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ASSESMENT OF RAINWATER AND STORM WATER QUALITY IN BIDADI INDUSTRIAL AREA

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ABSTRACT

India is land of versatile whether where in consistency in rain is frequent. So as an option of having a back up for water needs. One system becomes necessary which provides much saving of water, would be helpful in reducing wastage of water. Although rainwater harvesting is gaining popularity has a sustainable water saving system in urban as well as rural areas. Rain water harvesting is defined as the process of colleting and storing rain for later productive use. The study is an assessment of the quality of rainwater and storm water samples in Bidadi industrial area. The samples were analysed for pH , TDS, conductivity, Cat ions and Anion . Mean pH of rainwater and storm water is around 6.52 which is less than neutral pH 7depicts slight acidic nature of rain water and storm water. Rainwater and storm water was studied for chemical and physical parameters in Bidadi industrial area for a period of may 2017 to October 2017. Rain water and storm water has been subjected to human interferences regularly and water quality was to be getting deteriorated profoundly. Major anthropogenic activities practiced in and around the stretch: agriculture, discharging of sewage waste etc was generating serious threat to the biota of the rainwater and storm water by altering the physical, chemical and biological concentration of the environmental system. Samples of storm water from a local road were collected to evaluate its quality. It was observed that storm water is not completely pure.

Keywords: Alkalinity, Electrical Conductivity, Hardness, Ph, Turbidity, TDS,

I INTRODUCTION

Water is in scarcity. Increasing demand from industrial and domestic sector is likely to reduce the water available for agriculture in near future. It is therefore a valid concern of scientist and policy makers as to how to meet the increase in demand from industry and domestic sector while at the same time for the ever increasing demand from agriculture. The problem has become more acute as there are little and no additional water sources

for further development. Good water management may be viable option. There have been considerable advances in this area through improved technology and cultivation practices. Indian subcontinent on an average receives high monsoon rainfall for about 4 months. However remaining months remain mostly dry. Therefore rainwater harvesting may be a viable option in India. In 2007 world urban population has crossed world rural population (World urbanization prospects 2014) . Rapid urbanization is resulting in population migration, increase in water demand, decline in water bodies, pollution of ground water resources; depletion in water level drying up of bore wells, etc. these environmental risks can be managed through the technique of rainwater harvesting. The rain water quality to some extent is under the direct influence of the atmospheric air quality .Air pollution due to natural and anthropogenic sources have resulted in the reduction of ph in rainwater causing "Acid rain". The present has focused on assessments of rain water and storm water quality.

II OBJECTIVES OF STUDY

The work has been taken up with the following objectives

- To determine the physical parameters (Turbidity) of harvested rain water and storm water sample at selected points in Bidadi industrial area.
- To determine the chemical parameters (pH, Hardness, Alkalinity, TDS, Conductivity) of storm water sample at selected points in Bidadi industrial area.
- Problems with current system
- Feasibility of rainwater collection system with recommendations.

III MATERIALS AND METHODS

In this chapter, the study area is described in detail. The detailed list of equipment along with photographs and chemicals used for the study has been indicated. The criteria for selection of sampling points, methodology adopted for analysis have been explained.

IV DETAILS OF STUDY AREAS

4.1 The study area

The study area consists of rainwater and storm water situated near the Bidadi industrial area. The rain water and storm water is located at $12^0$45'48" N latitude, $77^0$25'36" E longitude. Total area of Bidadi industrial area is 3576sq.mt with a population of 9,917 and population density of 290 /km^2. It has traditionally been a centre of industrial and education and has been categorized as the industrial area in the state of Karnataka.

Bidadi is a town situated on the Bangalore express way and is the part of Ramanagara district in the state of Karnataka. The town is located 32 km from Bangalore towards Mysore and is connected by both rail and bus to Bangalore city. For studying the rainfall pattern 10 years actual rainfall from 1996-2005 is considered as per the data, normal annual rainfall Bangalore urban district received is 831mm. typical monsoonal climate prevails in

the distract with major contribution of rainfall during south waste monsoon. In general prevails pre-humid to semi arid climatic condition prevail in the districts. Average temperature is 23.1°c.

V RAIN WATER SAMPLING

Rain water sampling is the collection of wet fallout from the atmosphere. Rain water collector consists of a polyethylene funnel of 25cm dia. connected to 20liter polyethylene collector. It is installed over the roof of the building to collect the wet only precipitation samples in the study area. Rain water is collected manually during the rain events. The rain water collector is cleaned after every rain event using double distilled water. A clean Teflon bag was inserted on the collection apparatus when no rain events occurred. The rain water collectors shall be placed on the terrace of the building at a minimum height of 3m above from ground.

VI SAMPLING AND ANALYTICAL METHODS

The rain water and storm water different sufficient samples were available for analysis. The samples were transported to laboratory immediately after collection with completely covered to avoid sunlight and analyzed immediately for pH, TDS, Electrical conductivity. Subsequently, the samples were filtered through whatmann 41 filter paper. All water filtrates were preserved at 4^0 C in a refrigerator until for analysis. Whiskers (line extending from the top and bottom of the box) help to understand the maximum and minimum values of parameter.

- Determination of river water pH meter
  Method: electrometric
- Determination of river water turbidity
  Method: electrometric
- Determination of river water electrical conductivity
  Method: electrometric
- Determination of river water Alkalinity, Hardness
  Method: titration

VII TEST AND RESULT

This chapter briefly presents the results of the sampling and analysis of the samples. Discussions on 6 rain water and storm water quality parameters have been given. Analysis and discussion on chemical and physical parameters are also included. Sampling was done in the Bidadi industrial area in a month from May 2017 to Oct 2017. For better understanding and analysis of the results, tables and necessary graphs have been included.

7.1 Physical Analysis

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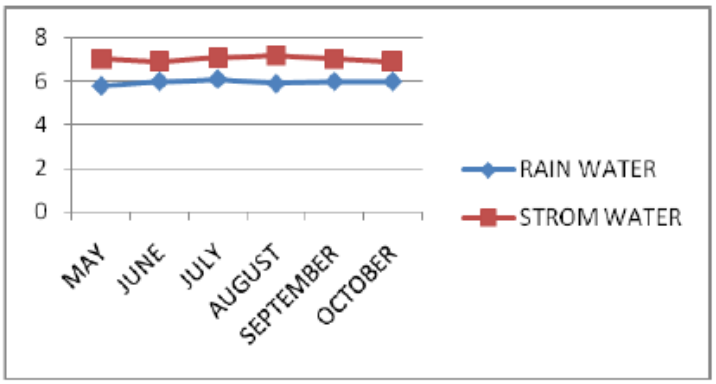
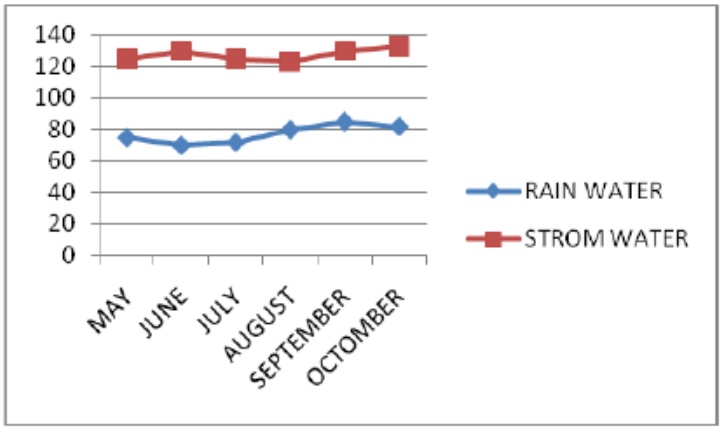
- **PH**

TABLE NO.1.PH RECORDED FOR FIVE MONTHS		
MONTHS	RAIN WATER	STROM WATER
MAY	5.8	7
JUNE	6	6.9
JULY	6.1	7.1
AUG	5.9	7.2
SEP	6	7
OCT	6	6.9



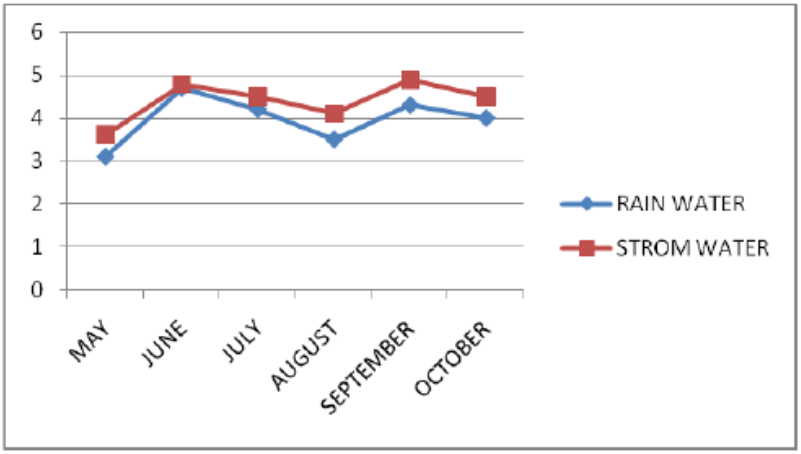
- **HARDNESS**

TABLE NO.2.HARDNESS RECORDED FOR FIVE MONTHS		
MONTHS	RAIN WATER	STROM WATER
MAY	75	125
JUNE	70	130
JULY	72	125
AUG	80	123
SEPT	85	130
OCT	82	133



- **ALKALINITY**

TABLE NO.3.ALKALINITY RECORDED FOR FIVE MONTHS		
MONTH	RAIN WATER	STROM WATER
MAY	3.1	3.6
JUNE	4.7	4.8
JULY	4.2	4.5
AUG	3.5	4.1
SEP	4.3	4.9
OCT	4	4.5



- **ACIDITY**

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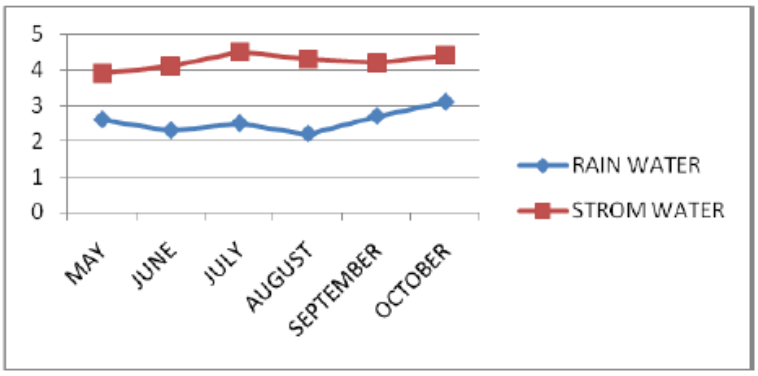
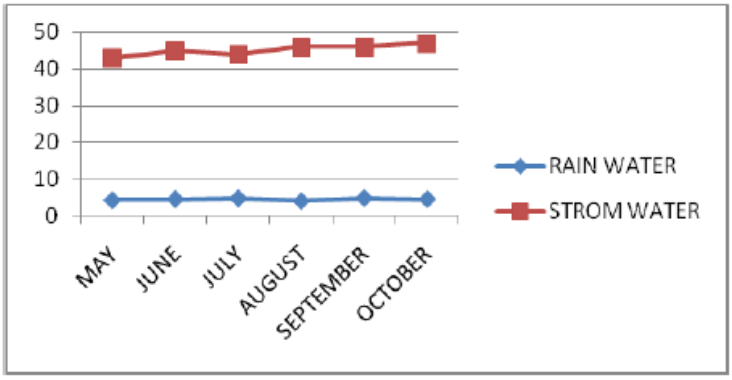
TABLE NO.4.ACIDITY RECORDED FOR FIVE MONTHS		
MONTHS	RAIN WATER	STROM WATER
MAY	2.6	3.9
JUNE	2.3	4.1
JULY	2.5	4.5
AUGUST	2.2	4.3
SEPTEMBER	2.7	4.2
OCTOBER	3.1	4.4



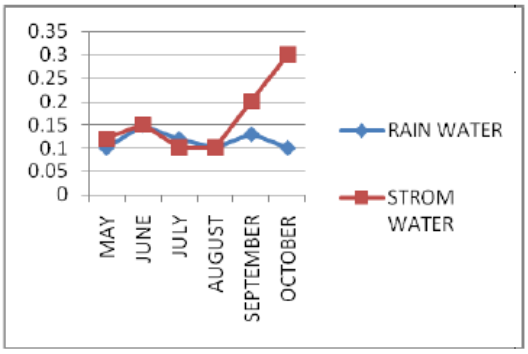
- **TOTAL DISSOLVED SOLIDS**

TABLE NO.5.TDS RECORDED FOE FIVE MONTHS		
MONTHS	RAIN WATER	STROM WATER
MAY	4.3	43
JUNE	4.6	45
JULY	4.8	44
AUG	4.1	46
SEP	4.9	46
OCT	4.6	47



- **ELECTRICAL CONDUCTIVIY**

TABLE NO.6.ELE CON RECORDED FOR FIVE MONTHS		
MONTHS	RAIN WATER	STROM WATER
MAY	0.1	0.12
JUNE	0.15	0.15
JULY	0.12	0.1
AUGUST	0.1	0.1
SEPTEMBER	0.13	0.2
OCTOBER	0.1	0.3



VIII RESULT AND DISCUSSION

The mean pH of the wet precipitation is around 6.5 which is more than the neutral value 5.6. The study area is located at the downstream of Bidadi industrial area. The impact of anthropogenic sources and industrial emission in the neighborhood can be attributed for change the concentration in harvested rain water. Summarize the harvested rain water concentration less than that of the storm water concentration.

IX CONCLUSION

The concentrations of storm water are more than the concentration of harvested rain water. The harvested rain water and storm water concentration is within the acceptable limit of drinking water quality standards-IS10500.The presence of pollutants can be attributed towards atmospheric dry depositions, anthropogenic activities, industrial emission. The harvested rain water can be utilized for ground water recharge or any other purpose by providing the pre treatment. The work presented the first assessment on the utilization of stormwater collected from paved roads in bidadi. The treatment and the subsequent use of stormwater collected from roads for use in non portable purpose could reduce the consumption of portable water, minimize water rationing, decrease the shortage of water resources, and in addition would control one of the main sourced of the pollution of rivers and streams.

The pH of the stormwater collected from the public road runoff was more alkaline than the pH for the rainwater from the atmosphere. In this study , the pH of the rainwater from the atmosphere was 5.8, while the pH of the storm water was 6.9. In the study the pH 7.2 for a road located in Bidadi industrial area.

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