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Industrial Impurities Contamination in Musi River Ground Water Area in Hyderabad Zone

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***ABSTRACT:** Water an essential requirement for the world, the need of saving water when natural resources are available. Present study focuses on the river MUSI which is started from Anathagiri hills and finally connect with river Krishna after travelling nearly 256 KM in state of Telangana state, India. Urbanization and industrialization factors in growing capital Hyderabad changes the natural flow phenomenon of river Musi when it compared with a century back word, around 1925 to 1932 most of the people depends on lakes for drinking water like himayathsagar, usmansagar and some more. On behalf of development taken place in capital of state, water requirements are highly appreciable. But true factors showing that Musi river being polluted from past 2 to 3 decades rapidly, studies needed to rectify the heavy metal additions which are health hazardous includes sewage, chemical industrial dump. The paper focused on the level of impurities with causes and need of purification.*

***Key words:** Musiriver, factors for pollution, Sewage, Chemical dump*

I. INTRODUCTION

River Krishna having so many tributaries, in that one of the major is river MUSI [1]. The river starts from Ananthagiri [2] Hills, Rangareddy District area of Vikarabad and flows through the Hyderabad, finally mix with river Krishna at vadapalle in Nalgonda district, a far distance of 40km from Nagarjunasagar dam. A total area of 256 km in Telangana covered by Musi giving drinking water to capital Hyderabad[3] but after crossing Hyderabad, most of the hard metals and industrial impurities added to river Musi, a name converted from original name of Muchukunda [4], a saint lived in anatha hills worship with lord Krishna. Many of the banks covered in Hyderabad [5] the river bed becoming polluted by the sewage, chemicals, pharmacy industries in capital mixed with rain water and river water. By the bottom of the river bed the water used for the agricultural [6] and encroachments, some areas at the end they are using for vegetable crops and leaf vegetable crops grown on regular basis [7]. A medium irrigation project at aleruNalgonda district near suryapet was built in 1963 nearly 216km from the origin of Musi.Ground water reservoirs for drinking water since 1591[8], Hyderabad mostly depends on the ground water tanks namely Hussainsagar [9] and Mir Alam Tank [10] were built in 1575 and 1806, these two polluted heavily by the sewage mixes.

There are two ground water reservoirs namely Osman sagar and Himayathsagar [11] supplying 205,000m^3 per day, because of urbanization these suppy increased drastically from 1965 to 1982. A dam named Manjira a part of Krishna river supplying water to capital Hyderabad [12]. Government declared the drinking water after treatment TDS < 300 mg/L, the water should not be contaminated at any level, for that the ground water should be organized in a proper way to reduce impurities and heavy metals after treatment [13]

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II. SOURCE OF POLLUTION

The growing of urbanization and industrializations are main cause of city and Musi pollution, as per the government census the population studied for 2001, 2011and estimated present are 3,637,483,[14] 6,809,970 more than 1,12,00,000 respectively. The migrations are more than 24% from rest of India and 87% from local areas which are 100% addition in each decade. Due to this an addition of industrialization taken place to fulfil the needs of urban people, this causes pollution rate and sewage waste to Musi and the river become highly polluted when compared with the past five decades.

Since the rapid growth of the city in the 1980"s, River Musi flows continuously which resulted in the year-roundcultivation of rice and green leafy vegetables in the downstream that was confined to the months following the monsoon season in the past [15]. Due to exponential populace explode inside the remaining five a long time, the river bed and the bounds of lakes are encroachments and a few are disappearing and the population and their unorganized offerings together with electroplating, leather tanning, engineering, oil extraction and commercial processing are heavily polluting the tanks, lakes and River Musi.As a result the river bearing ability to float appreciably reduced 12 months after yr inflicting surprising floods in lots of regions in the metropolis frequently even for a touch rain. The boom of the city with availability of vacant land, educational establishments and extraordinarily knowledgeable professional humans are main chemical processing industries to the want of pharmaceutical requirements, formulations and heavy engineering products.

2.1 Hydrogeochemistry of ground water

The pH estimations of groundwater of study territory somewhere in the range of 6.7 and 7.3 with a normal estimation of 6.97, demonstrates the marginally acidic nature of water tests.

Electrical conductivity and all out broke up solids in certain examples are surpasses as far as possible by WHO (2004) conductivity esteems fluctuated from 2,150 to 1,400 µs/cm. the most extreme cutoff points of EC in drinking water is depicted as 1,500 µs/cm according to WHO standard. The most extreme incentive in GW – 1 example was recorded, 3,460 µs/cm. The TDS worth range from 1305 to 2214 µs/cm The TDS esteems all are fall in Blackish stage (based on saltiness order).

The mean convergence of cations is organization Ca2+>Mg2+>Na+>K+ while for anion it is NO3->Cl->SO42->HCO3-. Sodium fluctuated from 100 to 250 mg/l with a normal worth 176.25 mg/l, Potassium shifted from 40 to 100 mg/l with a normal worth 70.5 mg/l, Magnesium particle focus changed from 25 to 385 mg/l with a normal worth 162.08 mg/l, the attractive estimation of Mg2+ for 50 mg/l, about 80% of tests surpass the alluring as far as possible. Calcium focus changed from 28 to 390 mg/l, with a normal value137.5 mg/l. as far as possible for Ca2+ for drinking water is 75 mg/l, 40% of groundwater tests from the examination territory are inside passable points of confinement according to WHO (2004) standard. The Carbonate substance is nil, where as Bicarbonate run between 45 mg/l to 111 mg/l, Chloride particle fixation changed from 145 to 889 mg/l, the attractive furthest reaches of Cl-for drinking water is determined as 200 mg/l, and 90% of tests surpass as far as possible according to WHO (2004). Sulfate happens normally in water because of draining from gypsum and other regular minerals. The sulfate substance changes fundamentally with time during invasion of precipitation and ground water. The centralization of sulphate is probably going to respond with human organs if the worth surpasses the most extreme admissible farthest point of 400 mg/l and cause a purgative impact on human framework with the overabundance magnesium in groundwater. Notwithstanding, the sulphate fixation shifted somewhere in the range of 50 and 200 mg/l with a normal estimation of 108.3 mg/l and found inside the most extreme suitable point of confinement in all example areas according to WHO detail.

2.2 Need of research

The downward percolating water isnot inactive, and it is enriched in CO2 .It can likewise go about as a solid enduring operator separated from general arrangement impact. Therefore, the substance synthesis of ground water will fluctuate contingent on a few variables like recurrence of downpour, which will drain out the salts, time of remain of downpour water in the root zone and halfway zone, nearness of natural issue and so forth. It might likewise be called attention to that the water front doesn't move in a uniform way as the dirt strata are commonly very heterogeneous. The development of permeating water through bigger pores is considerably quicker than through the better pores. An essential explanation behind this is all

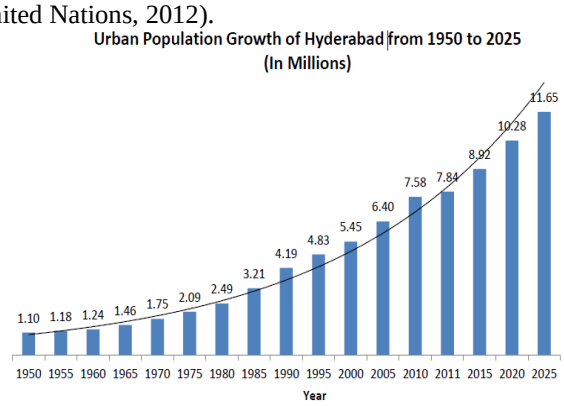
Three significant wellsprings of contamination (industry, horticulture and residential) are focused along the streams. Enterprises and urban communities have truly been situated along streams on the grounds that the waterways give transportation and have generally been an advantageous spot to release squander. Horticultural exercises have would in general be thought close to waterways, since stream floodplains are outstandingly ripe because of the numerous supplements that are stored in the dirt when the waterway floods.

III. RIVER WATER QUALITY & ENVIRONMENTAL FACTORS

There are three significant normal wellsprings of broke up and solvent issue conveyed by waterways: the environmental contributions of material, the corruption of earthbound natural issue and the enduring of surface rocks. These substances by and large travel through soil and permeable rocks lastly arrive at the streams. On their way, they are influenced by various procedures, for example, reusing in earthbound biota, reusing and capacity in soils, trade among broke down and particulate issue, loss of unpredictable substances to the climate, generation and debasement of sea-going plants inside streams and lakes and so forth. Because of these various sources and pathways, the convergences of components and mixes found in streams rely upon physical variables (atmosphere, alleviation), compound elements (solvency of minerals) and organic elements (take-up by vegetation, corruption by microbes).

IV. URBANIZATION IN HYDERABAD WITH INDUSTRIAL GROWTH EFFECTS ON RIVER WATER OF MUSI

Hyderabad was built up along the banks of Musi River, which now never again exist because of urban infringement and direct arrival of urban waste into this water body (Van Rooijen et al., 2005). Hyderabad has 6,809,970 occupants and spread along the banks of the Musi River. It has a metropolitan populace of 7.75 million, which is the fourth most crowded city and 6th most crowded urban agglomeration in India (Census of India, 2011a). In the worldwide positioning for 2025, it will be at 31st spot with populace of 11.6 million because of high populace development rate (United Nations, 2012). Like some other urban agglomeration in India, Hyderabad is additionally encountering a fast increment in populace. From 1.09 million of every 1950, the urban populace has now contacted the characteristic of 7.75 million out of 2011. The accompanying chart in Figure 3.2 shows the urban populace development since 1950 and anticipated up to 2025 in the United Nations report "World Urbanization Prospects-The 2011 Revision" (United Nations, 2012).



V. AREA CONSIDERED FOR WORK

The ground water samples are collected from the area which is contaminated with industrial effluents. Since the last decade, Hyderabad, the capital of Telangana, Southern province of India, has turned into a center point for pharmaceutical enterprises. The ground water has been seriously tainted with the effluents discharged from these businesses. Bollaram (17033l13.46llN, 78021l14.64ll E), Patancheru(17031l41.70llN, 78016l32.1ll E) and Isnapur (17032l33.56ll N, 78010l49.46ll E) are the three significant rural areas of Hyderabad; where about in excess of 300 businesses are found. These ventures incorporate mass medications, pesticides, pharmaceuticals, plastics, earthenware production and paints. The ground water in these regions is exceptionally polluted with the organics discharged from these businesses.

Huge numbers of the modern domains are situated in the foreshore regions of the lakes. Consistent release of untreated mechanical effluents into the water bodies has transformed them into 'poisonous lakes' practically without any life. 12 Some of the significant waterways/streams contaminated by the mechanical effluents are Bollaram, Isakavagu, Nakkavagu, and Manjeera (upstream of Nakkavagu conversion). Because of leakage and invasion from these dirtied water bodies/channels and other waste dumps, the groundwater and drinking water sources in the zone are profoundly contaminated. These regions are straightforwardly or in a roundabout way contaminating the stream MUSI.

Table: List of Initial Characteristics of the studied samples in industrial zones

S.No	parameters	BOLLARAM	ISNAPUR	PATANCHERU
1	pH	7.54	6.92	5.72
2	Electrical Conductivity	2.11	2.43	3.94
3	Total Dissolved Solids	3530	5160	1970
4	Total Hardness	940	2000	2100
5	Calcium Hardness	600	1125	1000
6	Ca	240	450	400
7	Non-carbonate	580	1540	1795
8	Hardness	360	460	305
9	Alkalinity	974.87	1435.72	1152.1
10	Chlorides	241.52	134.28	251.76
11	Sulphates	54.93	27.67	7.017
12	Nitrates	156.9	120.3	141.2
13	Sodium	5.8	1.0	4.1
14	Potassium	0.66	1.22	1.40
15	Fluorides	0.98	2.24	4.69
16	Fe	0.047	5.01	0.045
17	Zn	0.47	0.02	0.3
18	Ni	0.015	0.11	0.01
19	Ba	229.75	245.9	38.35
20	Ca	0.02	0.006	0.03
21	Co	0.01	0.01	0.01
22	Cr	0.05	0.001	0.01
23	Cu	0.007	3.09	2.7
24	Mn	0.08	0.07	0.02
25	Pb	120	140	80

Table: Verification of heavy metal zones in water of MUSI near industrial zones

Heavy metal	Summer	Monsoon	Winter	Mean
Iron (mg L-1)	0.073	0.075	0.076	0.075
Zinc (mg L-1)	0.050	0.046	0.050	0.049
Copper(mg L-1)	0.045	0.046	0.068	0.053
Manganese(mgL-1)	0.07	0.031	0.023	0.042
Nickel (mg L-1)	0.051	0.041	0.036	0.042
Chromium(mgL-1)	0.054	0.030	0.037	0.040
Cobalt (mg L-1)	0.008	0.005	0.008	0.007

5.1Connectivity of industrial canals to MUSI

Investigations of substantial metal fixations were led along and over the Musi River bowl from Amberpet Bridge (station M1) to Nallachervu (station M12), including 2 km on either side of the waterway. Topographically the Musi bowl is secured by rocks of archean age and intercalated with quartz veins to a great extent and is at a height of 500 m above mean

ocean level (M1) and 470 MSL (M12). The area of the Musi River stretch alongside the 12 examining locales (M1–M2) is appeared in Figure 1. The examination territory comprises of roughly 23.33 km2 under private use, 4.95 km2 with estates and gathered land, and 18.12 km2 land with clean.

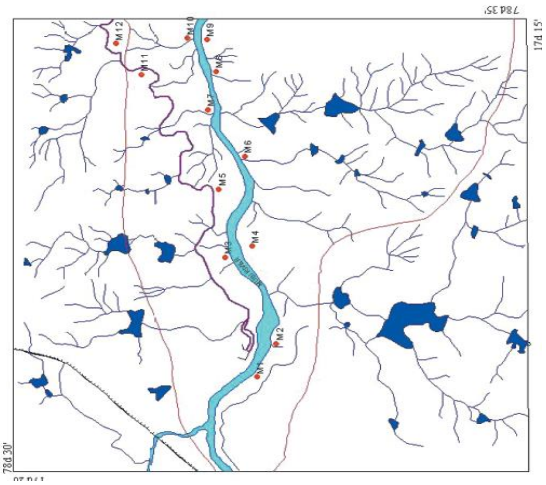


Figure 1 shows the connectivity of water canals to MUSI river

Table shows the Environmental quality criteria for soils compared with Musi soils(μg/g).

					Musi soil values	
					Background values[@]	Concentrations from our study area
Zn	200	250	1–100	6.5–13	26–60	227–401
Cr	8	8	0.03–14	2.7–8.5	1.4–2.5	26–38
Cu	150	100	5–20	1.8–5.7	12–30	21–35
Ni	60	80	0.02–5.2	0.9–2.3	10–20	33–63
Co	40	40	5–20	6.5–13	4–10	12–19
Pb	200	300	5–15	11–23	15–25	303–637
As	10	20	0.2–10	0.002–0.01	0.3–0.8	0.08–0.14
Hg	0.8	2	0.05–5	0.005–0.01	0.03–0.2	0.03–0.06
Cd	3	5	0.25–15	0.01–0.08	0.04–0.5	0.12–1.12

[$]: Ashwathanarayana (1999); [#]: Alloway (1990); Mc Bride (1994); [@]: Venkateshwarlu (1981); Venkateshwarulu and Kumar (1982); Syamala (1999); Stephanie (2002).

Figure2 shows industrial waste mix up to canal connectivity MUSI

VI. CONCLUSION

The pH of surface and groundwater ranged between 6.9–7.7 throughout near MUSI. The overwhelming metal focuses were low and well inside the allowable furthest reaches of the water system water quality, affirming discoveries of prior examinations. For every one of the metals there exist a few presentation pathways that rely upon the specific debased media of air, water, soil, and nourishment and on the receptor populace (Caussy et al. 2003). Nourishment is a significant pathway for a few metals, especially in populaces devouring provincially defiled nourishments. This would be valid for individuals expending vegetables or grains developed on soils polluted with metals.

The analytical data shows most of the water samples were contain heavy metal concentration below permissible limit and nickel concentration is above permissible limit in groundwater as per prescribed by BIS and WHO. But this examination accentuates the requirement for ordinary groundwater quality observing to survey contamination action every once in a while for conversing with proper administration measure so as to alleviate the force of contamination action. Thus to keep groundwater free from excess level of Fe, Mn, Zn, Cu, Ni etc and other ions the following recommendation should be taken into account. A much needed researches required to check the additional information for corrective actions on the banks of Musiriver.

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