Assessment of water quality of Damodar River in South Bengal region of India by Canadian Council of Ministers of Environment (CCME) Water Quality Index: a case study

Dibyajyoti Haldar, Seema Halder, Papita Das (Saha), Gopinath Halder

Department of Earth & Environmental Studies, National Institute of Technology, Durgapur 713209, India, Tel. +91 8100348889; email: mybiotech11@gmail.com

Department of Chemical Engineering, National Institute of Technology, Durgapur 713209, India, Tel. +91 9434241435; email: seema.halder6@gmail.com (S. Halder), Tel. +91 9434788189; emails: gopinath_halder@yahoo.co.in, gopinathhalder@gmail.com (G. Halder)

Department of Chemical Engineering, Jadavpur University, Kolkata 700032, India, Tel. +91 8013674550; email: papitasaha@gmail.com

Received 20 December 2013; Accepted 7 November 2014

ABSTRACT

River Damodar situated in the South Bengal region of India is the main source of water for the surrounding industries and agricultural places. The objective of the present study is to evaluate the water quality of Damodar River in terms of an index under the influence of several physical and chemical parameters by using Canadian Council of Ministers of Environment Water Quality Index (CCME WQI) method as the river has been subjected to enormous contamination in recent times. Water samples have been procured from eight different locations along the river bank in the pre-monsoon, monsoon, and post-monsoon for the entire period of 2012. Immensely complex data were coined into a single term for the sake of convenience using CCME WQI method. This index consists of three elements: scope, frequency, and amplitude. Besides this, the seasonal variation of different water quality parameters like pH, total dissolved solid, total suspended solid, conductivity, turbidity, dissolved oxygen, chemical oxygen demand, biological oxygen demand, chloride, fluoride, chromium, alkalinity, total hardness, calcium and magnesium hardness, oil, grease, and total Coliform were also assessed during the aforementioned time period. The relationships among the eight sampling stations were emphasized by cluster analysis to characterize and evaluate CCME WQI that produces an index value in the range of 0–100 to reflect the worst and best quality water, respectively. Nevertheless, the CCME WQI values obtained from the respective stations depict fair values on an average except the last sampling station Tetul Bagan Gas Canal where the river water is heavily contaminated and thus require pre-treatment before use.

Keywords: Damodar; Water quality; CCME; WQI; Cluster analysis

*Corresponding author.