

The Pollutant Content in the Padma River Water Draining from Rajshahi City and Its impact on fisheries

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Abstract

The study was carried out to assess surface water quality of Rajshahi City of Bangladesh. Based on surveys and chemical analyses, we performed a case study of the surface water collected from three different areas, in order to understand the sources of water pollution and the evolution of water quality in Rajshahi City, Bangladesh. Concentrations of major chemical elements in the surface water were related to the source of the agricultural, industrial and municipal sewerage. Low dissolved oxygen, pH, Secchi depth and high electrical conductivity, total phosphorous total nitrogen and heavy metals were strongly associated with the effluent impacted sites and greatly influenced the fish community structure. The Padma river bank close to the city side was more polluted by the domestic and sewerage system than that of opposite side. This study recommends the use of fish as valuable biological indicators in aquatic environmental pollution assessment.

River water is very much important for domestic, agriculture and industrial use in Bangladesh which is in critical condition from long time based on research data. During last 40 years, extreme pollution events occurred in peripheral rivers surrounding Dhaka city and Karnaphuli River in Chittagong city. Present data showed that other urban rivers are also in critical condition especially Korotoa, Teesta, Rupsha, Pashur and Padma. The pollutants flowing with water made a severe pollution in downstream areas of rivers. Metals concentrations in river water was found to be higher in dry season. Dissolve oxygen (DO) was nearly zero in Buriganga River and several points in Turag, Balu, Sitalakhya and Karnaphuli River. NO₃⁻, NO₂⁻ and PO₄³⁻ pollution occurred in different rivers. Zn, Cu, Fe, Pb, Cd, Ni, Mn, As and Cr concentration was above drinking water standard in most of the river and some metals was even above irrigation standard in water from several rivers. Sediment data showed very much higher metal concentrations in most of the rivers especially peripheral rivers in Dhaka and Karnaphuli, Korotoa, Teesta, Rupsha and Meghna River. Metal concentrations in sediment was above US EPA threshold value in most of the rivers. Metal concentrations in fish and agricultural crops showed that bioaccumulations of metals had occurred. The concentration of metals showed the trend like: water < fish < sediment. Agricultural crops were found to contain toxic metals through polluted water irrigation. The calculated data of daily intake for the non-carcinogenic and carcinogenic showed that consumption of the contaminated foodstuff can cause serious health injuries.

Water is a precious resource for living species on earth. Without water survival is impossible. Other planets have no water like earth so that living species cannot survive there. Out of 100% water on earth, 97% is reserved in Sea and Ocean which is saline and unusable normally. Only 3% water considered as fresh water and out of this 2% is stored as ice and glaciers which also unavailable water. The remaining 1% water stored in lake, canals and underground which is the only source of consumption. Proper management and sustainable planning is very much needed to sustain life on earth. Before industrial revolution it was rare to think about water scarcity and water pollution. But after suffering many health hazards due to water pollution it was become prime concern. In recent years, many developed countries like USA, Japan and South Korea developed efficient technology and national plan to ensure safe water to their citizens. However, developing and underdeveloped countries have serious water resource problem due to the lack of proper water resource management and Bangladesh is one of them.

Bangladesh has 238 major rivers. However, most of the rivers are small tributary of the major transboundary river Ganges, Brahmaputra and Meghna. Padma, Jomuna, Surma, Karnaphuli, Kushiara, Tista, Dudhkumar, Dharla, Atrai, Mohananda, Dhaleshwari, Karatoya, Sitalakhya, Rupsa and Pasur are the well-known rivers around the country. Bangladesh called riverine country because of these rivers. In earlier time, irrigation totally depends on this river water. However, due to sedimentation and pollution it became difficult to use river water for irrigation at present. So, farmers now highly depend on ground water. Intensive exploitation of ground water also causes serious threat to living species by the decline of ground water table which causes accumulation of toxic materials with water. Millions of peoples are now suffering from arsenic pollution in Bangladesh.

Most of the industries were established on the bank of the rivers. Thousands of tons of waste materials have been releasing into the river water every day. There are rules and regulations but they do not obey it properly. Some industries have effluent treatment plant (ETP) but they do not like to run it due to high profit goal. As a result, river water become toxic for living biota. Agricultural area close to the polluted river are affected as well. Farmers using this polluted water for irrigation made the toxic materials to enter into the food chain and ultimately come to human. The poor usually use this polluted water for washing and cooking, which is very harmful.

Rivers especially surrounding the city are becoming more polluted because of industrialization. Buriganga, Turag, Balu and Sitalakhya are the surrounding rivers of capital city Dhaka, which are in severe condition at present. Buriganga is called a dead river because of the quality of water. During summer season, the physical appearance of the water is dark black like burned Mobil. Karnaphuli River is affected severely by waste materials of Chittagong city. Hundreds of ship breaking industry situated on the Karnaphuli River bank area. Toxic liquids, oils and Mobil's and tons of iron materials were washed into the river water. This toxic water is used as irrigation water in many parts of the lower basin area.