

REVIEW ON SMART WATER MANAGEMENT SYSTEM

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ABSTRACT

Water is a key natural resource for human survival and the demand of water is tremendously increasing due to a variety of reasons like population growth, increasing income level, rapid industrial growth etc. Due to all these reasons the pressure on fresh water is increasing across the globe. Increase in water consumption means increase in waste water production and this give the idea of using waste water as a source of water. This waste water on treatment can be used for many beneficial purposes. Household waste water can be divided into two main categories namely black water (water from toilets) and grey water. Grey water is the waste water that originates from bathroom, kitchen, laundry etc. On the other hand, black water is the waste water from toilets and is highly contaminated. It cannot be treated easily. Grey water can be treated easily as it is less contaminated and it is also free from any kind of smell. This paper properly explains that how the grey water can be reused and suggests the most effective way of treatment of it after studying about the previous technologies available for treatment. This paper proposed a new and unique method of treatment for grey water.

KEYWORDS: Waste water, Grey water, Reuse.

Introduction

The demand of water is rapidly increasing due to increase in population, industrialisation and many other reasons. So there is a growing need to save water for the survival of life on earth. According to a survey, the average daily water consumption is about 900 litres per household and only a small percentage of total population understand the importance of water. Due to the increase in water consumption the waste water production also increases. Thus waste water can be used as a source of water after treatment and can be reused for many applications like to increase water availability, flushing, gardening, washing etc. So waste water, if recycled, can become a significant source of water that could potentially reduce the need of freshwater.



Fig. 1 Water Conservation [15]

Grey water i.e. waste water from kitchen, bathroom, laundry etc. contributes about 55-75% of total household waste water. On this basis grey water has good reuse strength as it is free from any kind of excreta and odour. Hence can be collected and treated properly without any difficulty. So greywater management is very useful for clean and healthy living conditions.

First section of this review paper is the introductory part which tells us about the need for recycling of wastewater and the reuse potential of greywater (wastewater from kitchen, laundry etc). Next section is the literature review section which includes all the previous work and contribution of the researchers and scientists to the greywater management. This section completely summarises, describe and clarify the topic. After complete study of these reviews we identify the area in which work is required to be done. In the last section, we finally concluded that treatment using microbial fuel cell can be one of the best method because it not only purifies waste water but also produces electricity.

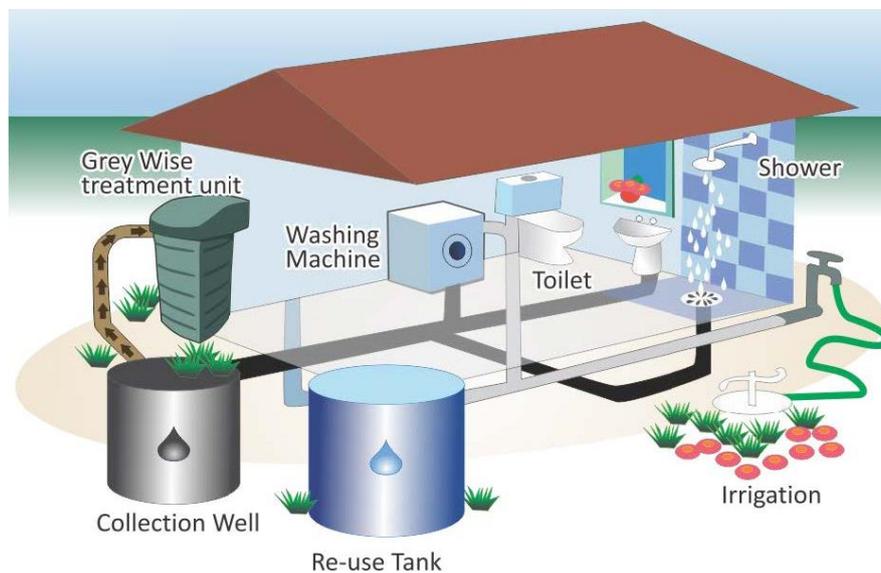


Fig.2 Water Management System [16]

1. Literature Review

Jeetendra Prasad, Ramesh Kumar Tripathi in their review paper “Maximum electricity generation from low cost sediment microbial fuel cell using copper and zinc electrodes” explain about electricity generation with the help of a low cost Microbial fuel cell which is made to provide renewable energy. In this paper, the previous work is compared with recent work in which energy extraction is done using copper as anode and zinc as cathode. Sediment Microbial fuel cell has a property of producing electricity, power generation and the long-term operation of MFCs. This type of microbial fuel cells can be used as a renewable source of energy [1]. Chengshuo Xia, Daxing Zhang, Witold Pedrycz, Yingmin Zhu, Yongxian Guo in their review paper “Models for Microbial Fuel Cells: A critical review” explain about the different type of modelling of MFCs. For the optimization of MFCs, there is a need of recognising an efficient method that is based on researches. Modelling of MFCs helps in understanding the various effects responsible for power generation [2]. Lucy Allen, Juliet Christian-Smith and Meena Palaniappan, in their review paper “The Potential of Grey water Systems to Aid Sustainable Water Management” explain the potential to scale grey water and the use of grey water instead of potable water. Grey water can be used to reduce the demand for fresh water and this also helps in reducing household bills [3]. J.R. Kim, S.H. Jung, J.M. Regan, B.E. Logan in their review paper "Electricity generation and microbial community analysis of alcohol powered microbial fuel cells" explains about the electricity generation from two entirely different setups of microbial fuel cell (MFC) using ethanol and methanol. Electricity generated is possible with the help of ethanol, but the

amount of generated power is dependent on the MFC type. Power cannot be generated using methanol substrate. The factors responsible for no power generation using methanol is the enrichment procedure of the MFC [4]. Prashant Tayde, Chaitanya Shastri, Bhoomi Shah, Nitesh Sankpal, Nitin Asabe, Hansa Jeswani in their review paper “Use of sullage for non-potable purpose” explains about reuse of grey water for non-drinking purposes such as cooling, irrigation ,household purpose to decrease the demand of fresh water. Grey water is a type of waste water from houses that is free from toilet liquid waste. In this method, the treatment of grey water is performed using a simple and cheap technology which is non- biological. In their study, they proposed a system in which process such as coagulation, sedimentation, absorption, filtration are done to treat grey water. After treatment, the grey water can be used for non-potable purpose [5].

2. Outcome of The Review

After studying about various methods of treatment of grey water, we found that there are many limitations in the existing technology like low treatment efficiency, effluent can smell, high treatment cost etc. Also most of the system requires energy to operate and they are costly too. So before designing a grey water treatment system, many different factors must be considered to in mind. So for the treatment of grey water we consider following factors: Costs, Physical and geographical environment, characteristics of greywater, effluent smell etc. Also we focus to generate electricity from the greywater. So we proposed a system that not only treat the water but also generates electricity by using that waste water, thereby producing two increasingly scarce resources. It has smart sensors which prevent the wastage of water and also have security options to capture the image of the person responsible for wastage. The generated electricity can be used to operate household appliances and the treated water can be reused.

3. Conclusions

After studying about so many technologies, we have found that there is no such system which can treat waste water and also produces electricity. Even after so many technologies, it was observed that there exist a large gap of technology and there is a growing need to modify the previous technologies that are available for grey water treatment. So, we found that treatment using Microbial Fuel Cell (MFC) can be one of the best and cheap method because it not only makes the water reusable but also generates electricity. So by using this technique, we can generate two scarce resources that are very useful for existence of life. The biggest advantage of this system is that it does not use any external energy for the treatment in fact it produces energy. The treated water is free from any kind of bad smell. The project, if industrialized will be able to provide electricity to the rural areas and reduces the need for fresh water. Reducing fresh water demand can reduce household water bills and it also protects our nature.

ACKNOWLEDGEMENTS

Our heartfelt gratitude goes to all faculty members of E&C Deptt., who with their encouraging and caring words and most valuable suggestions have contributed, directly or indirectly, in a significant way towards completion of this review paper. Last but not the least we are thankful to the Almighty who gave us the strength and health for completing this review paper. We owe a debt of gratitude to our father and mother for their consistent support, sacrifice, candid views, and meaningful suggestion given to us at different stages of this work.

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Authors Biography

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