Heavy Metals Impact on Fisheries of Mithilanchal

Dipti Kumari
Research Scholar,
Department of zoology,
L.N.Mithila University, DARBHANGA-846008, Bihar, India.

ABSTRACT : The fish reflects the water quality directly and indirectly fish communities reflect present and past conditions and are useful in the biological assessment of water quality as a result the water quality fish productivity has been effected in order to maintain the potential of fisheries,physico chemical characteristic, PH acidity, alkalinity, temperature and biological characteristic of the aquaculture has made.
The effect of cadmium,lead, chromium etcs exposure were analyzed in fresh water ponds of these areas.The deposition of these heavy metals were analyzed in gills, liver, kidney & muscles.
The deposition of lead was maximum followed by cadmium and chromium.The pH was found to be highest in january ranged from 7.5 to 8.00 temperature of pond water followed by the same course that of air temperature.Totalhardiness,ca,Mg was also found to be highest in january especially in mithila region the population of fish was highest in July and August and minimum in September to January.The fish fauna belong to family Clupeidae , Notopteridae, cyprinidae ,BagridaeSiluridae, Heteropneustiedae, Ophiocephalidae,Amphinoida,Anabentidae, mastecembelidaeetc.water pollution due to heavy metals is a matter of global concern during recent years.Heavy metals constitute a care group of water pollutants due to their bio accumulative and non-biodegreadable properties.
The rate of bioaccumulation of heavy metals in fishes dopends on the ability of the metals in water,it has to do with the concentration of the heavy matel in the surrounding soil sediments,and as well the feeding habits of the organism.Age of fish ,lipid content in the tissue and mode of feeding are significant factors that the accumulation of heavy metals in fishes.

KEYWORDS : Heavy metals,local fishes, aquaculture.

INTRODUCTION : Living organism require trace amounts of some heavy metals including cabalt copper, iron, manganese molybdenum, vanadium, strontium and zinc.But excessive levels of essential metals however, can be detrimental to the organism.

Fish is on important food source for the human body .fish provide essential fatty acids like omega 3, proteins, vitamins and minerals.Despiteit's nutritive value consumption fish brings many times a potential hazard concern for the human consumers.Heavy metals enter the aquatic environment mainly by anthropogenic sources.Fish is at the top of the aquatic food chain and during its life can accumulate large amounts of toxic elements.Heavy metals are defined by their weight .Non.essential heavy metals of particular concern to surface water systems are cadmium,chromium, mercury, lead ,arsenic and antimony.The colloidal and particulate metal may be found in the form of hydroxides,oxides,silicates or sulphidesabsrbed to clay,silca of organic matter.The solubility of trace metals in surface water is predominantly controlled by pH,the type and concentration of ligands on which the metal could obsorb and the oxidation state of the mineral components and the redox environment of the system.There are over fifty elements that can be classified as heavy metals but only seventeen are considered to be very toxic.One category of toxic contaminations accumulated by fishes are heavy metals such as lead (Pb), mercury (Hg), cadmium (Cd), chromium (Cr), and arsenic (As).Any of these heavy metals can destroy life when they concentrate in the body above acceptable levels.Heavy metals have the tendency to accumulate in various

organs and muscle tissue of fish.Contaminated fish enter the human body through consumption and it causes health hazards.sometimes, abandoned quarry pits turn into stagnant water bodies which create breeding ground for mosquitoes and black flies which spread disease within the locality.These wastes have been reported to contain toxic and hazardous substances including heavy metals, which eventually settle in bottom sediments stated that microbial and redox processes may change the properties of sediments and affect the composition of interstitial water, while reworking of the sediments by organsims will also bring sediments to the surface, where a significant fraction of heavy metals will be released.Heavy metals in water and sediments play a key role in detecting the Sources of pollution in aquatic systems.Fish accumulates toxic materials at various levels, depending on species, age season, feeding habits and so on.Non of the

metals are biodegradable and though they can change forms from solid, to liquid,to dust and gas, they never completely disappear.The ones that are toxic in even the same minute amount create intant cellular destination in any of their forms.

MATERIAL AND METHODS : Heavy metals are commonly found in natural waters and some are essential to living organisms,they may become highly toxic when present in certain concentrations. These metals also gain access into ecosystem through anthropogenic and get distributed in water body, tended solids and sediments during the course of their mobility.

The fishes were caught, identified, counted, graded, measured and weighed according to species. The species for chemical and histological analysis were taken immediately after weighing to the laboratory. Concentration of metals were studied in fish in the tissue lying between the lateral line and the fins, since high concentration of metals do not imply that the metals have a toxic effect It was observed that fish fin had reduced bioaccumulation of cadmium than the blood and liver.

The fish was fed with standard feed and were starved for 24 hr before the start of the experiment. Analytical grade cadmium chloride, lead nitrate and potassium chromate were used.

Fish were divided into four groups, of which first group served as control.The three groups administered with a sublethal concentration of 5 ppm of combined metal solution (1/10 of Lc 50) daily for 5.15 and 25 days fish from each group were dissected to separate organs, muscles, gills, kidney and liver and were analyzed as per PAO methods (Dybem 1983) The detailed analytical procedures for metal determination were after Ritterhoff and zanke (1997). Data obtained were analyzed and the results were expressed as mean ISD.The results were evaluated using students. Ideal values of p k 0.001 were considered statistical significant cant. Heavy metals are easily stored in fatty tissue and will bioaccumulate if the fish is analysis in different organs of fish .

Exposed to further contamination.The range of cadmium deposition in gills (site of entry of heavy metals range from 6.020± 0.040 to 6.798 ± 0.025. Lead accumulation in gills ranges from 4.190 ± 0.023 to 4.985 ± 0.026. The deposit of chromium in gills ranges from 2.140 ± 0.05 to 3.567 ± 0.014. The result show that cadmium accumulation in the gills increase with increase in day of exposure and it was maximum followed by lead and chromium. This result show similarity with that of Adami et Al.(2002). The liver shows highest accumulation of heavy metals and follows an increasing accumulation trend with the increase in days of treatment exposure. However the deposition trend liver are in little variance with that of gills. In liver lead shows maximum concentration followed by cadmium and chromium. Kidney is an organ where detoxification of heavy metals accur. Kidney also shows an increase deposition of metals with the increase in exposure period. In kidney,like liver, lead deposition shows maximum level with slightly lower level of cadmium followed by Chromium. In muscles, the deposition of heavy metals also shows an increase with the increase in exposure period .

TABLES :

Heavy metal analysis in different organs of fish

Name of organs	PERIOD OF EXPOSURE	Lead (pd)	Cadmium (cd)	Chromium (Cr)
GILLS	CONTROL	1.250±0.018	1.700±0.016	0.640±0.023
	10 days	4.090±0.023	6.020±0.040	2.240±0.05
	20 days	4.537±0.024	6.340±0.012	2.310±0.03
	30 days	4.885±0.026	6.699±0.025	1.467±0.014
LIVER	CONTROL	1.880±0.015	1.598±0.075	0.261±0.015
	10 days	7.225±0.031	4.691±0.018	2.556±0.032
	20 days	7.823±0.031	5.004±0.015	2.732±0.032
	30 days	8.529±0.029	5.541±0.012	4.076±0.016
KIDNEY	CONTROL	1.790±0.019	1.064±0.014	0.241±0.022
	10 days	6.252±0.015	4.220±0.025	0.841±0.022
	20 days	6.513±0.015	4.732±0.025	2.690±0.030
	30 days	6.735±0.015	5.225±0.025	2.843±0.030
MUSCLE	CONTROL	1.357±0.035	0.548±0.026	1.031±0.020
	10 days	2.052±0.025	1.101±0.018	1.481±0.020
	20 days	2.339±0.020	1.298±0.020	1.774±0.018
	30 days	2.602±0.014	1.487±0.021	2.072±0.015

CONCLUSION : The rate of bioaccumulation of heavy metals in the fishes of these areas depends on ability to digest the metals ,on species age, season, feeding habits species specific factors, fish size etcs. Variations in metal concentration were recorded in the internal organs of the studied fish species. Metal accumulations were higher in the liver followed by gills and flesh. Cadmium,lead and chromium were analyzed in different organs like gills, liver ,kidney and muscle of the control fish. Similar analysis of different fishes given exposure to heavy metals were made and the results were compared with that of control. Biological importance of accumulation of heavy metals in various organs of fresh water fishes is great throwing light on the possible hazardous effect on human population.

REFERENCES :

1. T. W. (1998). Levels of heavy metals (Cd, pb, cu and Ni) in tissue of cyprinuscorpio, Barbuscopito and regium from the sexhan river. Turk. J. Zool. 22(3): 149-157,
2. B.(1983). Accumulation of heavy metals in fresh water organisms assessment of toxic interested Turk 25(3):173-179
3. E. O. Adelowo, O. A and ajlmoko, Y.R (2007). Relation between growth and the heavy matel concentration in organs of bream abraniusbrama L. population lake Balaton arehenvtion canton 43(2)236-243 aquatTaxicol 48:151-164
4. Isha Rani A (2000). The effects of sublethal concentration of cadmium on hematological parameters in the dogfish conicula.J. fish Biol.32(2):277-282
5. Utukurus.s (2005). Effect of heavy metal model mixture on rainbow trout biological parameters ekologio 4:12-17.
6. Bandyopadhyay. M. K.andDas,A.K.(1998). Impact of paper of paper mill effluent on aquatic environment at discharge site in kolebeel, Mitsch W J and Gosselink J G (2000) Wetlands. John Wiley and sons. Inc, New York.920 pp.Banerjea S.M.(1967). Water quality and soil conditions of fish ponds in some states of India in relation to fish production, Indian J. Fish 14 (1-2).115-144 panday, u.Tyagi,H.R,(1999). The relation of algal productivity to the nature of physic chemical environment of a fresh water tropical lake,Ecol Environ. Cons 5 (4):365-368. Banerjea, S.M (1967) water quality and soil conditions of fishponds in some states of India in relation to fish production.Indianj.Fish 14 (1&2):115-144, Paul, A.(2003), A comparative study on the seasonal variation in hydrobiological conditions of three water bodies of Kalyani, West Bengal.