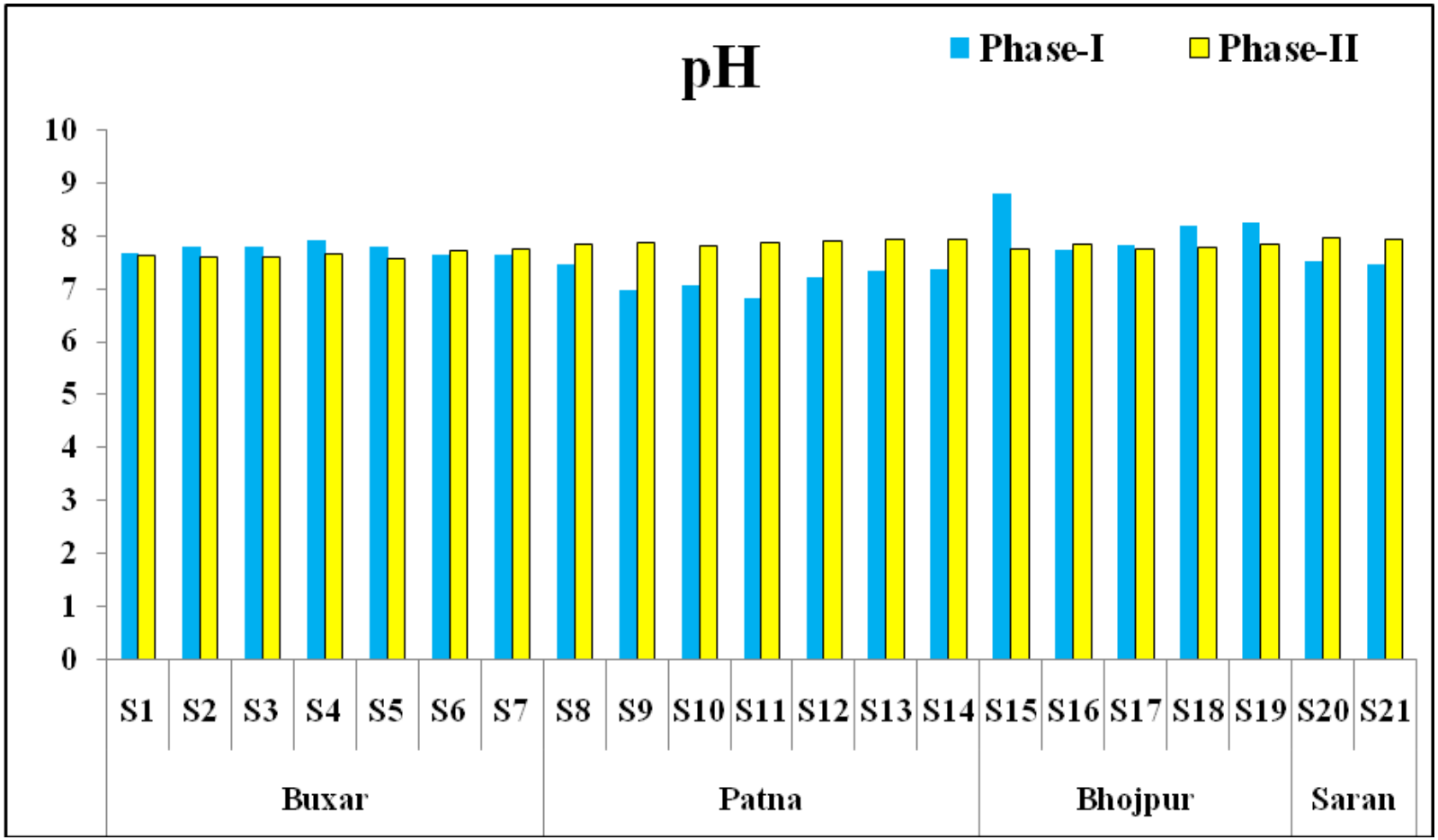




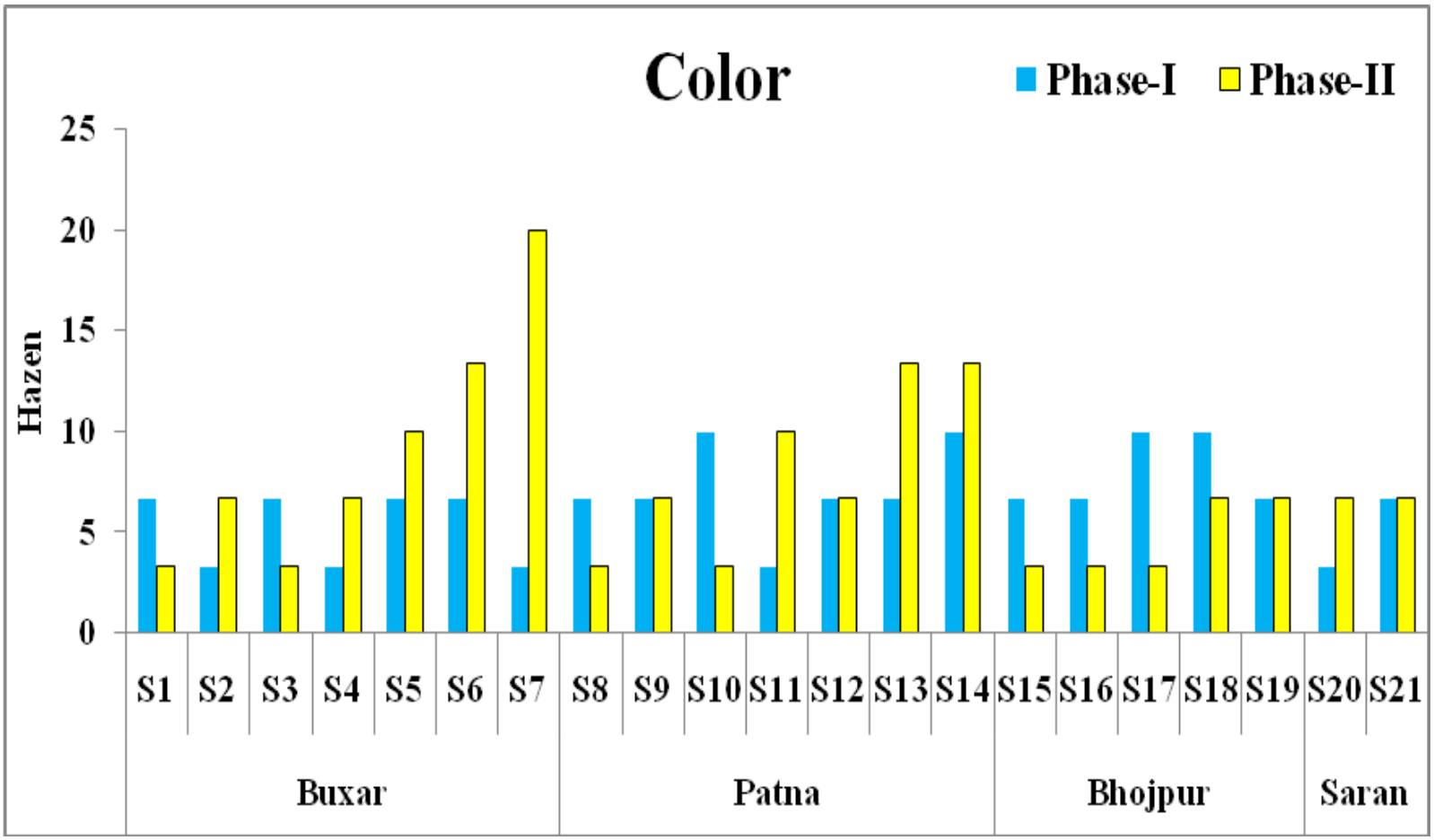
Graphical analysis of Ammoniacal nitrogen at sampling locations of river Ganga in Prayagraj, Varanasi, Mirzapur, Ghazipur and Ballia (Uttar Pradesh)

Sample	Location Site	Sample	Location Site	Sample	Location Site
Kannauj		**Prayagraj**		**Mirzapur**	
S1	City control (Tirva Kali)	**S1**	City Control Dhimi	**S1**	City Control 1(Bhairamganj)
S2	Mehndi Ghat	**S2**	Shringverpur Shavdah Ghat	**S2**	City Control 2(Barahpathar)
S3	Mehndi Ghat Horizontal	**S3**	Shringverpur Shavdah Ghat Horizontal	**S3**	Chunar Ghat
S4	Kothi Ghat			**S4**	Chunar Ghat Horizontal
Hamirpur		**S4**	Fafamau shavdah Ghat	**Ghazipur**	
S5	City control (Maunk Ghat)	**S5**	Fafamau shavdah Ghat Horizontal	**S5**	City Control
S6	Yamuan Bridge	**S6**	Sangam	**S6**	Tari Ghat
S7	Yamuan Bridge Horizontal	**Varanasi**		**S7**	Tari Ghat Horizontal
S8	Singh Maheshwari Mandir	**S7**	City Control	**Ballia**	
Kanpur		**S8**	City Control 2	**S8**	City Control
S9	City Control, Kanpur	**S9**	Markandey Mahadev Kaithi	**S9**	Shri Rampur Ganga Bridge
S10	Saraiyya Ghat			**S10**	Shri Rampur Ganga Bridge Horizontal
S11	Saraiyya Ghat Horizontal	**S10**	Markandey Mahadev Kaithi Horizontal		
S12	Rautpur				
Unnao					
S13	Rautpur Horizontal	**S11**	Assi Ghat		
S14	Shuklaganj				
S15	Shuklaganj Horizontal				
S16	Buxar bridge				
S17	Buxar Horizontal				

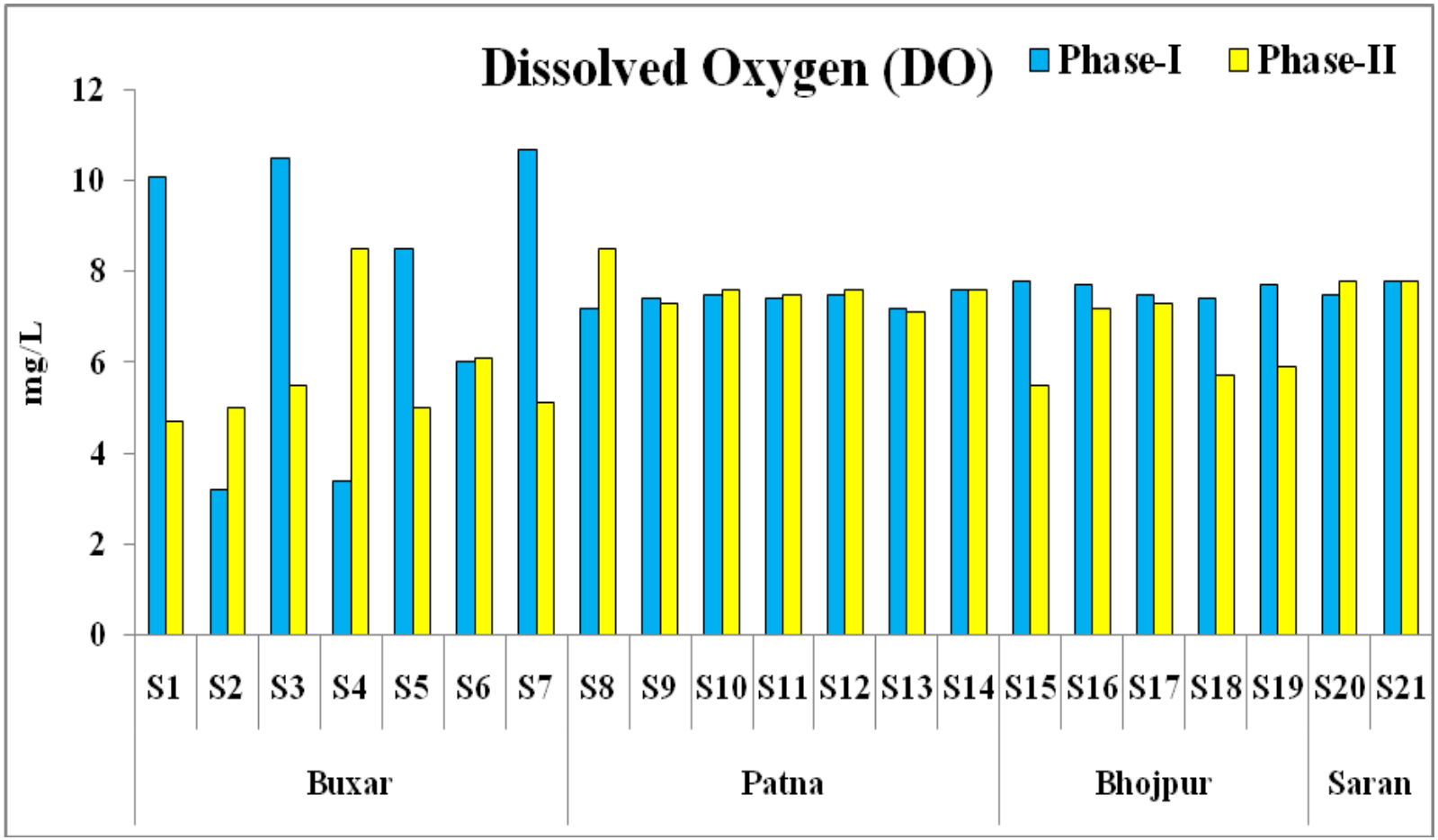
Graphical representation of parameters analyzed in river Ganga Bihar



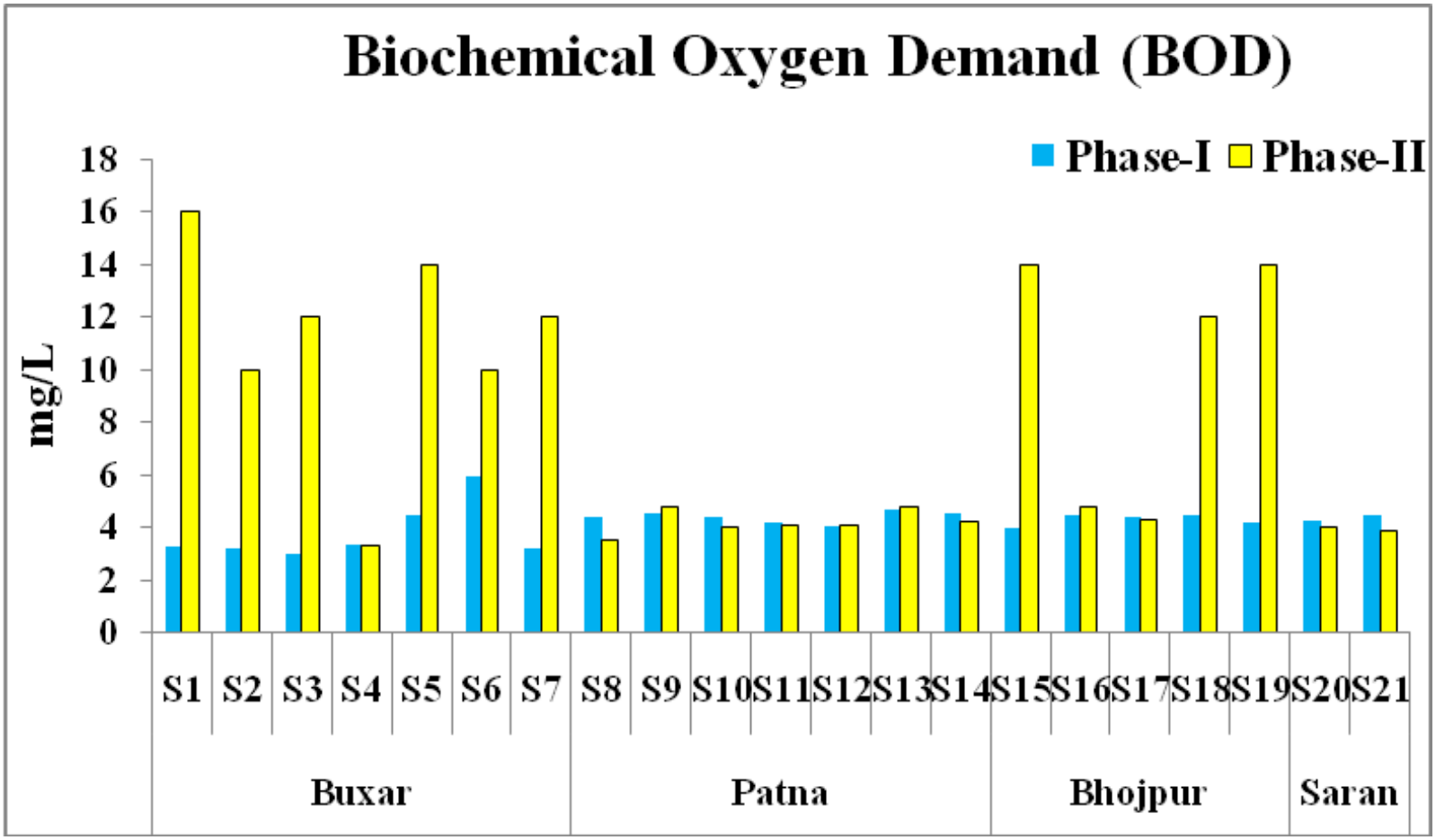
Graphical analysis of pH at sampling locations of river Ganga in Buxar, Patna, Bhojpur and Saran (Bihar)



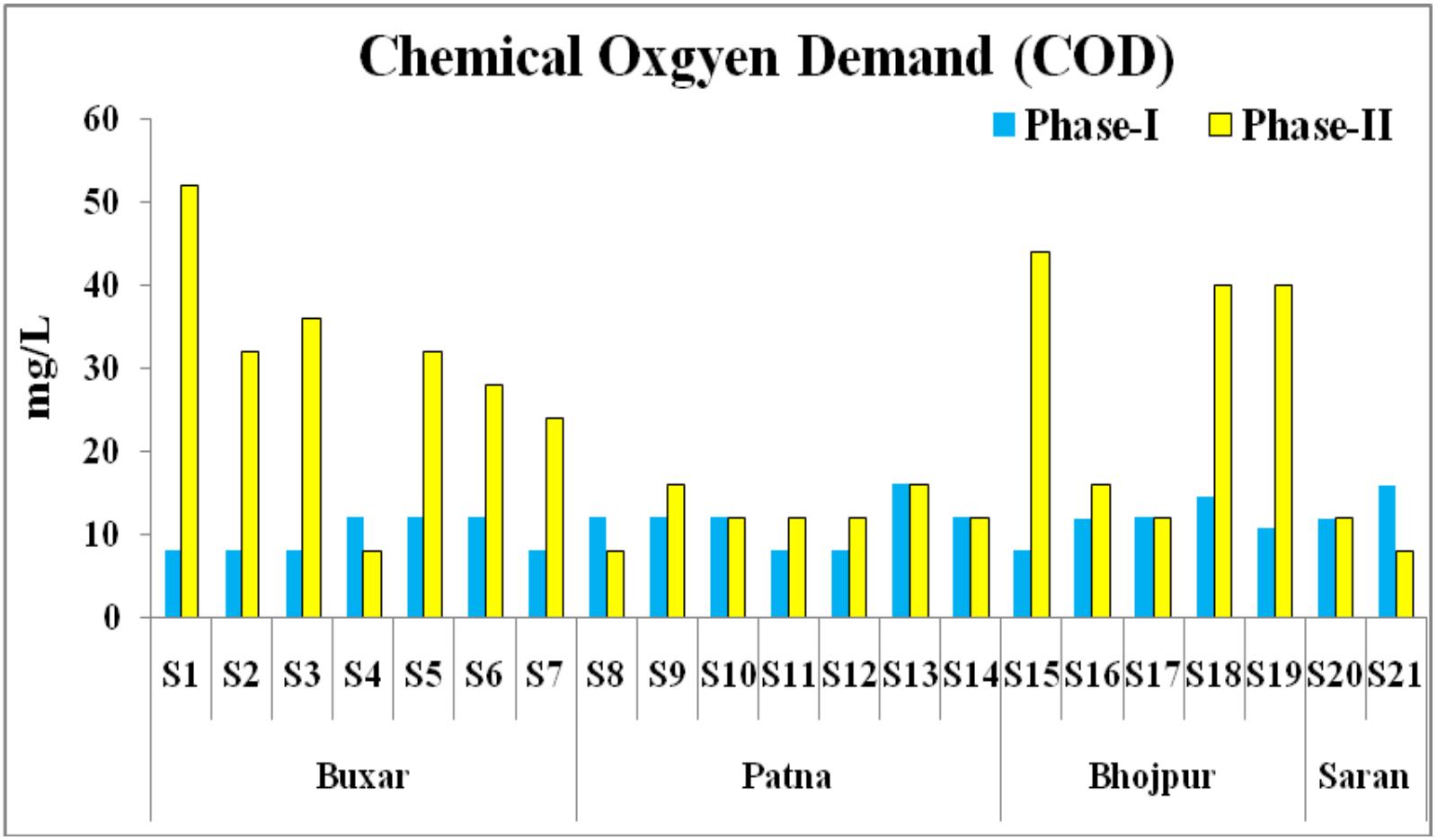
Graphical analysis of Color at sampling locations of river Ganga in Buxar, Patna, Bhojpur and Saran (Bihar)



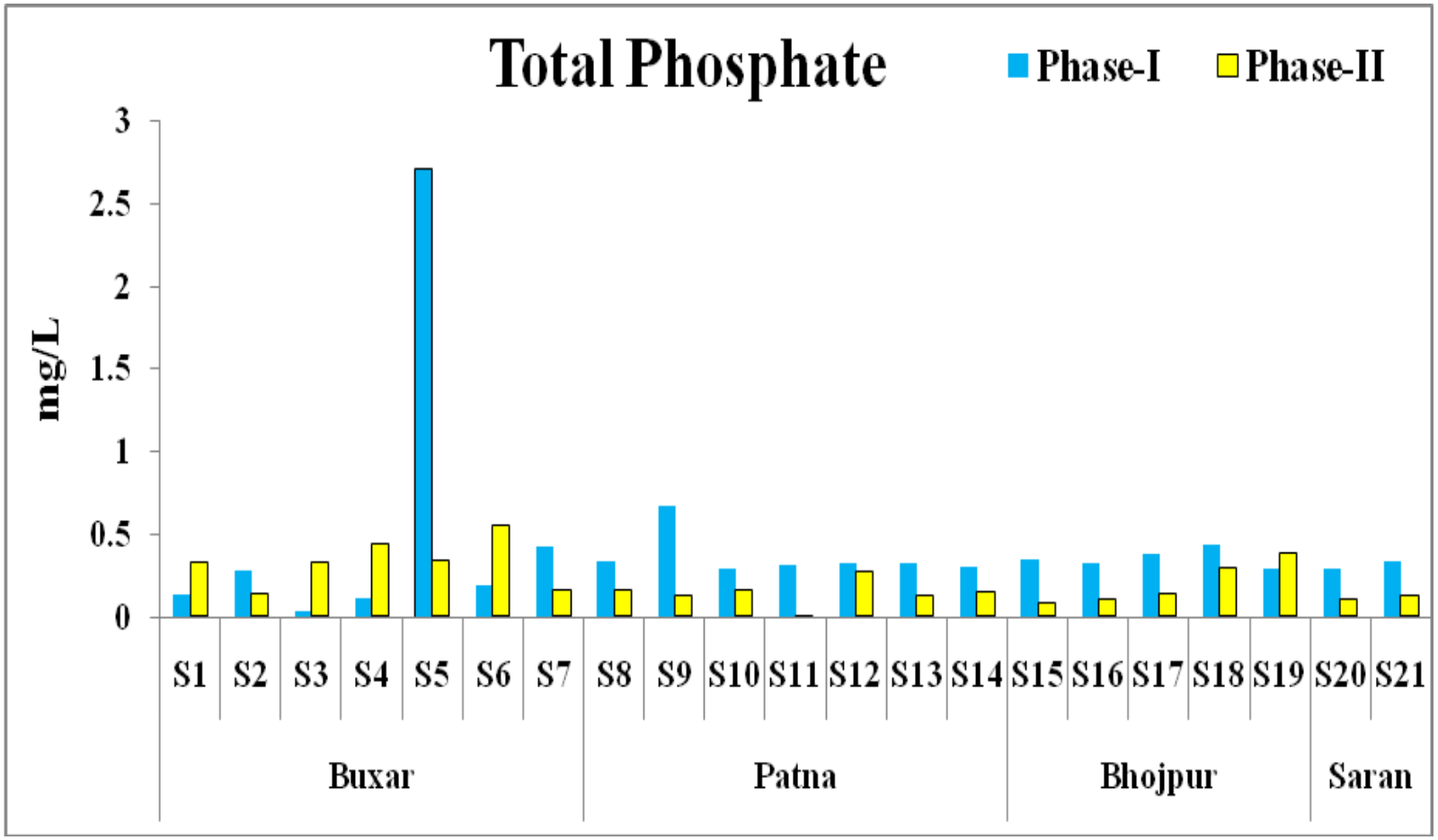
Graphical analysis of Dissloved Oxygen at sampling locations of river Ganga in Buxar, Patna, Bhojpur and Saran (Bihar)



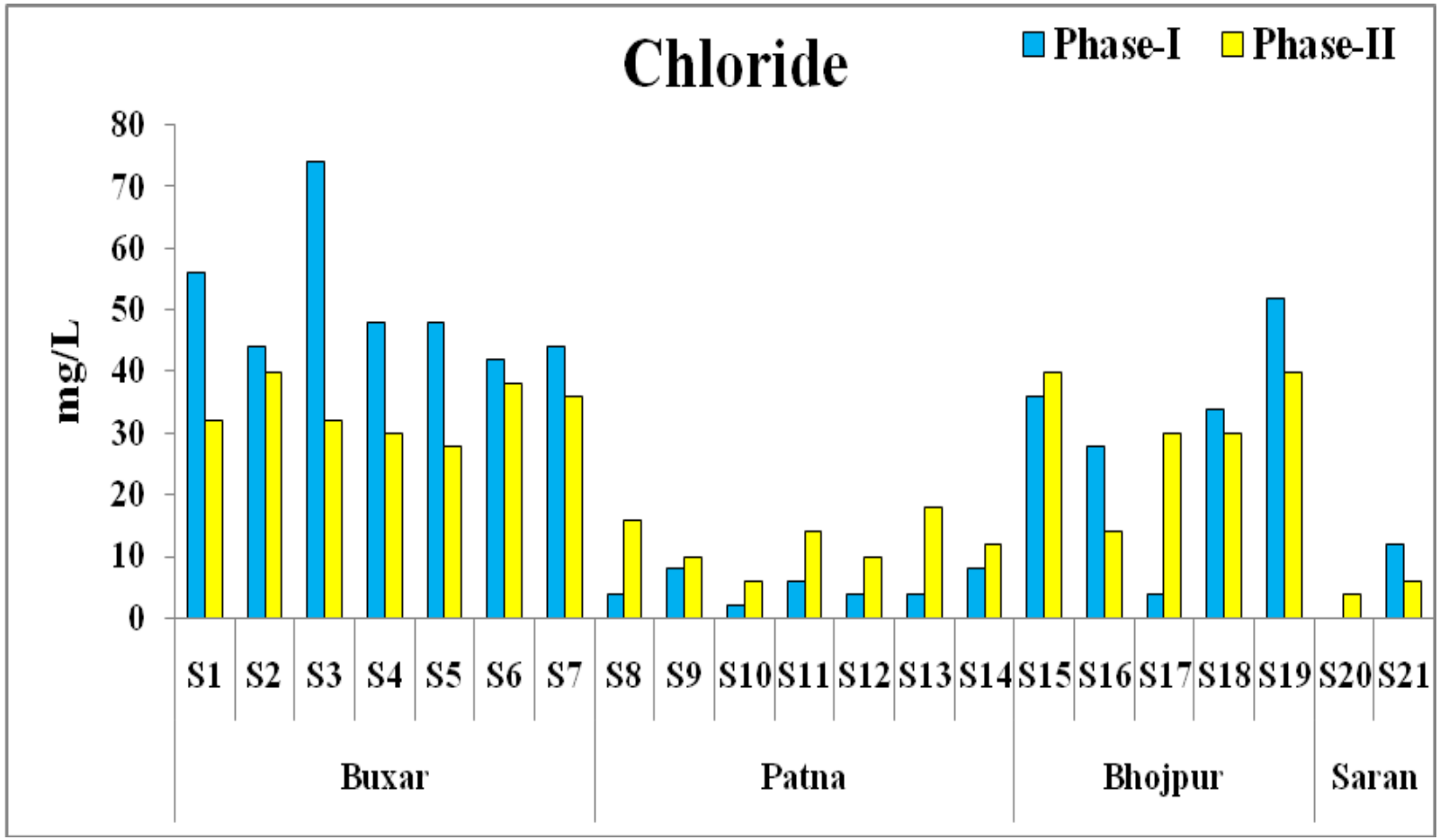
Graphical analysis of Biochemical Oxygen Demand at sampling locations of river Ganga in Buxar, Patna, Bhojpur and Saran (Bihar)



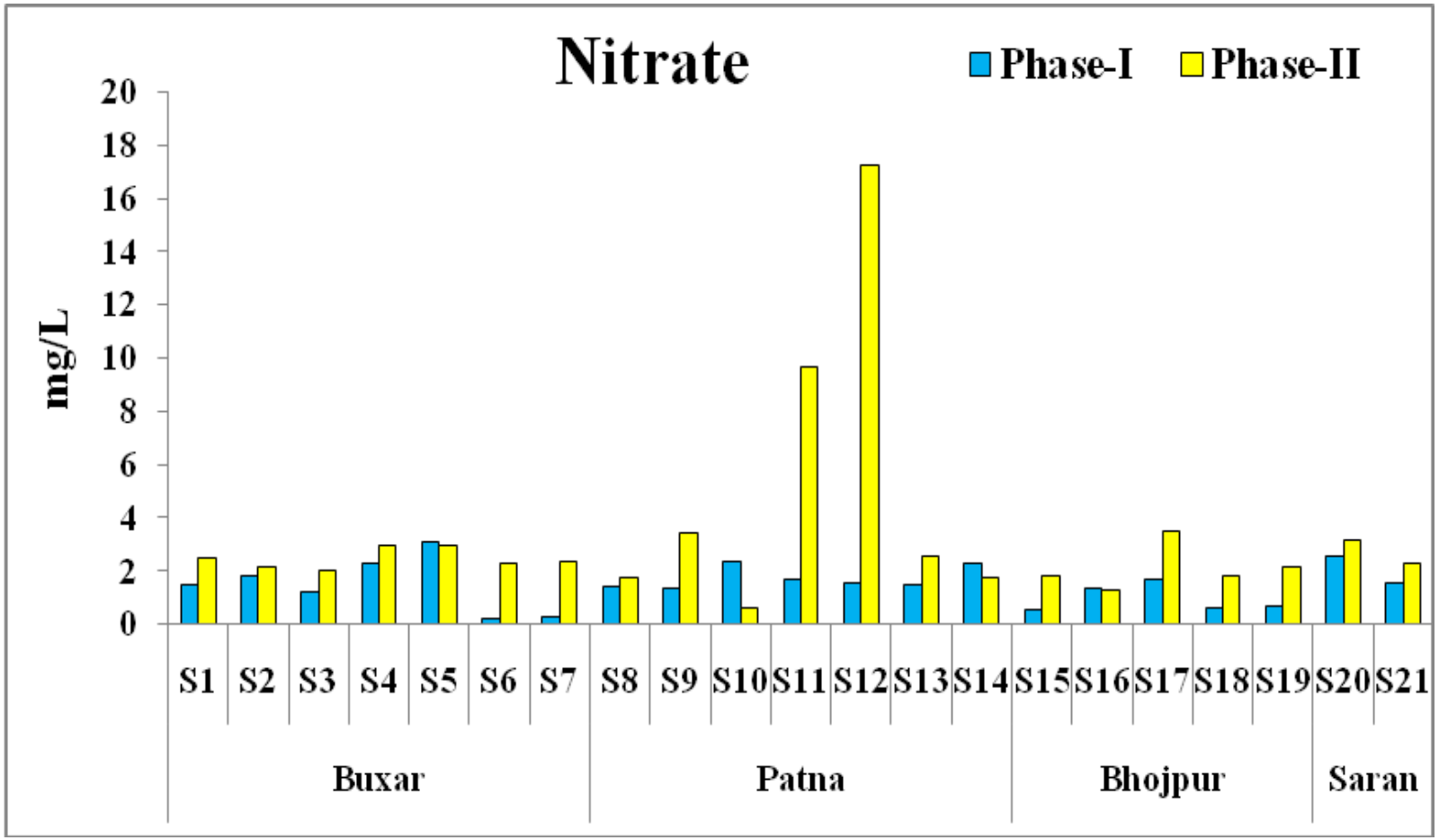
Graphical analysis of Chemical Oxygen Demand at sampling locations of river Ganga in Buxar, Patna, Bhojpur and Saran (Bihar)



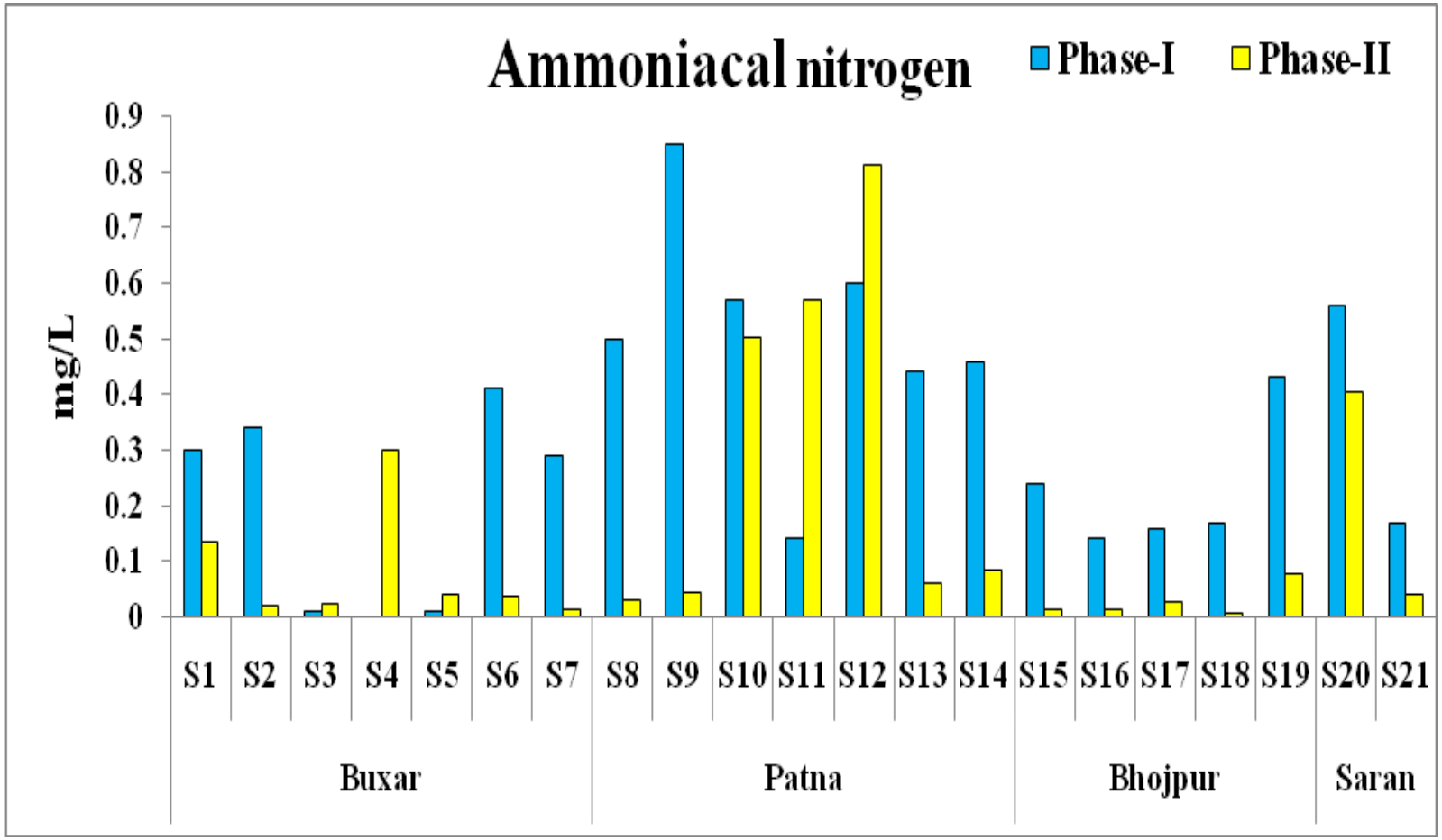
Graphical analysis of Total Phosphate at sampling locations of river Ganga in Buxar, Patna, Bhojpur and Saran (Bihar)



Graphical analysis of Chloride at sampling locations of river Ganga in Buxar, Patna, Bhojpur and Saran (Bihar)



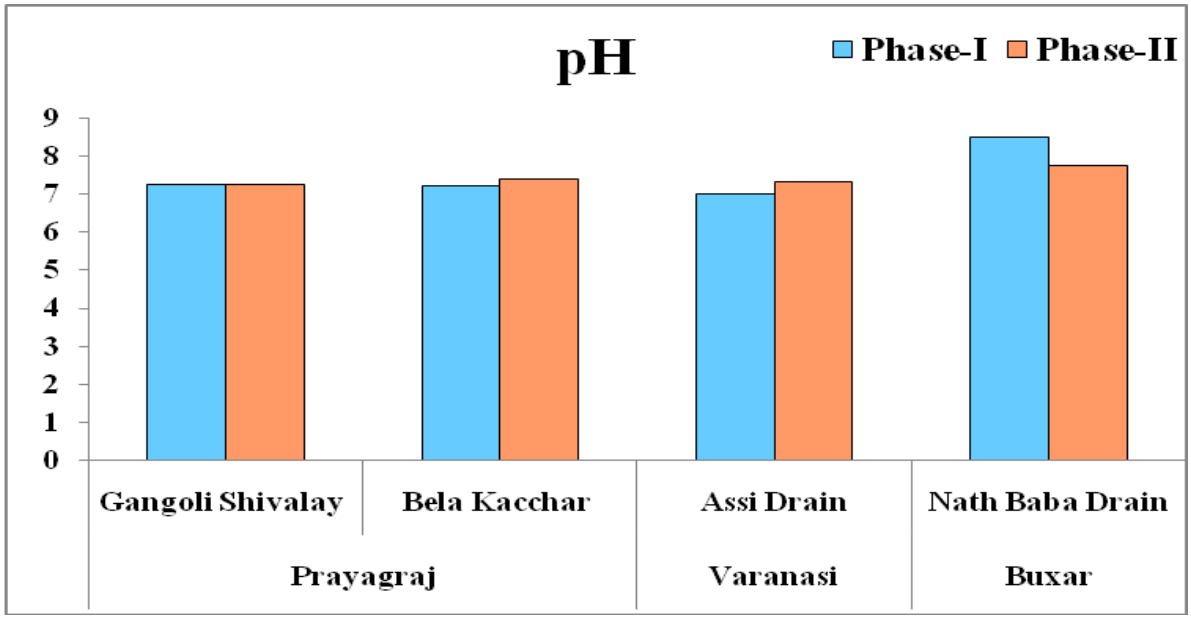
Graphical analysis of Nitrate at sampling locations of river Ganga in Buxar, Patna, Bhojpur and Saran (Bihar)

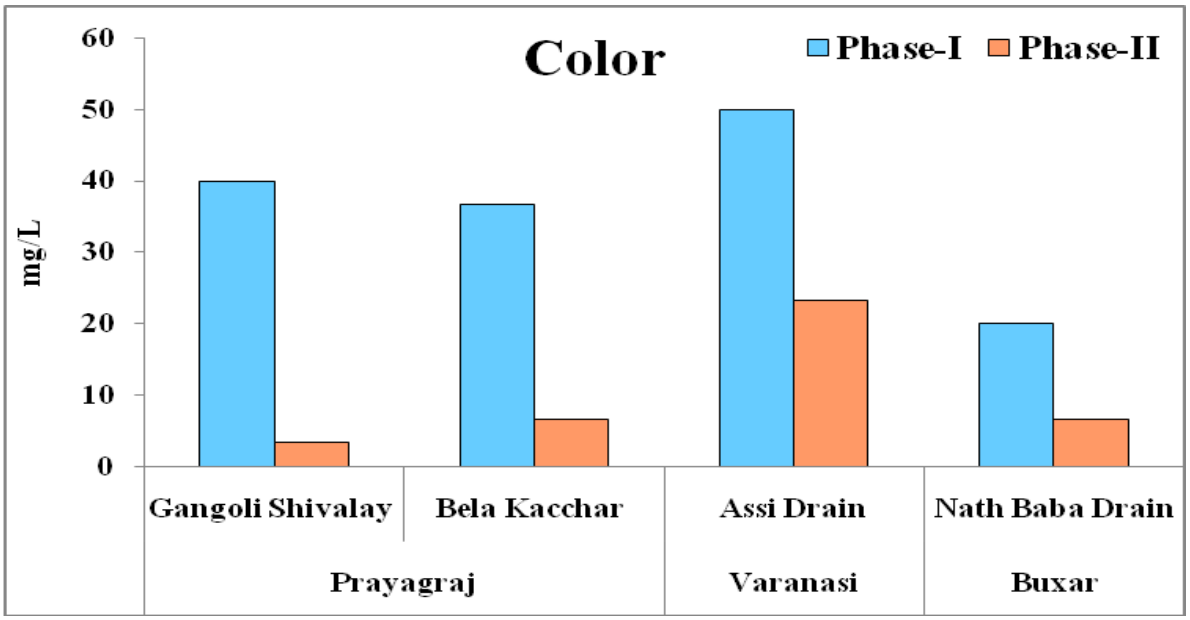


Graphical analysis of Ammoniacal nitrogen at sampling locations of river Ganga in Buxar, Patna, Bhojpur and Saran (Bihar)

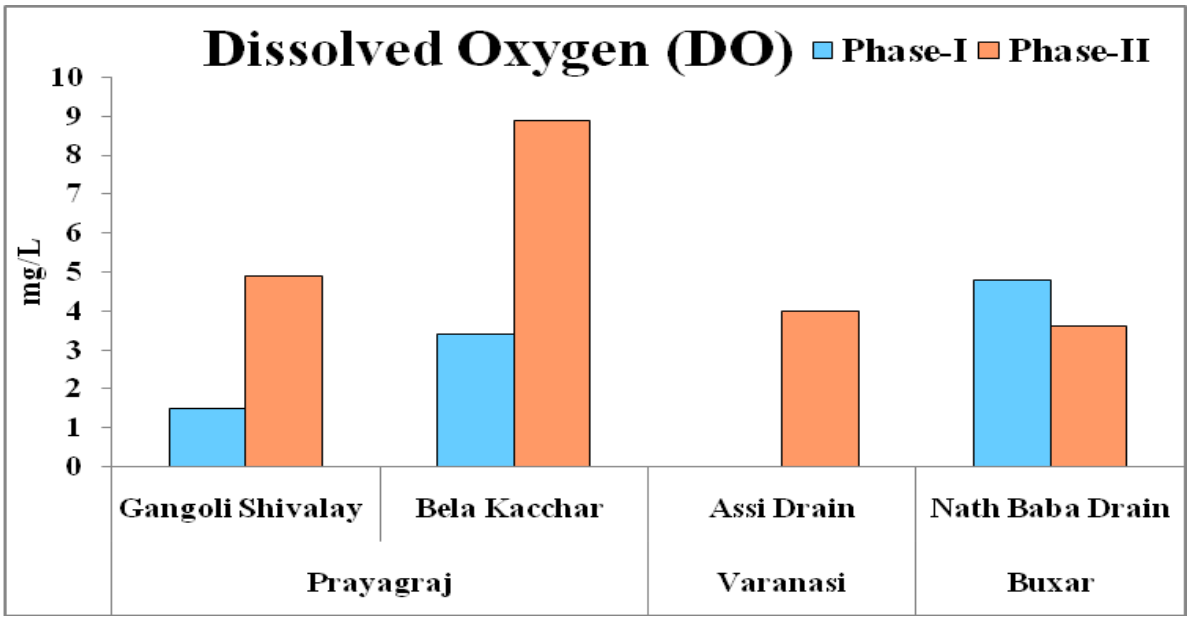
Sample	Location Site	Sample	Location Site	Sample	Location Site
Buxar		**Patna**		**Bhojpur**	
S1	City Control	**S8**	City control ,	**S15**	City control
S2	Jail Ghat	**S9**	GaiGhat main site	**S16**	Ara-Chapra road bridge
S3	Jail Ghat Horizontal	**S10**	GaiGhat Horizontal	**S17**	Ara-Chapra road bridge Horizontal
S4	Ram Rekha Ghat	**S11**	GaiGhat down stream	**S18**	Mauzampur Ghat
S5	Ram Rekha Ghat Horizontal	**S12**	GaiGhat up stream	**S19**	Mauzampur Ghat Horizontal
S6	Chausa Ghat	**S13**	Khurji digha Ghat	**Saran**	
S7	Chausa Ghat Horizontal	**S14**	Khurji digha Horizontal	**S20**	Doriganj near baluGhat
				S21	Doriganj near baluGhat Horizontal

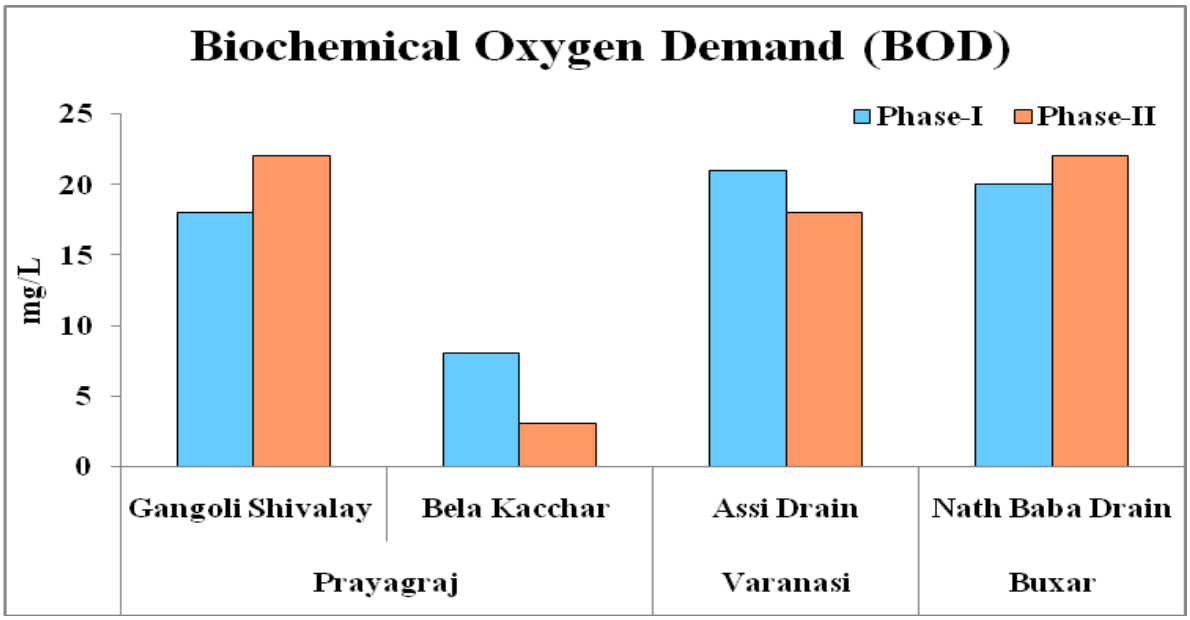
Assessment of drains in Uttar Pradesh and Bihar: Water quality parameters



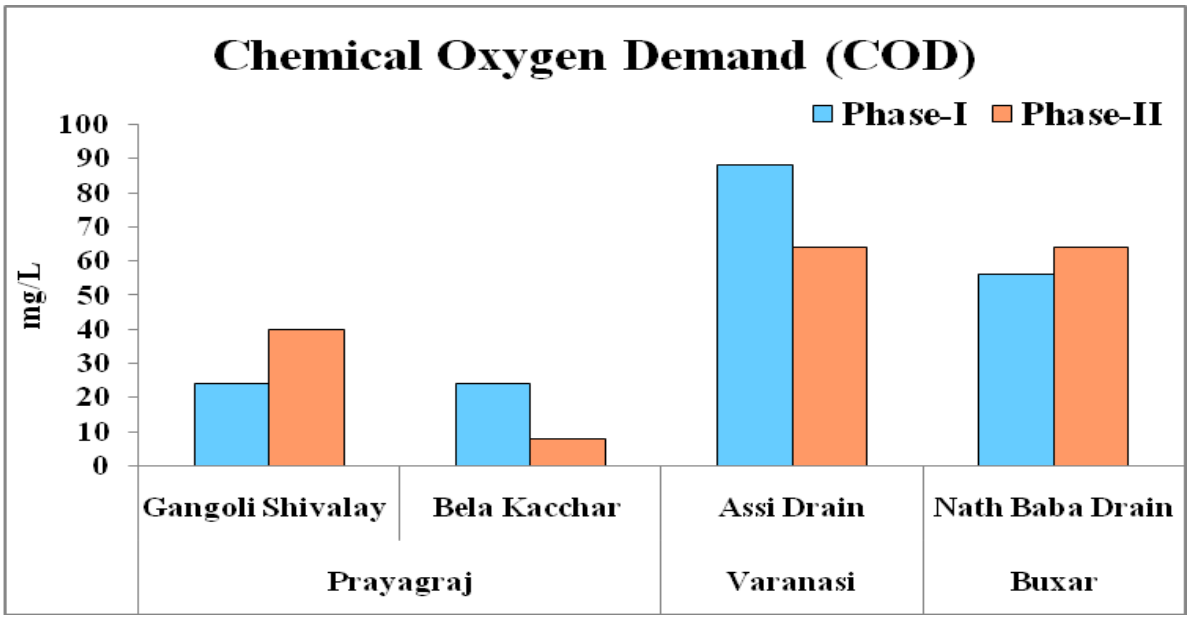


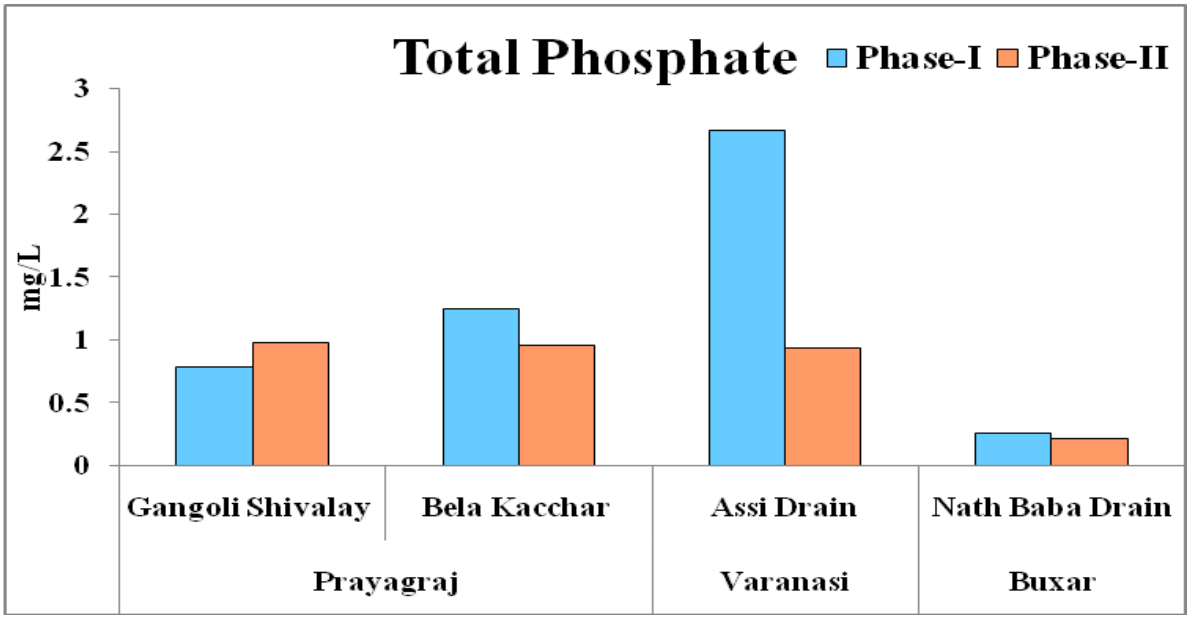
Graphical analysis of pH and Color at sampling locations of Drains in Prayagraj, Varanasi in Uttar Pradesh and Buxar in Bihar



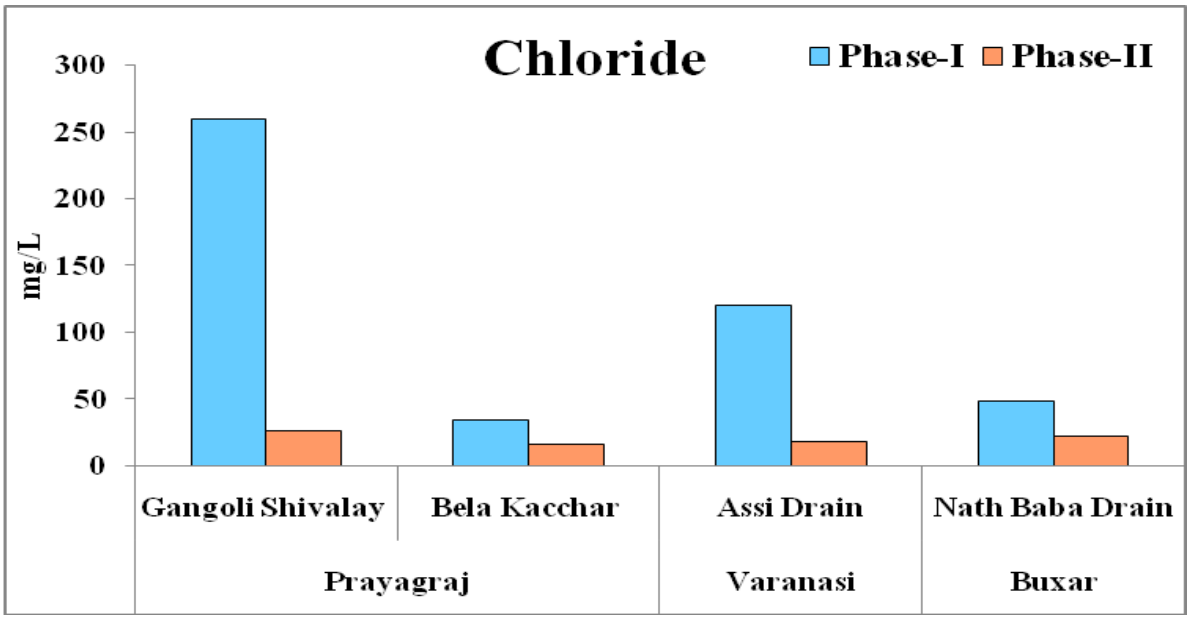


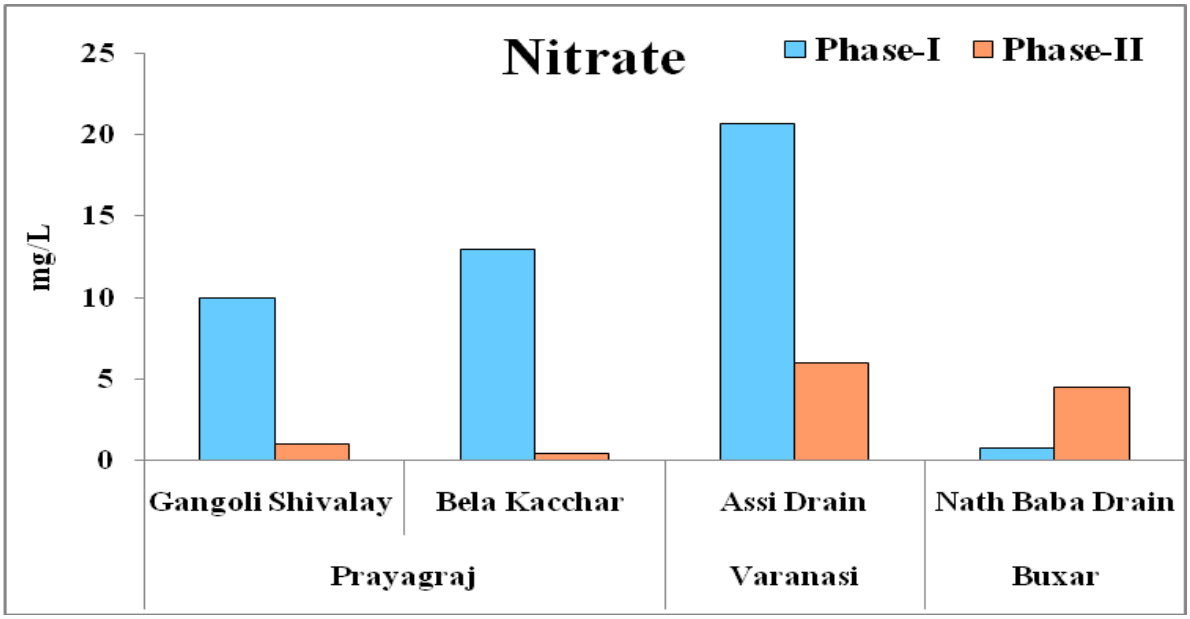
Graphical analysis of Dissolved Oxygen and Biochemical Oxygen Demand at sampling locations of Drains in Prayagraj, Varanasi in Uttar Pradesh and Buxar in Bihar



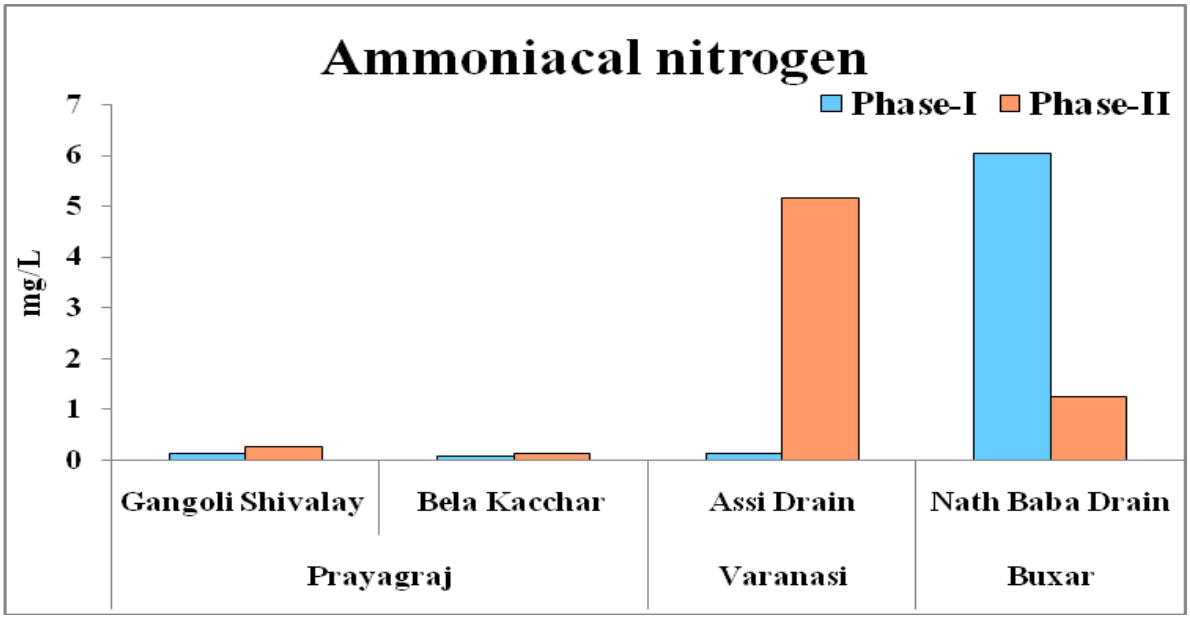


Graphical analysis of Chemical Oxygen Demand and Total Phosphate at sampling locations of Drains in Prayagraj, Varanasi in Uttar Pradesh and Buxar in Bihar





Graphical analysis of Chloride and Nitrate at sampling locations of Drains in Prayagraj, Varanasi in Uttar Pradesh and Buxar in Bihar



Graphical analysis of Chloride and Nitrate at sampling locations of Drains in Prayagraj, Varanasi in Uttar Pradesh and Buxar in Bihar

5. SUMMARY

- **SARS-CoV-2:** The water samples collected from the river Ganga at Kannauj, Unnao, Kanpur, Prayagraj, Mirzapur, Varanasi, Buxar, Hamirpur, Ghazipur, Ballia, Patna, Saran and Bhojpur were analyzed for detection of SARS-CoV-2 virus. Of total of 132 samples (378 sample triplicates/ 1134 technical triplicates) analyzed, none of the sample was found positive for presence of SARS-CoV-2 virus.

- **Color:** The color of water influences the photosynthesis process due to differential penetration of light, energy budget, stratification due to thermal gradients, and the aesthetic appearance of the aquatic ecosystems (Rana., 2021). Color of river Ganga in Uttar Pradesh and Bihar ranged between 3.33-16.67 Hazen Units and 3.33-10.0 Hazen units respectively during phase 1 and between 3.33-13.33 Hazen Units and 3.33-20.0 respectively during phase 2.

- **pH** is a measure of the relative amount of free hydrogen and hydroxyl ions in the water. Water that has more free hydrogen ions is acidic, whereas water that has more free hydroxyl ions is basic. Since pH can be affected by chemicals in the water, pH is an important indicator of water that is changing chemically. Optimal pH range for sustainable aquatic life is pH 6.5-8.2 (Matta., 2014). pH of river Ganga ranged between 7.17-8.47 in Uttar Pradesh and 6.83-8.5 in Bihar during phase-1 whereas during phase 2 it ranged from 6.89-8.54 in Uttar Pradesh and 7.56-7.95 in Bihar.

- The **dissolved oxygen** reveals changes occur in the biological parameters due to aerobic or anaerobic phenomenon and signifies the condition of the river/ streams water for the purpose of the aquatic as well as human life. The aquatic life gets disturbed due to low values of DO. As per the standards proposed by US EPA (1986) and CPCB the range of DO lies between 4 to 6 mg/L ensures better aquatic life in the water body (Gupta et al., 2017). During the study DO values was present

between 3.7-10.4 mg/L in Uttar Pradesh and 7.2-10.7 mg/L in Bihar during Phase 1, whereas during Phase-2 it ranged between 2.9-8.8 mg/L in Uttar Pradesh and 4.7-8.5 mg/L in Bihar.

- **BOD** (Biochemical Oxygen Demand) is the amount of dissolved oxygen, expressed in milligrams of oxygen per litre of water, consumed by micro-organisms to decompose the organic matter present in water. Large quantities of organic matter (microbes and decaying organic waste) in water are a potential risk to aquatic ecosystems and human health. The effluents disposed by domestic and industries into the surface and ground water contaminate the quality of the water which can be assessed by BOD determination. According to WHO drinking water standard, BOD should not exceed 6 mg/L. 3 mg/L is the maximum BOD for fisheries (Gupta et al., 2017). During the study BOD values was present between 3.4-14.0 mg/L in Uttar Pradesh and 3.0-6.0 mg/L in Bihar during Phase 1, whereas during Phase-2 it ranged between 3.0-28.0 mg/L in Uttar Pradesh and 3.3-16.0 mg/L in Bihar.

- **COD** is the measurement of total oxygen required to oxidize all biologically available and inert organic matter into carbon dioxide and water. It is expressed in milligrams/grams per liter, which indicates the mass of oxygen consumed per liter of solution. COD values during Phase-1 study in Uttar Pradesh and Bihar were between 8.0-40.0 mg/L and 8.0-16.0 mg/L respectively whereas during Phase-2 it was present between 7.2-88.0 mg/L in Uttar Pradesh and 8.0-52.0 mg/L in Bihar.

- **Phosphate** may occur in surface water as a result of contamination from domestic sewage, detergents, and agricultural effluents with fertilizers (Khatoon et al., 2013). The increase in phosphorus concentrations in the rivers leads to eutrophication and depletion of dissolved oxygen concentrations (Gupta et al., 2017). The limit for Total phosphate is 0.1 mg /L (US EPA, 1986; Gupta et al., 2017). Total Phosphate of river Ganga ranged between 0.06-0.9 mg/L and 0.03-2.71

mg/L during phase-1 in Uttar Pradesh and Bihar whereas during phase-2 the values ranged between 0.08-0.98 mg/L and 0-0.55 mg/L in Uttar Pradesh and Bihar, respectively.

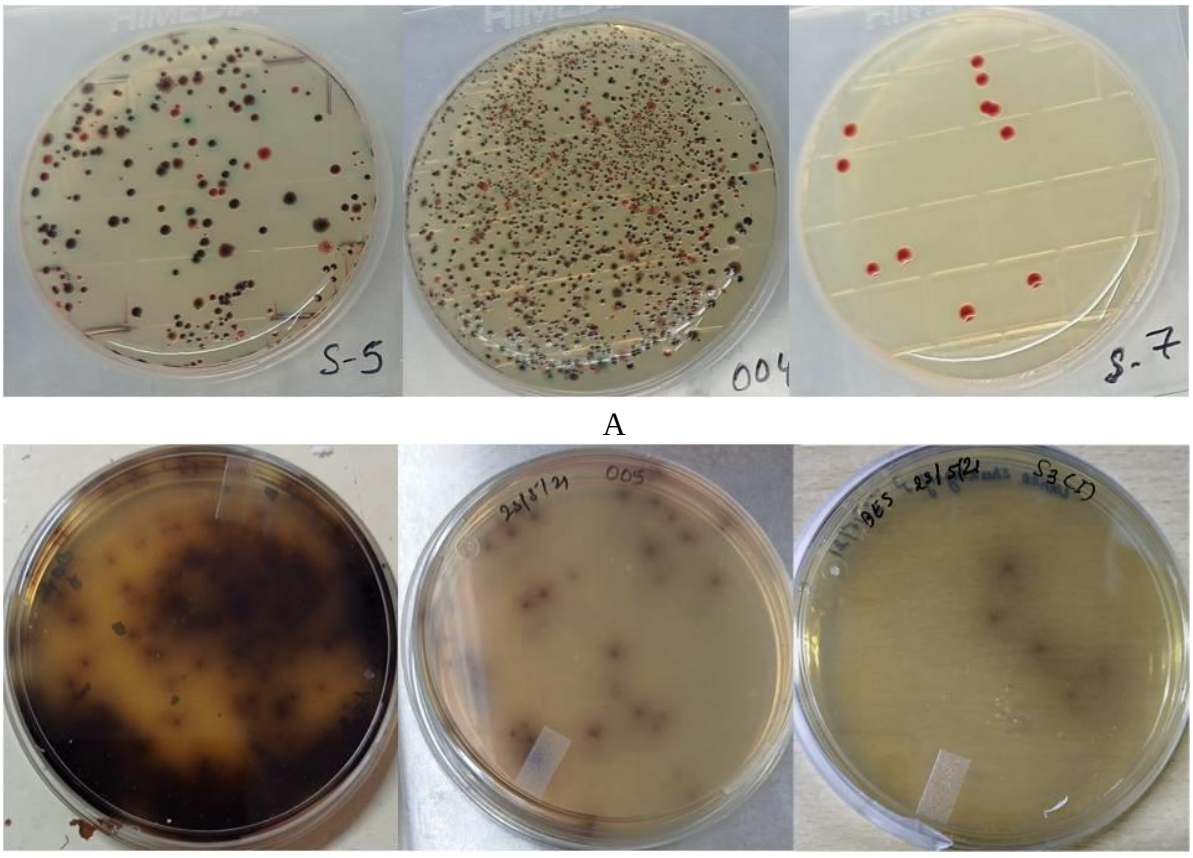
- The **chloride** ion is highly mobile and concentrations in water are not affected by chemical reactions. Hence chloride does not biodegrade, readily precipitate, volatilize, or bioaccumulate. High chloride concentration in water are not known to have toxic effects on human although large amount may act corrosively on metal pipes and be harmful to plant life. Chlorides are present in both fresh and salt water, and are essential elements of life. Chlorides can also enter a watershed through water softener discharge or sewage contamination (Shukla et al., 2018). Chloride of river Ganga in Uttar Pradesh and Bihar ranged between 11.99-239.92 mg/L and 1.99-73.98 mg/L respectively during phase 1 and between 6.0-209.9 mg/L and 4.0-39.9 mg/L respectively during phase 2.

- **Nitrates** are the most thermodynamically stable and non-toxic form of inorganic nitrogen as it is the end product of the aerobic decomposition of the organic nitrogenous. The nitrate concentration in the surface water may reach to elevated levels due to agricultural runoff, oxidation of nitrogenous waste products in human and animal excreta and refuse dump runoff. The excess nitrogen transported as nitrate-nitrogen to rivers leads to eutrophication and episodic and persistent hypoxia (Rana., 2021). Nitrate of river Ganga ranged between 0.03-10.98 mg/L in Uttar Pradesh and 0.17-3.09 mg/L in Bihar during phase-1 whereas during phase 2 it ranged from 0.29-24.39 mg/L in Uttar Pradesh and 0.59-17.27 mg/L in Bihar.

- The amounts of ammonia present in water due to landfll leachates or toxic sewage discharge can be found through measurement of **Ammoniacal nitrogen**. High levels of Ammoniacal nitrogen can be fatal to both aquatic life and humans. Accumulation of algae in water may contribute to

eutrophication and thus may be the reason for high levels of ammoniacal nitrogen in water (Khatri et al., 2020). Ammoniacal nitrogen of river Ganga ranged between 0-1.06 mg/L in Uttar Pradesh and 0-0.85 mg/L in Bihar during phase-1 whereas during phase 2 it ranged from 0.01-3.57 mg/L in Uttar Pradesh and 0.01-0.81 mg/L in Bihar.

Bacteriological parameters: Coliforms are indicators of fecal pollution. Discharge of untreated sewage and wastewater is the main source of fecal contamination in the river. In the study the coliforms were present at all the sites but their distribution varied along the entire stretch of the river in Uttar Pradesh and Bihar. Fecal *Streptococci* were detected only at few sites during phase-1 whereas during phase-2 Fecal *Streptococci* were present at most of the sites**.**



A

B

Figure 3: Presence of A-Coliforms (red to maroon colonies) and *E.coli* (bluish-purple colonies) on Hi Touch^{TM} *E.coli* / Coliform Count Flexi Plate and, B- Fecal *Streptococci* (brownish black colonies with brown halos) on Bile Esculin Azide Agar plate isolated from river Ganga

6. Executive summary

Based on the analysis report of CSIR-IITR on river Ganga the following observations were drawn:

1. The study was conducted primarily for **evaluation of water quality** and **detection of SARS-CoV-2** virus contamination due to disposal of dead bodies in river Ganga.
2. Water quality of the river was analyzed for **SARS-CoV-2 virus** and various **physico-chemical and bacteriological properties.**
3. The water samples collected from the river Ganga at Kannauj, Unnao, Kanpur, Prayagraj, Mirzapur, Varanasi, Buxar, Hamirpur, Ghazipur, Ballia, Patna, Saran and Bhojpur were analyzed for detection of SARS-CoV-2 virus. Of total of 132 samples (378 sample triplicates/ 1134 technical triplicates) analyzed, **none of the sample was found positive** for presence of SARS-CoV-2 virus.
4. During both phase-1 and phase-2 studies **pH of river Ganga was found within the prescribed limits (6.5-8.5) in Uttar Pradesh and Bihar**.
5. During Phase-1 the values of color in most of the sites of **Uttar Pradesh indicated that the water is unfit for outdoor bathing** but was found (≥10 Hz) suitable for propagation of aquatic life whereas during phase-2 the color of water samples collected **from Tari Ghat, Ghazipur and Assi Ghat, Varanasi** were found **unfit for outdoor bathing**.
6. In Bihar, during phase-1 the color was found within the prescribed limits whereas in phase-2 water samples from **Chausa Ghat, Buxar** was found **unfit for outdoor bathing**.
7. **DO was found within the prescribed limits (5 mg/L) in Uttar Pradesh and Bihar**.
8. During both the phases **BOD** of river Ganga was found **beyond the acceptable limits** in most of the sites in Uttar Pradesh and Bihar states.

9. There is no specified standard for phosphate, ammoniacal nitrogen and COD as per BIS 2296:1982 whereas desirable limit for Nitrate and Chloride in drinking water is 50 mg/L and 600 mg/L, respectively. In the study, **none of the samples exceeded the prescribed drinking water standards for Nitrate and Chloride**.
10. During the entire study ***E.coli*** **colonies were present at all the sites**. Fecal *Streptococci* were detected only at few sites during phase-1 whereas during phase-2 Fecal *Streptococci* were present at most of the sites.
11. **The water samples collected from the river Ganga at Kannauj, Unnao, Kanpur, Prayagraj, Mirzapur, Varanasi, Hamirpur, Ghazipur and Ballia, Buxar, Patna, Saran and Bhojpur were found negative for SARS-CoV-2 virus infection**.

The river Ganges is a sacred river of the nation and holds a high cultural esteem among the Hindu population of the country. The river is the main source of water for domestic as well as irrigation purposes. The large number of deaths due to persisting pandemic situations, led to disposal of the dead bodies in the rivers. Dead bodies being buried along the banks and floating in river Ganga has been reported in major cities with the fear of spreading SARS-CoV-2. Keeping in view of this alarming situation, various government authorities such as NMCG, CPCB, SPCB and specialized virology testing institutes joined hands and initiated the investigation of SARS Cov-2 virus contamination and analysis of water quality due to disposal of dead bodies in river Ganga.

The study was divided into two phases i.e., Phase-I and Phase-II. The investigation concluded that in each sampling sites the water quality was found to deviate from the standard norms. However, the overall water quality was not affected. The analysis report also shows that SARS-CoV-2 was not detected in any of the sites. Thus, it can be concluded that the disposal of dead

bodies did not largely affect the water quality of river Ganga though few of the parameters deviated from the standard norms which may be due to other anthropogenic activities (Annexure-1).

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Annexure 1

Surface water quality criteria for different uses

(Specified by CPCB, 1979 and the Bureau of Indian Standards, 1982)

S. No	Water quality parameter	Characteristic of water body				
		A *	**B ***	**C ***	**D ***	**E ***
1.	Dissolved Oxygen (DO) mg/l (min)	6	5	4	4	3
2.	Biochemical Oxygen Demand (BOD), mg/l (max)	2	3	3	-	-
3.	Total Coliform organisms ** MPN/100ml (max)	50 **	500	5000	-	-
4.	Nitrates (NO_3^-) mg/l (max)	20	-	50	-	-
5.	pH value	6.5-8.5	6.5-8.5	6.5-8.5	6.5-8.5	6.0-8.5
6.	Chlorides (as Cl^-) mg/l (max)	250	-	600	-	600
7.	Color, Hazen units (max)	-	10	300	300	-

A- Drinking water source without conventional treatment but after disinfection;
B- Out door bathing (organised);
C- Drinking water source with conventional treatment followed by disinfection;
D- Propagation of wild life, fisheries;
E- Irrigation, industrial cooling, controlled waste disposal

** If the coliform is found to be more than the prescribed tolerance limits, the criteria for coliforms shall be satisfied if not more than 20 percent of samples show more than the tolerance limits specified and not more than 5 percent of samples show values more than 4 times the tolerance limits. There should be no visible discharge of domestic and industrial waste into class "A" waters. In case of classes "B" and "C" the discharge shall be so regulated/ treated as to ensure maintenance of the stream standards.

Drinking Water-Specification

BIS Limit IS 10500:2012

S. no.	Test Parameters	BIS Limit IS 10500:2012	
		Desirable limit	**Permissible limit**
1.	pH value	6.5-8.5	No relaxation
2.	Color, Haxen units, Max	5	15
3.	Dissolved Oxygen (DO)	NS	NS
4.	Biochemical Oxygen Method (COD)	NS	NS
5.	Chemical Oxygen Demand (COD)	NS	NS
6.	Chloride (as Cl), mg/l, Max	250	1000
7.	Phosphate	NS	NS
8.	Nitrate (as NO_3), mg/l, Max	45	No relaxation
9.	Ammoniacal nitrogen	NS	NS
10.	Total Coliforms & Fecal Coliforms	0	0
11.	Fecal *Streptococci*	NS	NS

NS: Not Specified


सीएसआईआर-भारतीय विषविज्ञान अनुसंधान संस्थान
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File. No. 19110/WQ/WQM-II/CPCB/2021-22 1934-1985 **Date: June 10th, 2021**

To,

Member Secretary,
Uttar Pradesh Pollution Control Board,
Building No. TC-12V,
Vibhuti Khand, Gomti Nagar,
Lucknow - 226 010

Member Secretary,
Bihar State Pollution Control Board,
Beltron Bhawan, Shastri Nagar,
Jawahar Lal Nehru Marg,
Patna - 800 023

Sub: Raising awareness among riverside communities regarding measures to prevent disposal of dead bodies into River Ganga and Yamuna as Covid-19 cases surge in the nation and use of river water.

Sir,

As you may kindly be aware, recently the news of floating dead bodies in River Ganga in the stretches of Uttar Pradesh and Bihar and in River Yamuna in the stretch of Uttar Pradesh have been reported amid the surge in coronavirus infection in the country. There is also a speculation that the bodies might be infected with the highly contagious covid-19 virus. The disposal of these dead bodies into the river may lead to spread of various infections and the decomposition of dead bodies in rivers may also affect the river quality. The issue was also discussed by Secretary of Ministry of Jal Shakti with the Chief Secretaries of Uttar Pradesh and Bihar on 15.05.2021 wherein it was decided that CPCB in co-ordination with the SPCBs should issue guidelines or raise awareness with the river side communities on do's/ don't for the use of river water to prevent the spread of infection in current scenario of Covid-19 surge. States should take up awareness drive to educate the riverside communities in districts along Ganga and other tributaries so as to prevent such incidents and also for ensuring health and hygiene of the communities.

In view of above, it is imperative that awareness be raised regarding measures to further prevent disposal of dead bodies into River Ganga and Yamuna as well as use of river water amongst such communities. I would, therefore, request you to direct the concerned district administrations, local bodies, police authorities, stakeholders of the states of Uttar Pradesh and Bihar to conduct the same amongst the communities located on the banks of River Ganga and Yamuna. ***The guideline is enclosed for kind reference.***

It is requested to kindly convey the action taken in this regard.

Encl: As above

Yours faithfully,

10/06/21

(A. K. Vidyarthi)
Additional Director &
Divisional Head, WQM-II

Copy to:

Executive Director (Technical),
National Mission for Clean Ganga (MoWR, RD & GR),
1st Floor, Major Dhyan Chand National Stadium,
India Gate, New Delhi - 110 002

O/C to RA(AD)

केन्द्रीय प्रदूषण नियंत्रण बोर्ड
निर्गत.....
दिनांक.....

Measures to be undertaken to prevent disposal of dead bodies into River Ganga and its tributaries alongwith do's and don'ts regarding the use of river water by river side communities

During the second wave of Coronavirus pandemic in India, bodies of both suspected COVID-19 victims as well as others have been found either floating in the River Ganga and its tributaries or buried along the banks in various districts of Uttar Pradesh and Bihar. However, there is lack of clarity whether a dead body found is infectious for Covid-19. Many experts dismiss the possibility of a dead body posing a Covid-19 risk.

Few reasons for emerging dead bodies in River Ganga and other rivers are:

1. The age-old belief that by emerging remains of dead persons (ashes, partially burned bodies, unburned bodies) in Ganga he/she will attain Mukti.
2. Increasing cost of firewood for pyres. Most middle class and poor people are unable to afford the cost of firewood and the fee charged by the family of persons managing 'shamshaan' ghats.
3. Unavailability of firewood at most of the 'shamshaan' ghats in rural areas.
4. The tradition of emerging bodies of sadhus & sanyasis, children, unmarried women, patients of small pox, dead persons due to snakebite, etc.
5. Emerging of unclaimed dead bodies by police due to extremely low amount of money available to them. This also includes the transportation cost.
6. Poor connectivity and transport facility for carrying firewood to the banks of Ganga.
7. Unavailability of proper and dedicated shamshaan ghats near majority of villages.
8. Declining community and fellow feeling over the years due to various reasons.
9. The fear of getting infected by touching and coming closure to a dead corona patient have started keeping even family members, relatives and neighbours away from the rituals. Earlier villagers used to participate in large number in funeral processions most carrying one or two pieces of firewood to be placed on the pyre as a token of respect towards the dead.

River Ganga and its tributaries is key source of drinking and bathing water as well as finds use in other recreational purposes for many villages, especially by local riverside communities. It is imperative that awareness be raised regarding use of river water amongst such communities. It is because irrespective of being COVID-19 infected or not, dead bodies of unknown persons are considered contagious and have a large number of bacteria and viruses that would only increase pollution levels in Ganga in such case. Also, there is a risk of diarrhoea from drinking water contaminated by faecal material from dead bodies. Dead bodies often leak faeces which may contaminate rivers or other water sources, causing a risk of diarrhoeal illness which adequate treatment of water can prevent. Also, some dead bodies may have chronic blood-borne infections such as hepatitis or HIV, or may have tuberculosis, or other infectious diseases, which can't be ruled out in terms of management as they pose high risks even in handling.

In view of the above, certain interim measures to be emphasized and ensured with respect to **use of river water at locations where dead bodies** are found are:

Do's:

1. To reduce risk of diarrhoea, emphasis must be laid upon washing hands and use river water for drinking purpose only after boiling or after chlorination for 30 minutes of contact time.
2. The same disinfection protocol must be followed in case river water is used for brushing teeth, washing related to preparing food, and making ice, etc.
3. It would be best to avoid river water for on-site bathing and washing purpose. However, if river water is used for on-site bathing or washing purpose, the site should be at least 1-2 km away from the point where dead bodies have been discovered. If putrefying/rotten smell is sensed in water, such sites should be avoided.
4. Precautions must be taken while coming in contact with the bodies alongside River Ganga as it cannot be confirmed whether they are COVID-19 positive or not. They include, avoiding touching the eyes, nose or mouth with unwashed hands, sneezing into one's sleeve, practising physical distancing, etc.
5. Any symptoms such as fever, watery stools, vomiting, cough, cold experienced by any person living in adjoining areas of the riverbank or coming in contact with river water at such sites, should immediately seek medical advice.

Don'ts:

1. Drink river water directly without disinfection.
2. Use river water for washing clothes in the immediate surroundings of the zones where bodies are found.
3. Using onsite river water (without disinfection protocol) for social, cultural and religious purposes.
4. Avoiding any professional or recreational activities such as fishing, boating and tourism at immediate and proximate sites of River Ganga with dead bodies. Even if the fishing is continued from distant regions from sampling sites, it should be cooked properly.

Further, certain measures that could be taken to prevent future incidences or change the overall scenario are:

1. Intensive public awareness programs through TV channels and newspapers (it should be made mandatory for both electronic and print media), involving school children, teachers, PHC staff, Yuvak Mangal Dals, etc. to make the villagers aware about the importance of rivers like Ganga, Yamuna, etc. and the problems likely to be created.
2. Involving NGOs to create public awareness.
3. Authorizing local police, village panchayats, nagar panchayats, etc. to use necessary steps to stop this activity.
4. Construction of crematorium at every village (if large) or cluster of few villages (if small) at a place away from the inhibited area and free from flooding. Such

crematoria should have a hall for people to sit, a few toilets, water supply facility (hand pump, piped supply), and a large open hall with brick-layered floor and GI shade having equally spaced 4 to 6 chimneys over it (the size of this hall and number of chimneys should depend upon population and average death statistics of the village (s). The bodies should be placed on a pyre prepared over iron grates to permit adequate flow of air from all sides). Such grates are popular in several states such as Maharashtra, Gujarat, etc.

5. In most rural areas huge volume of agricultural residue (such as leaves and top portion of sugar cane, rice and wheat stalk, banana leaves and trunks, etc.) are just burnt in the field or left as such. It would be appropriate to collect and convert all such residues and convert them into briquettes. Besides use as domestic fuel, these briquettes can also be used as fuel in crematorium.
6. Help of NGOs may be sought for popularizing use of such briquettes.
7. The village panchayat should have financial support to be used for maintaining the place and running it.

उत्तर प्रदेश प्रदूषण नियंत्रण बोर्ड
UTTAR PRADESH POLLUTION CONTROL BOARD

संदर्भ सं0/ Ref. No. : 46272 /C-2/Sa-542/2021

दिनाँक/ Date : 24.6.21

सेवा में,

उप सचिव,
पर्यावरण, वन एवं जलवायु परिवर्तन विभाग
उ0प्र0 शासन।

विषयः– केन्द्रीय प्रदूषण नियंत्रण बोर्ड द्वारा कोविड–19 महामारी के दौरान उत्तर प्रदेश में शवों को गंगा एवं यमुना नदी में बहाये जाने से रोके जाने हेतु तैयार की गयी गाइलाइन के सम्बंध में।

महोदय,

कृपया केन्द्रीय प्रदूषण नियंत्रण बोर्ड, दिल्ली के पत्र सं0 19110/WQ/WQM-II/CPCB/2021-22 दिनांक 10.06.2021 का संदर्भ ग्रहण करें (प्रति संलग्न)। उक्त पत्र द्वारा सूचित किया गया है कि कोविड–19 महामारी के दौरान उत्तर प्रदेश में गंगा एवं यमुना नदी के स्ट्रेच में शवों को प्रवाहित किये जाने की घटनाये प्रकाश में आयी हैं, जिसे केन्द्रीय प्रदूषण नियंत्रण बोर्ड द्वारा गम्भीरता से लिया गया है। उक्त शवों का कोविड–19 वायरस से ग्रसित होना सम्भावित है। केन्द्रीय प्रदूषण नियंत्रण बोर्ड द्वारा शवों को नदियो में बहाये जाने के कारण नदियों के कैचमेंट क्षेत्र में कोविड–19 वायरस से जनमानस एवं पशुओं में बीमारी फैलने एवं नदियों का जल प्रदूषित होने की आशंका व्यक्त की गयी। प्रकरण के सम्बंध में सचिव, जल संसाधन मंत्रालय द्वारा दिनांक 15.05.2021 को मुख्य सचिव, उत्तर प्रदेश एवं मुख्य सचिव बिहार के साथ बैठक की गयी तथा यह निर्णय लिया गया कि केन्द्रीय प्रदूषण नियंत्रण बोर्ड द्वारा कोविड–19 वायरस के बढते प्रकोप को रोकने के लिये नदी जल के उपयोग के सम्बंध में जागरूकता उत्पन्न करने एवं प्रशिक्षित करने के उददेश्य से गाइडलाइन जारी की जाये। उक्त के अनुकम में केन्द्रीय प्रदूषण नियंत्रण बोर्ड द्वारा गंगा एवं इसकी सहायक नदियों के किनारे स्थित जनपदों में शवों को गंगा/यमुना नदी एवं इसकी सहायक नदियों में प्रवाहित किये जाने से रोकने हेतु तथा नदी के जल के उपयोग के सम्बंध में जागरूकता उत्पन्न करने हेतु गाइडलाइन तैयार कर प्रेषित की गयी है, जोकि इस पत्र के साथ संलग्न है।

अतः गंगा नदी/यमुना नदी एवं इसकी सहायक नदियों में शवों को बहाये जाने से रोकने हेतु केन्द्रीय प्रदूषण नियंत्रण बोर्ड द्वारा जनमानस को जागरूक किये जाने हेतु जारी गाइडलाइन के प्रभावी कियान्वयन सुनिश्चित कराने हेतु सम्बंधित विभागों को आवश्यक कार्यवाही हेतु शासन स्तर से पत्र प्रेषित कराने का कष्ट करें।

भवदीय,

संलग्नक–उपरोक्तानुसार।

(आशीष तिवारी)
सदस्य सचिव

प्रतिलिपि–

1. श्री ए0के0 विद्यार्थी, एडिशनल डायरेक्टर एण्ड डिविजनल हेड, केन्द्रीय प्रदूषण नियंत्रण बोर्ड, दिल्ली को पत्र सं0 19110/WQ/WQM-II/CPCB/2021-22 दिनांक 15.06.2021 के संदर्भ में सूचनार्थ प्रेषित।
2. समस्त क्षेत्रीय अधिकारी, उ0प्र0 प्रदूषण नियंत्रण बोर्ड को इस निर्देश के साथ कि अपने क्षेत्रान्तर्गत आच्छादित नदियों का नियमित रूप से अनुश्रवण सुनिश्चित करें तथा शवों के प्रवाहित होने की घटना प्रकाश में आने पर जिला प्रशासन के सहयोग से आवश्यक कार्यवाही सुनिश्चित करायें।

सदस्य सचिव

टी.सी. - 12 वी, विभूति खण्ड, गोमती नगर,
लखनऊ - 226 010
दूरभाष : 0522-2720828, 2720831
फैक्स : 0522-2720764, 2720676
ई–मेल : info@uppcb.com

T.C.-12 V, Vibhuti Khand, Gomti Nagar,
Lucknow - 226 010
Phone : 0522-2720828, 2720831
Fax : 0522-2720764, 2720676
E-mail : info@uppcb.com
Website : www.uppcb.com

BIHAR STATE POLLUTION CONTROL BOARD
Parivesh Bhawan, N.S.B.-2, Patliputra Industrial Area,
Patliputra, Patna – 800 010

Ref. No.

Patna, dated:

From

S. Chandrasekar, IFS,
Member Secretary,

To

Member Secretary,
Central Pollution Control Board,
Parivesh Bhavan, East Arjun Nagar,
Delhi-110032.

Sub: Raising awareness among riverside communities regarding measures to prevent disposal of dead bodies into River Ganga as Covid-19 cases surge in the nation and use of river water-regarding.

Ref. Central Pollution Control Board's letter no. 19110/WQ/WQM-II/CPCB/2021-2022, dated 10-06-2021

Sir,

With reference to subject cited above, it is to inform that local administrations/ police authorities/ ULBs have been directed to start conducting awareness amongst the communities located on the banks of river on do's/ don't for the use of river water to prevent the spread of infection in current scenario of Covid-19 surge vide this office ref.no. 949, dated-18.06.2021 (copy enclosed).

Encl: As Above.

Yours faithfully

Sd/-

(S Chandrasekar)
Member Secretary

Memo No: 958 Patna, dated:- 18/06/21

Copy to:- Sri A.K. Vidyarthi, Additional Director & Divisional Head WQM-II, Central Pollution Control Board, Parivesh Bhawan, East Arjun Nagar, Delhi-110032 for Information.

18/6/21

(S Chandrasekar)
Member Secretary

EPABX - 0612-2261250/2262265, Fax - 0612-2261050
E-mail-bspcb@yahoo.com, Website - http://bspcb.bih.nic.in

BIHAR STATE POLLUTION CONTROL BOARD
Parivesh Bhawan, N.S.B.-2, Patliputra Industrial Area,
Patliputra, Patna – 800 010

Ref. No. 949 Patna, dated: 18.6.2021

From

S. Chandrasekar, IFS,
Member Secretary,

To

The District Magistrate/Superintendent of Police,
Patna/ Bhojpur/ Buxar/ Saran/ Munger/ Bhagalpur
The Municipal Commissioner/ Executive Officer,
Patna/ Bhojpur/ Saran/ Munger/ Bhagalpur/ Buxar

Sub: Raising awareness among riverside communities regarding measures to prevent disposal of dead bodies into River Ganga as Covid-19 cases surge in the nation and use of river water-regarding.

Ref. Central Pollution Control Board's, letter no. 19110/WQ/WQM-II/CPCB/2021-22, dated-10.06.2021 (Enclosed).

Sir,

With reference to subject noted above and Central Pollution Control Board's letter under reference, it is to inform that news of floating dead bodies in river Ganga in the stretch of Bihar have been reported amid the surge in coronavirus infection in the country. This issue was also discussed by Secretary of Ministry of Jal Shakti with the Chief Secretary of Bihar on 15.05.2021 wherein it was decided that Central Pollution Control Board in co-ordination with the State Pollution Control Board should issue guidelines or raise awareness with the river side communities on do's/ don't for the use of river water to prevent the spread of infection in current scenario of Covid-19 surge. It is imperative that awareness be raised regarding measures to further prevent disposal of dead bodies into river Ganga as well as use of river water amongst such communities.

It is, therefore, requested to conduct the awareness amongst the communities located on the banks of river Ganga. The guideline is enclosed for kind reference.

Encl: As Above.

Yours faithfully

18/6/21

(S. Chandrasekar)
Member Secretary

EPABX - 0612-2261250/2262265, Fax - 0612-2261050
E-mail-bspcb@yahoo.com, Website - http://bspcb.bih.nic.in

Speed Post/E-mail

F. No. PJ-14014(12)/5/2021-WQM-II-HO-CPCB (Weekly Kanpur)/ 9492 Date: 06/12/2021

To,

Member Secretary,
Uttar Pradesh Pollution Control Board,
Building No. TC-12 V, Vibhuti Khand,
Gomti Nagar, Lucknow - 226010,
Uttar Pradesh

Sub: Pollution in river Ganga and adjoining drains in Kanpur-Unnao region– reg.

Sir,

Central Pollution Control Board (CPCB) along with Uttar Pradesh Pollution Control Board (UPPCB) carried out weekly monitoring of rivers (Ganga and Pandu) and 24 drains (Kanpur-22 and Unnao-02) under PMO direction from 19/03/2019 to 17/03/2020 (total 53 rounds of sampling carried out) and the monitoring was suspended thereafter due to COVID-19 pandemic. The weekly monitoring of river and drain was resumed from 05/10/2021 onwards. Based on the weekly monitoring data of drains (Kanpur-23 and Unnao-02) and rivers (Ganga-08 and Pandu-01) carried out during Oct 05th – 20th, 2021 (data attached at Annexure-I), following observations are made:

- Out of 25 drains monitored in Kanpur (23) and Unnao (02), 19 drains have gradient towards river Ganga (17 in Kanpur and 02 in Unnao) and 06 drains have gradient towards river Pandu.
- In Kanpur, out of 17 drains discharging wastewater into river Ganga in Kanpur, 11 drains were tapped and 06 were untapped. Out of 11 tapped drains, 06 drains were found dry namely Sisamau drain, Parmath drain, Police line drain, Jail drain, Air force drain and Wazidpur drain and overflow was observed in 05 drains namely Budhiya Ghat drain, Permiya/HBTI drain (0.49 MLD), Muir Mill drain, Dabka drain and Bhagwatdas Ghat drain (17.1-36.49 MLD). Wastewater from these drains showed characteristics of domestic wastewater with Bio-chemical Oxygen Demand (BOD) as 32.5-233.1 mg/l, Chemical Oxygen Demand (COD) as 71.6-431.3 mg/l, Color as 30-75 Hazen and total Chromium as < 0.2 mg/l.
- Out of 06 untapped drains, wastewater from 04 drains namely Ranighat Drain (1 MLD), Golaghat drain, Satti Chaura Drain and Rooma drain (28.4-48.4 MLD) showed characteristics of domestic wastewater (BOD as 25.3-127 mg/l, COD as 67.8-370 mg/l, Color as 40-100 Hazen, and total Chromium as 0.39-1.25 mg/l) and sample from 01 drain namely TAFCO drain could not be collected due to backflow of river Ganga. However, wastewater (Flow-13.8 MLD on 05.10.2021) from 01 drain namely Sheetla Bazar drain

was flowing into river Ganga with BOD as 688-1190 mg/l, COD as 1682-2403 mg/l, Color as 200-750 Hazen and total Chromium as 9.8-24 mg/l which indicates illegal discharge from tannery units into Sheetla Bazar drain.

- Water quality of river Ganga was meeting the primary water quality criteria for bathing w.r.t. pH and Dissolved Oxygen (DO) at all eight monitoring locations in the stretch from Bithoor to Fatehpur. However, in terms of BOD & Faecal Coliform (FC), the water quality of River Ganga was not meeting bathing water quality criteria during most occasions at all monitoring locations except one location namely River Ganga b/c with River Pandu, Dhondhiya Khera where BOD was found < 3 mg/l. During river monitoring carried out on 20.10.2021, high BOD ranged between 11.9 -14.2 mg/l were observed in river Ganga in the stretch from Bithoor to Rajapur village.

To maintain the water quality of river Ganga at Kanpur, you are requested to take effective action against polluting activities in drains of Kanpur. Following necessary actions are required to be taken immediately:

1. UPPCB shall identify the tannery units which are illegally discharging untreated wastewater into Sheetla Bazar drain and take appropriate action against defaulter tannery units which may include closure or levying Environmental Compensation as deemed fit following appropriate procedure.
2. UPPCB shall direct concerned authorities to ensure that broken/damaged tapping provisions in drains shall be repaired immediately and take necessary measures for proper functioning of sewage pumping stations so that no wastewater is being discharged through tapped drains.
3. UPPCB shall direct concerned authority for immediate removal of solid waste dumped along the drains namely Satti Chaura drain, Permiya drain and Police Line drain and to dispose it safely. UPPCB shall also identify source of solid waste dumped in to drains and take action if any industrial unit is disposing solid waste into drains or on its bank.
4. UPPCB shall take immediate necessary action to effectively control all polluting sources responsible for pollution in river Ganga in stretch from Bithoor to Fatehpur.

You are, therefore, requested to look into the matter and direct the concerned officials to ensure implementation of necessary measures. Action taken report may kindly be provided to CPCB within 15 days of issuance of this letter.

Yours faithfully,

Encl: As above

06/12/21

(A. K. Vidyarthi)
Additional Director & DH, WQM-II

Copy to:

1. Executive Director (Technical), : For kind information and necessary action, please.
   National Mission for Clean Ganga (MoWR, RD & GR),
   1st Floor, Major Dhyan Chand National Stadium,
   India Gate, New Delhi - 110002

2. Project Director, : For kind information and necessary action, please.
   State Mission for Clean Ganga – Uttar Pradesh,
   Plot No. 18, Sector 07, Gomti Nagar Extension,
   Lucknow - 226 010, Uttar Pradesh

3. Joint Managing Director (Ganga), : For kind information and necessary action, please.
   Uttar Pradesh Jal Nigam,
   6, Rana Pratap Marg
   Lucknow – 226001, Uttar Pradesh

4. District Magistrate, : For kind information and necessary action, please.
   Kanpur Nagar,
   DM Office, Collectorate, Civil Lines,
   Kanpur – 208001, Uttar Pradesh

5. Municipal Commissioner : For kind information and necessary action, please.
   Kanpur Nagar Nigam
   Moti Jheel,
   Kanpur, Uttar Pradesh 208002

6. Regional Director, : For kind information and follow up, please.
   Regional Directorate (North),
   Central Pollution Control Board,
   PICUP Bhawan, Vibhuti Khand, Gomti Nagar,
   Lucknow - 226 010, Uttar Pradesh

7. Regional Officer (Kanpur), : For kind information and necessary action, please.
   Uttar Pradesh Pollution Control Board,
   5243, Avas Vikas, Phase-III, Sadbhavna Nagar, Kalyanpur,
   Kanpur – 208017,
   Uttar Pradesh

Avyarthi 06/12/21
(A. K. Vidyarthi)

O/C (CTO) 213

केन्द्रीय प्रदूषण नियंत्रण बोर्ड
निगत...N.Singh...
दिनांक...13.12.2021

Annexure-I

Weekly Drain Monitoring Data of Kanpur-Unnao Region – 05/10/2021 to 20/10/2021

S. No.	Name of drain	Date of inspection	Tapping status	Flow (MLD)	BOD (mg/l)	COD (mg/l)	Colour (Hazen)	Total Cr. (mg/l)
KANPUR DRAINS HAVING GRADIENT TOWARDS GANGA								
Tapped Drains: No Flow/Back flow from river Ganga								
1.	Sisamau Drain, Kanpur	05.10.2021	Tapped	Dry				
		12.10.2021	Tapped	Dry				
		20.10.2021	Tapped	Dry				
2.	Parmath Drain, Kanpur	05.10.2021	Tapped	Dry				
		12.10.2021	Tapped	Dry				
		20.10.2021	Tapped	Backflow of river Ganga was observed at the discharge point of drain				
3.	Police Line Drain, Kanpur	05.10.2021	Tapped	Dry				
		12.10.2021	Tapped	Dry				
		20.10.2021	Tapped	Dry				
4.	Jail Drain, Kanpur	05.10.2021	Tapped	Dry				
		12.10.2021	Tapped	Dry				
		20.10.2021	Tapped	Dry				
5.	Air force Drain, Kanpur	05.10.2021	Tapped	Dry				
		12.10.2021	Partially tapped	Flow could not be measured due to backflow. Sample also not collected.				
		20.10.2021	Tapped	Dry				
6.	Wazidpur Drain, Kanpur	05.10.2021	Tapped	Dry				
		12.10.2021	Tapped	Dry				
		20.10.2021	Tapped	Dry				
Tapped Drains: Overflow								
7.	Budhiyaghat Drain, Kanpur	05.10.2021	Tapped	Dry				
		12.10.2021	Tapped	Dry				
		20.10.2021	Partially tapped (One of the pumping station for tapping was found non-functional)	Flow couldn't be measured due to discharge through closed pipeline into river	233.1	431.3	60	< 0.2
8.	Permiya Drain, Kanpur	05.10.2021	Partially Tapped	Flow couldn't be measured due to stagnant/ponding condition	32.5	71.6	30	< 0.2
		12.10.2021	Partially tapped (Tapping (SPS) exists only for 7 MLD)	0.49 MLD	82	161	50	< 0.2
		20.10.2021	Untapped (Tapping exist only for 7 MLD. There is no tapping on HBTI drain which is meeting to Permiya drain in d/s of existing tapping provision)	Flow couldn't be measured due to unapproachable site.	86	141	50	< 0.2

Annexure-I

Weekly Drain Monitoring Data of Kanpur-Unnao Region – 05/10/2021 to 20/10/2021

9.	Muir Mill Drain, Kanpur	05.10.2021	Untapped	Flow couldn't be measured due to backflow of R. Ganga. Tapping provision of this drain was under maintenance. Sample not collected.				
		12.10.2021	Untapped (Tapping (SPS) exists only for 6.5 MLD)	Flow could not be measured due to stagnant flow	102	221	70	< 0.2
		20.10.2021	Untapped (Tapping provision (6.5 MLD SPS) of drain was found immersed in water)	Flow couldn't be measured due to backflow of R. Ganga. Sample was not collected during inspection.				
10.	Dabka-1, 2 & 3, Kanpur	05.10.2021	Tapped	Dry				
		12.10.2021	Partially tapped	Flow could not be measured due to back flow. Sample also not collected.				
		20.10.2021	Tapped	Dry				
11.	Bhagwat Das Drain, Kanpur	05.10.2021	Untapped (Tapping was found broken during visit)	36.49 MLD	67.5	160	75	< 0.2
		12.10.2021	Tapped	Dry				
		20.10.2021	Untapped (Tapping provision (3.5 MLD SPS) of this drain was non-functional)	17.1 MLD	78.3	153.5	50	< 0.2
Untapped Drains								
12.	TAFCO Drain, Kanpur	05.10.2021	Tapped	Dry				
		12.10.2021	Tapped	Dry				
		20.10.2021	Untapped (Tapping of this drain was found non-functional)	Flow couldn't be measured due to backflow of R. Ganga at discharge point of the drain				
13.	Ranighat Drain, Kanpur	05.10.2021	Untapped	Flow couldn't be measured due to meagre flow.	101	370	75	< 0.2
		12.10.2021	Untapped (Previously, this drain was temporarily tapped but tapping provision was not found during monitoring)	Flow couldn't be measured due to presence of huge amount of sludge and solid wastes in drain	84	183	60	< 0.2
		20.10.2021	Untapped (Previously this drain was temporarily tapped, but at present tapping provision does not exist)	1.04 MLD	126.9	176.8	50	< 0.2
14.	Golaghat drain, Kanpur	05.10.2021	Untapped	Flow couldn't be measured due to meagre flow	105	229	75	< 0.2

Weekly Drain Monitoring Data of Kanpur-Unnao Region – 05/10/2021 to 20/10/2021

		12.10.2021	Untapped (Previously, this drain was temporarily tapped but tapping provision was not found during monitoring)	Flow couldn't be measured due to stagnant flow	72.4	144	70	< 0.2
		20.10.2021	Untapped (Previously this drain was temporarily tapped, but at present tapping provision does not exist)	Flow couldn't be measured due to meagre flow	51.2	128.1	40	< 0.2
15.	Satti Chaura Drain, Kanpur	05.10.2021	Untapped	Flow couldn't be measured due to meagre flow	70	118	75	< 0.2
		12.10.2021	Untapped (Previously, this drain was temporarily tapped but tapping provision was not found during monitoring)	Flow could not be measured due to choking of drain with wastes and water hyacinth	71	115	60	< 0.2
		20.10.2021	Untapped (Previously this drain was temporarily tapped, but at present tapping provision does not exist)	Flow couldn't be measured due to meagre flow	37	67.8	50	< 0.2
16.	Sheetla Bazar, Kanpur	05.10.2021	Untapped	13.82 MLD (Tapping was found broken during visit)	**688**	**1682**	**200**	**9.8**
		12.10.2021	Untapped	Flow could not be measured due to stagnant flow and huge amount of sludge	**1190**	**2403**	**750**	**24**
		20.10.2021	Untapped (Tapping provision was found immersed in flood)	Flow couldn't be measured due to backflow of R. Ganga. Sample not collected during inspection.				
17.	Rooma Drain, Kanpur	05.10.2021	Untapped	48.40 MLD	63	166	100	1.25
		12.10.2021	Untapped	47.51 MLD	62.5	178	70	0.61
		20.10.2021	Untapped	28.44 MLD	25.3	79.7	100	0.39
KANPUR DRAINS HAVING GRADIENT TOWARDS RIVER PANDU								
Tapped Drains: Overflow								
18.	Ganda Drain, Kanpur	05.10.2021	Partially tapped	124.53 MLD	85.8	168	100	< 0.2
		12.10.2021	Partially tapped	128.68 MLD	189	458	70	< 0.2

			(Tapping (by gravity) exists only for 10 MLD)					
		20.10.2021	Partially Tapped	144.72 MLD	108	131.2	50	< 0.2
19.	Halwakhanda drain, Kanpur	05.10.2021	Partially tapped (Tapping (SPS) exists only for 20 MLD)	48.04 MLD	59	106	75	< 0.2
		12.10.2021	Partially tapped (Tapping (SPS) exists only for 20 MLD)	87.09 MLD	120	334	60	< 0.2
		20.10.2021	Partially Tapped	Flow couldn't be measured due to stagnant water	78.3	147.3	60	< 0.2
20.	COD Drain, Kanpur	05.10.2021	Partially Tapped	Flow couldn't be measured due to staggered flow. Complete tapping was restricted due to maintenance work at MPS of STP	43.4	94.1	100	< 0.2
		12.10.2021	Tapped	Dry				
		20.10.2021	Tapped	Dry				
Untapped Drains								
21.	Ratanpur Drain, Kanpur	05.10.2021	Untapped	Flow couldn't be measured due to stagnant/ponding condition	33	55.7	50	< 0.2
		12.10.2021	Untapped	16.19 MLD	43.6	80.9	60	< 0.2
		20.10.2021	Untapped	13.91 MLD	15.3	52.9	40	< 0.2
22.	Panki Drain, Kanpur	05.10.2021	Untapped	Flow couldn't be measured due to backflow of R. Pandu in the drain. Sample not collected				
		12.10.2021	Untapped	15.87 MLD	55.2	171	70	< 0.2
		20.10.2021	Untapped	Flow couldn't be measured due to poor site condition	86.8	131.6	125	< 0.2
23.	ICI Drain, Kanpur	05.10.2021	Untapped	18.97 MLD	53.5	178	100	< 0.2
		12.10.2021	Untapped	21.6 MLD	37.3	96.3	80	< 0.2
		20.10.2021	Untapped	21.37 MLD	23.4	68.9	100	0.59
UNNAO DRAINS HAVING GRADIENT TOWARDS RIVER GANGA (Untapped and Flow)								
24.	City Jail Drain, Unnao	05.10.2021	Untapped	Flow couldn't be measured due to backflow of R. Ganga in the drain. Sample collected is not representative	24.5	63.3	40	< 0.2
		12.10.2021	Untapped	25.92 MLD	57.2	131	45	< 0.2

Weekly Drain Monitoring Data of Kanpur-Unnao Region – 05/10/2021 to 20/10/2021

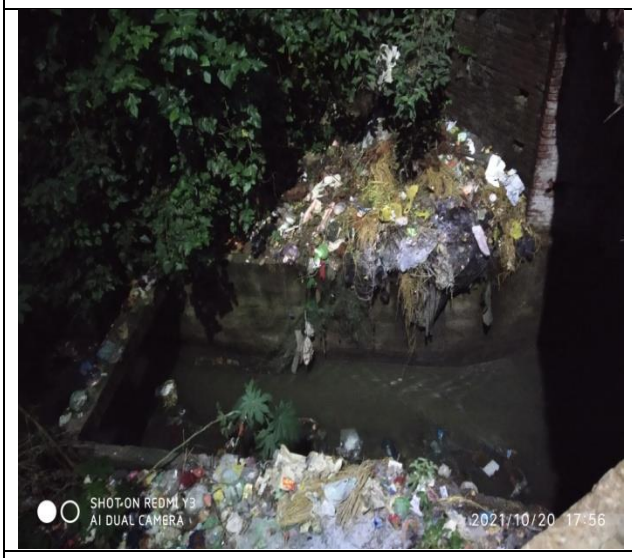
		20.10.2021	Untapped	Flow couldn't be measured due to flooded condition	6	15.7	40	< 0.2
25.	Loni Drain, Unnao	05.10.2021	Untapped	Flow couldn't be measured due to poor site condition	6.12	19.7	30	< 0.2
		12.10.2021	Untapped		5.53	16.5	35	< 0.2
		20.10.2021	Untapped	Flow couldn't be measured due to flooding condition	20.3	46.3	50	< 0.2

Note: Solid waste dumping has been observed in the following drains:

Date of inspection: 12.10.2021

(a) Solid waste dumping and **(b)** growth of water hyacinth along Satti Chaura drain

Date of inspection: 20.10.2021



Permiya /HBTI Drain

Police Line Drain

Annexure-I

Weekly River Monitoring Data of Kanpur-Unnao Region – 05/10/2021 to 20/10/2021

S. No.	Location	Sampling date	DO (mg/l)	Temp (°C)	pH	Colour (Hazen)	BOD (mg/l)	COD (mg/l)	TC (MPN/100 ml)	FC (MPN/100 ml)	Total Cr (mg/l)
1.	River Ganga, Bithoor, Kanpur	05.10.2021	7.07	31	6.8	10	**7.1**	11.5	1.3×10^4	$\mathbf{4.5 \times 10^3}$	< 0.05
		12.10.2021	7	28	7.0	10	1.9	8.3	3.3×10^4	$\mathbf{1.7 \times 10^4}$	< 0.05
		20.10.2021	6.1	25	7.6	10	**12.2**	34.1	1.2×10^5	$\mathbf{3.1 \times 10^4}$	< 0.05
2.	River Ganga, Barrage d/s, Kanpur	05.10.2021	7.05	31	7.4	10	< 1.0	7.9	1.3×10^3	< 1.8	< 0.05
		12.10.2021	6.8	28	7.3	10	**5.4**	12.9	7.8×10^3	2.0×10^3	< 0.05
		20.10.2021	6	25	7.5	15	**12.9**	38.4	7.9×10^4	$\mathbf{2.2 \times 10^4}$	< 0.05
3.	River Ganga, Shuklaganj u/s, Kanpur	05.10.2021	6.3	31	7.6	10	**6.6**	15.1	7.8×10^3	2.0×10^3	< 0.05
		12.10.2021	6.7	28	7.6	10	2.6	10.3	2.3×10^4	$\mathbf{4.5 \times 10^3}$	< 0.05
		20.10.2021	6.3	25	7.6	20	**12.3**	32.2	1.6×10^7	$\mathbf{3.5 \times 10^6}$	< 0.05
4.	River Ganga, Shuklaganj d/s, Kanpur	05.10.2021	6.3	31	6.5	10	2.0	8.6	7.0×10^4	$\mathbf{2.3 \times 10^4}$	< 0.05
		12.10.2021	6.5	28	7.7	10	**3.6**	9.8	4.9×10^4	$\mathbf{3.3 \times 10^4}$	< 0.05
		20.10.2021	6.1	26	7.6	20	**11.9**	28.8	5.4×10^6	$\mathbf{2.2 \times 10^6}$	< 0.05
5.	River Ganga, Janey Village, Kanpur	05.10.2021	6.2	31	7.4	10	**6.6**	14.2	3.3×10^5	$\mathbf{1.3 \times 10^5}$	< 0.05
		12.10.2021	6.7	29	7.6	10	**5.8**	12.6	7.0×10^4	$\mathbf{2.3 \times 10^4}$	< 0.05
		20.10.2021	5.7	26	7.4	15	**12.7**	35.8	9.2×10^6	$\mathbf{2.2 \times 10^6}$	< 0.05
6.	River Ganga, Rajapur Village, Kanpur	05.10.2021	5.5	30	7.2	10	**5.8**	12.6	3.3×10^5	$\mathbf{7.9 \times 10^4}$	< 0.05
		12.10.2021	5.8	28	7.6	10	**5.9**	12.7	2.3×10^4	$\mathbf{1.3 \times 10^4}$	0.06
		20.10.2021	5.6	26	7.2	15	**14.2**	41.3	3.5×10^6	$\mathbf{1.7 \times 10^6}$	< 0.05
7.	River Ganga b/c with River Pandu, Dhondhiya Khera	05.10.2021	8.8	29	7.3	10	2.4	7.5	3.3×10^4	$\mathbf{1.3 \times 10^4}$	< 0.05
		12.10.2021	6.6	29	7.6	10	1.4	8.3	2.8×10^5	$\mathbf{2.2 \times 10^5}$	< 0.05
		20.10.2021	6.8	29	7.2	30	2.7	8.55	1.6×10^7	$\mathbf{3.5 \times 10^6}$	< 0.05
8.	River Pandu, Bakshar Bridge	05.10.2021	5.3	30	7.3	30	**8.2**	17.6	4.6×10^4	$\mathbf{2.3 \times 10^4}$	< 0.05
		12.10.2021	4.2	30	7.9	30	**10.0**	20.8	1.3×10^5	$\mathbf{4.9 \times 10^4}$	< 0.05
		20.10.2021	5.3	30	7.2	20	**11.6**	27.1	1.7×10^5	$\mathbf{1.1 \times 10^5}$	< 0.05
9.	River Ganga a/c with River Pandu, Lahangi Village	05.10.2021	8.6	30	7.5	10	**3.9**	7.1	7.9×10^5	$\mathbf{1.7 \times 10^5}$	< 0.05
		12.10.2021	6.9	29	7.7	15	**4.6**	11.3	1.7×10^5	$\mathbf{7.0 \times 10^4}$	< 0.05
		20.10.2021	6.7	30	7.2	15	**5**	13.4	9.2×10^6	$\mathbf{5.4 \times 10^6}$	< 0.05

केन्द्रीय प्रदूषण नियंत्रण बोर्ड
CENTRAL POLLUTION CONTROL BOARD
पर्यावरण, वन एवं जलवायु परिवर्तन मंत्रालय भारत सरकार
MINISTRY OF ENVIRONMENT, FOREST & CLIMATE CHANGE GOVT. OF INDIA

Speed Post / E-mail

F. No. PJ-14099/36/2021-WQM-II-HO-CPCB-HO (Magh Mela-2022) Dated: 22.02.2022

14072-73

To,

1. Managing Director,
Uttar Pradesh Jal Nigam (Urban),
6, Rana Pratap Marg,
Lucknow – 226001, Uttar Pradesh

2. Managing Director,
Uttar Pradesh Jal Nigam (Rural),
6, Rana Pratap Marg,
Lucknow – 226001, Uttar Pradesh

DIRECTION UNDER SECTION 5 OF THE ENVIRONMENT (PROTECTION) ACT, 1986 REGARDING YELLOW COLOR IN RIVER GANGA

WHEREAS, the Ministry of Environment & Forests, Govt. of India, vide notification S.O.157 (E) of 27.02.1996 has delegated powers vested under Section 5 of the Environment (Protection) Act, 1986 (29 of 1986) to the Chairman, Central Pollution Control Board (CPCB), to issue direction to any industry, Municipal Corporation, Municipal Council, Cantonment Board or to any local or other Authority for the violation of emission and effluent standards notified under the Environment (Protection) Rules, 1986; and

WHEREAS, the Central Government has notified the standards for discharge of environmental pollutants from various categories of industries, Common Effluent Treatment Plants (CETPs) and Sewage Treatment Plants (STPs) under the Environment (Protection) Act,1986 and the rules framed there under; and

WHEREAS, amongst others, under Section 17 of the Water (Prevention and Control of Pollution) Act, 1974, one of the functions of the State Pollution Control Boards (SPCBs)/Pollution Control Committees, constituted under the Water (Prevention and Control of Pollution) Act, 1974, is to plan a comprehensive programme for the prevention, control and abatement of pollution of stream and wells in the State/UT and to secure the execution thereof; and

WHEREAS, CPCB in consultation with state agencies namely Uttar Pradesh Pollution Control Board (UPPCB) and State Mission for Clean Ganga (SMCG) has inventoried 153 drains discharging into river Ganga in Kanpur to Varanasi stretch (Annexure-I). Out of 153 drains discharging into river Ganga in Kanpur-Varanasi stretch, 100 drains are untapped; and

WHEREAS, CPCB has inventoried 16 tributaries/rivulets discharging into river Ganga in upstream Kanpur to Varanasi stretch (Annexure-I); and

'परिवेश भवन' पूर्वी अर्जुन नगर, दिल्ली-110032
Parivesh Bhawan, East Arjun Nagar, Delhi-110032
दूरभाष/Tel : 43102030, 22305792, वेबसाईट/Website : www.cpcb.nic.in

WHEREAS, Central Pollution Control Board (CPCB) along with UPPCB carry out weekly monitoring of rivers at nine locations (Ganga-08 and Pandu-01) and 25 drains (Kanpur-23 and Unnao-02) in Kanpur-Fatehpur stretch from Oct 05, 2021. During weekly monitoring carried out on Jan 04th, 2022 and Jan 11th, 2022 (analysis data enclosed as Annexure-II) following observations were made:

1. Out of 25 drains monitored, 19 drains have gradient towards river Ganga (17 in Kanpur and 02 in Unnao) and 06 drains have gradient towards river Pandu (06 in Kanpur).
2. In Kanpur, 17 drains discharging wastewater into river Ganga out of which 13 drains were tapped and 04 were untapped. Out of 13 tapped drains, 08 drains were found dry and overflow was observed in 04 tapped drains namely Air Force drain, Dabka drain, Budhiya Ghat drain and Permiya drain. Wastewater discharged from Kanpur into river Ganga through drains was 47.1 MLD on Jan 04th, 2022 & 115.7 MLD on Jan 11th, 2022.
3. High levels of BOD, COD, Total Chromium and Color were observed in effluent in Sheetla Bazar drain (BOD-626 mg/l, COD-1394 mg/l, Colour-150 Hazen and Total Cr-13.93 mg/l), Budhiya Ghat drain (BOD-497 mg/l, COD-866 mg/l, Colour-300 Hazen, Total Cr-4.1 mg/l) and Rooma drain (BOD-562 mg/l, COD-2144 mg/l and Total Cr-3.42 mg/l) which indicate discharge of untreated wastewater from tannery and textile units located in Jajmau and Rooma industrial clusters of Kanpur.
4. Out of 06 drains having gradient towards river Pandu, 03 drains were tapped. Out of three tapped drains, overflow was observed in 02 drains namely Halwakhanda and COD. Wastewater discharged from Kanpur into river Pandu through drains was 143.2 MLD on Jan 04th, 2022 & 245.1 MLD on Jan 11th, 2022. In drains discharging effluent into river Pandu, BOD varied as 31.5-267 mg/l, COD as 71.5-412 mg/l, Color as 30-125 Hazen and Total Chromium as < 0.2 – 0.3 mg/l.
5. Discharge from tapped drains indicates that sewage pumping stations are not operating properly and also wastewater is discharged in these drains from some other sources including illegal industrial units which is beyond the capacity of pumping stations.
6. Water quality of river Ganga and Pandu was observed as under:
    a. Water quality of river Ganga was meeting the primary water quality criteria for bathing w.r.t. Dissolved Oxygen at all eight monitoring locations in the stretch from Bithoor to Fatehpur. However, in terms of pH, BOD & Faecal Coliform, the water quality of River Ganga was not meeting bathing water quality criteria at all monitoring locations.
    b. During river monitoring carried out on 04.01.2022, high BOD-31.5 mg/l and Color-30 Hazen were observed in river Ganga at Shuklaganj, downstream of Kanpur.

c. In river Ganga at Dhondiya Khera before confluence of river Pandu, pH ranged as 8.6-8.79, DO as 9-9.8 mg/l, BOD as 4.0-7.7 mg/l and Colour as 10-20 Hazen.
d. In river Ganga at Lahangi Village after confluence with river Pandu, pH ranged as 8.48-8.71, DO as 8.8-10.5 mg/l, BOD as 3.48-8.24 mg/l and Colour as 15-20 Hazen.
e. In river Pandu at Buxar Bridge before confluence to river Ganga, pH ranged as 7.81-8.06, DO as 4-4.4 mg/l, BOD as 4.9-8.4 mg/l and Colour as 20 Hazen.

AND WHEREAS, Magh Mela, an important yearly ritual held on the bank of river Ganga at Prayagraj which involves the holy dips (bathings) in to river Ganga which is held from Jan 14, 2022 and will continue till Mar 01, 2022; and

WHEREAS, appearance of slightly yellowish colored water in River Ganga at Nagwa Ghat, Varanasi in Uttar Pradesh was reported in various local newspapers on Feb 12th & 13th 2022; and

WHEREAS, Uttar Pradesh Pollution Control Board (UPPCB) carried out water quality monitoring of river Ganga in the stretch of Mirzapur to Varanasi on Feb 12th & 13th, 2022 and following observations were made:

a. In the stretch of river Ganga from Vindhyachal to Chhota Mirzapur in Mirzapur (Uttar Pradesh), DO in river Ganga ranged as 12.9-13.7 mg/l, pH as 8.77-8.92 and Colour as 15 Hazen.
b. In the stretch of river Ganga from Assi Ghat to Raj Ghat in Varanasi (Uttar Pradesh), DO in river Ganga ranged as 11.6-13.7 mg/l, pH as 8.55-8.92 and Colour as 15 Hazen.
c. All 07 STPs in Varanasi were found operational.
d. Drains (cis and trans) discharging into river Ganga were physically verified and out of cis-drains, Nagwa drain, Nakkha drain and Raj Ghat outfall were found partially tapped and other 19 drains were found completely tapped. Five trans-drains meeting river Ganga from Ramnagar were found completely tapped.
e. No smell was observed in river Ganga and higher colour was observed in river water in comparison to earlier days, which prevailed from U/s Mirzapur (Vindhyachal).

AND WHEREAS, field survey and water quality monitoring was also carried out by teams of CPCB authorized technical institutes, namely Motilal Nehru National Institute of Technology (MNNIT), Allahabad and Harcourt Butler Technical University (HBTU), Kanpur from Kanpur till Prayagraj and following observations were made:

River Ganga

a. Yellowish color was observed at Rosoolabad Ghat in Prayagraj and its upstream for about 40-50 km till Dalmau Ghat in Raebareli.
b. Water quality in terms of color improved/ was observed normal in upstream stretches from Dalmau Ghat in Raebareli.
c. Colour and DO at Rasoolabad Ghat, Prayagraj were found as 30 Hazen and 8.77 mg/l, respectively.
d. Colour and DO at Sandeepan Ghat, Kaushambi were found as 25 Hazen and 7.73 mg/l, respectively.
e. Colour and DO at Kada Dham Ghat, Kaushambi were found as 40 Hazen and 8.3 mg/l, respectively.
f. Colour and DO at Dalmau Ghat, Raebareli were found as 20 Hazen and 8.2 mg/l, respectively.
g. On Feb 14, 2022, the colour of samples collected from river confluence, upstream of river Pandu and Nawabganj (upstream Prayagraj) was found light yellowish and hazy in appearance.

River Pandu

a. At the entry of the Kanpur city, the colour of river Pandu was observed sandy with slow and low flow.
b. At Delhi Harwrah railway bridge, considerable flow and very light brown colour was observed in river Pandu with a smell of sewerage.
c. After confluence of COD Nala, black colour and highly foul smell was observed in river Pandu and overall flow appeared higher than the upstream point.

AND WHEREAS, CPCB carried out water quality monitoring of river Ganga in the stretch of Kanpur-Varanasi on Feb 13th & 14th, 2022 and following observations were made:

a. In river Ganga before confluence of river Pandu at Dhondiya Khera, Fatehpur, pH was 8.72, Temperature-17^0 C, DO-8.9 mg/l and Colour-10 Hazen.
b. In river Ganga after confluence with river Pandu at Lahangi Village, Fatehpur pH was 8.5, Temperature-17^0 C, DO-7.9 mg/l and Colour-15 Hazen.
c. Yellowish colour in river Ganga was observed at Kuresar Ghat, Prayagraj; Chunar downstream, Mirzapur; Ramnagar upstream Varanasi; Dashawamedh Ghat and Malviya Bridge, Varanasi and at these locations DO ranged 8.5-10.2 mg/l and pH ranged 7.5-8.82.

AND WHEREAS, such an incidence of color river water was also reported in the month of May'2021 and beginning of June'2021 in River Ganga in the stretch of Prayagraj to Varanasi-Ghazipur in Uttar Pradesh, which was gradually washed-out; and

WHEREAS, one of the probable causes of the appearance of colour river water (yellow/green), with high DO level could be due to episodic event of phytoplanktonic algal bloom belonging to family Chlorophyceae /xanthophyceae or diatoms. Algal blooms are generally caused by nutrient enrichment (particularly of phosphorus and nitrogen) that may happen when drains/lower order tributaries discharge their contents as well as when untreated or partially treated wastewaters from septic systems and sewage treatment plants find its way into the river system, thereby, adding the organic pollution load. This may result in eutrophication leading to excessive growth of phytoplankton that have high density of pigmented cells, thereby, imparting colors such as green, bright-green, yellowish-green. The organic matter becomes food for phytoplankton that decompose it using up the dissolved oxygen in the water. Algal blooms may generate foul tastes and odors in source and drinking waters and make bathing areas unappealing; and

It is evident that discharge of untreated sewage and wastewater from drains and tributaries/rivulets has potential to cause incident of colour in river water, which may be due to algal blooms.

NOW, THEREFORE, in view of above referred observation & resolution and in exercise of the power conferred under section 5 of the Environment (Protection) Act, 1986, you are here by directed to take appropriate measures for compliance of following measures in a time bound manner with immediate effect:

1. Uttar Pradesh Jal Nigam shall update inventory of tributaries/rivulets and drains discharging into river Ganga in Kanpur-Varanasi stretch and also carry out the mapping of the origin, confluence, catchment area, flow and water quality of these tributaries/rivulets and drains.
2. Uttar Pradesh Jal Nigam shall identify the potential polluting sources (such as villages, towns and industries) contributing to drains discharging into river Ganga in Kanpur-Varanasi stretch.
3. Uttar Pradesh Jal Nigam shall also prepare an action plan for management of wastewater discharged from drains/rivulets to control & abate pollution load discharged by drains/rivulets into river Ganga. The Action plan may not only include interception and diversion for treatment of sewage through sewage treatment plants but should also include a short term solution viz. low-cost, de-centralized wastewater treatment systems such as oxidation ponds, constructed wetlands or combination of both to be developed for in-situ treatment of drains/lower-order tributaries. Biodiversity parks could also be constructed in the floodplains as an intervention measure which may be commissioned in a duration of 06-12 months. The action plan of Varuna and Assi rivers approved by Hon'ble NGT in matter of Mr. Saurabh Tiwari Vs. Union of India & Ors. in O. A. No. 128/2021 may also be referred. The action plan shall be submitted to CPCB within 30 days.

4. Uttar Pradesh Jal Nigam shall ensure proper functioning of sewage pumping stations so that no wastewater is discharged through tapped drains.

5. Uttar Pradesh Jal Nigam along with concerned state agencies and district administration shall constitute a team and identify industrial units disposing coloured and untreated/ partially treated effluent into river Ganga through adjoining drains/rivulets/tributaries which affect the water quality of river Ganga in Kanpur-Varanasi stretch.

Uttar Pradesh Jal Nigam shall acknowledge the receipt of direction and submit reply to this office within 15 days from the date of this notice failing which suitable action as deemed fit under provision of the Environment (Protection) Act, 1986 shall be taken without any further notice.

22/2/22

(TANMAY KUMAR)
CHAIRMAN

Copy to:

1. **Director General,**
National Mission for Clean Ganga (MoWR, RD & GR),
1st Floor, Major Dhyan Chand National Stadium,
India Gate, New Delhi - 110002
: For kind information, please.

2. **Joint Secretary (CP Division),**
Ministry of Environment Forests & Climate Change,
Indira Paryavaran Bhawan, Jor Bagh Road,
New Delhi - 110003
: For kind information, please.

3. **Member Secretary,**
Uttar Pradesh Pollution Control Board,
Building No. TC-12V, Vibhuti Khand,
Gomti Nagar, Lucknow - 226 010
: For kind information and necessary action, please.

4. **Regional Director (North),**
Central Pollution Control Board
PICUP Bhawan, Ground Floor, Vibhuti Khand,
Gomti Nagar, Lucknow – 226010
: For kind information, please.

5. **In-charge, IT Division, CPCB**
: For uploading on CPCB website, please.

केन्द्रीय प्रदूषण नियंत्रण बोर्ड
निर्गत..
दिनांक 28/02/2022

(PRASHANT GARGAVA)
MEMBER SECRETARY

O/c

RA(GD)

Annexure-I: List of drains and tributaries discharging into river Ganga in Kanpur to Varanasi stretch

S. No	District	Drain discharging directly into river Ganga in Kanpur-Varanasi stretch	Status
1	Kanpur	Permiya Nala	Untapped
2	Kanpur	Ranighat drain	Untapped
3	Kanpur	Sisamau Nala	Tapped
4	Kanpur	TEFCO Nala	Tapped
5	Kanpur	Parmath drain	Tapped
6	Kanpur	Muir drain	Untapped
7	Kanpur	Police Line drain	Tapped
8	Kanpur	Jail drain	Tapped
9	Kanpur	Golaghat Nala	Untapped
10	Kanpur	Bhagwatdas Nala/Guptarghat Nala	Untapped
11	Kanpur	Satti Chaura	Untapped
12	Kanpur	Dabka Nalla-1	Tapped
13	Kanpur	Dabka Nalla-2	Tapped
14	Kanpur	Dabka Nalla-3	Tapped
15	Kanpur	Shetla Bazar	Untapped
16	Kanpur	Budhiyaghat Drain	Tapped
17	Kanpur	Wazidpur Nalla	Tapped
18	Kanpur	Airforce Nala	Untapped
19	Kanpur	Rooma drain	Untapped
20	Unnao	City Jail/Dakary Drain	Untapped
21	Unnao	Loni Drain	Untapped
22	Raebareli	Ahiyari/ NTPC drain	Untapped
23	Dalmau/Raebareli	Padva Nala/(Muraibagh) Shankar Nagar	Untapped
24	Dalmau/Raebareli	Bada Math - Chhota Math ke bich ka Nala/(Sherandajpur)	Untapped (dry)
25	Dalmau/Raebareli	Busda Ghat ka Nala/(Sherandajpur)	Untapped (dry)
26	Dalmau/Raebareli	Shukla Ghat ka Nala/(Sherandajpur)	Untapped (dry)
27	Dalmau/Raebareli	Pathvari Ghat ka Nala/(Tikaitganj)	Untapped
28	Dalmau/Raebareli	Soarakh Ghat Muroop Nala/(Tikaitganj)	Untapped
29	Dalmau/Raebareli	Muskatpal Nala	Untapped
30	Dalmau/Raebareli	Shivala Ghat Nala	Tapped
31	Dalmau/Raebareli	Raja Tiloi Ghat Nala/Mo. sherndajpur(Deen shah Gaora Ghat)	Untapped (dry)
32	Kunda/ Pratapgarh	Ganda Nala Raiyapur	Ganga/Canal
33	Kunda/ Pratapgarh	Taar Nala Babaganj	Untapped
34	Kunda/ Pratapgarh	Ganda Nala Baraipur	Ganga/Canal
35	Prayagraj	Rasulabad Drain-1	Untapped
36	Prayagraj	Rasulabad Drain-2	Tapped
37	Prayagraj	Rasulabad Drain-3	Tapped
38	Prayagraj	Rasulabad Drain-4	Untapped

39	Prayagraj	Sadananda Ashram Drain	Untapped
40	Prayagraj	Nehru Drain	Untapped
41	Prayagraj	Kodar Drain	Untapped
42	Prayagraj	Pongaghat Drain	Tapped
43	Prayagraj	Solari Drain	Untapped
44	Prayagraj	Mavaiya Drain	Untapped
45	Prayagraj	Chuhara Mandir Drain-1	Tapped
46	Prayagraj	Chuhara Mandir Drain-2	Untapped
47	Prayagraj	Mehndauri Drain	Untapped
48	Prayagraj	Jhusi Drain--	Untapped
49	Prayagraj	Chhatnag Drain -	Untapped
50	Prayagraj	Mannaiya/Muglaha Drain	Untapped
51	Prayagraj	Morigate Nala	Tapped
52	Prayagraj	Drains Of Daraganj Area	Tapped
53	Prayagraj	Jondhwal drain / chuhara mandir -1	Tapped
54	Prayagraj	Shankarghat Colony Drain (Near Phaphamau Bridge)	Untapped
55	Prayagraj	Unchwagarhi Drain No. 1	Untapped
56	Prayagraj	Beligaon Drain	Untapped
57	Prayagraj	Mumfordganj Drain	Tapped
58	Prayagraj	Shivkuti Drain No. 1	Untapped
59	Prayagraj	Shivkuti Drain No. 3	Untapped
60	Prayagraj	Shivkuti Drain No. 4	Untapped
61	Prayagraj	Shivkuti Drain No. 5	Untapped
62	Prayagraj	Chilla Drain	Untapped (dry)
63	Prayagraj	Allenganj Nala / Buxi Bund Nala	Tapped
64	Prayagraj	Nehru Park Nala	Untapped
65	Prayagraj	Rasulabad Puccaghat Drain	Tapped
66	Prayagraj	A.D.A. Colony Nala / Jwaladevi	Untapped
67	Prayagraj	Jondhwal Ghat Drain/Chhuhara Mandir	Untapped
68	Prayagraj	Rajapur Nala	Untapped
69	Prayagraj	Tv Tower Nala	Untapped
70	Prayagraj	Sadar Bazar Nala	Untapped
71	Prayagraj	Muirabad (Ganesh Nagar) Nala	Untapped
72	Prayagraj	Nayapurwa Drain	Untapped
73	Prayagraj	Co-Operative Nala	STP outlet
74	Prayagraj	Basna Nala and Shantipuram Nala	Untapped
75	Prayagraj	Indira Awas Nala / Jai Gurudev Ashram Nala	Untapped
76	Prayagraj	8 small drains at different locations in Jhushi area	Untapped
77	Prayagraj	Lotey Haren Nala /Chhatnag	Untapped
78	Prayagraj	Shastri Bridge Nala (03 small drains), Jhushi	Untapped
79	Manikpur	Pakka Nala	Untapped
80	Manikpur	Raja Hela Nala	Untapped
81	Manikpur	Prathmik Vidyalaya	Untapped (dry)
82	Manikpur	Mallahan Tola	Untapped

83	Manikpur	Post office Nala	Untapped (dry)
84	Mirzapur	Badali	Tapped
85	Chunar	Tekaur Basti South	Untapped
86	Chunar/ Mirzapur	Bharatpur Trimohani	Untapped
87	Mirzapur/Chunar	Patengra Drain	Untapped
88	Mirzapur/Chunar	Malhaiya Drain	Untapped
89	Mirzapur/Chunar	Parashuram ghat	Untapped
90	Mirzapur/Chunar	Gangeshwar Nishad Park	Untapped
91	Mirzapur/Chunar	Post Office South Drain	Untapped (dry)
92	Mirzapur/Chunar	Post Office North Drain	Untapped (dry)
93	Mirzapur/Chunar	Santoshi Mata Mandir	Untapped (dry)
94	Mirzapur/Chunar	Chunar Tekur North Drain	Untapped
95	Mirzapur/Chunar	Bhiaramganj West Drain	Untapped
96	Mirzapur/Chunar	Bhiaramganj East Drain	Untapped (dry)
97	Mirzapur/Chunar	Dargah Sharif Drain	Untapped
98	Mirzapur/Chunar	Tammalganj Drain	Untapped (dry)
99	Mirzapur/Chunar	Gundara Drain	Tapped
100	Mirzapur/Chunar	Balughat Pakka Drain	Tapped
101	Mirzapur/Chunar	Balughat Kaccha Drain	Untapped
102	Mirzapur/Chunar	Deewanghat Old Drain	Tapped
103	Mirzapur/Chunar	Baswariya Drain	Untapped
104	Mirzapur/Chunar	Narghat Drain	Tapped
105	Mirzapur/Chunar	Koniyaghat Drain	Tapped
106	Mirzapur/Chunar	Sundarghat Drain	Tapped
107	Mirzapur/Chunar	Oliyar Drain	Tapped
108	Mirzapur/Chunar	Kachahari Drain	Tapped
109	Mirzapur/Chunar	Morchaghar Draidewann	Untapped
110	Mirzapur/Chunar	Irrigation Colony Drain	Untapped
111	Mirzapur/Chunar	Barahimiliya Drain	Untapped
112	Mirzapur/Chunar	Public Club Drain	Untapped
113	Mirzapur/Chunar	Lift Canal Drain	Ganga/Canal
114	Mirzapur/Chunar	Hanuman Ghat Drain	Untapped
115	Mirzapur/Chunar	Balaji Temple Drain	Untapped
116	Mirzapur/Chunar	Bisunderpur Drain	Untapped
117	Mirzapur/Chunar	Kanshiram Awas Drain	Untapped
118	Mirzapur/Chunar	Chaura Mata Drain	Untapped (dry)
119	Mirzapur/Chunar	Balughat Drain, Chunar	Untapped
120	Mirzapur/Chunar	Belbeer Ghat Drain	Untapped
121	Mirzapur	Ghore Saheed Drain	Untapped
122	Mirzapur	Khandwa Drain	Untapped
123	Mirzapur	Chorwa Drain	Untapped
124	Chunar/Mirzapur	Chunar Tikaur Drain	Untapped

125	Varanasi	Nagwa/ Asi Drain	Untapped
126	Varanasi	Ramnagar Drain	Untapped
127	Varanasi	Varuna Drain	Untapped
128	Varanasi	Shivala Drain	Tapped
129	Varanasi	Khirkiya/ Rajghat Nala	Untapped
130	Varanasi/Ramnagar	Lalita Ghat	Tapped
131	Varanasi/Ramnagar	Jalasen Ghat	Tapped
132	Varanasi/Ramnagar	Manikarnika Ghat	Tapped
133	Varanasi/Ramnagar	Sankatha Ghat	Tapped
134	Varanasi/Ramnagar	Mehta Ghat	Tapped
135	Varanasi/Ramnagar	Ram Ghat	Tapped
136	Varanasi/Ramnagar	Panchganga	Tapped
137	Varanasi/Ramnagar	Brahma Ghat	Tapped
138	Varanasi/Ramnagar	Lal Ghat	Tapped
139	Varanasi/Ramnagar	Trilochan Ghat	Tapped
140	Varanasi/Ramnagar	Bhaisasur Drain	Tapped
141	Varanasi/Ramnagar	Baluaghat	Tapped
142	Varanasi/Ramnagar	Shakti Ghat	Tapped
143	Varanasi/Ramnagar	Salotri Ghat	Tapped
144	Varanasi/Ramnagar	Hanuman Ghat	Tapped
145	Varanasi/Ramnagar	Samne Ghat Drain	Untapped
146	Varanasi/Ramnagar	Nakhi Drain	Untapped
147	Varanasi/Ramnagar	Harishchandra Ghat	Tapped
148	Varanasi/Ramnagar	Mansarovar Ghat	Tapped
149	Varanasi/Ramnagar	Pandey Ghat	Tapped
150	Varanasi/Ramnagar	Dr. Rajender Prasad Ghat	Tapped
151	Varanasi/Ramnagar	Meer Ghat	Tapped
152	Varanasi	Teliya Drain	Untapped
153	Ramnagar/Varanasi	Rambhag Ghat Drain	Tapped

Sl. No.	Location before confluence	Tributary/ Rivulet	District	Lat.	Long.
1.	River Isan at Bilhaur, Kanpur upstream	River Isaan	Kanpur (u/s of town)	26.831553	80.104306
2.	River Noon at d/s of Bithoor u/s of Kanpur	River Noon	Kanpur u/s of town)	26.584272	80.263724
3.	River pandu on Baksar - Muradipur road b/f c/f with Ganga	Pandu	Fatehpur	26.125874	80.646522
4.	Loni Drain confluence with Ganga	Loni River	Rai Bareily	26.074746	80.986377
5.	Rivulet/Drain at Unchahar on Lucknow-Prayagraj road	Rivulet/Nallah	Rai Bareily	25.904947	81.29445
6.	River Duar before confluence with river Ganga on Prayagraj by pass near Samaspur	Duar river	Pratapgarh/ Prayagraj	25.59984	81.56573
7.	Rivulet at Purey Nanku (Uldi) Prayagraj bye pass [Mubarakpur Puran Kachar	Rivulet near Pure Nanku-Mubarakpur	Prayagraj	25.570377	81.702699
8.	Rivulet/Nallah at Mubarakpur Puran kachar Prayagraj	Rivulet/Nallah Musrekpur	Prayagraj	25.524575	81.725652
9.	Rivulet/Nallah at Mendara on Pryagraj Byepass	Rivulet/Nallah Mendara	Prayagraj	25.576427	81.682378
10.	River Tons (Tamsa) before confluence with river Ganga	Tamsa River (Tons)	Prayagraj	25.269037	82.045599
11.	Karnavati River on Naini - Mirzapur road near Akorhi, Lalapur near Birohee Railway station, Vindhyachal	Karnavati river	Mirzapur	25.177152	82.45167
12.	Ojhla River bridge on Mirzapur-Vindhyachal Road	Ojhla River	Mirzapur	25.151917	82.528022
13.	Rivulet at Chauhan Patti d/s of Mirzapur	Rivulet	Mirzapur	25.170599	82.694098
14.	Chatar river on Mirzapur-Chunar road near Dewahi B/F C/F with River Ganga	Chatar River	Mirzapur	25.116028	82.738307
15.	Kalkaliya River (a/c of Jargo before confluence with river Ganga u/s of Varanasi	River Kalkaliya (a/c of Jargo river)	Mirzapur	25.192423	82.97279
16.	Rivulet/Nallah at Chunar-Ramnagar Road, Hakanipur Kalan	Rivulet	Chandauli/Mirzapur	25.217781	83.030733

Annexure-II Weekly River and Drain Monitoring Data of Kanpur-Unnao Region (04/01/2022 to 11/01/2022)

S. No.	Location	Sampling date	DO (mg/l)	Temp (°C)	pH	Colour (Hazen)	BOD (mg/l)	COD (mg/l)	TC (MPN/100 ml)	FC (MPN/100 ml)	Total Cr (mg/l)
1.	River Ganga, Bithoor, Kanpur	04.01.2022	10.8	16	8.75	15	3.96	17.9	4.5×10^3	2.0×10^3	< 0.05
		11.01.2022	8.5	17.6	8.59	15	2.72	9.45	3.3×10^5	1.7×10^5	< 0.05
2.	River Ganga, Barrage d/s, Kanpur	04.01.2022	10.5	16	8.8	20	4.74	21.7	3.3×10^4	4.5×10^3	< 0.05
		11.01.2022	8.1	17.5	8.52	15	3.08	8.45	1.3×10^5	3.4×10^4	< 0.05
3.	River Ganga, Shuklaganj u/s, Kanpur	04.01.2022	10.4	16	8.81	15	6.6	19.3	4.5×10^3	< 1.8	< 0.05
		11.01.2022	8.3	17.5	8.64	10	1.83	7.36	2.3×10^5	3.3×10^4	< 0.05
4.	River Ganga, Shuklaganj d/s, Kanpur	04.01.2022	10.1	16	7.84	30	31.5	61.4	1.4×10^5	1.7×10^4	< 0.05
		11.01.2022	8.2	17.7	8.66	15	4.28	16.8	2.4×10^6	1.3×10^6	< 0.05
5.	River Ganga, Janey Village, Kanpur	04.01.2022	9.1	16	8.88	20	7.91	27.4	6.8×10^4	2.0×10^4	< 0.05
		11.01.2022	8.1	17.5	8.54	15	3.84	17.3	2.2×10^5	1.7×10^5	< 0.05
6.	River Ganga, Rajapur Village, Kanpur	04.01.2022	9.5	16	8.77	25	8.45	30.1	2.0×10^4	7.8×10^3	< 0.05
		11.01.2022	8.6	17.6	8.53	15	4.7	14.2	2.1×10^4	1.7×10^4	< 0.05
7.	River Ganga b/c with River Pandu, Dhondhiya Khera	04.01.2022	9.8	18.5	8.79	20	7.72	31.6	4.5×10^3	2.0×10^3	< 0.05
		11.01.2022	9	17	8.6	10	4.02	14.6	7.8×10^3	4.5×10^3	< 0.05
8.	River Pandu, Bakshar Bridge	04.01.2022	4.02	18	7.81	20	8.36	24.1	3.3×10^4	1.1×10^4	< 0.05
		11.01.2022	4.4	18	8.06	20	4.92	16.4	2.2×10^4	1.7×10^4	< 0.05
9.	River Ganga a/c with River Pandu, Lahangi Village	04.01.2022	10.5	18.5	8.71	20	8.24	29	2.0×10^3	< 1.8	< 0.05
		11.01.2022	8.8	17	8.48	15	3.48	15.1	1.1×10^4	7.8×10^3	< 0.05

S. No.	Name of drain	Date of inspection	Tapping status	Flow (MLD)	BOD (mg/l)	COD (mg/l)	Colour (Hazen)	Total Cr. (mg/l)
KANPUR DRAINS HAVING GRADIENT TOWARDS GANGA								
Tapped Drains: No/Meagre Flow								
1.	Sisamau Drain, Kanpur	04.01.2022	Tapped	-				
		11.01.2022	Tapped	-				
2.	Parmath Drain, Kanpur	04.01.2022	Tapped	-				
		11.01.2022	Tapped	-				
3.	Police Line Drain, Kanpur	04.01.2022	Tapped	-				
		11.01.2022	Tapped	-				
4.	Jail Drain, Kanpur	04.01.2022	Tapped	-				
		11.01.2022	Tapped	-				
5.	Wazidpur Drain, Kanpur	04.01.2022	Tapped	-				
		11.01.2022	Tapped	-				
6.	Muir Mill Drain, Kanpur	04.01.2022	Tapped	-				
		11.01.2022	Tapped	-				
7.	Bhagwat Das Drain, Kanpur	04.01.2022	Tapped	-				
		11.01.2022	Tapped	-				
8.	TAFCO Drain, Kanpur	04.01.2022	Tapped	-				
		11.01.2022	Tapped	-				
9.	Sati Chaura Drain, Kanpur	04.01.2022	Meagre flow	Sample not collected				
		11.01.2022	Tapped	Temporarily diverted to Air Force drain as sewerage network work was under progress				
Tapped Drains: Overflow								
10.	Air force Drain, Kanpur	04.01.2022	Untapped	0.36 MLD	88.2	188	75	< 0.2
		11.01.2022	Untapped	0.46 MLD	115	228	70	< 0.2
11.	Dabka-1, 2 & 3, Kanpur	04.01.2022	Tapped	-				
		11.01.2022	Tapped	11.52 MLD	111	233	100	0.35
12.	Budhiyaghat Drain, Kanpur	04.01.2022	Untapped	1.19 MLD	497	866	300	4.1
		11.01.2022	Tapped	-				
13.	Permiya Drain, Kanpur	04.01.2022	Tapped	Flow could not be measured due to inaccessible site conditions	13.3	25.8	75	< 0.2
		11.01.2022	Tapped	27.5 MLD	21.8	57.1	25	< 0.2
Untapped Drains								
14.	Golaghat Drain, Kanpur	04.01.2022	Untapped	1.45 MLD	270	419	100	< 0.2
		11.01.2022	Untapped	1.81 MLD	223	380	60	< 0.2
15.	Sheetla Bazar Drain, Kanpur	04.01.2022	Untapped	5.68 MLD	626	1394	150	13.93
		11.01.2022	Tapped	-				
16.	Rooma Drain, Kanpur	04.01.2022	Untapped	38.4 MLD	562	2144	125	3.42
		11.01.2022	Untapped	74.4 MLD	55.5	138	75	0.57
17.	Ranighat Drain, Kanpur	04.01.2022	Tapped	Flow could not be measured as wastewater was discharged into R. Ganga through a pipe	197	318	75	< 0.2
		11.01.2022	Tapped		210	313	75	< 0.2
KANPUR DRAINS HAVING GRADIENT TOWARDS RIVER PANDU								
Tapped Drains: Overflow								

18.	Ganda Drain, Kanpur	04.01.2022	Tapped	64.32 MLD	72.8	131	50	< 0.2
		11.01.2022	Tapped	121.38 MLD	189	458	100	< 0.2
19.	Halwakhanda drain, Kanpur	04.01.2022	Tapped	26.56 MLD	126	239	100	< 0.2
		11.01.2022	Tapped	81.72 MLD	267	412	125	< 0.2
20.	COD Drain, Kanpur	04.01.2022	Tapped	-				
		11.01.2022	Tapped	-				
Untapped Drains								
21.	Ratanpur Drain, Kanpur	04.01.2022	Untapped	8.65 MLD	68.5	123	75	< 0.2
		11.01.2022	Untapped	16.47 MLD	65	118	50	< 0.2
22.	Panki Drain, Kanpur	04.01.2022	Untapped	31.66 MLD	93.7	190	100	< 0.2
		11.01.2022	Untapped	16.66 MLD	107	190	100	< 0.2
23.	ICI Drain, Kanpur	04.01.2022	Untapped	12 MLD	49.5	133	50	0.23
		11.01.2022	Untapped	8.89 MLD	59	144	30	0.3
UNNAO DRAINS HAVING GRADIENT TOWARDS RIVER GANGA (Untapped and Flow)								
24.	City Jail Drain, Unnao	04.01.2022	Untapped	20.73 MLD	90.3	284	125	1.03
		11.01.2022	Untapped	46.3 MLD	171	379	125	4.75
25.	Loni Drain, Unnao	04.01.2022	Untapped	279.93 MLD	5.44	16.7	25	< 0.2
		11.01.2022	Untapped	Flow could not be measured due to heavy and scattered flow	< 5.0	8.21	30	< 0.2

Item No.1 (Court No. 2)

BEFORE THE NATIONAL GREEN TRIBUNAL
PRINCIPAL BENCH

(By Video Conferencing)

Original Application No.262/2022

Sanjay Sharma Applicant

Versus

Union of India & Ors Respondents

Date of hearing: 10.05.2022

CORAM: HON'BLE MR. JUSTICE ARUN KUMAR TYAGI, JUDICIAL MEMBER
HON'BLE DR. AFROZ AHMAD, EXPERT MEMBER

Applicant: Mr. Harsh Vardhan Kedia, Mr. Shaz Khan and Mr. Talha Abdul Rahman, Advocates

ORDER

1. The applicant, a journalist with an illustrious profile as highlighted, has statedly filed the present application in the larger public interest, seeking urgent intervention and directions from this Hon'ble Tribunal for the protection of environment and ecology in the following terms as prayed for:-

> *" i) Direct the Respondents to ensure that proper Covid-19 protocol is followed for the disposal of the Covid-19 impacted human corpses, with such suitable amendments that an expert committee appointed by this Hon'ble Court may suggested and as directed by this Hon'ble Court.*
> *ii) Direct the Respondents to devise permanent mechanisms to regulate disposal of dead bodies into the rivers, and issue directions to incentivize resort to crematorium to give effect to the fundamental right to decent burial and cremation;*

iii) Direct Respondent No. 4 & 5 to ensure a proper and complete health checkup of those living near the river beds where the human corpses are buried / set afloat and ensure their proper treatment;

iv) Direct Respondents No. 4 & 5 to identify the individuals dependent on the rivers for their livelihood whose right to livelihood is impacted on account of disposal of dead bodies in the river Ganga;

v) Direct the Respondents to initiate immediate corrective action and identify the areas where the corpses are buried on the river beds; and to ensure proper cremation of the bodies so buried, in light of the Report of Seven IITs by improving cremation facilities;

vi) Pass such other orders as this Hon'ble Tribunal may deem fit and proper in the facts and circumstances of this case."

2. The applicant has acknowledged that after the nation was hit by the Covid-19 pandemic, nation- wide lockdowns were imposed in order to curb the spread of the virus and Various precautionary and safety measures were announced to check the contagion of the Covid-19 virus. In view of the detrimental effect an infected human corpse could have on the environment and human lives, the Ministry of Health and Family Welfare, Union of India issued Standard Operating Procedure/ Directions titled "COVID-19: GUIDELINES ON DEAD BODY MANAGEMENT", based on the then epidemiological knowledge about the Covid-19 virus. The National Human Rights Commission (NHRC), in view of the rights guaranteed under Article 21 of the Constitution and keeping in view the large number of deaths because of the Covid-19 pandemic and challenges in the management of the dead bodies, issued an "Advisory for Upholding the Dignity and Protecting the Rights of the Dead". As per the press release issued by the Press Information Bureau (PIB) the Centre had directed States to prevent dumping of dead bodies in Ganga and

focus on their safe disposal and providing support for ensuring dignified cremation. The press release also referred to steps taken to prevent dumping of dead bodies in river and burying of dead bodies in sand along the river, launching of suitable awareness generation program and extending financial support for cremation. However the applicant has claimed that the same have remained on paper without implementation on ground.

3. While referring to news reports regarding Covid-19 infected dead bodies being dumped in the river Ganga and also being buried along the river, the applicant has submitted that the Covid-19 pandemic is far from over, and it is uncertain when it will resurrect – despite vaccination. The issue of throwing dead bodies in the river needs to be tackled from environmental point of view and standing directions need to be issued and followed. In respect of COVID, the situation in the rural parts of India continues to be grim where the RT- PCR tests are at a bare minimum and poverty is forcing people with limited means to float the corpses of their family members in rivers or to bury them near the river beds. Even though now mortality has gone down, but preventive and curative steps are required to be taken for avoidance and management of such a situation in the future. Since rotting bodies may have had an impact on the health of those living along the rivers, curative steps are required to be taken their complete health check-up and proper treatment.

4. Grievance of the applicant is also that he made representation dated 24.05.2021 to the respondents but no action has been taken on the same.

5. Learned Counsel for the applicant has reiterated the factual and legal submissions made in the application for intervention by this Tribunal.

6. We are of the considered view that this case, which is stated to have been filed by the applicant on account of the flagrant violation of the statutory norms by the instrumentalities of the State whose lackadaisical attitude in attending to the victims of the COVID-19 pandemic and their failure in assisting the families of those succumbing to this pandemic by providing them decent funeral/ cremation is forcing them to either float the corpses in rivers including the holy river Ganga, or forcing them to bury the said corpses on the river beds, also raises the issue of creating public awareness by all instrumentalities of democratic form of government particularly the electronic and print media and not just the agencies of government/instrumentalities of State and the more important issue of public participation for the cause of preserving and improving environment, which is not only the statutory obligation of the State but also fundamental duty of all the citizens who collectively known as “we the people of India” constitute the State and confer authority on all its instrumentalities and legitimacy to the working thereof. The case also raises the questions of adequacy and efficacy of measures/steps already taken and further measures/steps required to be taken to deal with the issues.

7. In view of the averments made in the application, we consider it appropriate to seek reports from Additional Chief Secretary (Home) and Additional Chief Secretary/Principal Secretary (Health), Governments of Uttar Pradesh and Bihar respectively to submit factual verification reports as to the following aspects:

(i) How many dead bodies were documented/found (ai) to have been floating in river Ganga and (b) to have been buried on the river bed in the States of Uttar Pradesh and Bihar before Covid 19 in the years 2018 and 2019 and after Covid 19 in the years 2020, 2021 and till 31.03.2022?

(ii) In how many cases financial support was extended by Governments of Uttar Pradesh and Bihar respectively for cremation funeral or burial of the dead bodies?

(iii) What steps were taken for creating public awareness and promoting public participation for preventing floating of dead bodies in river Ganga or their burial in or near the river bed?

(iv) Whether any criminal case was registered and any prosecution was launched against any person for violation of the guidelines for management of dead bodies covid infected or otherwise?

(v) Whether there was any violation of environmental norms and, if so, the details of the remedial measures taken may be furnished?

8. Report may be furnished by Additional Chief Secretary (Home) and Additional Chief Secretary/Principal Secretary (Health), Governments of Uttar Pradesh and Bihar respectively within two months by e-mail at judicial-ngt@gov.in preferably in the form of searchable PDF/OCR Support PDF and not in the form of Image PDF.

9. List the matter for further consideration on 04.08.2022.

10. In the meanwhile notice of the petition be also issued to the respondents for filing their replies with reference to the material averments made in the petition besides their observations/ recommendations regarding steps taken/to be taken.

11. The applicant is also directed to file his affidavit giving suggestions regarding creating of public awareness by the media, promoting public participation and involvement of civil society for the cause and improving efficacy of steps already taken and modalities of steps required to be taken.

12. A copy of this order, along with a copy of the application and its enclosures be forwarded to Additional Chief Secretary (Home) and Additional Chief Secretary/Principal Secretary (Health), Governments of Uttar Pradesh and Bihar respectively by e-mail for compliance.

Arun Kumar Tyagi, JM

Dr.Afroz Ahmad, EM

May 10, 2022
Original Application No. 262/2022
AG