Effect of water Pollution in the Musi River Hyderabad District Of Telangana State

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Abstract: *The present study was carried out to determine various physico-chemical parameters and that meanders through Hyderabad is itself dying a slow, death, contaminating its surroundings just as the residents and authorities of Hyderabad have contaminated it. Water quality of the Musi River in Hyderabad District of Telangana state to examine the quality of water for public consumption, recreation and other purposes. This study deals with the influence of environmental factors as well as domestic activities in the water quality in the related areas. for this area sampling sites were selected along the river Musi in and around Hyderabad area Langer House, Govt. City college, Nagole, Amberpet Water samples were collected during a month of January 2008 to February 2016. The observed values of different parameters such as Colour, Odour, pH, EC, TDS, Turbidity, CO3, HCO3,, Cl, F, NO3,,SO4,, Na, K, Ca, Mg, TH, BOD and COD of samples were indentified in different locations in and around Hyderabad city*

Key Words: ***Keywords*** *Water Pollution, Total Dissolved Solids (TDS), BOD, COD, Monitoring, Parameters*

1. INTRODUCTION:

Musi River is a tributary of the Krishna River in the Deccan Plateau flowing through Telangana state in India. Hyderabad stands on the banks of Musi river, which divides the historic old city and the new city. Himayat Sagar and Osman Sagar are dams built on it which used to act as source of water for Hyderabad. It was known as Muchukunda river in olden days, and the precise reason for the change of name is not known. Rising in the Ananthagiri hill in Ranga Reddy district, the Musi flows into the Krishna at Vedapally in Nalgonda district. But as it flows through Hyderabad, it turns into a giant sewer, filled with garbage and industrial waste from the city. Years of neglect have earned it the notoriety of being named one of the most polluted rivers in the country

2. SAMPLE STUDY AND AREA:

The Varies samples have been collected from Nagole Moosaram Bagh, Himayath sagar.

Nagole Is located at 17.373576° North latitude and 78.568726° East longitude. This area is also having partial treatment plant at Amberpet, but much sewage inflows into in this area, from nearby areas of the city and through Hussian sagar, Secundrabad sewage water also inflows into this site It is located east of Hyderabad city on inner ring road and Northern bank of River Musi

Moosaram Bagh area is Locate at Coordinates: 17.3730°N 78.5164°E East Longitude the area itself have a water treatment plant but the area is totally polluted due to the waste chemical and Industry discharge

The samples were collected in sterilized polythene bottles of one litter capacity. Monitoring was performed during January 2017 to February 2018 (seasonal monsoon, winter and summer). For unstable parameters such as temperature, electrical conductivity (EC), pH, and dissolved oxygen (DO) were measured at the sampling site. Samples were brought to the laboratory for analysis of other physico-chemical parameters like sodium, total alkalinity, total hardness, calcium, magnesium, chlorides, sulphate, nitrate, phosphate and biochemical oxygen demand (BOD). The parameters were compared according to the standard methods described in the literature

3. MATERIALS:

Electrical conductivity
Total dissolved solids
pH
Alkalinity
Total hardness
Calcium

Magnesium
Sulphate
Dissolved oxygen
Chloride
Nitrate
Biochemical oxygen demand
Phosphate

3. METHODOLOGY:

Electrical conductivity is a measure of water's capability to pass electrical flow. This ability is directly related to the concentration of ions in the water. These conductive ions come from dissolved salts and inorganic materials such as alkalis, chlorides, sulphate and carbonate compounds the electrical conductivity ranged from 2.15 to 3.47 Ω/cm. The highest electrical conductivity was reported during winter 3.47 Ω/cm due to the addition of domestic wastage into the lake and lowest in monsoon 2.15 Ω/cm because of water dilution by rainy water.

Total dissolved solids One measure of the quality of the water in lakes, rivers, and streams is the total amount of solids dissolved in the water. High amounts of dissolved solids can indicate poor water quality. The same is true for drinking water.In wastewater or polluted areas, TDS can include organic solutes (such as hydrocarbons and urea) in addition to the salt ions. While TDS measurements are derived from conductivity, some states, regions and agencies often set a TDS maximum instead of a conductivity limit for water quality. At most, freshwater can have 2000 mg/L of total dissolved solids, and most sources should have much less than that. Depending on the ionic properties, excessive total dissolved solids can produce toxic effects on fish and fish eggs. Salmonids exposed to higher than average levels of CaSO4 at various life stages experienced reduced survival and reproduction rates 37. When total dissolved solids ranged above 2200-3600 mg/L, salmonids, perch and pike all showed reduced hatching and egg survival rates

pH The pH is a measure of a solution's acidity. in water are small numbers of water molecules (H2O)which will break apart or disassociate into hydrogen ions (H+) and hydroxide ions (OH-). And Other compounds entering into the water may react with these, leaving an imbalance in the numbers of hydrogen and hydroxide ions present in it. When more hydrogen ions react with more hydroxide ions are left in solution and the water is basic; when more hydroxide ions react, with more hydrogen ions are left and the water is acidic. pH is a measure of the number of hydrogen ions and thus a measure of acidity. pH is measured on a logarithmic scale between 1 and 14 with 1 being extremely acid, 7 neutral, and 14 extremely basic. Because it is a logarithmic scale there is a tenfold increase in acidity for a change of one unit of pH, e.g. 5 is 100 times more acid than 7 on the pH scale. The largest variety of freshwater aquatic organisms prefers a pH range between 6.5 to 8.0.

Alkalinity Alkalinity refers the capability of water to neutralize acid. It is really an expression of buffering capacity. A buffer is a solution to which an acid can be added without changing the concentration of available H+ ions (without changing the pH) appreciably. It essentially absorbs the excess H+ ions and protects the water body from fluctuations in pH. In most natural water bodies in Pennsylvania, the buffering system is carbonate-bicarbonate (H2CO3, HCO3, and CO3).The presence of calcium carbonate or other compounds such as magnesium carbonate contribute carbonate ions to the buffering system. Alkalinity is often related to hardness because the main source of alkalinity is usually from carbonate rocks (limestone) which are mostly CaCO3. If CaCO3 actually accounts for most of the alkalinity, hardness in CaCO3 is equal to alkalinity. Since hard water contains metal carbonates (mostly CaCO3) it is high in alkalinity. Conversely, unless carbonate is associated with sodium or potassium which don't contribute to hardness, soft water usually has low alkalinity and little buffering capacity. So, generally, soft water is much more susceptible to fluctuations in pH from acid rains or acid contamination.

Total hardness There are two types of water hardness. The calcium and magnesium hardness is the concentration of calcium and magnesium ions expressed as equivalent of calcium carbonate. The molar mass of CaCO3, Ca2+ and Mg2+ are respectively 100,1 g/mol, 40,1 g/mol and 24,3 g/mol. A water supply with a hardness of 100 ppm contains the equivalent of 100 g of CaCO3 in 1 million g of water or 0.1 g in 1 L of water (or 1000 g of water since the density of water is about 1 g/mL).Water hardness calculator. Temporary hardness is caused by dissolved calcium hydrogen carbonate (which is removed by boiling). Permanent hardness is caused by dissolved calcium sulphate (which is not removed by boiling). Water can be softened using washing soda or an ion-exchange resin. Total hardness. 150-1000. 300. 600 permissible limit

Calcium Calcium is a mineral that is necessary for life. In addition to building bones and keeping them healthy, calcium helps our blood clot, nerves send messages and muscles contract. About 99 percent of the calcium in our bodies is in our bones and teeth. Calcium is naturally present in water. It may dissolve from rocks such as limestone, marble, calcite, dolomite, gypsum, fluorite and apatite. Calcium is a determinant of water hardness, because it can be found in water as Ca2+ ions. Magnesium is the other hardness determinant. Making slaked lime. Calcium oxide reacts with water to form calcium hydroxide, also called slaked lime. A lot of heat is produced in the reaction, which may even cause the water to boil.

Magnesium The nervous system, it functions as a dampener. Magnesium is the ninth most abundant element in the universe 1, and the eighth most abundant element in the Earth's crust. Below you'll find over two dozen interesting facts about magnesium including the history of magnesium, chemical composition, and health. Magnesium is often associated with calcium in all kinds of waters, but its concentration remains generally lower than the calcium. Magnesium is essential for chlorophyll growth and acts as a limiting factor for the growth of phytoplankton. The amount of magnesium recorded in the water ranged between 36 to 41 mg/L. The highest amount of magnesium in the water samples was recorded during monsoon season 41 mg/L as it is associated with calcium in all water types and during monsoon

Sulphate It is second to bicarbonate the major anion in hard water reservoirs. Sulphate(SO4--) can be naturally occurring or the result of municipal or industrial discharges. When naturally occurring, they are often the result of the breakdown of leaves that fall into a stream, of water passing through rock or soil containing gypsum and other common minerals, or of atmospheric deposition. Point sources include sewage treatment plants and industrial discharges such as tanneries, pulp mills, and textile mills. Runoff from fertilized agricultural lands also contributes sulphate to water bodies. Sulphate are not considered toxic to plants or animals at normal concentrations. In humans, concentrations of 500 - 750 mg/L cause a temporary laxative effect. A sulphate cycle exists which includes atmospheric sulfur dioxide (SO2), sulfate ions (SO22-) and sulphate (S-). Sulphate, especially hydrogen sulfide (H2S), are quite soluble in water and are toxic to both humans and fish. They are produced under conditions where there is a lack of oxygen (anaerobic). Because of their foul "rotten egg" smell they are avoided by both fish and humans. Sulphate formed as a result of acid mine runoff from coal or other mineral extraction and from industrial sources may be oxidized to form sulfates, which are less toxic.

Dissolved oxygen Dissolved oxygen is oxygen gas molecules (O2) present in the water. Plants and animals cannot directly use the oxygen that is part of the water molecule (H2O) Oxygen enters streams from the surrounding air and as a product of photosynthesis from aquatic plants. Consistently high levels of dissolved oxygen are best for a healthy ecosystem. The Oxygen Level Vary Depending upon on factors including water temperature, time of day, season, depth, altitude, and rate of flow. Water at higher temperatures and altitudes will have less dissolved oxygen. Dissolved oxygen reaches its peak during the day. At night, it decreases as photosynthesis has stopped while oxygen consuming processes such as respiration, oxidation, and respiration continue, until shortly before dawn.

The Human factors that affect dissolved oxygen in streams include addition of oxygen consuming organic wastes such as sewage, addition of nutrients, change in the flow of water and raising the water temperature, addition of chemicals.

Dissolved oxygen is measured in mg/L.

0-2 mg/L: not enough oxygen to support life.

2-4 mg/L: only a few fish and aquatic insects can survive.

4-7 mg/L: good for many aquatic animals, low for cold water fish

7-11 mg/L: very good for most stream fish

Chloride The Presence of chloride in drinking water originates from natural sources, Sewage and industrial effluents, urban runoff containing de-icing salt and saline intrusion. A chloride concentration in was noticed 20 mg/L. The highest chloride reported in winter was 39 mg/L due to frequent run-off loaded with contaminated water from the surrounding slum area and evaporation of water. The lowest value of chloride recorded during monsoon season was 98 mg/L due to the dilution of lake water by rain. Chloride. Range 50-600. 250

Nitrate Nitrogen is abundant on earth, making up about 80% of our air as N2 gas .plants use nitrate to build protein and animals that eat plants also use organic nitrogen to build protein. When plants and animals die or excrete waste, this nitrogen is released into the environment as NH4+ (ammonium). This ammonium is eventually oxidized by bacteria into nitrite (NO2-) and then into nitrate. In this form it is relatively common in freshwater aquatic ecosystems. Nitrate thus enters streams from natural sources like decomposing plants and animal waste as well as human sources like sewage or fertilizer. It is measured in mg/L Natural levels of nitrate are usually less than 1 mg/L. Concentrations over 10 mg/L will have an effect on the freshwater aquatic Water with low dissolved oxygen may slow the rate at which ammonium is converted to nitrite (NO2-) and finally nitrate (NO3-). Nitrite and ammonium are far more toxic than nitrate to aquatic life.

Biochemical oxygen demand Biochemical oxygen demand (BOD, also called biological oxygen demand) is the amount of dissolved oxygen needed by aerobic biological organisms to break down organic material present in a given water sample at certain temperature over a specific time period. BOD directly affects the amount of dissolved oxygen in rivers and streams. The rate of oxygen consumption is affected by a number of variables: temperature, pH, the presence of certain kinds of microorganisms, and the type of organic and inorganic material in the water.

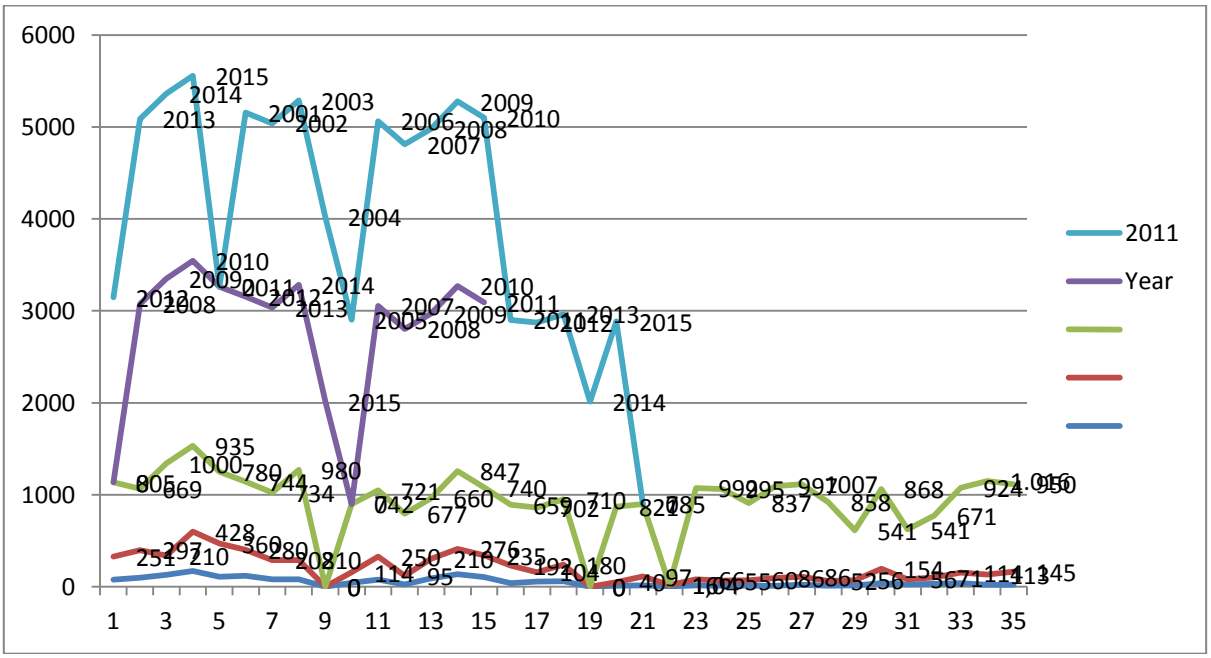
BOD is an important water quality parameter because it provides an index to assess the effect discharged wastewater will have on the receiving environment. The higher the BOD value, the greater the amount of organic matter or “food” available for oxygen consuming bacteria. The test for biochemical oxygen demand (BOD) is a bioassay procedure that measures the oxygen consumed by bacteria from the decomposition of organic matter. A water supply with a BOD

level of 3-5 ppm is considered moderately clean. In water with a BOD level of 6-9 ppm, the water is considered somewhat polluted because there is usually organic matter present and bacteria are decomposing this waste. The BOD/COD ratio for untreated wastewater is 0.5 or greater, the waste is considered to be easily treatable by biological means. If the ratio is below about 0.3, either the waste may have some toxic components or acclimated micro organisms may be required in its stabilization.

Phosphate Phosphorus in small quantities is essential for plant growth and metabolic reactions in animals and plants. It is the nutrient in shortest supply in most fresh waters,. Phosphate-induced algal blooms may initially increase dissolved oxygen via photosynthesis, but after these blooms die more oxygen is consumed by bacteria aiding their decomposition. This may cause a change in the types of plants which live in an ecosystem. The Phosphate include animal wastes, sewage, detergent, fertilizer, disturbed land, and road salts used in the winter. Phosphates do not pose a human or health risk except in very high concentrations. It is measured in mg/L. Larger streams may react to phosphate only at levels approaching 0.1 mg/L, while small streams may react to levels of PO4-3 at levels of 0.01 mg/L or less. In general, concentrations over 0.05 will likely have an impact while concentrations greater than 0.1 mg/L will certainly have impact on a river.

4. ANALYSIS:

Year Moosarambagh	BOD(Biological Oxygen Demand)	COD(Chemical Oxygen Demand)	TDS(Total Dissolved Solid)
2008 ->	78->	251->	805
2009->	100->	297->	669
2010->	130->	210->	1000
2011->	170->	428->	935
2012->	110->	360->	780
2013->	120->	280->	744
2014->	82->	208->	734
2015->	80->	210->	980
Nagole			
2007->	43->	114->	742
2008->	77->	250->	721
2009->	24->	95->	677
2010->	92->	210->	660
2011->	135->	276->	847
2012->	106->	235->	740
2013->	40->	192->	659
2014->	55->	104->	702
2015->	60->	180->	710
Hussainsagar			
2001->	10->	40->	821
2002->	15.5->	97->	785
2003->	3.5->	16->	1,040
2004->	15->	66->	992
2005->	13->	55->	995
2006->	11->	60->	837
2007->	10->	86->	997
2008->	23->	86->	1,007
2009->	10.4->	52->	858
2010->	14.9->	56->	541
2011->	40.1->	154->	868
2012->	26.4->	56->	541
2013->	31->	71->	671
2014->	40->	114->	924
2015->	20->	113->	1,016
June 2016->	20->	145->	950



5. FINDINGS:

The parameters Which has been use to Analyze such as pH, EC, Total Dissolved Solids (TDS) Carbonate, Bicarbonate, Chloride, Fluoride, Nitrate, Sulphate, Sodium, Potassium, Calcium, Magnesium and Total hardness are not within the permissible limit at some Area. BOD,
COD exceeds

6. CONCLUSION:

In conclusion analyzed different parameters such as Colour,Odour, pH, EC, Total Dissolved Solids (TDS), Turbidity, Carbonate, Bicarbonate, Chloride, Fluoride, Nitrate, Sulphate, Sodium, Potassium, Calcium, Magnesium and Total hardness are within the permissible limit at some sites. BOD, COD exceeds WHO acceptable limits. The high level indicates that there could be low oxygen available for living organisms in the waste water. Whereas the high value of BOD is an indication of the contamination. The BOD levels in Musi at Nagole is 32.4 mg/L and at Govt. city college 22 mg/L and COD levels are 68.4 mg/L, 28.9 mg/L at respective sites. The more nitrate is harmful, excess of Fluoride causes fluorosis and BOD levels has an impact on the flora and fauna of the river and underground water surrounding it, Fishes in the river can't survive in this conditions and marine life is affected. Because of this polluted water people have major health problems in the city of Hyderabad and at the down streams of Musi river, are like arthritis, diarrheic, stomach pain, malaria, food poison, body pains, knee pains, kidney problems, skin allergies and jaundices diseases, poor eyesight, skin lesions, Many had miscarriages and also fisher men stopped fishing in the river, ground water also effected and are not useful for the cultivation with the pollution of Musi river.As per data obtained from Telangana State Pollution Control Board, main indicators of water quality the values of biochemical oxygen demand, chemical oxygen demand and total dissolved solids have not changed for the Musi since 2007 and in some cases have increased drastically. The pollution board monitors water quality at nine points along the Musi River. High TDS indicates the presence of sewage water and untreated industrial effluents in the water. While the BOD (Biological Oxygen Demand figures have doubled, COD (Chemical Oxygen Demand) has more than tripled. The value of total coliforms is almost the same. The only relief is that compared to figures from 2011-14, only the BOD value has decreased. An official from TSPCB said, "Mixing of sewage is a major issue. It Should be controlled to improve the water quality. Industrial effluents are also a problem but they just form a small percentage of the pollutants, which get mixed directly into Musi. The Pollution in the Musi River cause a more Worry for the Health of the common people **Skin ailments, diarrhoea and watery eyes.** Pollution in river

Musi has reached such alarming levels that it has been causing miscarriages among **pregnant women** living in its vicinity. In fact, most people consuming fruits and vegetables grown on the river bed are at risk, a study states. The once pristine waters of Musi have acquired dangerous germs, natural as well as synthetic hormones, and lethal Chemicals that could act adversely on the baby growing in the womb, according to the study. High levels of chemical, biomedical, biological, pharmaceutical and industrial contamination and consequent groundwater pollution has Not only killed the aquatic life, but is now affecting pregnancy outcome in humans. The problem is more pronounced in women, who depend on the polluted groundwater, or consume vegetables and fruits irrigated by the river. The joint research study conducted by the department of chemistry , Government City College, and the department of chemistry

, Annamacharya Institute of Technology Sciences, Hyderabad, suggests that due to polluted water "people have major health problems in the city and in the downstream of the Musi...many had miscarriages". It goes on to add that "fishermen have stopped fishing in the river. The groundwater is also affected. It is not useful for cultivation". The study was published in the recent issue of the scientific publication, The Research Journal of Chemical Sciences. While scientists link miscarriage with pollution in the river, city doctors are more cautious, pointing out that the Musi may not have a direct impact on the pregnancy outcome, though the effect of chemical and biological contaminants in the river could be delirious to human and animal health. They however also warn that that certain pollutants may result in abortion of the fetus. Dr VimeeBindra, consultant gynaecologist and infertility specialist, Apollo Health City, Jubilee Hills, says, "Miscarriage is indirectly related to the Musi as consumption of contaminated vegetables and fruits grown on its bed will have an effect on pregnancy."

Elaborating on the matter, she says, “A healthy pregnancy needs healthy nutrition (sic). So if nutrition (food) is contaminated it will affect pregnancy either in the form of miscarriage, low birth weight, preterm labour or congenital abnormality associated with some specific substances present in the diet." Speaking about the impact on groundwater, she says, "Pollution in river water can lead to pollution of groundwater, drinking water, and water for irrigation. It will also increase incidence of diseases including diarrhea, jaundice, skin allergies and paediatric illnesses. It also hits livestock and crops in villages downstream of Hyderabad." Senior consultant physician Dr HariKishan Boorugu too points out that high level of pollution are indirectly linked to human health and can cause miscarriage. "If groundwater is contaminated, it can result in many food-and water-borne infections like typhoid, hepatitis, listeriosis, and many infections resulting in diarrheal illnesses. Listeriosis, which is a food-borne disease, can cause miscarriage in pregnant women," he said.

7. RECOMMONDATIONS:

The development plan for Musi affects the life of people specially to livelihoods, and physical environment. Implementation of the plans prepared and being undertaken it would be involve in eviction of people living near by the Musi. The effects of the work and livelihoods. It is, therefore, important to understand the ground level situation and have a consultative process for planning and implementation. Any physical intervention also has to take care of the heritage of Musi River, the various structures located around it. There are heritage regulations which give solution for development and in some cases restrict development. Conserving Musi and restoring its past glory would also involve extensive heritage conservation

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