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DETERMINATION OF HEAVY METALS FROM GODAVARI RIVER WATER AT NANDED, MAHARASHTRA, INDIA

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ABSTRACT

The concentration of heavy metals in the water which may affects the human health and the health of aquatic ecosystem were determine in Godavari river water. Water samples collected from the selected sites of Godavari River at Nanded for determination of heavy metals. For the detection of heavy metals using standard methods suggested by APHA, 1995 and NEERI, 1988. The results of the heavy metals were obtained in the following range Fe 0.254 to 0.537 mg/l at site I, 0.254 to 0.478 mg/l at Site- II and 0.233 to 0.465 mg/l at site – III, Cu 0.0248 to 0.0550 mg/l at site I,0.0249 to 0.0599 mg/l at Site- II and 0.0249 to 0.0567 mg/l at site – III, Mn 0.021 to 0.055 mg/l at site I, 0.020 to 0.050mg/l at Site- II and 0.022 to 0.051 mg/l at site – III, and Zn 0.60 to 0.83mg/l at site-I, 0.58 to 0.72 mg/l at site- II and 0.52 to 0.77 mg/l at site III respectively. The above heavy metal is selected for the study because it cause pollution in river water and it is highly toxic to the aquatic animals or flora and fauna. The concentration of these parameters of pollution contained in the study area indicated the river is fairly polluted. It may be due to the mixing of domestic sewage, agricultural waste and surface runoff water in the river.

Keywords: Godavari river water, Iron, Copper, Manganese and Zinc.

INTRODUCTION

Water plays a vital role in living organisms in river water. The discharge of pollutants in river water is beyond the limit and more than the self-purification capacity of river. Almost all rivers in India are affected due to pollution and reached a crisis point. Metals after entering the water may be taken up by fauna and flora and eventually, accumulated in aquatic organisms that are consumed by hman beings [1]. Ganga river is the most sacred and important river in India, regarded as the cradle of Indian civilization. About 2506 K.m of these river stream gives to twenty nine cities, several towns and thousands of village which are containing the river by over 1.3 billion L waste water per day [2]. The pollutants in the form of pesticide, heavy metals are toxic to the aquatic organisms and effect t of these pollutants on the freshwater fishes evenly they are dander migrates. So to see the heavy metal pollution in Godavari river water, the origin of Godavari river is Bhramgiri at Trimbakeshwar in Nashik district of Maharshtra and the river flows through the central part of Nanded district from west to east further down in Andhra Pradesh and finally in to the bay of Bengal. The two major project are constructed at Paithan (Jayakwadi) and Vishnupuri at Nanded. The water pollution is one of the major problems in India. The river gets polluted by sewage. The rapid development, urbanization, population explosion Godavari river received huge amount of untreated municipal waste, agricultural waste and industrial waste are mixed in waste water river get polluted. Heavy metals in aquatic ecosystems are considered as serious pollutants due to their environmental persistence, toxicity and ability to be incorporated in to food chain The deadlier diseases like edema of eyelids, tumor, congestion of mucous membrane and Pharynx, reproductive, neurological and genetic malfunctions caused by some of these heavy metals have been documented [3,4]. Therefore it is essential to irrigate the water quality of river Godavari. In the present study to see the heavy metal pollution in Godavari river water in the form of Fe, Cu, Mn and Zn.

MATERIALS AND METHODS

Samples were collected from all selected three

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sites I, II and III at monthly intervals during the year June 2012-May 2013. The samples were collected in a clean polythene can. The heavy metals were determined as per the standard methods suggested by APHA, 1995 and NEERI,1988 using by the spectrophotometer Systononics.

Study area

Site-I (Govardhan Ghat)

This site is situated at upper stream after kaleshwar where Godavari river enters into the city, Nanded. It is also known as burning ghat of Nanded city where huge amount of city sewage are discharged Washing, bathing, discharge of ash, hair cutting are frequent on this site.

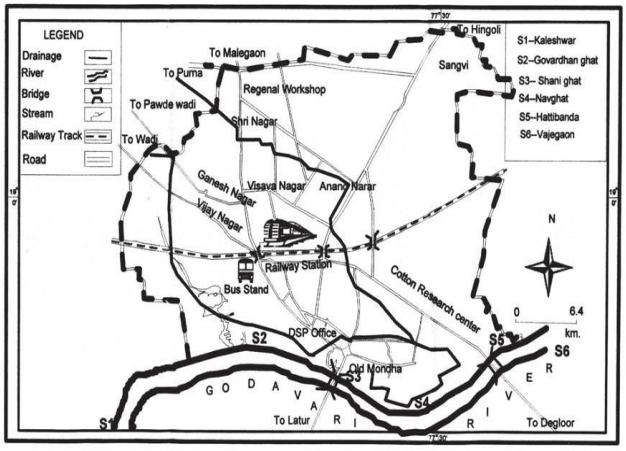
Site-II Hattibanda (Near Old Bridge)

This site is also known as Idgaha ghat this site is located 1.5 km away from Navghat towards downstream. Two huge nalla with large quantity of city sewage and meet the river near this site along with run off from slaughters houses.

Site-III (Vajegaon)

This site is situated near the village Vajegaon towards downstream various activities of villager are frequent on this site.

Fig. 1. Location of sites in River Godavari at Nanded



RESULTS AND DISCUSSION

In the present investigation Iron, Copper, Manganese and Zinc were determining from Godavari river at Nanded from the selected sites- I, II and III respectively. The analysis of the heavy metals from Godavri river at Nanded are depicted in Table 1,2 and 3 and graphically represented in figure 1,2 and 3 respectively.

In the present investigation the fe ranges between 0.0254 to 0.0537 mg/l at site I, 0.254 to 0.478 mg/l at site II and 0.233 to 0.465 mg/l at site III respectively. The average range of fe in Godavari river water ranges from 0.233 to 0.537 mg/l. The minimum value of fe recorded in the month of August and maximum value in the month of Feburary. Adefemi and Awokunmi (2010) studied on the determination of physic-chemical parameters and heavy metals in water samples from Itaogbolu area of Ondo State Nigeria and reported that the fe was found in all the water samples between 0.1 to 5.3 mg/l with an average value of 0.71 to 0.22 mg/l. The highest concentration 5.3 mg/l Ona River compared with the values in wells is expected because it has been reported that iron occurs at high concentration in Nigeria soil [5]. But the present investigation the minimum quantity of fe is found it may be due to the low content of the iron in surrounding soil. Sukhdev Kundu [6] recorded the concentration of fe varied from 0.274 to 1.989 ppm in the selected stretch of the river. He stated that the high concentration of fe in the water imports a bitter taste and strains the cloths if used.

In the present study the copper ranges between 0.0248 to 0.0550 mg/l at site I, 0.0249 to 0.0599 mg/l at site II and 0.0249 to 0.0567 mg/l at site III respectively. The average range of the copper in Godavari river water at Nanded ranges between 0.0248 to 0.0599 mg/l. The minimum value recorded in the month of May and maximum in the month of October. Adefemi and Awokanmi [7] studied on the determination of physic-chemical parameters and heavy metals in water samples from Itaogbolu area of Ondo State Nigeria and reported that the concentration of copper (0.18 mg/l). This could be attributed to geological distribution of minerals that vary from location of sited. In the present study similar results were found but the concentration of copper is very low. The similar variation reported in sediment of major dams in Ekiti state.

The concentration of Mn in Godavari river water at Nanded ranges from 0.021 to 0.055 mg/l at site I, 0.020 to 0.050 mg/l at site II and 0.022 to 0.051 mg/l at site III respectively. The average range of Mn in Godavari river water ranges from 0.020 to 0.055 mg/l. The minimum concentrations of Mn are found in the month of January and maximum in the month of September. Kar *et.al* Studied on assessment of heavy metal pollution in surface water and observed that the Mn is ranges from 0.025 to 2.720 mg/l in river Ganga. The seasonal value of Mn at four location in the surface water of Ganga river were observed in the range of 0.085 to 0.712 mg/l. The Mn are observed in higher concentration. In the present study the Mn was found in low concentration when compared with above results. The concentration of Mn in Godavari river water at Nanded might be due to the disposal of solid waste from residential area which might contain levels of the metals. Akan et.al studied on the heavy metals in sediments from river Ngada, Nigeria of Manganese (243.0 ug/g) was detected in points.

The concentration of Zinc in the Godavari river water at Nanded ranges between 0.60 to 0.83mg/l at site-I, 0.58 to 0.72 mg/l at site- II and 0.52 to 0.77 mg/l at site III

respectively. The average range of Zn in Godavari river water ranges from 0.52 to 0.83 mg/l. The maximum concentration of Zn in the month of July and maximum in the month of April. Adefemin and Awokunmi reported that the concentration of Zinc ranged between 5.5 to 9.2 mg/l with an average value of 3.2 $\pm$ 0.42 mg/l. The highest value (9.2 mg/l) was obtained in Ona River. This could be associated with human activities such as use of chemicals and Zinc based fertilizers by farmers [10], Moral FMM [11] reported that the Zinc is highly toxic to aquatic organisms particularly to fish when the hardness of water is less and temperature is high. Sukhdev Khndu reported that the concentration of Zinc ranges between 0.041 to 0.098 ppm. The concentration of Zinc in the river water was highly influenced due to the point sources of effluents similar observation were made in the present investigation.

Table 1. Heavy metal concentration at site I Godavari river at Nanded

MONTHS	Fe(mg/l)	Cu(mg/l)	Mn(mg/l)	Zn(mg/l)
JUNE	0.272	0.0260	0.035	0.60
JULY	0.262	0.0310	0.032	0.61
AUG	0.254	0.0349	0.054	0.71
SEPT	0.358	0.0404	0.055	0.81
OCT	0.362	0.0550	0.051	0.78
NOV	0.464	0.0498	0.044	0.72
DEC	0.449	0.0376	0.024	0.69
JAN	0.449	0.0310	0.021	0.73
FEB	0.537	0.0310	0.027	0.78
MAR	0.498	0.0273	0.033	0.81
APRIL	0.465	0.0310	0.039	0.83
MAY	0.419	0.0248	0.035	0.68

Table 2. Heavy metal concentration at site II at Godavari river

MONTHS	Fe(mg/l)	Cu(mg/l)	Mn(mg/l)	Zn(mg/l)
JUNE	0.254	0.0249	0.032	0.58
JULY	0.254	0.0290	0.035	0.58
AUG	0.262	0.0333	0.047	0.69
SEPT	0.313	0.0352	0.050	0.69
OCT	0.351	0.0599	0.049	0.71
NOV	0.410	0.0512	0.040	0.67
DEC	0.456	0.0369	0.022	0.59
JAN	0.410	0.0387	0.020	0.69
FEB	0.478	0.0299	0.025	0.69
MAR	0.442	0.0299	0.036	0.72
APRIL	0.425	0.0256	0.037	0.69
MAY	0.399	0.0249	0.031	0.59

Table 3. Heavy metal concentration at site III at Godavari river

MONTHS	Fe(mg/l)	Cu(mg/l)	Mn(mg/l)	Zn(mg/l)
JUNE	0.263	0.0266	0.029	0.55
JULY	0.298	0.0309	0.033	0.52
AUG	0.233	0.0336	0.049	0.63
SEPT	0.276	0.0392	0.051	0.64
OCT	0.335	0.0567	0.048	0.67
NOV	0.428	0.0475	0.039	0.61
DEC	0.444	0.0370	0.025	0.53
JAN	0.399	0.0290	0.022	0.77
FEB	0.563	0.0299	0.024	0.72
MAR	0.465	0.0266	0.047	0.76
APRIL	0.395	0.0249	0.035	0.71
MAY	0.389	0.0260	0.032	0.59

Fig No. 1. Monthly variation of heavy metals in Godavari river at Site-I.

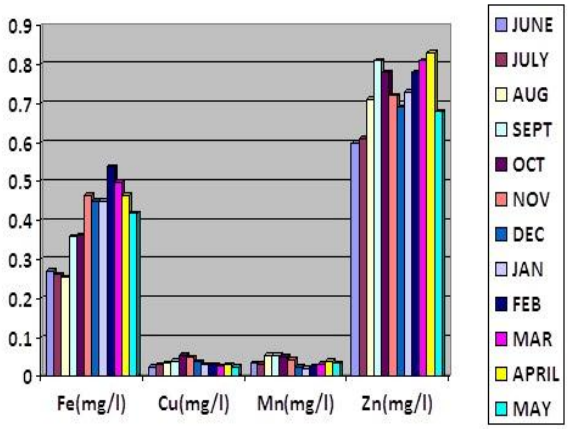


Fig No. 2 Monthly variation of heavy metals in Godavari river at Site-II.

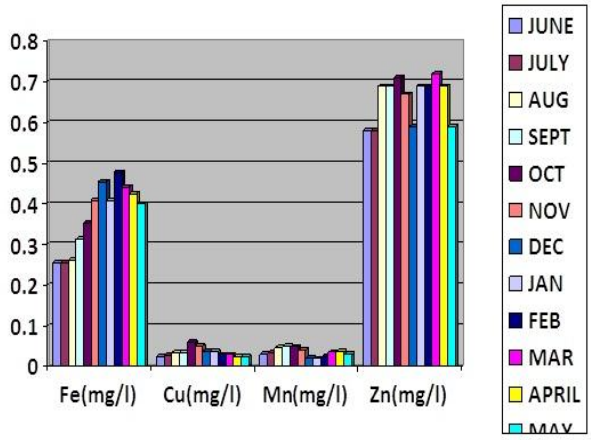
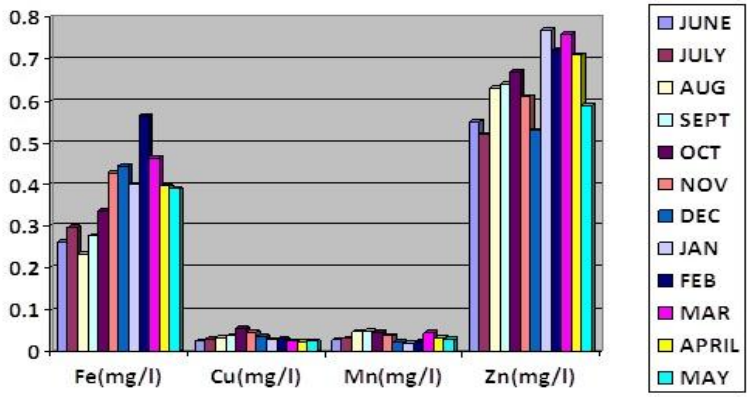


Fig No.3 Monthly variation of heavy metals in Godavari river at Site-III.



CONCLUSION

The concentration of the heavy metals in the Godavari river water at Nanded exhibiting the following order Zn > Fe > Mn > Cu. The study revealed that the Godavari river water contained very high concentration of cu. The present study provides the information on the concentration of heavy metals is affected to the aquatic organisms such as fish and the probable source of the heavy metal in Godavari river may be caused by various industries, outlets, domestic sewage, agricultural surfaces run off water and also affected to the aquatic animals, plants and human health. Overall it is concluded that the Godavari river water may be polluted with the heavy meals

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