

# Estuarine Fish Fauna Affected due to Industrialization near D. H

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**Abstract**— Rapid industrialization in the west bank of river Hooghly near Diamond Harbour( D. H ) causes health hazard for heavy metal contamination in fish muscle tissue. Human consumption of fish as protein source in daily diet of major Bengali people lives near coastal belt as well as in 3 cities in Maritime state West Bengal affects in many ways. Digestion problem is now-a-days common in people of Kolkata, Howrah and Haldia. Heavy metals like Zn, Cu and Pb affects fish health of estuarine belt near Bay-of-Bengal. Hilsa, a migratory fish is most tasteful to consume with highest market price. Other brackish water fishes like *L. calcarifer*, *N. chitala*, *P. pangasius* also popular to eat. AAS detect heavy metal accumulation (non bio degradable) in fish muscle tissue collected from the site i.e D.H near Bay-of Bengal.

**Keywords**— AAS, D.H, Brackish water, Heavy metals.

## I. INTRODUCTION

Hooghly river gets polluted by bottom painting of ships and trawlers due to continuous leaching of paint in adjacent water. Cu toxicity present in water, sediment and (higher trophic level resident of Hooghly) fish.

Fish muscle tissue gradually enters in human and bioaccumulated in their body (absorbed through intestine and circulate through blood to different organs like Liver, Pancreas, Brain, Muscle tissue, Adipose tissue, Gonads and Skeleton ).

Haldia petro chemical presents in the opposite bank of river Hooghly which add heavy metals near Diamond harbour.

## II. MATERIALS AND METHOD

If you see images you will understand how river Hooghly gets affected due to Ships and trawlers and fish landing stations near Mohona at Digha coast.



Fig.1: Ships carries petroleum from Haldia port



Fig.2: River Hooghly



Fig.3: River Bhagirothi meets Bay-of-Bengal



Fig.4: Trawlers visible for fishing and carries human

If you see the opposite bank of river Hooghly it is clear that trees are visible. Length almost 700 m .from east to west. Till Diamond harbour bouncy of river is there. So many ships and trawlers assembled there. Many estuarine fish available in that river belt. Bay –of-Bengal is hardly 50 kms. away. So many ships and trawlers enter from sea to river. Again ships are sailing in Bay-of –Bengal . Land and river holds mangrove in that area , largest delta known as Sundarban delta. 102 islands scattered in three districts like South 24 parganas, North 24 Parganas and Midnapur. Total coastline in Bay-of-Bengal from Bakkhali to Digha is in west Bengal. Largest island Shankarpur is near Digha coast. River Bhagirothi enters in Digha coast. Two tributaries of river Ganges.( Hooghly and Bhagirothi ) meets Bay-of-Bengal.

Estuarine fish like *Hilsa ilisha* who leads a migratory life (Half life in river and half life in sea) available in this zone. *Lates calcarifer*, *Pangasius pangasius* , *Notopterus chitala*, *Notopterus notopterus* , *Satipina phasa* all estuarine fish available in daily catch. Marine zone holds many species variety of marine fish like Pomfret, Ray fish, Sea horse, Ornamental fishes and edible fin fishes as well as shell fishes.

I have collected marine and estuarine fishes like *Hilsa* sp., *Notopterus chitala*, Pomfret (*Pama pama*) and *Lates calcarifer*. From river Hooghly and marine zone i/e Bakkhali and Digha.

20 mg. muscle tissue of equal size fresh fish collected from the stations and preserved in crushed ice and bring to the laboratory for AAS to see accumulation of heavy metals in above mentioned fishes in 2019 March 17<sup>th</sup>.

#### Trace Metals Analysis

Inductively coupled plasma – mass spectrometry (ICP-MS) is now - a - day accepted as a fast, reliable means of multi-elemental analysis for a wide variety of sample types (Date and Gray, 1988). A Perkin-Elmer Sciex ELAN 5000 ICP mass spectrometer was used for the present analysis. A standard torch for this instrument was used with an outer argon gas flow rate of 15 L/min and an intermediate gas flow of 0.9 L/min. The applied power was 1.0 kW. The ion settings were standard settings recommended, when a conventional nebulizer/spray is used with a liquid sample uptake rate of 1.0 mL/min. A Moulinex Super Crousty microwave oven of 2450 MHz frequency magnetron and 1100 W maximum power Polytetrafluoroethylene (PTFE) reactor of 115 ml volume, 1 cm wall thickness with hermetic screw caps, were used for the digestion of the muscle samples of the fish. All reagents used were of high

purity available and of analytical reagent grade. High purity water was obtained with a Barnstead Nanopure II water-purification system. All glasswares were soaked in 10% (v/v) nitric acid for 24 h and washed with deionised water prior to use.

The analyses were carried out on composite samples of 4 specimens of each species having uniform size. This is a measure to reduce possible variations in metal concentrations due to size and age. 20 mg composite muscle samples from 10 individuals of each species of fishes were weighed and successively treated with 4 ml aqua regia, 1.5 mL HF and 3 ml H<sub>2</sub>O<sub>2</sub> in a hermetically sealed PTFE reactor, inside a microwave oven, at power levels between 330-550 W, for 12 min to obtain a clear solution. After digestion, 4 ml H<sub>2</sub>BO<sub>3</sub> was added and kept in a hot water bath for 10 min, diluted with distilled water to make up the volume to 50 ml. Taking distilled water in place of muscle samples and following all the treatment steps described above the blank process was prepared. The final volume was made up to 50 ml. (Source : Abhijit Mitra, Prabal Barua, Sufia Zaman & Kakoli Banerjee , 2011)

### III. RESULT

L. calcarifer	<b>Zn</b> <b>53 ppm</b>	<b>Cu</b> <b>45 ppm</b>	<b>Pb</b> <b>0.133ppm</b>
P. pama	<b>Zn</b> <b>97 ppm</b>	<b>Cu</b> <b>94 ppm</b>	<b>Pb</b> <b>0.155ppm</b>
H. ilisha	<b>Zn</b> <b>92 ppm</b>	<b>Cu</b> <b>45 ppm</b>	<b>Pb</b> <b>0.111ppm</b>
N. chitala	<b>Zn</b> <b>93 ppm</b>	<b>Cu</b> <b>41 ppm</b>	<b>Pb</b> <b>0.1777ppm</b>

### IV. DISCUSSION

**Heavy metal analysis shows Zn>Cu>Pb** . Permissible limit by WHO AND FAO ( Pb is 0.10 ppm ) . So it is exceeding the permissible limit.

Lead , Copper and Zinc, these three heavy metals are persistent in river water and sediment. They flows from Himalaya (Gangotri glacier ) to Bay-of Bengal. Total 2525 kms stretch of this pure Ganges water carries these metals for weathering of rocks, addition of Zn, Cu and Pb from adjacent catchment area of agricultural field. Different pesticides and fertilizers add these metals during monsoon run off to river. Industrial effluents from Haldia petro chemical add major contribution of heavy metals in D.H. ( Station ). Fish health affected and bio accumulate in adipose tissue and muscle layer in fish. Which in turn as these metals are non-biodegradable after cooking too these are

gradually enters in human system to break BBB.(BLOOD BRAIN BARRIER )

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