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ASSESSMENTS OF HEAVY METALS OF GROUNDWATER SOURCES FOR DIFFERENT TAHSILOF NANDED DISTRICT, MAHARASHTRA (INDIA)

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Introduction:

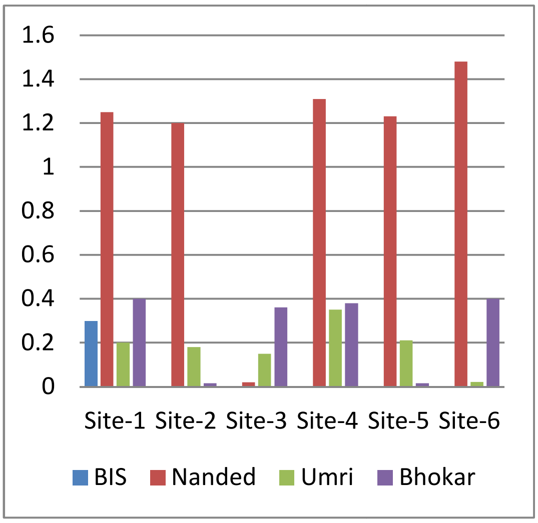
Heavy metals are widespread pollutant of great environmental concern as they are non-degradable, toxic and persistent with serious ecological ramification on aquatic ecology. Heavy metals discharged into a river system by natural or anthropogenic sources during their transport are distributed between the aqueous phase and sediments. In many cases, anthropogenic inputs of metals exceed natural inputs. Living organisms require some metals as essential nutrients, including calcium, sodium, potassium, magnesium, iron, zinc, chromium, cobalt, copper, nickel, manganese, molybdenum, and selenium. According to (Ajibade *et al.,* 2011) 90% of the population depends largely on hand-dug wells. Many of the heavy metals are required by the body in minute amounts but can be toxic in large doses (Singh *et al.,* 2011). Heavy metals are significant environmental pollutants and toxicity of theirs is major problem for ecological, evolutionary, nutritional and environmental balances (Goyer 2001 and Wang *et al*. 2001). In waste water commonly found heavy metals include, cadmium, arsenic, chromium, lead, copper, zinc and nickel, all of these are causing risks to human health and the environmental balance by entering the surroundings via natural means and through the human activities (Beyersmann *et al*. 2008). Hence, in the present investigation the heavy metals were not investigated from such sources of ground water from the preselected Tahsil area of Nanded district.

Study area:

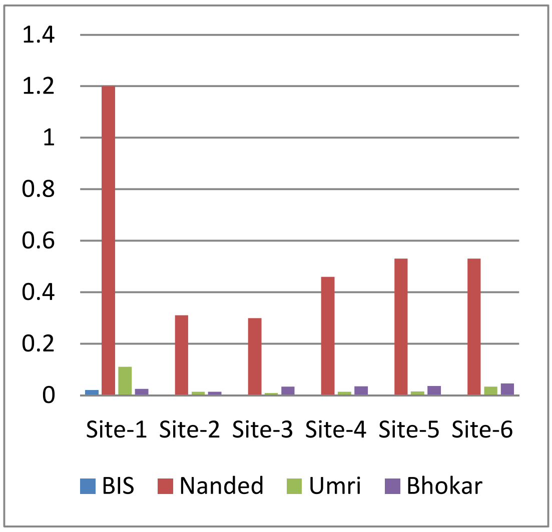
Nanded Tehsil is administrative block of Nanded District located in South Eastern Part of Deccan Volcanic Province of Marathwada region of Maharashtra state. The study area is located between latitudes 190 3’ N to 190 17’N and longitude 770 10’ E to 770 25’ E (Fig. 1). The study area comprises with semi-arid region and tropical climate. The temperature of study area is ranging from 13 to 46 0C. The average rainfall of the study area is 900 mm, where, 88 % rain receives under the influence of South West Monsoonal winds. Godavari River flows in South West to South East direction having alluvial plain along its coast in the study area. The thickness of alluvium varies at different places and maximum 20 m encountered in flood plain areas of rivers. The study area is principally irrigated by Godavari and its sub-tributary Asna River and also left bank canal taking off water from Siddheshwar dam of the Purna project, of Parbhani district. The North East part of the study area is the convergence point of Asna and Godavari River. The study area underlain by geological formation mainly Deccan Basalt flows of vesicular, amygdaloidal, weathered, fractured basalt etc. Black cotton soil and loamy to sandy soil are main soil types covering the study area. The present study has been carried out to assess the groundwater parameters from selected areas of Tahsil Nanded district, Nanded, in which three talukas namely Nanded, Umri, Bhoker were selected for this study to know the impact of anthropogenic and geogenic activities on the quality of groundwater.

Material and Methods: Iron, Nickel, Cadmium & copper was determined by atomic-absorption spectrophotometry methods.

Results and Discussion:

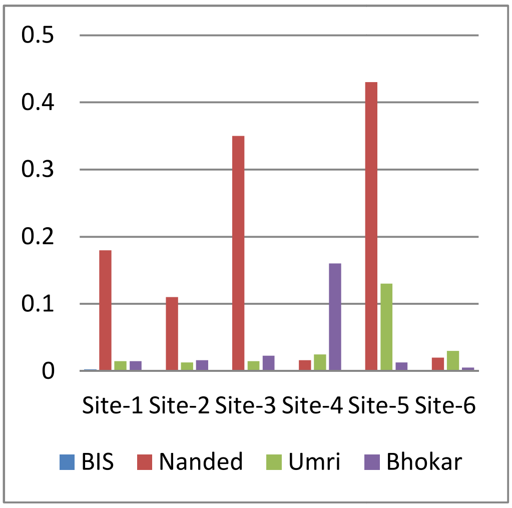


Iron (Fe). In this present investigation maximum value of iron was recorded in Nanded at Site-6 (1.48mg/lit) & Site-4 (1.31mg/lit). The minimum value was to be recorded in Bhoker, (0.01mg/lit) followed by in Umri at Site-6 (0.02mg/lit) all these value was significant at ($p<0.01$) level. Results was compared with standard permissible limit given by (BIS, WHO-0.3mg/lit) limit. As shown in Graph no.1



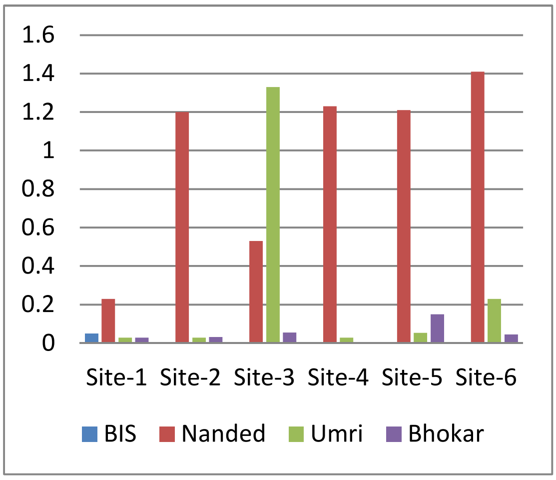
Nickel (Ni): In the present investigation the data revealed the mean values of Ni in water samples was maximum recorded in Nanded at Site-1 (1.2mg/lit), Site-5& (0.53mg/lit) and Site-4 (0.46mg/lit) was observed significant at ($p<0.01$) level. The minimum concentration of Iron was recorded in Umri, at Site-3(0.009mg/lit) and it was found significant at ($p<0.05$) level. Results was compared with standard permissible limit given by BIS limit (0.02mg/lit). As shown in Graph no.2

Cadmium (Cd): In this investigation the maximum concentration of Cadmium was recorded in in Nanded at Site-5(0.43mg/lit) and these value was found to significant at (p<0.05



&p<0.01) level. Results was compared with standard permissible limit given by BIS (BIS-0.003mg/lit) limit. As shown in Graph no.3

Copper (Cu): In the present investigation the Copper concentration was maximum in in Nanded at Site-4 (1.23mg/lit), Site-6 (1.41mg/lit), all these obtained values were found to be significant at (p<0.01& p<0.01) level. Results was compared with standard permissible limit given by BIS (BIS-0.05mg/lit) limit. As shown in Graph no.4. The occurrence and distribution of heavy metals in various river systems was studied by many workers (Abaychi and Dou-Abul, 1985), (Ajmal *et al.,* 1988), (Ajmal and Khan, 1987). (Ajmal *et al.,* 1985; Dharmadhikari *et al.,* 1992; Gadh Ranu *et al.,* 1991), and Govindan and Devika, 1991). The iron concentration was recorded maximum in all sites. Similar observation was made and reported by Chavan *et al.,* (2013) was recorded iron metal concentration maximum range 1.0 ± 0.27 ppb to minimum range 0.007 ± 0.002 ppb from 11 sampling points of River Savitri at Mahad. The variation of heavy metal concentrations between stations is probably attributed to the distance factor. The groundwater systems that experienced an increase in contaminants were located closer to pollution sources such as agricultural activities and industrial activities. Fe shows the highest abundance among other types of heavy metals, due to it being among the abundant elements making up the earth's crust and also being released through intermixed processes such as water–rock interaction and anthropogenic activities Melegy *et al.,* (2013). Joseph Jerald (1994), observed the level of iron as high as 0.04 mg/L and lowest 0.01 mg/L in the Anicut reservoir (Tamilnadu). Nickel is found in ambient air at very low levels as a result of releases from oil and coal combustion, nickel metal refining, sewage sludge incineration and other sources. According to BIS-10500 (2012) the acceptable limit of nickel in drinking water is 20 μg/L. The higher value of nickel occurs in the south and central portion of the area under study which may be contaminated by domestic and industrial effluents. The higher concentration observed in the study area may be an atmospheric accumulation of nickel from phosphate fertilizers, combustion of diesel oil and fuel oil, industrial emissions, automobile emissions, emissions from electric power utilities, the



incineration of waste and disposal of sewage sludge as well as, from miscellaneous sources (Cempel & Nikel, 2006; Iyaka, 2011).

Earlier study in Nangodi catchment reported Cd concentrations that ranged from below detection limit to 0.223 mg/L (Cobbina *et al.,* 2012) and in Datuku, Cd concentrations ranged from below detection limits to 1.700 mg/L (Cobbina *et al.,* 2013). Tinga reported Cd concentration ranged from 0.002 to 0.103 mg/L (Cobbina *et al.,* 2013). The high level of Cd contamination may be due soil composition and environmental pollution in the study area. The extensive uses of Cd in protective plating for steel, pigments in plastics and glasses, electrode material in nickel-cadmium batteries and as a component of various alloys, in plastic toys and food containers enhance the risk of contamination (Friberg *et al.,* 1992).

The fluctuations in copper content at all the sampling stations are observed. Similer observation was reported by various researchers, Jayadev and Puttaih (2013) observed the seasonal variation of copper metal concentration ranged from 0.001 mg/L to 0.032 mg/L in the summer season and ranged from 0.001 mg/L to 0.020 mg/L in the rainy season. Ndeda and Manohar (2014) recorded the copper metal concentration ranged from 2.62 mg/L to 3.18 mg/L. Okonkwo and Mothiba (2005) observed the copper metal contamination varied from 2.5 µg/L to 3.0 µg/L.

Conclusion:

The analytical data shows most of the water samples were contain heavy metal concentration above permissible limit in groundwater as per prescribed by BIS and WHO. But this study emphasizes the need for regular groundwater quality monitoring to assess pollution activity from time to time for talking to appropriate management measure in time to mitigate the intensity of pollution activity.

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