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RESEARCH ARTICLE

HEAVY METAL CONCENTRATION IN ETROPLUS MACULATUS OF LAKE VATTAKAYAL, KOLLAM DISTRICT. KERALA

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ABSTRACT

Some heavy metals such as copper, Nickel ,cadmium, magnesium, zinc and lead were estimated in the gills lever and kidney of fish ***Etroplus maculatus.*** collected from Vattakayal Lake, Kollam(dist). The concentration of these heavy metals was high and at higher concentration these might be toxic to the fish and to humans that depends on such fish as food. The concentration of heavy metals were carried out using Flame Atomic Absopition spectrophotometer (AAS). The levels of heavy metals varied in different tissues .Large amount of Zinc and Magnesium were noted in the liver whereas Nickel and magnesium in the gills and lead and copper in the kidney. When compared to FAO, FEPA and WHO standards it was noted that these heavy metals bio accumulated in the different parts of the fish, exceeds the permissible limit.

INTRODUCTION

The Lakes which comprises 67% of the total water bodies of Kerala, have played a significant role through the ages in the socio -economic and cultural history of the state. But today the extensive, reclamation of land from backwaters both authorized and un authorized threatens to tear apart the pristine ecology of the region .(Kurshid, A Basheer 1998) Aquatic organisms are largely influenced by changes in hydrological conditions of the water body. Fishes are essential for maintaining the aquatic, ecosystem. They are valuable sources of high grade protein, and other organic products .A comprehensive study of fishery resources of kerala has become essential for the effective management, Planned exploitation and scientific conservation of these highly productive water bodies.

Heavy metals are high pollutants because of their relative high toxicity and persistent nature in the environment .Therefore, Knowledge of the changing concentrations and distribution of heavy metals and their compounds in various habitats all over the world due to anthropogenic activities and natural process were studied by Don Petro *et al* ,2004, Forstner and Wittmann,1979 and veena, *et al* ,1997. As long as human induced generation of heavy metals continues in industrial and domestic activities sustained measurements will be needed to asses the effectiveness of set limitation standards and facilitate the identification and qualification of the state of environmental degradation attributable to the discharged heavy metals contaminating elements and compounds are transported by water and gather in bottom and alluvial sediments . Thus these has been growing concern in recent years that certain anthropogenic trace metals released by industries and domestic effluents are incorporated into accumulating sediments (sokolowska,1996,Zerbe *et al*,1998) .Metal pollution of the sea ,lakes etc is less visible and direct than other types of pollution but its effects on marine and lake ecosystems are very extensive. A few works jon ccology and heavymetal pollution in kerala are as follows.

MATERIALS AND METHODS

Vattakayal lake a big brakish water lake about 5km away from KMML (Kerala Minerals and Metals Limited) company Chavara, Kollam District, Kerala lies between 8^0 53'N and 8^0 54'N latitude and 76^0 32'E and 76^0 34'N longitude, with a circumference of 90 areas.

The fish samples were collected at monthly Intervals from Vattakayal Lake with the help of local fisherman. The fish were laballed with an identification number . Samples of fishes were transported to the laboratory on the same day Fishes were dissected to remove the liver kidney and gills. The liver ,kidney and gills of each fish samples were dried at 105^0C until they reach a constant weight .Ecach dried sample was

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ground using protein mortar. The ground fish tissues were transferred to a porcelasin basin and put into a thermicon .P muffle furnace at a tempareture of c for 4 hrs samples were digested with triacid mixture (HNO_3: HCI:H_2SO_4)at a rate of 5 ml/0.5 g of sample and were placed on a hot plate at c temparature All the digested liquors were filtered through Whatmann 541 fitter paper and diluted to 25 ml with distilled water. Determination of Copper, Nickel, Magnesium, Zinc were made directly on each final solution using Perkin Eimer analyst 300 atomic absorption spectroscopy(AAS).

CESS (2000) studied the conservation measures of Vellayani Lake as a drinking water source Shaji, Nimi *et al*, (2009) studies the water quality assessment of open wells in and around Chavara industrial area, Quillon, Kerala.George Thomas,Tresa Fernandez (1997) studied incidence of heavymetals in the mangrove flora and sediments in Kerala, India. Girijakumari (2007) studied Resource potential of Sasthamcottah Lake with special reference to fish founa. Anju A. Kumar *et a1* (2011) studied seasonal variation of heavy metals in cochin esturay.

RESULTS AND DISCUSSION

The heavy metals mostly accumulated in the tissues of ***Etroplus maculatus*** was Zinc and Cadmium was not detected. The levels of bioaccumulation of Zinc in the liver is Zinc 87.9 mg /Kg ,Magnesium 73.5mg/Kg , Copper 10.6 mg/Kg Lead 5.5mg/kg , Nickel 4.7mg/Kg Cadmium below 0.2mg/Kg. (Table 1). The metal bioaccumulation in the liver of ***Etroplus maculates*** was in the decreasing order of Zn>Mg>Cu>Pb>Ni. The accumulation of Zinc in the gills of Etroplus was 11.2 Magnesium 15.3, Ni 17.1,Cu2.2Pd 1.7 mg/ kg. The metal bioaccumulation in the gills of Etroplus was in the decreasing order of Ni>Mg>Zn>Cu>Pb>Cd. The levels of Zinc accumulated in the Kidney of ***Etroplus maculatus*** was 7.7 mg/Kg , Ni 7.3 mg/kg, lead 4.1 mg/kg ,lead 8.6 mg/kg and copper 9.6mg/Kg. The metal bioaccumulation in the kidney of ***Etroplus maculatus*** was in the decreasing order of Cu>Pb>Zn>Mg>cd Table 2 shows the maximum permissible limit for some heavy metals. In general the different tissues showed different capacitties for accumulating trace elements. The highest concentration of Zn and Mg were detected in the liver of ***Etroplus maculates*** whereas Zn, Mg, Cu,Cd and Ni concentration were found above the critical limit value (Table 2).. The concentration of Lead was below permissible limit When

Table 1 Mean values of heavy metals in_etroplus maculatus

	Metals	Body parts	
MG/kG	Kidney	Liver	Gill
Copper	9.6	10.6	2.2
Nickel	4.1	4.7	7.1
Cadmium	nd	n.d	nd
Magnesium	7.3	73.5	15.3
Zinc	7.7	87.9	4
Lead	8.6	5.6	1.7
Nd- not detected			

compared to FAO, FEPA and WHO standards it was noted that these heavy metals bio-accumulated in the different parts of the fish, exceeds the permissible limit (Table 2). The polluted toxic and radioactive effluents from the KMML company reaches Ashtamudi Lake via Vattakayal Lake. About 1500 families in and around the company were bearing the curse of the persistent pollution being caused by the company. Mgcneral the different tisiues showed different capaciffes for acceimulatg trall elements

Table2 Maximum permissible limit for some Heavy metal.(WHO Standards)

Heavy metals	Aquatic life (ppb)
Cu	5.0
Ni	0.40
Cd	0.20
Mg	30
zn	5
lead	25

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