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Low Cost Filtration For Grey water With Constructed Wetland

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Abstract - *Filthy water emerging from the washbasin, restrooms, shower, and clothes washer with the exception of a latrine known as "dim water." This treated dark water can be utilized in lawn gardens. Developed wetlands are progressively used to treat wastewater. This study was directed with the point of tracking down an answer for the treatment of dim water. The treatment process is minimal expense, straight forward and comprehensive. Dim water was sanitized by developed wetlands. The developed wetlands address one more area of disinfection since they are similarly powerful in eliminating contamination. The developed wetland has a filtration cycle to eliminate contaminations from wastewater. In this program we will oversee dim water for example from the wash bowl, restroom and so forth.*

Key Words: Greywater, Constructed wetlands, low cost filtration.

1. INTRODUCTION

In this specific venture we are learning about the Low expense Filtration for Grey water with Constructed Wetland. The Natural wastewater treatment frameworks are straightforward, minimal expense strategies that use the physical, compound and organic cycles that happen in the regular habitat between water, soil, plants, microorganisms and the environment. Normal for dark water is that it frequently contains high convergences of effectively degradable natural material, for example fat, oil and other natural substances from cooking, build-ups from cleanser and cleansers. The persistent decrease in disinfection inclusion could be ascribed to the roaring populace development, quick urbanization and absence of interest in the area. Present day, wastewater treatment innovations have become progressively perplexing with the prerequisite of generally complex and costly plants.

Vegetation place and significant job in squander water treatment wetland. Plants give a substrate to microorganisms, which are the main processers of waste water impurities. Plants likewise gives microorganisms a wellspring of carbon. Plants have extra site-explicit worth by giving living space to natural life and making waste water treatment framework tastefully satisfying. Wetland types of all development structures have been utilized in treatment wetlands. Built wetland are an endorsed squander water treatment framework and have been utilized effectively overall to treat different sorts of waste water including storm water, modern, home-grown, agrarian, mine seepage and landfill leachate Groundwater is generally utilized as savouring reason country region. Squander water treatment is a huge universe, and is produce in various condition with various extent. The issue of dim water the executives which is characterize as all wellsprings of home-grown waste water barring latrine squander water-is acquiring and more significance, particularly in non-industrial nations where ill-advised administration is one of most significant reasons for natural contamination and deadly sicknesses. Appropriate dim water the board, containing assortment, treatment and reuse or removal, forestalls person in touch with it and cut off points microorganism move. A sound treatment likewise emphatically affects the close by water bodies, since it restricts the contribution of supplements and in this way eutrophication. Dim water the executives isn't just a free condition for spotless and sound day to day environments, it likewise has an extraordinary potential for reuse. Treated dark water in a decentralized manner is reused for an entire scope of use all over the planet; in emerging nations, the reuse of treated dim water for water system designs is generally normal. The point of this work was to give an outline on the writing in the field of dim water, treatment on family level in emerging nations. This research paper conducted a detailed study of grey water and where grey water is produced. Grey water comes from the trees of the bathroom sinks and kitchen sinks, Narges Shamabadi, Mahamood Farahani.et. al. (2015) [1]. The university has recommended the use of a drip filter with suspended plastic media. In this flow filter the waste particles are removed from the system with a 1cm mesh screen and water is evaporated into a sealed septic tank and the result is pumped into a flow filter consisting of plastic and mud, Hazart-e-masoumeh [2]. In this research paper they concluded that the construction of wetlands is an effective treatment for gray water, K. Soundaranayaki (2017) [3]. In this research paper first purification of water is carried out, in this paper the gray water is treated using a root system with a fixed root in the wetlands column, Mr. Sarang K. Dighe, Prof. S.R. Korke (2018) [4]. This paper discusses the need for gray water, the features and technologies of gray

water treatment how to recycle water and reuse clean water can reduce our need for clean water for nondrinking purposes. The government should also promote the implementation of a gray water treatment plant in large buildings, facilities, public areas, and the maintenance of a single house, especially in areas where water is scarce, Sonali Manna (2018) [5]. This paper discusses water conservation as a result of water treatment and re-use of urban contexts in the developing world, explaining about design, performance appraisal, water conservation and the benefits of water collection, cleaning and re-use in Nagpur to an urban family, Shankar dhone et. Al., (2011) [6].

1.1 Objectives

- To minimize the water pollution which is increased due to discharge of grey water and black water directly into the rivers.
- Recycle and reuse of waste water for economic profits.
- To find an economical way to treat water.

1.2 Water Consumption Survey

The survey for water consumption was divided into three parts which involved bathroom, washing machine and kitchen, water consumption was 37,000 m3 /day for bathroom, 136,500 m3 day for washing machines and 5,000 m3 /day for cooking. The overall result as in Figure 2 the high volume of grey water generated by washing machine at 76%, 21 % of bathroom and 3 % of kitchen. Similarly, according to the 51 % of washing machine, 25 % of bathroom and 15 % of kitchen. From result shows the maximum of grey water used was washing machine because the regular occupants used washing machine twice per week for every person.

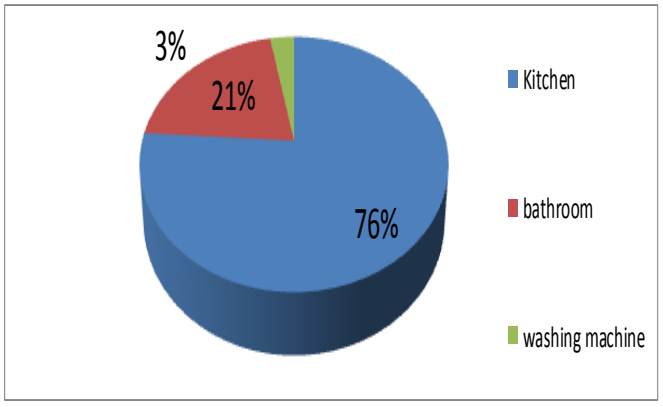

Fig.1 Removal % of grey water produce from household activities.

1.3 Characteristics of Gray Water

A huge gathering of information concerning physical and compound qualities of dim water. By and large dark water is separated in four dim water classes in view of its starting point: washroom, clothing, kitchen and blended beginning.

1.3.1 Gray Water From Bathroom

Water utilized close by washing and washing creates around 50 to 60% of absolute dim water and is viewed as the most un-sullied sort of dark water. Normal compound toxins incorporates cleanser, cleanser, hair color, toothpaste and cleaning items. It additionally has some facial tainting (and the related microbes and infections) through body washing.

1.3.2 Gray Water From Cloth Washing

Water use in material washing creates around 25 to 30% of complete dim water. Squander water from the materials washing changes in quality from wash water to flush water to second wash water. Dim water created because of material washing can have facial defilement with the related microorganisms and parasites like microbes.

1.3.3 Gray Water From Kitchen

Kitchen dim water contributes around 10% of the all-out dim water volume. It is tainted with food particles, oils, fats and different squanders. It promptly advances and supports the development of microorganisms.

1.4 Parameters Affecting the Characteristics of Grey Water

The composition of grey water depends on several factors, including sources and installation from where the water is drawn:

- Quality and type of water supply (ground water well or piped water)
- Type of distribution net for drinking water
- Type of distribution net for grey water (because of leaching from piping, chemical and biological processes in the bio- film on the piping walls
- Activities in the house hold (life style, custom and use of chemical products).
- Installation from which grey water is drawn (kitchen sink, bathroom, hand basin or laundry wash.
- Type of source: house hold or industrial uses like commercial laundries.
- Geographical location

- Demographics and level of occupancy
- Quantity of water used in relation to the discharged amounts of substances.

The composition of grey water also varies with time "because of the variations in water consumption in relation to the discharged amount of substances.

1.5 Properties of Water

The properties of water make it reasonable for people to get by in contrasting weather patterns. Water is described by complex bizarre properties that separate it from different substances. Water is the general dissolvable because of its polar nature. It breaks up countless different synthetic substances. Its properties are as per the following:

1.5.1 Physical properties of Water: -

Water has numerous extraordinary actual properties. It exists in every one of the three actual conditions of issue: strong, fluid, and gas at climatic temperatures and tensions. Water has an extremely high unambiguous intensity limit and a high intensity of vaporization. The two properties emerge because of broad hydrogen holding between water atoms. Water's exceptionally high unambiguous intensity limit is a decent vehicle for spreading the world's intensity. Water has high thickness, which relies upon the broke down solids and temperature of the water. Water is genuinely special since it is less thick as strong (ice) than as a fluid.

The most extreme thickness of fluid water happens at 4ºC. Water has a high surface pressure when contrasted with different fluids because of solid union between particles. Surface pressure is answerable for fine activity, which permits water to travel through the underlying foundations of plants. Water is the substance of which strong state can drift on fluid state. Different properties of water like softening point, edge of boiling over, consistency, slow warming and cooling are consequence of intermolecular hydrogen holding between water particles.

1.5.2 Chemical properties of Water: -

Water has numerous interesting attributes that make it ideal forever. Water is the synthetic substance with compound recipe H2O and bowed shape. Water is a fluid at room temperature because of hydrogen holding. In the water particle both hydrogen iotas make a positive electrical charge while the oxygen molecule makes a negative charge, in this manner water particles is polar in nature. Water is thermally steady however at higher temperatures separate into hydrogen and oxygen gases.

Water can ionize itself to a tiny degree however in unadulterated water the measures of hydronium particles and hydroxide particles are equivalent. Thus unadulterated water is nonpartisan. Water is an amphoteric particle it goes about as corrosive as well as a base. Water oxidizes carbon to carbon monoxide acting as an oxidizing specialist while it lessens chlorine gas to hydrogen chloride going about as a decreasing specialist.

1.5.3 Biological properties of Water: -

Water is the general dissolvable on the grounds that it disintegrates wide scope of substances than other normal solvents4. Water functions as moving biotic atom, bio minerals, chemicals and nutrients to various pieces of creature and plant bodies. Water is huge for every one of the metabolic responses fundamental for life to happen in arrangement in the cytoplasm of living cells.

Water particles are glue because of polar nature and subsequently water sticks to other polar substances. This permits water to move upwards through the xylem of plants against gravity. Water breaks up oxygen gas from air which is important for amphibian life.

2. METHODOLOGY

2.1 Stabilization tank method

Adjustment tank is one of the minimal expense treatment used to treat dark water. Water adjustment tank intended to treat the wastewater and to diminish the natural substance, microbes from squander water. Adjustment tank is a characteristic interaction which requires some investment since evacuation rates are slow. Adjustment tank function admirably almost in all climate and can treat most kind of wastewater. It is essentially a tank which greywater is permit to pass, toward the end the particles will settle down at the base and we will get the treated water toward the end. Adjustment tank is a modest other option. It requires huge space as contrast with other cycle.

2.2 Root zone wastewater treatment

In this Root zone technique cover every one of the natural exercises among various kinds of organisms, water soil and sun Root zone. The root zone wastewater framework utilizes natural and actual treatment cycles to eliminate contaminations from wastewater. It is a characteristic cycle, there is compelling reason need to add any synthetics, mechanical siphons or any outside energy. Root zone wastewater treatment likewise diminishes the support cost. It is likewise one of minimal expense innovation to treat dark water.

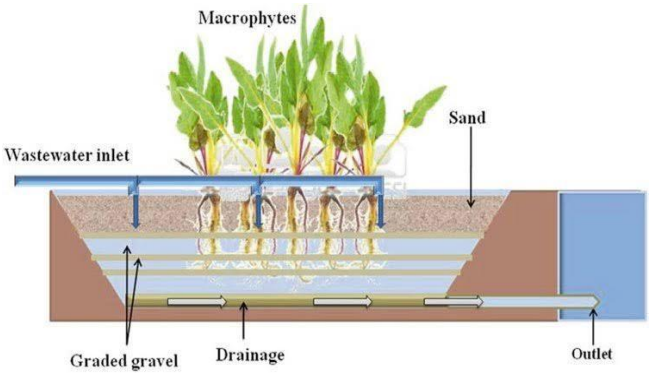

Fig. 2 Root zone wastewater treatment in constructed wetland

3. STANDARD METHODS ADOPTED FOR ANALYSIS

The ground water samples collected from various selected locations were analyzed for physicochemical parameters in order to determine degree of pollution. Standard methods given in "Water supply and sanitary engineering prepared and published by B.C. Punmia in Laxmi Publication and Environmental Engineering- I manual (BECVE303P) were used for determination of various physicochemical parameters.

- pH: Electrometric method no – given on page no 02/EE/(BECVE303P) was used.
- CONDUCTIVITY: Laboratory method– given on page no 05/EE/(BECVE303P) was used.
- TOTAL DISSOLVED SOLIDS: given on page no 10/EE/(BECVE303P) was used.
- TURBIDITY: given on page no 13/EE/(BECVE303P) was used.
- TOTAL ALKALINITY: The titration method given on page no 22/EE/(BECVE303P) was used. For total alkalinity was followed.
- TOTAL HARDNESS: for determination of total hardness, given on page no 26/EE /(BECVE303P) was used.
- CALCIUM HARDNESS: EDTA titration method– given on page no 26/EE /(BECVE303P) was used.
- MAGNESIUM HARDNESS: given on page no 26/EE/(BECVE303P) was used.
- CHLORIDE: given on page no 07/EE/(BECVE303P) was used.
- JAR TEST: given on page no 29/EE/(BECVE303P) was used.
- BOD given on page no 31/EE/(BECVE303P) was used.
- COD: given on page no 33/EE/(BECVE303P) was used

4. EXAMINATION OF SAMPLES

Groundwater samples of various locations were analyzed for determination of degree of pollution with respect to the following physicochemical parameters for investigation.

- pH
- EC (Electrical Conductivity)
- T.D.S. (Total Dissolved Solids)
- T.H. (Total Hardness)
- Ca Hardness
- Mg Hardness
- T.A. (Total Alkalinity)
- Chloride
- COD
- BOD

The determination of heavy metals concentrations in water sample can be accomplished by various methods i.e., titrametric, gravimetric, colorimrtic, flame photometric method, ion chromatographic, atomic absorption spectrophotometer (AAS) etc.

5. RESULT & DISCUSSION

By conduction of this study & analysis of data following result has been made based on experimental investigation and research.

Table 1. Concentration of various parameters at each stage of treatment system.

(Sample 1)

SR NO	PARAMETER	WASTE WATER	SEDIMENTATION TANK (UNIT 1)	SAND & GRAVEL FILTER (UNIT 2)
1	Turbidity	145.1	34.1	19.08
2	TSS (mg/l)	155.3	19.53	12.32
3	TDS (mg/l)	688.5	649.1	638.03
4	TH (mg/l)	522.3	396.96	285.5
5	COD(mg/l)	176.3	153.22	152.39
6	BOD(mg/l)	56.65	49.76	47.53

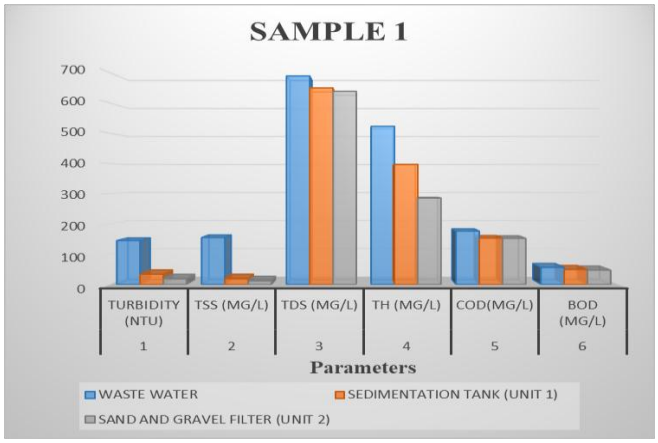

Fig. 3 % Removal efficiency of various parameters in each stage of treatment System

Table 2. Concentration of various parameters at each stage of treatment system.

(Sample 2)

SR.NO	PARAMETER	WASTE WATER	SEDIMENTATION TANK (UNIT 1)	SAND & GRAVEL FILTER(UNIT 2)
1	Turbidity	160.4	54.32	34.17
2	TSS (mg/l)	163.2	29.31	18.321
3	TDS (mg/l)	752.3	721.31	672.6
4	TH (mg/l)	562.6	311.55	279.13
5	COD(mg/l)	183.2	160.25	101.16
6	BOD(mg/l)	59.24	50.43	48.5

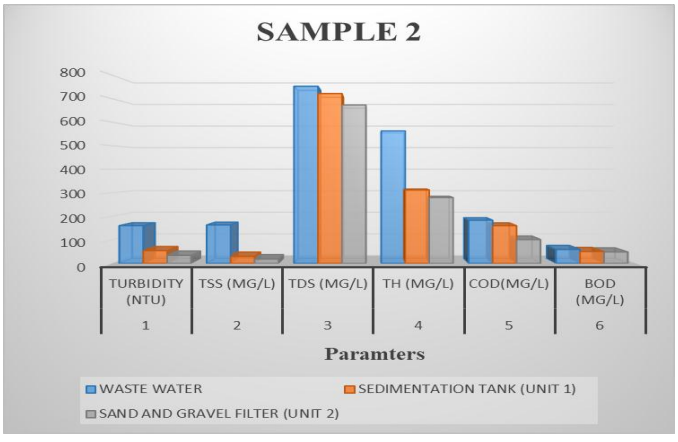

Fig. 4 % Removal efficiency of various parameters in each stage of treatment System

6. CONCLUSIONS

For all pollutants removal efficiency was increased in the filtration stage. This stage was only to control the total treatment system. Hence the filtration stage was studied and performance evaluation for removal of load pollutants in grey water at each filter bed was investigated and is depicted in above figures. The results presented in this study are to establish the potential applicability of the developed low cost technological treatment system especially for the rural areas in which economics is the major constraint.

This laboratory scale grey water treatment system is a combination of natural and physical operations which could be applied easily without any maintenance. All the natural and easily available low cost materials were used for the treatment process. Economically the unit could be easily made available, the power supply, which is an important part of the operating cost of the conventional system and it is a today's major issue in India, is required minimum, because system works on the natural force for flowing of water from first stage to last stage.

7. FUTURE SCOPE

Grey water treatment has very important in future internationally and in India because, the quality of water in ground level decreasing day by day and this is due to the domestic waste and pollution which dangerous diseases so, developing countries are now working on waste water. It has very good scope. After coming next years from now it is hoped that higher efficiencies in and effectiveness of the system would allow less waste and better recycling of the resources. We may see various technologies applied new trends. Perhaps water and waste treatment will combined, and less waste water will be discharged to the rivers. Perhaps more facilities will utilize closed-cycle systems, making rivers safer and environmentally friendlier.

Constructed wetland for grey water filtration with better water treatment and delivery systems the public is increasingly concerned about whether we remove all the harmful pathogens. In the future mini constructed wetland is more useful because improve water quality for various irrigation purposes such as gardening, domestic uses etc. and also rise the ground water level.

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