A Critical Evaluation for Pollution Source of Surface Water Bodies: A Model Study from Hyderabad City

Akhil Gurijala, SS Asadi

Abstract*: Due to swift escalation of residents Industrialization urbanization and a mixture of developments drinking and farming practices as 1970's the worth of water income have been failing radically. Hyderabad is called 'Limnological capital of India' outstanding to superior integer of chief along with trivial stream body within its urban limit. The majority of these stream bodies are worn as drinking water source within the town. The ejection of mess and industrialized ravage waters addicted to water bodies is primary to authentication of a mixture of pollutants addicted to water bodies. Persistent these contaminants may create water incompatible in favor of drinking and assorted purposes. Musi basin to sewer drain shipping the household and manufacturing ravage generate in Hyderabad metropolitan negatively polluting lying on the waterway system. The administration move toward to the storing up of musi have no careful the wider catchment region of the waterway. Chief water bodies of Hyderabad are infected via expulsion of raw domestic and industrial ravage water. In sight of rapid, unplanned as well as haphazard urbanization of the capital of Hyderabad. The prospective water precautions of Hyderabad town deceit an integrated supervision of the whole catchment spot of the musi basin like fine as an amount of water bodies with the aim of at rest be real in and region of the metropolitan.

Keywords: Musi River, Water bodies, Domestic and Industrial Pollution

I. INTRODUCTION

Water is the vital natural source lying on Earth. It preserve modify together the geology plus the landscape of our globe with its existence plus profusion prepared verve resting on Earth feasible. Water cover ¾ of the Earth's plane; in reality, the world seen starting freedom appear to be real a "blue planet". Water is an input supply in all-economic actions range from farming to industry. Only a petite part of the planet's plentiful water is offered to us while clean water on 97% is establish in the oceans and is too saline in favor of intake, irrigation or industrial. The 3 percent is fresh water. On 2.99 percent of it is sheltered up in ice caps or glaciers or it is enclosed. About 0.0035 of earth's total level of water is offered. (Seetharaman.R, 2004). Metropolitan city is Hyderabad of Telangana state sited lying on the Deccan plateau, abide of an amount of streams with bunds which be construct by the rulers of Qutubshahi empire, metropolitan city sited on 17o 22′ 12″ N, 78° 28′ 48″ E of the longitude by an spot of 7,100 sq.km. The metropolitan city is worn out in stream Musi which be prior a foremost intake water resource. As per the survey statistics, 2011 the populace of Hyderabad is projected toward are 9.5 million by 2015 except it have cross 10 million marks in ending of 2015. (Census of India, 2011), to provide this population by intake water is the most face intended for the government of Telangana. The reservoirs are Osmansagar plus Himayatsagar were constructed on musi stream toward assemble the intake water requisite of city dwellers. In current days, Environmental crash on Musi River due to usage of top and ground water and growing of quick urbanization, industrial growth and farming utilizations. The Musi basin extends more than a physical area of 11,270 sq. km around. Musi stream is a branch of the Krishna River. The river originates in Anantagiri Hills near Vikarabad district, 90 kilometers to the west of Hyderabad and flows due east for almost its entire course. It joins the Krishna River at Vadapally in Nalgonda district after casing an expanse of about 240 km. The basin is bordered by 170 58' N to 160 38' N latitude and 770 46'E to 790 48'E longitude.

1.1. Climate Condition

Hyderabad has a parched weather. The days are searing and dried out, frequently departing up to excessive highs of 40°C, while the nights are cold and blowy. Winds usually transport along clouds of dust in the Day time, while the breezes at nighttime are pleasing and clean. The monsoon and the Western trouble are the two major factors that alter the climate over Hyderabad; if not, Continental air prevails intended for respite of the seasons. Rare dust storms can be witnessed through the month of May and June. Monsoon occurs in summer commencing the month of June turn over September.

1.2. Rainfall condition

Weighty rainfall on or after the south-west summer monsoon falls connecting June with September, Hyderabad among the majority of it's imply once a year precipitation. As account begins into November 1891, the heaviest precipitation record during a 24-hour period was 241.5 mm (10 in) lying on 24 August 2000. The maximum hotness eternally recorded be 45.5 °C (114 °F) lying on 2 June 1966, plus the lowly was 6.1 °C (43 °F) resting on 8 January 1946.

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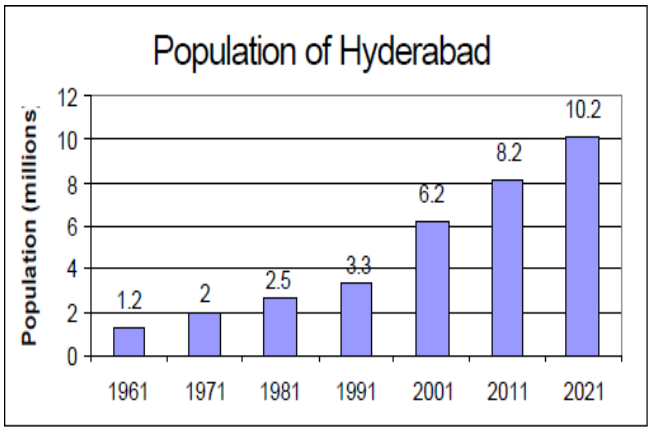
The town receives 2,731 hours of sunlight apiece year; highest every day sunlight exposure occur during February. The town receives 2,731 hours of sunlight for each year; most every day sunlight exposure occurs in February.

1.3. Population of Hyderabad

Similar to other urban cities in India, Hyderabad have witness a hurried raise in population. As of 1.25 million in 1961 the city's population touched 4.3 million in 1991. Its projected population in 2003 was over 6.8 million and the shape is liable to achieve 17.7 million by 2020. The swift raise in population (HMWSSB). To seek for new water resource to b ridge the growing gap among insists and supply. HMWSSB was established in 1989, is an independent body that looks following water provide and dirt removal system of the urban region of Hyderabad and the 10 municipalities about the city. The board's 5,200 experienced technical officers, staff and workers, though, have been at a defeat in annoying to bridge the gap in command with deliver of water.



Source: (Project report, 1994) HUDA-Hyderabad

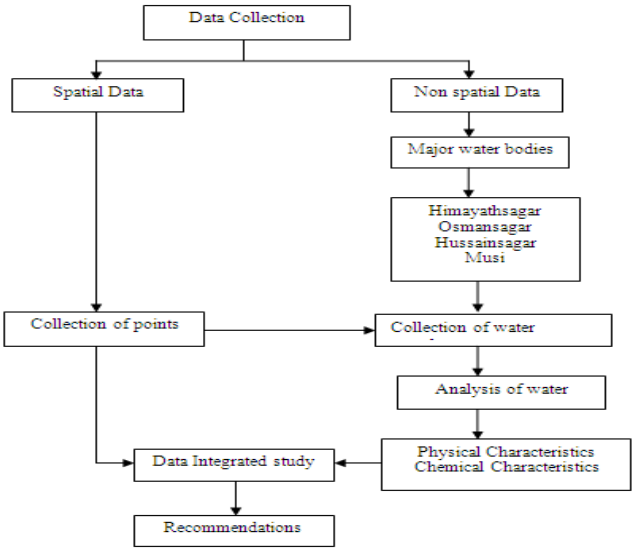
Table.1 Graphical representation of the population of Hyderabad city

II. OBJECTIVES

- When you submit your final version, after your paper has been accepted, prepare it in two-column format, including figures and tables. The purpose driven study object is to study of urban surface water effluence sources of float up water assets of main water bodies of Hyderabad town cataract under musi sub Basin of Krishna River. Greater Hyderabad city Telangana.
- The focal intention of learn is to evaluate the current study of surface water pollution sources due to urbanization as manufacturing emissions and quantification of plane water resources.

III. METHODOLOGY

In the present study a study on water contamination sources of four major water bodies of Hyderabad and its contamination sources and its water analysis



Flowchart.1 step by step processing of methodology

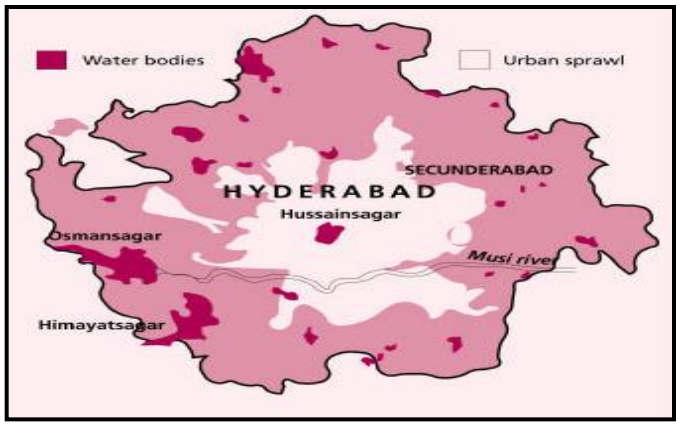
IV. MAJOR WATER BODIES OF HYDERABAD

Hyderabad is notorious in favor of have copious water bodies but owed to hasty urbanization as well as industrialization various of them are encroach plus what are vacant nowadays are deeply contaminated resultant within the deprivation of water value. Permanent expulsion of unprocessed industrial effluents keen on the stream body has twisted them keen on 'lethal ponds'. The contaminations of water bodies have turn into a basis of stern unease right through the planet. The release of household sewage with manufacturing waste into the streams pilot toward deposition of organic material, nitrogen plus phosphorous cause of eutrophication. The key source of drinking water with a range of purposes meant for Hyderabad town is four impoundments of the follow 4 main water bodies of Hyderabad they are.

Musi basin
Osmansagar
Himayathsagar
Hussainsagar

Source: (project report, 1994) HUDA-Hyderabad

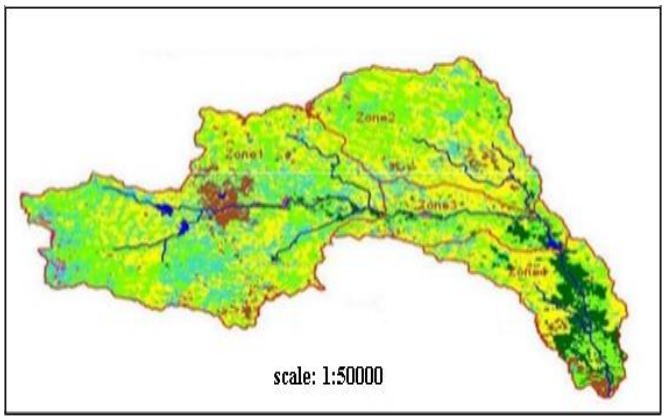
Figure.2 shows water bodies in Hyderabad city.



4.1. Musi River

Hyderabad is found lying on the bank of musi stream which be placed lying on the Deccan upland within Telangana State. The streams originate 60 km upstream of the metropolitan and join among Krishna River 200 km downstream. It be a basis of intake water to be metropolitan plow before time 20th century, but owed to regular flood of stream water both dams were construct in 1920 to assemble the water contribute of town. The Musi River is the reason of common torrent destruction of town until the untimely decades of the 20th century. On 1908, these floods cause vast destruction to Hyderabad and killed around 15,000 people. The modern time of the maturity of twin cities begin quickly past this flood in 1908. A Dam was building in 1920 diagonally the river, 10 miles (16 km) upstream as of the city called Osmansagar. In 1927one more reservoirs was build on Esi (branch of musi) and name Himayatsagar. These lakes prohibited the flooding of the stream musi with chief potable water source for Hyderabad town. (WWP)

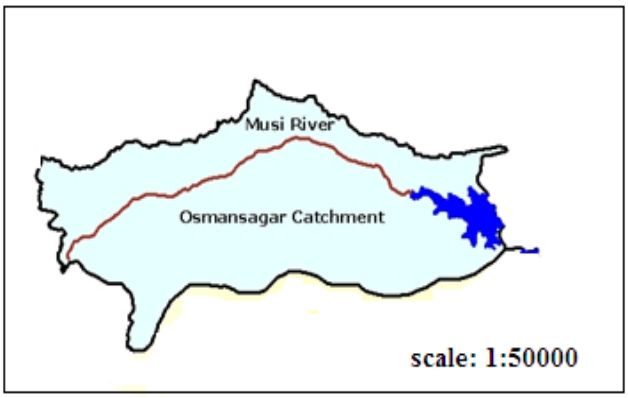
The raw domestic as well as industrial ravage water and raw waste water as of a mixture of sewage treatment plants go keen on the stream. The Hyd town discharge on 600 million liters for each date ravage water keen on musi stream. The effluence of top water bodies in a mixture of region in Hyderabad owing to free of industrial waste matter have been prior known (Subrahmanyam.K et al., 2001).



(Source:www.google.co.in/search?q=mcatchment)
Figure.3 shows Musi basin catchment Area

4.2. Osmansagar

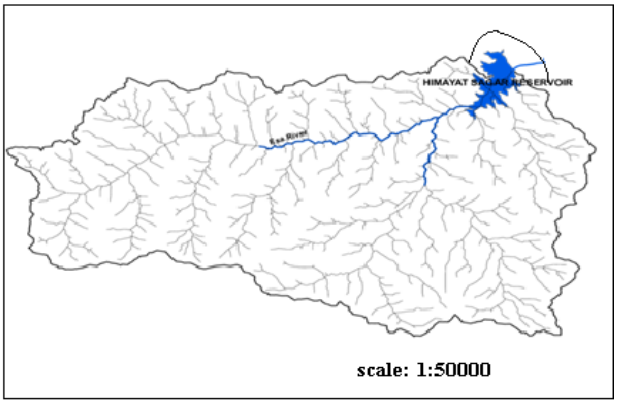
Osmansagar was constructing with dam the Musi stream in1920, to supply further basis intake water intended used for Hyd along with toward care for the town later than the huge Musi torrent of 1908. Osmansagar, commonly well-known like gandipet, is a reservoir within Hyderabad which lies involving 170181N 780181E. (Sri Lakshmi.K, 2016).The lake is around 46 km² Osmansagar lake has a catchment area of 736 sq.km. Moreover the reservoir is about 29 km², by entire stage of 1,790 feet with a ability of 3.9 TMC. It was constructing for the period of the section of the end Nizam of Hyderabad, Osman Ali Khan, therefore its person's name.



(Source:www.google.co.in/search?safe=strict&hl=en&biw)Figure.4 shows Osmansagar Catchment area

4.3. Himayatsagar

Himayatsagar is an imitation lake regarding 20 km since Hyderabad in Telangana, India. It deceit similar to a superior artificial lake Osmansagar. The Himayatsagar is bordered by 17°18′N 78°21′E.The storage space ability of the reservoir is 2.9TMC.The creation of reservoir on Esi a branch of musi stream was finished in 1927, used for provide drinking water basis used for Hyderabad and keep the city as of floods, which Hyderabad suffer in 1908. It was build through the control of the end Nizam of Hyderabad, Nizam VII and is name subsequent to his youngest son Himayat Ali Khan. (Padmaja.K, 2017).The Himayatsagar and Osmansagar reservoir provide constant water give toward the both cities of Hyderabad along with Secunderabad until lately. Owing to resident's increase, they are not enough to assemble the city's water provide claim.



(Source:www.google.com/search?safe=strict&biw=1024&bih)Figure.5 shows Himayatsagar Catchment area

Table.2 hydrological data of Himayatsagar Lake

S.No	Parameter	Specification
1	Time of building	1927
2	Catchment region	505 Sq.km
3	Max overspill within the stream	160000 Cusec
4	distance of the dam	7400ft
5	stable storage space	R.L 1763.00 FTL
6	whole storage space ability	10130 Mcft
7	upper limit water stage	R.L +178.00
8	Water extend region	12.60 Sq.km
9	highest deepness of the water	84 ft
10	Flood gates	17 No's

4.4. Hussainsagar

Hussainsagar Lake name following Hussainshaw wali is positioned within spirit of twin cities of Hyderabad along with secunderabad the state capital of Telangana state in south India the lagoon is placed at 17.45°N 78.5°E at 510m more than sea level. Owing to residents enlarges with unintended urbanization and Industrialization huge quantity of Industrial and domestic wastewaters infected the lake for the long-ago 10 decades. The likely inflows to the lake are as of the catchment part of concerning 275 Sq.km (HMWSSB, 1992), the intensity of the lagoon was about 12.2m (Zafar, 1996), which regularly condensed on 5.02m as on nowadays most likely since of stern siltation with sedimentation. The standard Runoff all through regular year keen on the lake is regarding 28-33m cum/year.

(source: www.google.co.in/search?safe=strict&ei)
Figure.6 shows Hussainsagar Catchment area

Table.3Hydrological data of Hussainsagar Lake

S.No	Parameter	Specification
1	face region (A) of lake	5.7x106 Sq.km
2	storage space (V) of the lake (to spill level)	28.6x106Cum
3	regular deepness (V/A)	5.02m
4	Depth variant	1-12m
5	highest working stage	514.93m
6	lowest working stage	513.43m
7	Round/Bound level	518.16m
8	Maximum length	3.2km (2.0mi)
9	Maximum width	2.8km (1.7mi)
10	Surface area	4.4km2 (2.0 Sq mi)
11	Maximum Depth	32ft (9.8m)
12	Surface Elevation	1,759ft (536m)

V. SOURCES OF WATER POLLUTION

Natural water is rarely chemically clean. When it rain, natural with lifeless balanced particulate material, gas, vapours, mist, etc. during the air obtain dissolve within stream. Main water streams of Hyderabad are tainted by means of release of unprocessed household plus manufacturing ravage water. Since of speedy, unintended with jumbled urbanization of the urban of Hyderabad. The city release on 600 million liters apiece dates raw sewerage water keen on to water bodies. Even ground water source be polluted, the intake water in complete locale is bring as of remote places

5.1. Domestic source pollution

As per Indian Planning Commission in its Tenth Plan Document report manure while a vastly pollute basis causative to on 80% of the totality water effluence. Out of on 38000 million liter for each day of manure generates treatment ability exist intended for simply about 12000 million liter for each day.

Domestic water effluence is twisted through the release of domestic sludge contain organic substance and soaps. These substances commonly decant keen on external river flow. Therefore, the quantity of ravage water generate is a lot other than the sum filtered. A lot of the obtainable treatment amenities are not efficiently utilize since of process with preservation harms. Process and continuation of accessible plants and manure pump stations is not satisfactory, since they are not in compliance to the common standard prearranged underneath the ecological safety system intended for free addicted to streams.

Almost every of the manufacturing effluents plus the sewage of the whole city are deserted in to water bodies of Hyderabad. When such impure water gets covered with water up in the ground underneath, it make the groundwater of the metropolitan contaminated as well. Also, since of construction of buildings on and approximately the catchment area with the normal drainage areas, the stream Musi doesn't catch adequate water to stream from end to end it. So, nearly all of the water flowing through the waterway consists of ravage water which is deserted into the stream.

5.2. Industrial source pollution

Hyderabad underwater which is valuable through summer is extremely inside part of Hyderabad manufacturing manure be worn irrigate as of industrialized or else element process to is deserted keen on top of the ocean with stream. Ravage water starting industrialized before element process in industry is major cause toward water contamination. Industry is an enormous basis of water contamination, it produce pollutant so as to be awfully unsafe toward citizens plus the surroundings. A lot of manufacturing conveniences utilize freshwater toward bring gone ravage as of the place and keen on river, lake with oceans.

Researchers comprise describe its class as nastiest separately as of lofty salty level the turbidity of underwater range commencing reddish tanned to yellowish. Region surrounded by the interior town among extremely contaminated groundwater is Bholakpur, Musheerabad, Ramnagar, Nallacheruvu, Peerzadiguda with Uppal the groundwater within the area adjoining the stream Musi is tainted by salt and chemical. The superiority of groundwater within Hyderabad the researchers supposed advice so as to the surroundings of the metropolitan have turn into hazardous intended for human being life. The groundwater plus sewage pollution have reach its crest level the revise exposed region astute cause of groundwater effluence within the town take in tanneries (Bholakpur) Pharmaceutical industry (Vidyanagar). Household and manufacturing manure inside Musi stream (Nallacheruvu, Peerzadiguda, & Uppal) the researchers assumed mainly of the mark out element show elevated concertinos (numerous commands of scale) inside the town as compare by means of universal regular standard. Particularly salts similar to sodium, calcium, magnesium & Selenium are on crest level addition turbidity toward stream as well as creation it the most evil in quality.

VI. RESULTS AND DISCUSSIONS

6.1. Water Quality analysis of water bodies

The studies on major water bodies of Hyderabad town to analysis of lakes and streams of water sampling procedures and analysis like physical and chemical characteristics during September 2018. Each water body has selected three sample locations and its three different check points they are shown in table.4

Table.4 sampling locations of water bodies

Name of water body	Location Name	Location code
Himayathsagar	Near Himayatsagar village	L-1
	Near bethaniya prayer house	L-2
	Near kothwalguda	L-3
Osmansagar	Balaji temple road	L-1
	At gandipet park	L-2
	Near vplay cricket ground	L-3
Hussainsagar	Front of NTR garden	L-1
	Near boating spot	L-2
	Near rock garden	L-3
Musi stream	Near pratapsingaram	L-1
	At RTC colony	L-2
	Near peerizadiguda	L-3

As per above review analysis of water bodies heavily contaminated because of exposed to the water effluence difficulty existing into the urban irrigate body is owed to the hasty people plus urbanization with increasing industrial uses as well as domestic pollutions. Suitable preparation plus unacceptable ruling. Within finale the stream of musi is vastly tainted particularly. Water bodies water worn for assorted hygienic and farming purpose. Unrestrained use of pharma industries chemical immoral removal of household and manufacturing wastes is too the key basis of worsening of stream. As a result it is suggested with the aim of effluence of stream water preserve be condensed through provided that appropriate drainage ability. Along with the private company which comprises industry within the region have to not be permissible to deposit waste with no proper treatment.

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Parameter	Himayathsagar			Osmansagar			Hussainsagar			Musi stream		
	L-1	L-2	L-3	L-1	L-2	L-3	L-1	L-2	L-3	L-1	L-2	L-3
pH	7.2	7.4	7.6	6.7	6.5	6.3	9.6	10.3	10.7	8.91	8.63	7.86
Temperature(oC)	27	26	25	22	26	25	26	28	25	-	-	-
Turbidity(NTU)	5	4.2	6	1.7	1.5	1.2	7.1	7.6	7.9	8.6	7.3	8.2
Total solids(mg/l)	4.5	4.1	4.6	5.3	5.5	5.7	6.0	6.6	6.8	-	-	-
TDS (PPM)	301	298	306	293	287	296	982	996	990	2340	1970	1360
DO (mg/l)	4.4	4.3	4.1	4.9	4.6	4.4	5.6	5.9	6.1	-	-	-
BOD (mg/l)	3.0	3.3	3.5	4.2	4.0	4.1	37.22	42.68	58.72	3.0	2.5	2.8

Table.5 water Quality analysis data of water bodies

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