

Fishes inhabiting fly ash-polluted tributary of Hasdeo river, Chhattisgarh, India

Fishes are among the abundant vertebrates in the world. There are about 39,900 species of vertebrates, among which about 21,720 species are fishes; out of which about 8410 are fresh water species and 11,650 are marine water species. India occupies the ninth position in fresh water mega biodiversity in the world¹. In India there are 2500 species of fish, among which 930 species are fresh water and about 1570 are marine species². The 742 fresh water fishes documented in India belong to 233 genera, 64 families and 16 orders³. About 2546 fresh water species of fishes belong to 969 general, 254 families and 40 orders⁴. Several researchers have studied ichthyofaunal diversity of fishes from various aquatic environments such as rivers, tributaries, dams, reservoirs, etc.⁵⁻²³. Fishes are not only of economic importance, but they also provide a source of livelihood for the local population. It is necessary to study the biodiversity of freshwater fishes in aquatic environment, especially from contaminated water. The

present study was conducted to study the distribution of freshwater fishes in Hasdeo River, Chhattisgarh, India which is contaminated with fly ash from thermal power plants. Hasdeo River, a tributary of the Mahanadi, joins the Mahanadi River near to Bilaiygarh. Hasdeo Bango dam has been constructed across this river. The river originates about 910 m amsl, nearly 10 km from Sonhat, Korba district, Chhattisgarh. The total length of the river is 333 km and drainage area is 9856 sq. km.

Fishes were collected from the Hasdeo river from two different water bodies, one contaminated with fly ash and the other was not contaminated, which is located at 2–3 km from the contaminated water body. We placed fishing nets in the contaminated water body at three different sites. The fishes were brought to the laboratory and preserved in formalin solution. They were identified up to the species level using standard keys^{24,25}.

We found occurrence of 21 fish species belonging to four orders, where Cypriniformes was dominant with 15 species, followed by Ophiocephaliformes with 4 species, and Mastacembeliformes and Perciformes, each with 1 species, i.e. *Mastacembelus pancalus* and *Oreochromis mossambicus* from the site of the tributary not contaminated with fly ash. In highly contaminated water body, we found the species, *Puntius sophore*, *Puntius sarana* and *Puntius ticto*, which again confirms the dominance of order Cypriniformes.

In the present study, we found 21 species belonging to 13 different genera, 4 orders and 6 families (Table 1). In the water bodies contaminated with fly ash, cypriniformes were found to be dominating with 15 order, 4 different families, 10 genera and 14 species, with major abundance of fishes labeo, catla and mrigal. We found *P. sophore*, *P. sarana* and *P. ticto* from the fly ash-contaminated site II to be the predominating species (Table 2).

Our study is in agreement with that conducted in one of the most polluted rivers reporting 24 species of fishes surviving, including *Puntius chola*, *Puntius manipurensis* and *Puntius sophore*²⁶. Studies have been conducted on the effects of water pollution on ichthyofaunal diversity of east Kolkata wetlands having water bodies contaminated with tannery, electroplating, plastic and dye industries rich in ichthyofaunal diversity, including many Indian major carps along with *Puntius* species surviving there²⁷. Results are similar to a study conducted on fishes species surviving in a polluted water body of Baral river²⁸, Natore, Bangladesh, which reported 60 species of fishes surviving and decline in fish population due to various anthropogenic activities such as agro-industrial waste, different obstacles of water flow, excess use of river water, siltation, over fishing, etc. In this study, *P. sarana* was reported surviving in the polluted spot along with other fish species⁵. According to the available records, such type of identification and classification of ichthyodiversity of fishes in fly ash-contaminated habitat has not been done before. Several researchers have reported on the decrease



Figure 1. Google Earth image of Hasdeo river and its tributaries.

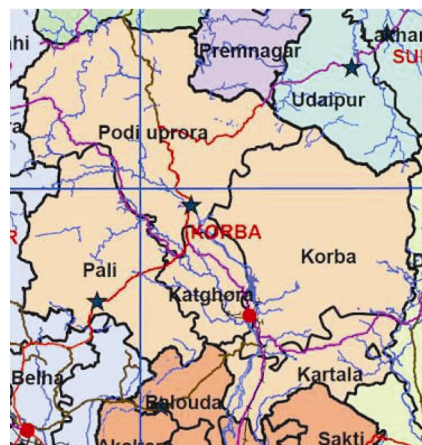


Figure 2. Google Earth image of Hasdeo river and its tributaries.



Figure 3. Photograph showing a tributary of Hasdeo river.

Table 1. Site I fishes from freshwater

Order	Family	Genus and species	Common name
Cypriniformes	Bagridae	<i>Mystus cavasius</i>	Tengna
Cypriniformes	Bagridae	<i>Mystus vittatus</i>	Tengna
Cypriniformes	Bagridae	<i>Mystus oar</i>	Singi
Cypriniformes	Bagridae	<i>Rita rita</i>	Kotia
Cypriniformes	Claridae	<i>Clarius batrachus</i>	Mongri
Cypriniformes	Cyprinidae	<i>Catla catla</i>	Catla
Cypriniformes	Cyprinidae	<i>Cirrhinus mrigala</i>	Mrigal
Cypriniformes	Cyprinidae	<i>Labeo bata</i>	Bata
Cypriniformes	Cyprinidae	<i>Labeo rohita</i>	Rohu
Cypriniformes	Cyprinidae	<i>Puntius sarana</i>	Kotra
Cypriniformes	Cyprinidae	<i>Puntius sophore</i>	Kotri
Cypriniformes	Cyprinidae	<i>Puntius ticto</i>	Kotri
Cypriniformes	Cyprinidae	<i>Oxygaster bacila</i>	Sirangi
Cypriniformes	Cyprinidae	<i>Hypophthalmichthys molitrix</i>	Silver carp
Cypriniformes	Saccobranchidae	<i>Heteropneustes fossilis</i>	Singhi
Mastacembeleformes	Mastacembelidae	<i>Mastacembelus pancalus</i>	Bami
Ophiocephaliformes	Ophiocephalidae	<i>Channa punctatus</i>	Khoksi
Ophiocephaliformes	Ophiocephalidae	<i>Channa straitus</i>	Bhunda
Ophiocephaliformes	Ophiocephalidae	<i>Channa marulius</i>	Sanwal
Ophiocephaliformes	Ophiocephalidae	<i>Channa gachua</i>	Bijru
Perciformes	Cichlidae	<i>Oreochromis mossambicus</i>	Tilapia

Table 2. Site II fishes from fly ash-polluted water body

Order	Family	Genus and species	Common name
Cypriniformes	Cyprinidae	<i>Puntius sophore</i>	Kotri
Cypriniformes	Cyprinidae	<i>Puntius sarana</i>	Kotra
Cypriniformes	Cyprinidae	<i>Puntius ticto</i>	Kotri

of fish species due to environmental pollutants and the measures to be taken for protection of fish population²⁹⁻³². Ichthyofaunal diversity of freshwater fishes in water reservoirs of Chhattisgarh needs to be thoroughly documented³³⁻³⁶. Several researchers have also reported on the influence various types of pollutants on fish species in contaminated water bodies. However the influence of fly ash contamination on the distribution and abundance of fishes in water bodies contaminated with fly ash needs to be studied in detail.

In conclusion, we found that water bodies contaminated with fly ash were dominated by Cypriniformes, mainly consisting of *P. sarana*, *P. sophore* and *P. ticto*, whereas in other nearby water bodies we found other fishes such as rohu, katla, and mrigal, etc. Our study may be helpful for developing strategies for the conservation of fish species in the study area.

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