

# Chapter 25

## Assessment of Water Quality of Indian Rivers: Case Study of Ramganga, Dhela, and Kosi During Magh Mela 2021

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### **ABSTRACT**

*Magh Mela, held from 14th Jan. to 11th Mar. 2021, is an important yearly ritual held on the bank of river Ganga in Prayagraj, Uttar Pradesh. River Ganga is the longest and most sacred river of India. It originates in the Western Himalayas in the State of Uttarakhand and traverses a distance of approximately 2525 km through the states of Uttar Pradesh, Bihar, Jharkhand before meeting the Bay of Bengal in West Bengal. Magh Mela involves a holy dip (bathing) by pilgrims in the River Ganga at Prayagraj, Uttar Pradesh. To maintain the water quality of River Ganga during Magh Mela, the water quality of its tributaries/sub-tributaries was assessed. Among monitored rivers, Dhela was found to be the most polluted. Rivers Dhela and Bahela impacted the water quality of rivers Ramganga and Kosi, respectively. Moreover, the discharge of wastewater from drains, namely Pachhana drain and Dhandi drain (discharged into river Dhela) and Rampur drain (discharged into river Kosi), impacted the water quality of rivers.*

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## INTRODUCTION

Magh Mela, an important yearly ritual held on the bank of river Ganga in Prayagraj which involves a holy dip (bathing) into river Ganga, was held from 14<sup>th</sup> January 2021 to 11<sup>th</sup> March 2021. River Ramganga is an important tributary of river Ganga which originates in the southern slopes of Dudhatoli Hill in Pauri Garhwal district of the Indian state of Uttarakhand and joins river Ganga at village Katri Chandapur in the HarDOI district of U.P. River Ramganga receives wastewater from cities, towns and villages and tributaries (including rivers Kosi and Dhela).

There has been an unsettling rise in river contamination due to climate change and anthropogenic activities (Tung and Yaseen, 2020). Domestic wastewater and industrial effluents significantly contribute to the contamination of river water quality (Mokarram et al., 2020). Domestic and industrial wastewaters include a wide array of organic/inorganic contaminants such as metals, nitrogenous compounds, dyes, phenolic compounds, petroleum, surfactants, etc. (Madima et al., 2020). Metals are persistent and toxic to the environment and human health. Metals cause gastrointestinal, cardiovascular, hematological, hepatic, renal, neurochemical, neurobehavioral diseases (Maurya et al., 2019).

To maintain the water quality of River Ganga during Magh Mela, 2021 at Prayagraj, the assessment of the water quality of tributaries of river Ganga is necessary. There is a paucity of data on the assessment of water quality of rivers Ramganga, Dhela, and Kosi during Magh Mela. No study on the water quality of these rivers during the mass bathing occasion of Magh Mela has been reported. This study was carried out with the following objectives: (i) assessment of water quality of river Ramganga and its tributaries Kosi and Dhela; and (ii) assessment of pollution in drains discharging wastewater into rivers Kosi and Dhela.

## MATERIALS AND METHODS

To maintain the water quality of River Ganga during Magh Mela, 2021 during January 14<sup>th</sup> to March 11<sup>th</sup>, 2021 at Prayagraj, sampling of rivers Ramganga, Kosi, and Dhela at 16 locations and three connecting drains (Pachhana drain, Dhandi drain, and Rampur drain) was carried out in Uttarakhand and Uttar Pradesh states of India. The monitoring locations along with geographical coordinates are shown in **Table 1**.

The sampling of rivers and drains was carried out during Magh Mela on fortnightly basis from Jan 04<sup>th</sup> to Mar 15<sup>th</sup>, 2021. The sampling schedule is shown in **Table 2**.

Round I: Jan 04<sup>th</sup>, 2021; Round II: Jan 18<sup>th</sup> – 19<sup>th</sup>, 2021; Round III: Feb 01<sup>st</sup>, 2021; Round IV: Feb 15<sup>th</sup> – 16<sup>th</sup>, 2021; Round V: Mar 1<sup>st</sup> – 3<sup>rd</sup>, 2021; Round VI: Mar 15<sup>th</sup>, 2021

Grab samples of river water were collected using polypropylene bottles from 30 cm below the water surface (CPCB 2017). The temperature was measured onsite using a thermometer. The samples for pH, color, conductivity, chemical oxygen demand, total dissolved solids, and total suspended solids were collected in pre-washed polypropylene bottles. Samples for dissolved oxygen, biochemical oxygen demand, total and fecal coliform were collected in glass bottles. Sampling bottles for total and fecal coliform bacteria analysis were pre-sterilized with 70% v/v ethanol before use. Samples for dissolved oxygen were preserved with MnSO<sub>4</sub> and NaN<sub>3</sub>. After collection, the samples were transported to the laboratory in an ice-box and analyzed using standard protocols (APHA 2017).

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