


Chapter 11


Heavy Metals Contamination in River Water and Sediments of Ganga and Hooghly in India

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ABSTRACT

The Ganga River and its tributary Hooghly River in India are distressed by variable levels of heavy metals contamination in river water and sediments by industrial effluents, agricultural runoff, cultural practice, idol immersion and domestic waste. The concentrations of heavy metals (Pb, Hg, Cd & Cr etc) in the river water are repeatedly above the safe limits (above max. admissible & desirable limits) thus making them potentially toxic, hazardous to aquatic lives, ecosystem, biodiversity health and livelihood of people who are using the rivers for drinking, irrigation, pasture and other purposes. The consumption of fish and other aquatic species

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contaminated with heavy metals poses a risk to food safety and general health of the population including retardation, chronic and acute toxicity, carcinogenic effects, liver and lung damage, neurological & skin diseases, cancer and gastrointestinal disturbances. The result commanding all govt. departments, industries and local communities collaborate to highlight this pollution issues and defend both environmental and human health in India.

INTRODUCTION

Water is one of the most important resources on Earth. India is not only a country of rivers but here rivers were treated as Goddess or Devi. Ganga is treated as the most holy river in India. It is embodied as Mother Ganga. Nearly 25% of the water resources of India, comes from river Ganga (Paul, 2017; Rahaman, 2009; Clayton et al 2025). It is one of the largest rivers in the Indian subcontinent. The water from the Ganga is used for agriculture, industries, domestic purposes, religious rituals and other daily needs. The availability of water in the Ganga is throughout the year, thus it helps in the growth of Indian civilization, culture, rich heritage and Indian economy.

The availability, quality, and quantity of water from this river are rapidly declining, severely impacting flora, fauna, and human life. Waterborne diseases are rising due to poor water quality. In West Bengal, the Ganga and its distributary, the Hooghly River, are heavily contaminated with heavy metals (HMs) in both water and sediments. The agricultural runoff, commercial effluents, urban waste, and idol immersion are some of the causes of massive environmental pollution in Ganga and Hooghly rivers (Maiti et al 2021, Gaur et al 2021) . It has emerged as major environmental issue in India and in densely populated and highly industrialized regions like West Bengal, India (Pandey & Singh, 2017).

The Ganga basin covers most heavily populated areas in the world with an average density of 520 persons/km² (Das and Tamminga, 2012). The two major river bodies-the Ganga and Hooghly together sustain millions of people who face serious threats from human activities. Ganga basin in India, Bangladesh and Nepal, sustains more than 300 million people's lives (Gopal, 2000).

The concentration of heavy metals above their normal level is dangerous to aquatic and human health. Contaminated water is not good for drinking, irrigation and other daily uses. The ingestion of fish and other aquatic animals contaminated with HMs poses a danger to food safety and consumption. Frequent consumption of these contaminated foods causes neurological illnesses and cancer (Tchounwou et al., 2012; Dwivedi et al 2018). Another research showed that HMs may produce reactive oxygen species, thereby affecting both terrestrial and aquatic organisms

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