COMPARATIVE STUDY OF TREATMENT OF MUNICIPAL EFFLUENT BY USING FLY ASH AND LATERITE AS A FILTERING MEDIA

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***Abstract:* - The present study reports the comparative study of soil-based constructed soil filter system monitored for about 2 months for removal of turbidity of turbid water in which fly ash and laterite is used as a filtering media. The samples passed through this arrangement, includes water collected from Nagriver, Koradi, Gorewada.The result indicates removal of turbidity from these samples ranging from 3 NTU to 21NTU. Various other tests were also performed to check whether the water is potable or not viz., temperature, pH, dissolved solid, hardness of water, BOD and COD. The water passed through this arrangement reduces pH value from 0.1 to 1.3, dissolved solids from 160ppm to 1528ppm, hardness reduces from 220 to 560, BOD reduces from 8ppm to 67ppm and COD reduces from 23ppm to 90ppm. The unique features of the system include no chemicals, odour free, no energy requirement and green ambience.**

Keywords- Colour removal; Fly ash; laterite.

I. INTRODUCTION

Several monitoring studies of water bodies reveal that the mainSource of pollution is the discharge of raw sewage. Due to rapid economic growth and exponential population increase, Mumbai, the commercial capital of India is expected to have a population of around 26.5 million by 2025. It is expected to lead to a water demand of 18,000 million liters per day (MLD) generating almost 14,400MLD wastewater. Wastewater treatment and recycling are the potential sources for addressing problems in such rapidly growing urban centers. There are various technological options available in the conventional approach for wastewater treatment. But most of the available technologies are often found to be unsuitable for applications in developing countries. One of the hurdles is the cost associated with its operation as regular supply of energy may not be available and the operating requirements are often ill matched to local skills. As a result such plants can be beyond the reach of the community. Natural systems overcome these disadvantages, *viz*., land treatment and wetland systems.

Land treatment has emerged as one of the promising technologies for wastewater renovation. In land treatment, wastewater is first treated by conventional physicochemical and/or biological treatment and then allowed to infiltrate through aerated unsaturated zone wherein it gets purified through unit operations and

processes such as filtration, adsorption, chemical processes and biodegradation.

Land treatment system comprises of mainly Slow-Rate Irrigation System, Overland Flow System, Compact Filter System, Multi Soil Layering System, Rapid Infiltration System and On Site Disposal System. Operation cost, mismatch of operating requirements with local skills and space constraint particularly in the urban sector of the developing world have limited their application to a great extent. Hence there is a need to find out a method to purify water in an economical way and eco-friendly in nature.

II. MATERIALSUSED

Here, two main important materials are used.

1. Fly Ash

Fly ash, also known as flue-ash is one of the residues generated in combustion, and comprises the fine particles that rise with the flue gases. Ash which does not rise is termed as bottom ash. In industrial context, fly ash usually refers to ash produced during combustion of coal. Fly ash is generally captured by electrostatic precipitators or other particle filtration equipment before the flue gases reach the chimneys of coal-fired power plants, and together with bottom ash removed from the bottom furnace is in this case is jointly known as coal ash. Depending upon the source and makeup of the coal being burned, the components of fly ash vary considerably, but all fly ash includes substantial amounts of silicon dioxide and calcium oxide, both being endemic ingredients in many coal bearing.

2. Laterite

Laterites are soil types rich in iron and aluminium, formed in hot and wet tropical areas. Nearly all laterite are rusty-red because of iron oxides. They develop by intensive and long-lasting weathering of the underlying parent rock. The tropical weathering is a prolonged process of chemical weathering which produces a wide variety in the thickness, grade chemistry and ore mineralogy of the resulting soils. The majority of the land arecontaining laterite is between the tropic of cancer and Capricorn. It is the major component found in raw water in most tropical regions in Africa, and its removal represents the main objective of the drinking water processes. Laterite is a clay material that confers to raw water a red color and hazy aspect. It is also known to be the main vector of arsenic contamination in ground water in many regions of the world. Because of the lack of knowledge on this clay and/or inappropriate process, it is common to find suspended particles in tap water, especially during the rainy season. Moreover, the known implication of aluminum in Alzheimer disease makes this issue of using low coagulant level a worldwide problem. In drinkable water application, aluminum salt concentration depends on the physicochemical properties influencing salt precipitation.

The following quantities of material are required

1) 0.5lit. of contaminated water (collected from Nagriver, Koradi, Gorewada).
2) 800gm coarse aggregate retained in sieve size 4.74mm.
3) 800gm fine aggregate passed through sieve size 2.36mm and retained in 1.13mm.
4) 800gm fly ash and laterite passed through sieve size 600micron and retained in 300micron.
5)800gm medium aggregate passed through sieve size of 4.75mm and retained in 2.36mm.
6)12 jars of same size with holes on the bottom face.
7) Filter paper.

8) Thermometer.

III. Methodology

1. For the comparative study of fly ash and laterite as a filtering media, we made two arrangements to find the effective filtering media.

2. The arrangement was made preparing layers of different soil based materials. The top most layerswere made using fly ash passed through sieve size 600 micron and retained in 300 micron.

3. The below layer was followed by coal, which is used as an adsorbent material and is retained in sieve size 1.13mm. This layer was followed by fine aggregate passed through sieve size 2.36mm and retained in 1.13 mm. This layer was followed by medium aggregate passed through sieve size of 4.75mm and retained in 2.36mm. This layer was followed by coarse aggregate retained in sieve size 4.75mm.

4. We used various parameters to find out the purity of water. We performed test to determine temperature of our sample, pH value,turbidity, dissolved solid,hardness of water,COD and BOD.

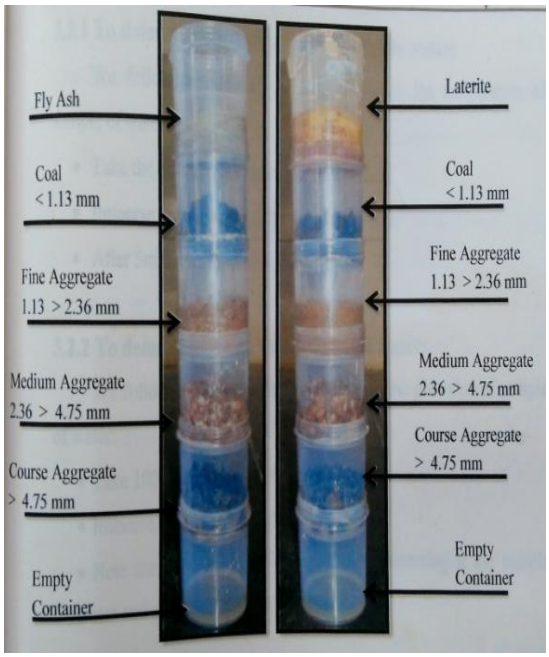
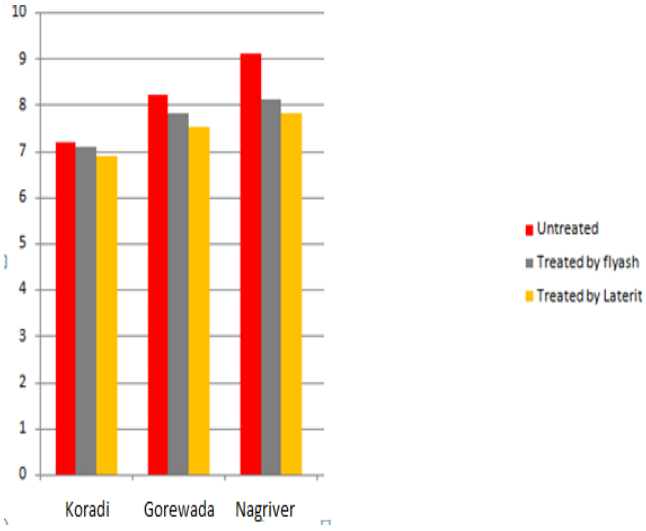


Fig. 1 Model Arrangement

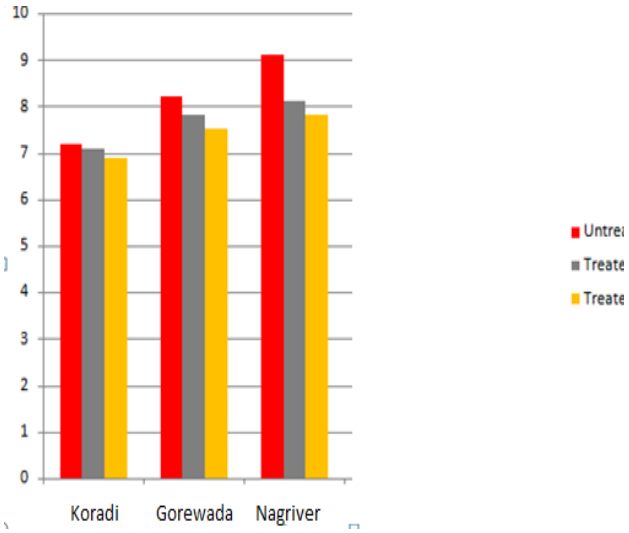
IV. Result and Discussion

1. pH

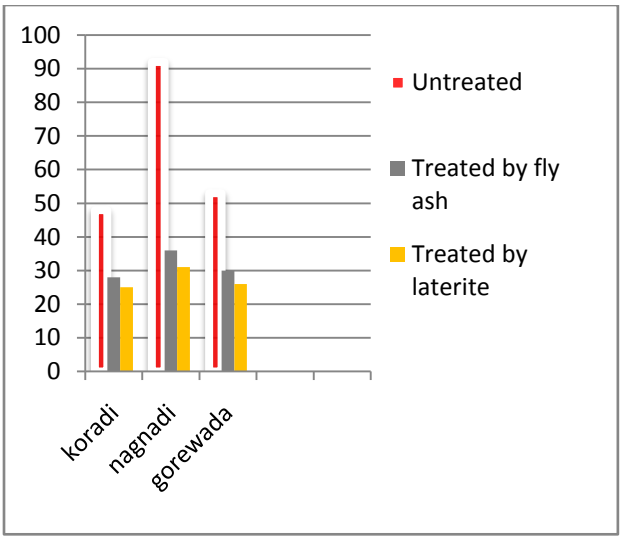


The water passed through this arrangement reduces pH value from 0.1 to 1.3.

2. Dissolved solid

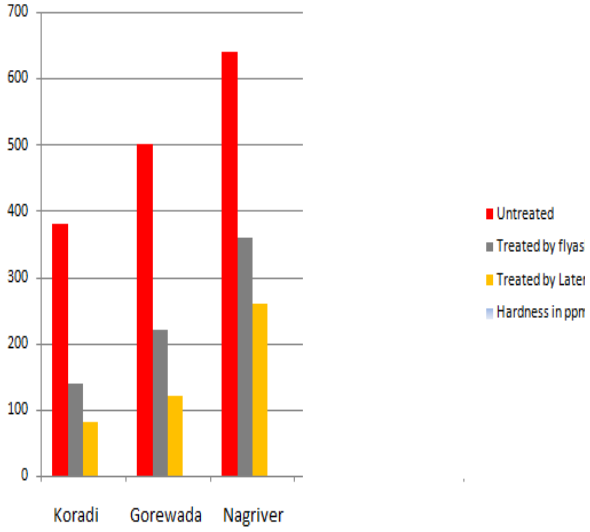


The dissolved solid remove from this arrangement is 370 ppm to 1528 ppm.



This arrangement helps in the removal of color and turbidity ranging from 20 to 60 NTU.

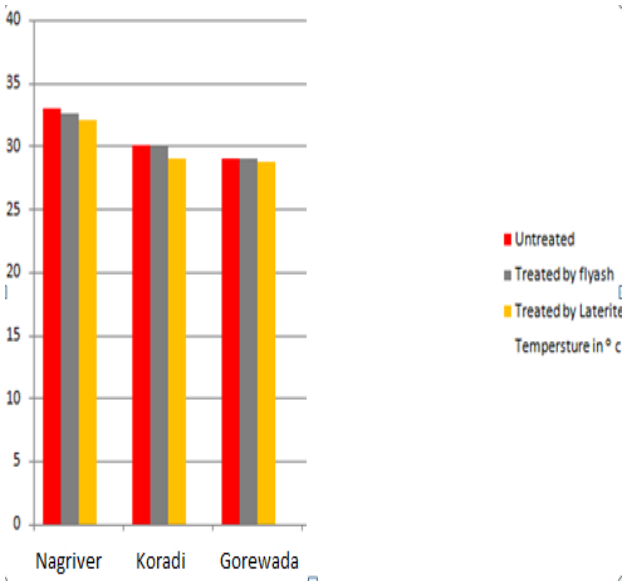
3. Hardness



Hardness reduces from this arrangement is 240 to 380.

4. Tubidity

5. Temperature



V. Conclusion

The present study confirms the comparative study of soil based constructed soil filter system monitored for about one and half months for removal of colour of turbid water

in which fly ash and laterite is used as a filtering media.

1.The samples water collected from Nagriver, Koradi, Gorewada, helps in the removal of colour turbidity ranging from 3 NTU to 21 NTU.

2. Various other tests were also performed to check whether the water is potable or not viz., temperature, PH, dissolved solid, hardness of water, etc.

3. We also concluded from this comparative study that through Fly ash can be used for a numberof times but not Laterite. After some time when the water is passed through it for a number of times, Laterite gets completely saturated and settles at the bottom; thus blocking the smooth flow of water through it. Water passed through these arrangement removes 60% to 70% of the impurities.

VI.Acknowlegdement

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