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Microbiological analysis of waste water for onsite treatment: a review

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ABSTRACT:

This study is about to treat the waste water with the help of natural system. This paper intends to give an overview of microbiological activities present in the waste water. The challenges in the present urban environment due to the rapid development of city as well as villages and the consequent changes in the water quality are creating threat to the human beings and animals. Providing safe environment has increasingly become a tough task for the growing population in our country. The present study to find solutions to the above said problem. Using the above concepts safe natural waste water treatment through proper technological intervention and sustainable water through environment and human intervention can be achieved. The treated water was put to water quality test on physical, chemical and the biological parameters. The periodical test came up with the result that the water from this technology was as much as free from all contaminations. This research also tries to decrease the costing required for treatment of waste water and also to enhance the use of natural material for treatment.

KEYWORDS: Domestic water, Constructed wetlands, Wastewater treatment, Microbiology

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I. INTRODUCTION

This study gives aim to provide a brief but comprehensive overview of various literature from the point of view of low cost and environment friendly treatment of waste water by using natural system with the combination of some conventional units for best results or output. When we see the sources of generation of wastewater, it can be classified in various combinations like residential, commercial, industrial animal waste etc. Constructed wetlands system supporting vegetation, which provide secondary treatment by physical and biological means to effluent from a primary treatment step and may also may be used for tertiary treatment. This may have mainly one purpose which is treating wastewater coming from different resources such as agricultural, domestic, petroleum, aquaculture and seafood processing wastewater. The macro biologic unit operation require small amount of energy in the form of the appropriate ambient temperature, so they can be performed in the natural conditions, cheaply, if the energy used is the free solar energy, and the collector with the smallest losses in the system is the water itself, or water surface.[1] The CWs use microorganisms, plants and soil to treat wastewater. Microorganism is used to convert the dissolved and particulate matter into simple product. Microorganisms also used to remove nitrogen and phosphorous in waste water treatment process.

II. LITERATURE REVIEW

Shrirang vrushali and Chatterjee Kaustav "Sewage treatment & Reuse- A step towards water conservation"[International science journal, volume-1 Issue 2 (2014) This paper aims for the treatment of sewage for various secondary uses. The main objective of this paper is to make a environmentally safe fluid waste stream and waste for reuse. Ranges of COD,BOD,TSS concentrations of sewage from 180-200 mg/l and 150 to 200mg/l respectively is evaluated by the experimentation .Under this paper they told the technology that developed for treatment of sewage. Treatment technology adopted for treatment that is the methodology of this study include: Filtration, Chlorination, Activated Sludge Process. So the results vary encouraging. This treatment system achieves 96.8% BOD 92.5% COD, 95% TSS & 99% Total coliform removal respectively. They carried out lab scale study of that setup to know the efficiency of that plant with the help of parameters like BOD, COD, TSS, pH. MLSS. Also design a Dual media filter of height 90cm & width 20cm media used in that dual media filter is activated carbon. The aim of this research is to treat the sewage and put it to use for various propose they achieved 90.5% & 79.6% reduction of BOD & COD respectively in 96hr.[10]

V. Jayalakshmi and N. Lakshmi "Assessment of Microbiological Parameters of Water and Waste Waters In and Around Vijayawada "[IOSR Journal Of Environmental Science, Toxicology And Food Technology (IOSR-JESTFT) e-ISSN: 2319-2402, p- ISSN: 2319-2 (Mar-Apr. 2014)in this paper microbiological parameters of water and wastewater in and around Vijaywada was studied by considering seven sites namely Selected sites are Krishna river water (site-I), exit canal near Vijayawada thermal power plant(site-II), canal near agricultural fields(site-III), water present in agricultural fields(site-IV), drain water near SIRIS company(site-V), drain water near railway station(site-VI) and drain water near bus stand(site-VII).[1]The selection of microbial examination of water sample they employed heterotrophic plate technique for isolation of microorganism. Detection of salmonella species and vibrio cholera was carried out by enrichment of water sample on selinite F broth & 1% alkaline peptone water for 6-8 hr followed by isolation. This paper also shows the different analysis of bacteria fungi and actinomycete. From bacterial analysis it is clear that number of bacterial colonies varies from season to season and location. Where fungal analysis contains pencillium, fusarium, Rhizopus, Mucor Aspergillus and found in all site that they were studied. The conclusion of this paper is all sites are polluted by various kind of pollutant including dissolved solids & microbial parameters are also in not range according to WHO.

Dong Qing Zhang et al "Applications of constructed wetland for waste water treatment in tropical and subtropical regions (2000-2013)" [Journal of environmental sciences, pg no: 30-46,24 February 2015] The study is carried out on various kind of wetland system that are used to treat the wastewater in tropical and subtropical regions. They concluded that constructed wetland have very high efficiency to treat wastewater especially in tropical region. This research is about various types of wetland like floating treatment wetlands (FTWs), hybrid constructed wetlands, subsurface flow constructed wetlands (SSF CWs), free water surface (FWS) CWs. Also this study shows a comparison of the different types of CWs used to treat the wastewater. In this study, removal of BOD and TSS was very efficient and consistent across all types of treatment wetlands. This paper also highlights the application, practice and research of treatment under tropical and subtropical areas. Removal of COD, BOD, TSS, TN, TP, Nitrate ammonium etc can be effectively done with various types of constructed wetland as mentioned above.

Samar Kamthekar et al "Design and treatment of wastewater (Grey) for two pipe system using wetland STP"[IJESC Volume Issue no 6 DOI 10.40 10/2016.1776]The study is carried out on Mula Mutha and Pavana River flowing though the Pune city and Pimpari Chinchvad industrial are. It is observed that the river water is polluted by various parameters (like COD, BOD, DO, Phosphate etc) and exceeds MPCP limits. There are 13 treatment plant in city which are controlled by

SCADA.[6]They constructed artificial ecosystem to treat sewage which include natural and constructed wetland system to teat domestic and grey water in Pune city.

III. MICROBIOLOGICAL OPERATION

The application of microbiological unit operations is possible under the natural conditions as well as artificial conditions. Natural conditions are cheaply and favorably, because, the energy of the sun is used free of charge, and the collector with the least losses in the system is the water itself or water surface. If we consider artificial condition it is necessary to extend the working season to a longer time interval during a year or to a complete year, with the necessary economic analysis. In the waste water treatment performed by the microbiological methods the microbiological living stations are used. The microbiological living stations are the term for all kind of plants and animals also.

IV. CONSTRUCTED WETLANDS

Constructed wetlands are designed systems to treat wastewater and enhance water quality to be used in many domains. Building constructed wetlands have mainly one purpose which is treating wastewater coming from different resources such as agricultural, domestic, petroleum, aquaculture and seafood processing wastewater. The CWs use microorganisms, plants and soil to treat wastewater. There are many types of wetlands existing for several years and others that are recent or still developing. They mainly serve four functions that are enhancing landscape, wastewater treatment, fish farming and enhancing aesthetics of lands. For some cases constructed wetlands are the main and only wastewater treatment, for others they are only a step within a bigger treatment process. Plants usage in constructed wetlands helps filtrating wastewater and absorbing solids in addition to transferring oxygen. CWs have many advantages such as their god ability to remove pollutants (suspended solids and organic matter). In addition, CWs do not need much energy or maintenance cost and they can be adapted to climate change.[5]

V. METHODOLOGY

Comparison of various conventional systems and natural treatment system. In the consideration of Costing, Limitation, Efficiency, feasibility. After that deciding the microbiological test which is to be carried on the sample. Following test by American Public Health Association will be carried out on the collected sample before and after the treatment.

Table No 1: Different parameters and method

Sr.no	Parameter	Methods	Standard methods by APHA
1	p^H	Electric p^H meter	4500-H

2	Dissolved Oxygen	DO fixation method	4500-O
3	BOD	Alkali azide method , titrimetric method	5210
4	COD	Open reflux method	5220
5	Total dissolved solid	Filtration & Gravimetric method	2540-B
6	Total suspended solid	Filtration & Gravimetric method	2540-D
7	Total Coliform	Multiple tube fermentation method	9221-B
8	Total plate count	Standard plate count (SPC) agar method.	

VI. CONCLUSION

We can conclude that by studding the Biology of waste water, we can decide the treatment required for that water. For primary we carried out literature survey and after analysis we found many microbiological tests. There are various chemicals and biological methods are available for removal of effluent from waste water. As we know chemical methods having some limitations and slightly they affect the water bodies and ecosystem. Biological methods are more suitable than chemical methods. Also biological methods are cost effective and maintain ecosystem conditions.

VII. REFERENCES

1. Application of microbiological methods in the settlement Waste water treatment and exploitation of its energy and Resource potential (Dragan B. Milicevic Veljko Nikolic)
2. Applications of constructed wetland for waste water treatment in tropical and subtropical regions(2000-2013) (Dong Qing Zhang et al)
3. Assessment of Microbiological Parameters of Water and Waste Waters In and Around Vijayawada(V. Jayalakshmi and N. Lakshmi)
4. Constructed wetlands for animal waste water treatment(P.G. Hunt, A. A.Szogi,et al)
5. Design of a constructed wetland for trout wastewater treatment(Supervised by: Dr. Abdelghani El Asli)
6. Samar Kamthekar et al “Design and treatment of wastewater(Grey) for two pipe system using wetland STP”IJES, Volume Issue no 6 DOI 10.40 10/2016.1776
7. Journal of Environmental Management, ,1 October 2017; 201.
8. Metcalf and Eddy, 1981. Wastewater Engineering: Collection and pumping of Wastewater. McGraw Hill Inc., New York.
9. Metcalf and Eddy, 1981. Wastewater Engineering: Collection and pumping of Wastewater. McGraw Hill Inc., New York.
10. Sewage treatment & Reuse- A step towards water conservation (Shrirang vrushali and Chatterjee Kaustav)
11. Wastewater Engineering, treatment and reuse (Metcalf and Eddy)
12. Wastewater Engineering, treatment and reuse (Metcalf and Eddy)

13. Wastewater Treatment ,concepts and design approch(G.L. Karia,R.A.christan)
14. Wastewater treatment. (n.d.). Retrieved October 27, 2017, from http://www.fao.org/docrep/t0551e/t0551e05.htm#3.2 conventional wastewater treatment processes.