# Feasibility study on the application of Phytoremediation process for treatment of grey water

**Sonawane Shubham Francis[1],Shinde Adesh Ambadas[2],Sabale Mayur Dattu[3],Kanoj Manoj Bajirao[4]**
Department of Civil Engineering
[1,2,3,4] Dr.V.V.P. College Of Engineering, Ahmednagar, Maharashrata, India.

***Abstract-*** *Now day their is problem of increasing domestic waste water which can be commonly known as grey water. To overcome the problem of treatment of grey water it can be done by economically. The method is used for the treatment of grey water is phytoremediation. Phytoremediation is the technique using vetiveria Zizanioides to treat domestic water.*

*In this study phytoremidiation is ecofriendly and cost effective technquie is used for removal of various contaminents from grey water.*

*Phytoremediation is an environmental pollutants clean-up technology using plants. To get higher efficiencies, the appropriate selection of the most efficient vegetation is very important for all phytoremediation applications. Vetiveria Zizanioides commonly called Vetiver.*

***Keywords***- : Phytoremediation,Vetiveria Zizanioides, Water Quality Parameter.

## I. INTRODUCTION

In global vision the problem of environmental pollution is so big facing by every country .it will increase day by day study of pollution from waste water in major topic of research.

The phytoremediation in which the living plants are used or removal or for containment of contaminent in soil, sewges, sludges, surface and ground water.It is low cost, solar energy driven, clean up technology. Phytoremediation is a wide and emerging technology that uses green plants to clean up contaminated environmental media.(i.e water bodies, soil, wetland system).

## II. LITERATURE SURVEY

Literature survey is carried out to familiar with the work done in this area throughout the world. The survey gives ideas about the extent of work to be carried out during project. It generates the clear vision of the work and gives the overall scenario of it. During this survey many new things, concepts, and ideas will emerge which improve the clarity of the topic. Initially material related to the topic are searched out and collected through various sources. Papers from IRJET,IJAERD, IJSER, IJARSE journals, Science direct etc. are collected. The literature is summarized as below.

**Mansoor ali** et al. (2018) studied about heavy metals present in treatment of industrial waste water.A large part of the world has been contaminated by organic and inorganic materials.Accumulation of heavy metals by plants is affected by many factors, variations in plant species, plants growth stage and elements characteristics control absorption, accumulation and traslocation of metals. As a result, metal removal by vegetation can be greatly enhanced by the judicious selection plant species.

**Anu priya james** et al. (2017) studied about phytoremediation process constructing wetland system by using vetiver grass. In this study, main objectives was to study the design, construct, and moniter the performance of a varying load constructed wetland and examine the pollutant removal efficiency in treating the domestic sewage.In this study, it was concluded that vetiver grass is an efficient biological means of primary filtration agent and can be used as a low cost primary filter of water run off in poorer areas where it is not treated and discharged into natural water courses.

**Jefferson** et al. (2004) studied grey water characterisation and its impact on the selection and operation of technologies for urban reuse. In this 0study it revealed that characterisation of grey water is a source of water that is similar in organic strength to a low medium strength municipal sewage in effluent but with physical and biodegradability characteristics similar to a tertiary treated effluent. Grey water was collected from 102 individuals made up of a distribution of ages, gender and washing applications (bath, shower and hand basin). Sample were collected on the day of production (preferably within two hours) either immediately analysed or stored at 5˚C for maximum of 24 hours. Sample stored for longer periods or at higher temperatures was discarded from study. Also observed that total COD concentrations of the same sources of 420 245, 367 246.

**Kushwah** et al. (2011) conducted waste water quality studies of influent and effluent water at municipal waste water treatment plant, Bhopal (India). The study was to determined pH, DO, BOD and turbidity reduction from municipal waste water. In the present study, samples of influent and effluent waste water from Badwai sewage treatment plant (STP) situated at Bhopal, Madhya Pradesh were collected during the year 2010. Physical and chemical parameters were analysed using standard methods. The result with treated water indicate that the waste water treatment plant was efficient in treating waste water. From the experiment it revealed that, the pH values varied from 6.62 to 6.77 in the influent of STP. In investigation period for DO was nil in the influent and 2.4 mg/l to 5.2 mg/l in effluent water. During the period of investigation BOD varied from 198.6 mg/l to 382.4 mg/l in the influent and 30.2 to 102.6 mg/l for effluent water. Turbidity was observed from 116.5 NTU to 248.6 NTU in the influent water and 18.5 NTU to 35.2 NTU in effluent water. This treated water recommended for use of irrigation and gardening.

**Ukpong and Agunwamba** et al.(2012) studied grey water reuse for irrigation. The objective of this study was to design and construct a filter for grey water reuse for irrigation of not less than one hundred household. To achieve this objective, samples were collected from one hundred households within the University of Nigeria, Nsukka campus and its environs. Laboratory tests were conducted on these samples and they revealed the presence of BOD, TSS, nitrate, pH, Coli form etc, whose values varies when compared with that of the parameters for standard irrigation water. From the results obtained a slow sand filter bed for not more than one hundred households was designed and constructed. A filter which was used for filtration consists of a layer of sand or crushed coal supported on a bed of gravel. The sand used in the filter was hard and resistant to chemical attack and free from dirt such as clay or dust. It also examined that the sand should be coarse (0.4-2.0mm), medium (0.3-1.8) or fine (0.25-1.50mm). Also 30 per cent of natural colour in waste water effectively removed by slow sand filter. The filter media was made of two medium which are fine and coarse gravel and with both filling the entire 50cm.

**Nnaji** et al. (2013) studied feasibility of a filtration adsorption grey water treatment system for developing countries. In this study the performance and economic viability of simple inexpensive grey water treatment system consisting of a filtration unit and an adsorption unit was evaluated. At steady state, the overall performance of the combined system was 85.68 per cent BOD removal, 57.09 per cent COD removal and 70.74 per cent TSS removal. Most of the BOD removal 83.6 per cent was achieved in the filtration unit, while most of the faecal coliform removal was achieved in the adsorption chamber. The pH of the entire system remained stable (7.6 0.29) throughout the experiment. The dissolved oxygen concentration of the final effluent was (1.3 0.28), indicating the need for aeration. Problems with carbon particle washout were observed in the adsorption chamber. Generally, the final effluent was found to be suitable for the range of uses such as toilet flushing, irrigation and fire protection. An economic sand filter media used with effective size of d10=0.19, d60=0.55 and Cu=2.89 was laid on the top of the gravel layer. Analysis shown that 77.5 per cent saving in water expenditure can be achieved, if a simple grey water treatment is installed for toilet flushing.

**Bhelose and Salunkhe** (2014) studied effect of various filtration media on grey water. They determined some chemical parameters before and after treatment on grey water such as pH, EC, TDS, potassium, calcium, carbonate and bicarbonate. The results were found as pH varied from 6.14 to 7.23 for treated sample sample and 6.27 for untreated sample, EC varied from 88.58 micromhos/cm to 209.7 micromhos/cm for treated sample and 298 micromhos/cm for untreated sample. TDS varied from 40.96 mg/l to 134.2 mg/l for treated sample and 190.80 mg/l for untreated sample. Values of calcium for treated water varied from 0.8 to 1.2 me/l and 1.3 me/l for untreated sample. Carbonates found were nil. Values of bicarbonate varied from 0.9 to 1.55 me/l for treated sample and for untreated sample it was 1.1 me/l. Also potassium varied from 0.8 to 4.15 mg/l for untreated sample and it was found 6.2 for treated grey water sample.

## III. NEED AND OBJECTIVE OF STUDY

- To find the factor and parameters that enhance plants capacity to uptake more contaminants in its above ground part to develop a successful phytoremedation technology.
- To study about the effect of phytoremediation on soil microbiological activities and nutrient availability.
- To design constructed moniter performance of constructed project model.
- Examine pollutant removal efficiency of grey water.
- Study change in grey water characteristics while treatment to grey water.

(Fig: Formation Of Bed)

## IV. METHODOLOGY

**Introduction**

Greywater is gently used water from bathroom sinks, showers, tubes, and washing machine. It is not water that has come to contact with feces, either from the toilet or from washing diapers. greywater may contain traces of dirt, food, grease, hair and certain household cleaning products.

(Fig: Constructed Model)

**• Collection of grey water:**

Collection of samples from houses within area of Gajanan Colony and Dr.V.V.P. Foundation area. After every 15th days sample will be collected in plastic container.
It contain three step process:

1) Upper Stage-Storage Of Grey Water
2) Middle Stage-Formation Bed
3) Lower Stage- Treated Water

**1) Upper stage :**

Grey water collected from wash basin sink , bathroom etc These grey water is store in pre-determinant storage tank having capacity 50L.

**2) Middle stage :**

Formation of bed:

Sand,aggregate,black cotton soil,coconut shell,activated carbon etc.
different types of bed show in figure.

**3) Lower stage :**

Collection of experimental treated grey water from beds.

## V. CONCLUSION

Under this project at various stages to evaluate water quality and compare evaluated value of grey water with standard limit of Indian standard 10500:2012

The treated water can be directly disposed in to any surface of water body or land as the concentration of the pollutants are below the standard permissible limits of effluent discharge.

## REFERENCES

[1] A.K.Bhat, Tsering Dolkar and M.A. Malik "*Phytoremediation :A plant- Based* Technology"IJCMS7(3):766-777.2018
[2] Andreea-Mihaela Dunca "Water Pollution And Water Quality Assessment Of Major Transboundary Reverse

From Banat(Romania) Journal Of Chemistry".Volume2018Article ID9073763

[3] Alexazdru Amarioarei, Corina Itcus, Mihaela Paun "Phytoremediation Research- How RomaniaIs Placed World wide" National Institute Of Research And Development For Biological Science Volume 22,No.3.2017

[4] K.Shri Laxmi,V. Hema Saileja, M.Anji Reddy. "Phytoremediation :A promising Technique In Waste Water Treatment" IJSRM volume 5,5480-5489.2017

[5] Valipour A., Raman V.K., Young H. " Effecti-Veness Of Domestic Wastewater Treatment Using A Bio-Hedge Water Hyacinth Wetland System".Water. 7, 329.2015.

[6] Delis P.C., Effendi H., Krisanti M., Hariyadi S."Treatment Of Aquaculture Wastewater Using Vetiveria Zizanioides" (Liliopsida, Poaceae). Aacl. 8, 4.2015.

[7] Darajeh N., Idris A., Masoumi H.R.F., Nourani A., Truong P., Sairina. "Modelling Bod And Cod Removal From Palm Oil Mill Secondary Effluent In Floating Wetland By Chrysopogon Zizanioides (L.) Using Response Surface Methodology". J.Environ. Manage. 181, 343.2016.

[8] Singh V., Thakur T., Mandal P. "Removal Of Lead And Chromium From Synthetic Wastewater Using Vetiveria Zizanioides". Article In Clean – Soil Air Water. 42 (9999), 1.2014.

[9] Lasat,M.M.,"Phytoextraction Of Toxic Metal", Journal Of Environmental Quality ,31:109-120.2002

[10] Ma. Y. Rajkumar ,M. And Freitas ,H. , A."Improvement Of Plant Growth And Nickel Uptake By Nickel Resistant –Plant Growth Prmoting Bacteria" . Journal Of Hazardous Material166:1154-1661.2009

[11] Vinita, H.. "Phytoremediation Of Toxic Metals From Soil And Waste Water". Journal Of Environmenral Biology, 28(2):367-376.2007

[12] BIS (Bureau of Indian Standards) "Indian standard for Drinking Water Specification" IS10500:2012

[13] www.mpkv.ac.in/websitedata/deptofmedicinaltree