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Seasonal Changes in Levels of Zinc and Mercury in Tissues of *Lamellidens marginalis* Collected from Sukhana Dam

Dahiwale Bhausahab J., Gulbhile Shamsundar D., Patil Satish S.,

Assistant Professor, Department of Environmental Science, Vaishnavi Mahavidyalaya,
Wadwani, (M.S.) India

Assistant Professor, Department of Zoology, Vaishnavi Mahavidyalaya, Wadwani, (M.S.) India

Professor, Department of Environmental Science, Dr. Babasaheb Ambedkar Marathwada University,
Aurangabad (M.S.) India

Email: drdahiwale@gmail.com, sdgulbhile@yahoo.com, sushshrey@rediffmail.com

Abstract: Freshwater reservoirs maintain ecological balance of flora and fauna interrelationship, regulate surrounding climate and recharge ground water. Dams are the major part of freshwater resources. Globally more than 3 times the freshwater in rivers is available in the dams, which have multiple uses, such source of water for drinking, fishing, agriculture and aquaculture, conservation areas of biodiversity, recreation and tourism. Sukhana dam is constructed on the river Sukhna, is the oldest dam in Aurangabad district. From the last 20 years the dam was subjected to many destructive influences like illegal encroachments, unauthorized reclamation, heavy siltation and industrial effluent. These factors had their impact on morphometry, water quality, biodiversity and recreational potential of the dam. In the present investigation, *Lamellidens marginalis* was used as an experimental animal. Zinc and Mercury metal levels in different body parts of *L. Marginalis* were determined in summer, monsoon and winter. The metal levels were determined by using Atomic Absorption Spectrophotometer, model Chemito-200 using different hollow cathode lamps. Three replicates of the samples were performed every time on each body parts and the mean values were subjected to statistical analysis using Students 't' test. Percentage differences were also calculated and concluded results.

Key Words: Zinc, Mercury, *Lamellidens marginalis*, Sukhna Dam

Introduction:

Most of The Indian Rivers and Fresh Water Streams Are Seriously Polluted by Industrial Waste or Effluents Which Comes Along With waste waters of different industries such petrochemicals, fertilizers factories, oil refineries and mills include metals, detergents, petroleum, acid etc. all the chemicals of industrial wastes are toxic to animals and may cause death or sub lethal pathology of the respiratory system in both invertebrates and vertebrate aquatic animals. The toxic substances present in the industrial wastes not only disturb the ecological balance in the receiving water but also may endanger the health of animal. The metal contaminants into the aquatic systems have various sources including smelting process and fuel combustion via atmospheric fall out, pollution from leaks, effluents and dumping activities from runoff of terrestrial systems. Where accumulation has occurred by atmospheric input, land application of sewage materials and leaching of garbage, on the otherhand polluted water bodies showed many pathways of metal contamination of terrestrial ecosystem, e.g., by way of irrigation, biota flux etc.

Today man is on the threshold of next millennium and in 21st century, freshwater is going to be the scarcest resource and its availability. Judicious exploitation and sustainable use will determine standard of life and livelihood of population in developed, developing and underdeveloped countries. In this context 2010 billion people lack access to adequate sanitary facilities and billion don't get clean drinking water. Further, water borne, carried and transmitted diseases account for 80% morbidity in the developing world and kill 10 million annually of the available freshwater, 85% is used by agriculture, 10% by industry and 5% for drinking purpose (Chandraasekhar, 1996). It was estimated that industrial and domestic wastewater adds up to a million different pollutants into natural water. Substances such as polycyclic aromatics, pesticides, radioactive substances and trace metals directly endanger to human life (Kodarkar, 1995).

Selection of Experimental Animal:

Freshwater mussels are valuable subjects for the study of contamination in aquatic ecosystem because they are sedentary and have long life span. They live in close contact with water and thus are subject to pollutant exposure from both sources. Almost all the bivalves are aquatic and majority of

fresh water form occur in the shallow banks of rivers. The size of the animals ranges from 2mm to 250mm. The headless soft body of the animal is enclosed in the shell, which has two valves as the name implies. The shell is variously shaped and brackish colored. The freshwater mussel *Lamellidens marginalis* bivalve, which belongs to the phylum - mollusca, class - pelecypoda (Bivalvia), subclass - Lamellibranch and family - Unionidae which is abundantly found in fresh water, gastropods those belonging to this group are economically important since they act as intermediate host of many helminth parasites endangering the health of domestic animals as well as human beings. Fresh water bivalve like *Lamellidens marginalis* abundant in both lotic and lentic environment throughout the Marathwada. The research work on these species occurring in different lentic and lotic areas has been carried out by Kulkarni (1993) and Patil (1993).

Collection Site Selection:

Aurangabad is a historical city of lakes, ponds and dams. As the city land is identified for the world tourism spots like Ajanta and Ellora Caves. The big and small impoundments from a part of scientifically developed irrigation systems are the semi arid region. In the last 20 years the Sukhana dam was subjected to much destructive influence like illegal encroachments, unauthorized reclamation, heavy siltation and pollution. These factors had their impact on morphometry, water quality, biodiversity and recreational potential of the dam. Sukhana dam is constructed on the river Sukhna, is the oldest in Aurangabad district. The river began from village Naregaon, originates from northeast side of Aurangabad. Dam is constructed on Sukhana River at Chitepimpalgaon in Aurangabad district. The dam is located 9° N 49° E longitude and latitude 75° N 31° E the dam is the oldest in Aurangabad district. The highest peak catchment area is 55.50 feet in river.

Morphometry of Sukhana Dam:

Construction period: 1964-1965

Irrigation use starts in: 1966-1967

Type of the dam: Earthen

Cost of construction: 107.69 lakhs

Catchment area: 116.24 sq. miles /301.59 sq. km.

Height of the dam: 55.50 ft. from river

Distance: 26 km. from Aurangabad

Molluscs are known to accumulate metal ions from the environment to a very high level relative to the concentration in water (Nambisan *et al.*, 1970). Heavy metal pollution is known to be a major problem in aquatic environment because of their toxicity, their persistence, their tendency to accumulate in organisms and in undergoing food chain amplification (Vilikour *et al.*, 1980). Balogh and Salanki (1987) stated that mussel can be used as biological indicators for detecting temporal variations in the degree of toxic heavy metal contamination in surface waters are good objects for signaling local events of pollution. Sedentary organisms like mollusks, which are not subjected to rapid migration, can be affected badly if the water column is contaminated by toxic chemicals (Hiswankar *et al.*, 1988). Heavy metal pollution causes disorder in the aquatic ecosystem with deleterious effect on associated organisms. Amongst the heavy metals, mercury and cadmium uptake via food chain is more significant than direct uptake from water and sediments (Zwlewskiet. *al.*, 2001; Markich, 2002). Over the past several decades, the increasing use of metals in industry has led to serious environmental pollution through effluents and emanations (Sericanoet. *al.*, 1995). Under certain environmental conditions, heavy metals may accumulate to a toxic concentration (Guenet *al.*, 1999). In general, studies on heavy metals can be important in two main aspects. First, from the public health point of view, where the attention has been drawn to the necessity of measuring the accumulation of heavy metals; particularly these metals which pose serious health hazards to humans (e.g. Cd, Pb, Hg). Second, from the aquatic environment viewpoint, the main problem has been to prevent biological deterioration and to identify the sources, which threaten ecological equilibrium.

Materials and Methods:

Survey of Sukhana dam situated at Chitepimpalgaon near Aurangabad city (26 km away) was carried out with reference to species diversities of benthic macro invertebrates such as location, habits and habitat, nature of catchments area and main human activities associated with that, sources of water, such as drains etc. Primary productivity of the dam was determined in summer (March/April), monsoon (June/ July) and in winter season (November/ December). The freshwater bivalve mollusca, *Lamellidens marginalis* (Lamarck) was identified from the Sukhna dam. The adult bivalves of shell length 65 to 70 mm after collection immediately brought to the laboratory; the shells were brushed and

washed with fresh water to remove fouling biomass and mud. The animals were adjusted to the laboratory conditions by keeping them in a large aquarium containing aerated water for 24 hour. The water was renewed twice in a day at an approximate interval of 12 h. while studying ten adult bivalves in aquaria containing 5-liter reservoir water. For the analysis of heavy metals in water and sediments, water samples were collected seasonally. Samples were collected in plastic containers, which were thoroughly cleaned with nitric acid and rinsed several times with distilled water. Analysis was carried out to determine the concentration of various heavy metals like zinc and mercury by using Atomic Absorption Spectrophotometer (AAS). Heavy metals were estimated by using standard methods as described by APHA (1992). Sediment sample was dried and made a soil suspension 1:5 (20gm soil in 1lit. of water) and stirred with magnetic stirrer and filtered with Whatman filter paper 42. Filtered solution was mixed with aqua-regia 3:1 (HClO₄:HNO₃) and boiled on hot plate for 15 to 20 min till became a clear solution (APHA, AWWA et. al., 1985).

The body parts like mantle, gill, hepatopancreas, gonad, foot and adductor muscles were also analyzed for the metal content in summer, monsoon and winter. The different body parts were dried in a hot air oven at 60oc till constant weight was obtained. The dried samples were powdered and 1 gm dry powder of each tissue was acid digested and agitated in a shaker bath at 70oc till sample become colourless. The samples were cooled at room temperature and filtered with Whatmann filter paper 43 and this filtrate was then diluted with deionized water up to 25 ml volume for detection of metal content. The metal level was determined by using Atomic Absorption Spectrophotometer, model Chemito-200 using different hallow cathode lamps. The above procedure was repeated in summer, monsoon and winter. Three replicates of the samples were performed every time on each body parts and the mean values were subjected to statistical analysis using Students't' test. Percentage differences were also calculated.

Results:

The mollusca population was dominated in summer, monsoon and winter (Table A & B). In summer, the percentage wise component was mollusca57.15% (Table A & B). In monsoon the percentage of mollusca was 50%. In winter the percentage of mollusca was 70%. The overall percentage of mollusca was 59.26%. The mollusca group was found to be dominant from all the seasons. In the present investigation *Lamellidens marginalis* was dominated the Mollusca groupwas dominated. The population density of macro invertebrate showed those 3 genera of mollusca. In the present investigation *Lamellidens marginalis* species was observed from mollusca group.

Systematic Position of *L. marginalis*

- Phylum: Mollusca
- Class : Pelecypoda
- Subclass: Lamellibranch
- Family : Unionidae
- Genus : *Lamellidens*
- Species : *marginalis*

Table-A: Seasonal variations of Mollusca at Sukhana Dam

	Summer	Monsoon	Winter	Total
Mollusca	4 (57.15%)	5 (50%)	7 (70%)	16 (59.26%)

Table-B: Seasonal diversity and abundance of benthic macroinvertebrate at Sukhana Dam

	Summer	Monsoon	Winter
Mollusca			
<i>Lamellidens marginalis</i>	+	+	+



***Lamellidens marginalis* (Lamarck)**

Seasonal changes in Heavy metal contents from different body parts of *L. marginalis*

winter in hepatopancreas ($P < 0.001$, 35.84%), followed by gonad ($P < 0.001$, 28.03%) and adductor muscle ($P < 0.05$, 18.42%) but decreased significantly in foot ($P < 0.001$, 42.5%), non-significantly in gill (NS, 3.64) and mantle (NS, 3.31%).

In monsoon Zn was high in hepatopancreas (0.62 ± 0.02), followed by foot (0.51 ± 0.03), adductor muscles (0.47 ± 0.01), gill (0.47 ± 0.08), gonad (0.37 ± 0.01) and mantle (0.23 ± 0.01). In monsoon the Zn content was decreased significantly compared summer in mantle ($P < 0.001$, 556.52%), followed by gonad ($P < 0.001$, 256.75%), gill ($P < 0.001$, 191.48%) and adductor muscle ($P < 0.001$, 61.7%) but increased significantly in foot ($P < 0.01$, 21.56%). In monsoon the Zn content was decreased significantly compared to winter in mantle ($P < 0.001$, 578.26%), followed by gill ($P < 0.001$, 202.12%), gonad ($P < 0.001$, 156.75%), hepatopancreas ($P < 0.001$, 64.51%), adductor muscle ($P < 0.001$, 31.91%) and non-significantly in foot (NS, 11.76%)

In winter the zinc content was high from mantle (1.56 ± 0.03), followed by gill (1.42 ± 0.02), hepatopancreas (1.02 ± 0.01), gonad (0.95 ± 0.02), adductor muscles (0.62 ± 0.05) and foot (0.57 ± 0.04). In winter the Zn content was increased significantly compared to summer in foot ($P < 0.001$, 29.82%), non-significantly in gill (NS, 3.52%) and mantle (NS, 3.20%) but decreased significantly in hepatopancreas ($P < 0.001$, 55.88%), followed by gonad ($P < 0.001$, 38.94%) and adductor muscle ($P < 0.05$, 22.58%). In winter (Table 15; Fig. 26) the Zn content was increased significantly compared to monsoon in mantle ($P < 0.001$, 85.25%), followed by gill ($P < 0.001$, 66.9%), gonad ($P < 0.001$, 61.05%), hepatopancreas ($P < 0.001$, 39.21%), adductor muscle ($P < 0.01$, 24.19%) and non-significantly in foot (NS, 10.52%).

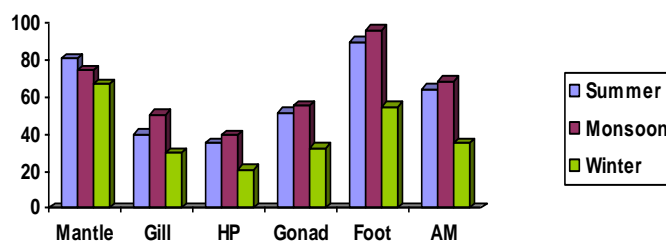
Table No. 2: Seasonal changes in mercury content from different body parts of *L. marginalis* ($\mu\text{g} / \text{g}$)

Tissue	Summer	Monsoon	Winter
Mantle	80.56 ± 2.74 NS* (7.67%) $P < 0.01$ (20.89%)	74.38 ± 3.34 NS** (10.28%) NS (8.30%)	66.73 ± 3.39 $P < 0.01$ *** (20.72%) NS (11.46%)
Gill	39.80 ± 1.47 $P < 0.01$ * (26.30%) $P < 0.01$ (24.77%)	50.27 ± 1.87 $P < 0.001$ ** (40.44%) $P < 0.01$ (20.82%)	29.94 ± 1.54 $P < 0.01$ *** (32.93%) $P < 0.001$ (67.90%)
Hepatopancreas	35.00 ± 2.00 NS* (12.62%) $P < 0.001$ (40.20%)	39.42 ± 2.15 $P < 0.001$ ** (46.90%) NS (11.21%)	20.93 ± 1.13 $P < 0.001$ *** (67.22%) $P < 0.001$ (88.34%)
Gonad	51.56 ± 1.46 NS* (7.29%) $P < 0.001$ (37.17%)	55.32 ± 1.84 $P < 0.001$ ** (41.44%) NS (6.79%)	32.39 ± 1.16 $P < 0.001$ *** (59.18%) $P < 0.001$ (70.79%)
Foot	89.43 ± 2.92 NS* (7.51%) $P < 0.001$ (39.09%)	96.15 ± 3.12 $P < 0.001$ ** (43.34%) NS (6.98%)	54.47 ± 2.26 $P < 0.001$ *** (64.18%) $P < 0.001$ (76.51%)
Adductor muscle	64.50 ± 1.72 NS* (5.84%) $P < 0.001$ (45.5%)	68.27 ± 1.88 $P < 0.001$ ** (48.51%) NS (5.52%)	35.15 ± 1.32 $P < 0.001$ *** (83.49%) $P < 0.001$ (94.22%)

*=Compared to monsoon
 ***=Compared to summer

** =Compared to winter
 NS = Not significant

Fig No.2: Seasonal changes in mercury content from different body parts in *L. marginalis* ($\mu\text{g} / \text{g}$)



Data from Table No.2; Fig No.2, In summer the Hg content was decreased significantly compared to monsoon in gill ($P < 0.01, 26.30\%$), non-significantly in hepatopancreas (NS, 12.62%), foot (NS, 7.51%), gonad (NS, 7.29%) and adductor muscle (NS, 5.84%) but increased non-significantly in mantle (NS, 7.67%). In summer (Table 18; Fig. 29) the Hg content was increased significantly compared to winter in adductor muscle ($P < 0.001, 45.5\%$), followed by hepatopancreas ($P < 0.001, 40.2\%$), foot ($P < 0.001, 39.09\%$), gonad ($P < 0.001, 37.17\%$), gill ($P < 0.01, 24.77\%$) and mantle ($P < 0.01, 20.89\%$).

In monsoon the mercury content was high in foot (96.15 ± 3.12), followed by mantle (74.38 ± 3.34), adductor muscle (68.27 ± 1.88), gonad (55.32 ± 1.84), gill (50.27 ± 1.87) and hepatopancreas (39.42 ± 2.15). In monsoon (Table 18; Fig. 29) the Hg content was increased significantly compared to summer in gill ($P < 0.01, 20.82\%$), non-significantly in hepatopancreas (NS, 11.21%), foot (NS, 6.98%), gonad (NS, 6.79%) and adductor muscle (NS, 5.52%) but decreased non-significantly in mantle (NS, 8.30%). In monsoon the Hg content was increased significantly compared to winter in adductor muscle ($P < 0.001, 48.51\%$), followed by hepatopancreas ($P < 0.001, 46.9\%$), foot ($P < 0.001, 43.34\%$), gonad ($P < 0.001, 41.44\%$), gill ($P < 0.001, 40.44\%$) and non-significantly in mantle (NS, 10.28%).

In winter mercury content was high in mantle (66.73 ± 3.39), followed by foot (54.47 ± 2.26), adductor muscle (35.15 ± 1.32), gonad (32.39 ± 1.16), gill (29.94 ± 1.54) and hepatopancreas (20.93 ± 1.13). In winter the Hg content was decreased significantly compared to summer in adductor muscle ($P < 0.001, 83.49\%$), followed by hepatopancreas ($P < 0.001, 67.22\%$), foot ($P < 0.001, 64.18\%$), gonad ($P < 0.001, 59.18\%$), gill ($P < 0.01, 32.93\%$) and mantle ($P < 0.01, 20.72\%$). In winter the Hg content was decreased significantly compared to monsoon in adductor muscle ($P < 0.001, 94.22\%$), followed by hepatopancreas ($P < 0.001, 88.34\%$), foot ($P < 0.001, 76.51\%$), gonad ($P < 0.001, 70.79\%$), gill ($P < 0.001, 67.90\%$) and non-significantly in mantle (NS, 11.46%).

Discussion:

Fresh water represents a very small part of the total water on the earth. Fresh water has become a critical natural resource due to number of reasons. The increasing demand of fresh water in all the sectors like drinking, agriculture, aquaculture and industrial. Fresh water is going to be the scarcest resource in the 21st century and it is said that the next world war will be due to the water. India receives about 1400-1800 mm of rainfall annually. It is estimated that 85% of water is used for agriculture, 10% for industry and 5% for domestic use and analysis conducted in 1982 revealed that about 70% of all the available water in our country is polluted (Chandrasekhar, 1997). It is well known that the bivalves are filter feeders and that the degree of opening of shell valves and extension of foot, active feeding and burrowing depend on the existing environmental parameters. In the light of this information, the data collected on benthic invertebrates especially bivalve groups such as *L. marginalis* from Sukhana dam revealed following changes due to environmental parameters. The heavy metals are known for their strong attraction biological tissues. Metal ions once absorbed into body are capable of reacting with a variety of binding sites and disturbing the normal physiology of organism leading to toxicity. Population explosion have increased the demand of water resources for rapid industrialization due to which water has become highly polluted and hence including man various organisms are presenting a potential threat for survival in their respective tropic level. Zinc is one of the most abundant essential trace elements in the human body. It is a constituent of all cells, and several enzymes depend upon it as a cofactor (Forstner and Wittmann, 1983). High level of zinc in *Siganusrivulatus* are reported majority of zinc from dietary sources rather than from water (Moore and Ramamoorthy, 1981; Pourang, 1995; Kargin, 1996). The Zn content in water was high in monsoon and low in summer. In summer, the content was decreased significantly compared to both monsoon

and winter. In monsoon, the content was increased significantly compared to summer and non-significantly compared to winter. In winter, the content was increased significantly compared to summer but decreased non-significantly compared to monsoon. While the Zn content was high in monsoon and low in winter in sediment. The Zn content in water and sediment showed same trend but the sediment accumulated more heavy metals than the water in the present study as have it has also been observed by Bower (1979), Fabris et al. (1994), Lau et al., (1996; 1998), Besada et al., (2001), Chindah and Braide (2003) and Eja et. al., (2003). Sediment is the major depository of metals in some cases, holding more than 99 percent of total amount of a metal present in the aquatic system (Odiete, 1999). The observed low concentrations of Zn in this present study are consistent with the findings of Obire et al., (2003).

According to EPA (2006), mercury enters human's lives more frequently than someone may imagine. It may be in the fluorescent lights in offices, in old cans of latex paint, in batteries, in dental fillings, and numerous other sources. Nevertheless, mercury does not degrade easily, it is not destroyed by combustion and therefore it's extremely dangerous to the human health. In the present study the Hg content was high in monsoon and low in summer in water while it was high in monsoon and low in summer from sediment. According to Kamman et al., (2005) environmental mercury contamination is an issue of global importance. In the past two decades, the concentration of mercury has been determined in numerous environmental matrices, including air, water, sediment, and biota. As sediments serve as the ultimate depository for much of the particulate matter that moves through watersheds, sediments are a wellstudied environmental matrix. Mercury concentrations in the river and the wetland sediments both were pretty high. Cetesb (2005) established 0.5 mg/kg as an acceptable mercury concentration in freshwater sediments. In the present study the concentration of mercury was more than the water. As sediments serve as the ultimate depository for much of the particulate matter that moves through watersheds, sediments are a well studied environmental matrix (Moore and Ramamoorthy, 1984; Kamman et al., 2005). The heavy metals are known for their strong attraction biological tissues. Metal ions once absorbed into body are capable of reacting with a variety of binding sites and disturbing the normal physiology of an organism leading to toxicity. Population explosion have increased the demand of water resources for rapid industrialization due to which water has become highly polluted and hence including man various organisms are presenting a potential threat for survival in their respective tropic level.

Metal levels in *L. marginalis*:

Mussels can play an important role in the environments where they are very abundant in freshwater (Patil, 1993; Dame et al., 2002; Patwari, 2002; Zadpide, 2002) particularly because of their influence on biogeochemical cycles. Much of the past work on heavy metal levels in aquatic organisms was directed towards understanding the mechanisms and rate of metal uptake, the effect of metals on the organism, and the concentration factor between organism and environment (Patil, 1993; Metcalfe-Smith, et. al., 1996; Gregory et. al., 1999; Patwari, 2002; Ravera, 2001, 2003, 2004, 2007).

In the present study, in summer the Zn content in *L. marginalis* was increased significantly in mantle, gill, hepatopancreas, gonad and adductor muscle but decreased significantly in foot compared to monsoon while the content was increased significantly in hepatopancreas, gonad and adductor muscle but decreased significantly in foot, non significantly in mantle and gill compared to winter. In monsoon, the content was decreased significantly in mantle, gill, hepatopancreas, gonad and adductor muscle but increased significantly in foot compared to summer while the content was decreased significantly in mantle, gill, hepatopancreas, gonad, adductor muscle and non-significantly in foot compared to winter. In winter the content was increased significantly in foot, non-significantly in mantle and gill but decreased significantly in hepatopancreas, gonad and adductor muscle compared to summer while the content was increased significantly in mantle, gill, hepatopancreas, gonad and non-significantly in foot but decreased significantly in adductor muscle compared to monsoon.

Zinc is one of the most abundant essential trace elements in the human body (Hadjmohammadi, 1988). It is a constituent of all cells, and several enzymes depend upon it as a cofactor (Forstner and Wittmann, 1983). High level of zinc in *Siganus rivulatus* confirms obtaining majority of zinc from dietary sources rather than from water (Moore and Ramamoorthy, 1981; Pourang, 1995; Kargin, 1996). Rainbow et al., (1990) pointed out that gastropod molluscs are used much less extensively as potential biomonitors in aquatic ecosystems than bivalve molluscs. Ravera et al., (2007) observed Zn concentration in *pictorummancus* and reported high concentration in summer and low in winter from all the tissues. The increase or decrease in the content was probably due to the

ecological parameters such as temperature, pH, salinity and the respiration rate of *L. marginalis*. Similar results were observed by Patil (1993), Kulkarni (1995), Chaudhari, (1999), Patwari, (2002).

In the present study, the Hg content was increased non-significantly in mantle but decreased significantly in gill, non-significantly in hepatopancreas, gonad foot and adductor muscle compared to monsoon while the content was increased significantly from all the tissues compared to winter. In monsoon the content was increased significantly in gill, non-significantly in hepatopancreas, gonad, foot and adductor muscle compared to summer but decreased non-significantly in mantle while the content was increased significantly in gill, hepatopancreas, gonad foot adductor muscle and non-significantly in mantle compared to winter. In winter the content was decreased significantly from all the tissues compared to both summer and monsoon. Pollution monitoring techniques using mussels include measurement of physiological rates (Marshall and McQuaid, 1993), evidence of bioaccumulation of heavy metals (Regolli and Orlando, 1994) and estimation of the biotoxicity of metals from pathological changes in soft-tissue morphology (Gregory et al., 1999). Metals are known to reduce the physiological performance of bivalve molluscs (Patil, 1993; Patwari, 2002). Bivalves are reported to sequester Hg from their environment (Clark, 1996). The metal gradually accumulates in the tissues (Micallef and Tyler, 1990) especially the viscera.

The mercury concentration was observed high in summer and low in monsoon. Similar results were observed by Riccardi and Ravera (1989), At low concentrations zinc also plays an important role in physiology (Zadpide, 2002). The metal concentrations in the soft tissues should reflect the present level of the water contamination by the same metals, while those in the shell the time-integrated metal contamination of the environment. The metal concentration in an organism reflects that in the water in which it lives if the ratio between the metal concentration in the organism and that in the water is constant or at least similar. This means that the organism has very little or no capacity to select the metals to be up taken. Such an ideal indicator species does not exist. A simple approach to test discrimination capacity consists in comparing the sequence of the metals arranged in order of decreasing concentration for the water with the sequence for mussel soft tissues and shell (Ravera et al., 2003).

Conclusion:

Freshwater reservoirs maintain ecological balance of flora and fauna interrelationship, regulate surrounding climate and recharge ground water. Dams are the major part of freshwater resources. Globally more than 3 times the freshwater in rivers is available in the dams, which have multiple uses, such source of water for drinking, fishing, agriculture and aquaculture, conservation areas of biodiversity, recreation and tourism. Sukhana dam is constructed on the river Sukhna, is the oldest dam in Aurangabad district. The river began from village Naregaon, originates from northeast side of Aurangabad. Dam is constructed on Sukhna River at Chitepimpalgaon in Aurangabad district. From the last 20 years the dam was subjected to many destructive influences like illegal encroachments, unauthorized reclamation, heavy siltation and industrial effluent. These factors had their impact on morphometry, water quality, biodiversity and recreational potential of the dam. The source of pollution of water in the dam is mainly from disposal of solid waste and discharge of industrial wastewater. The macro invertebrate community in freshwater belongs to main taxonomic groups such as mollusca, arthropoda, annelida, crustaceans, larvae and some insects. These are abundant in shallow areas of reservoirs, ditches, stagnant water ponds, but only few species are abundant in open water. They occupy an intermediate position in food webs.

In the present investigation, *Lamellidens marginalis* was used as an experimental animal and there sample-scanned throughout the study period. The metal level in water and sediment showed varying levels in summer, monsoon and winter. The metal level of water showed that Zn and Hg were low. In monsoon Zn and Hg was high. While the metal level in sediment showed that in summer Hg were low. In monsoon Zn and Hg were high. In winter Zn was low. Adsorption and desorption play an important role in the transformation process and in the concentration of heavy metals in natural waters. The concentration of mercury was more in sediment than the water. The sediments served as the ultimate depository for much of the particulate matter that moves through watersheds. The results showed that some metal mobility increased as the pH decreased and as the exposure duration increased and also man-made changes in external parameters (e.g. pH, salinity) may cause a mobilization of the accumulated metals in the water and sediment. Final conclusion of this investigation shows diverse effect in seasonal changes in levels of zinc and mercury in tissues of *Lamellidens marginalis* collected from Sukhana dam.

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