

Recycle and Reuse of Water- A Review

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Abstract:

Increasing water demand and decreasing water sources and reservoirs calls for an effective and efficient use of water. The domestic and industrial wastewater can be reused or recycled. Recycling means using the water for the same purpose again. Reuse is the utilization of the wastewater for various applications such as agriculture, sanitation, washing etc. The use of wastewater in agriculture has added advantages such as low fertilizer cost. It is necessary to study the quality of crops

grown on this wastewater. The present review summarizes the studies and research for efficient and economic utilization of water in order to preserve the water sources and reservoirs and also protect ecology from the adverse effect of the contamination due to wastewater disposal.

Keywords:

Wastewater; scarcity; treatment; economy; sources

Introduction

The economical and efficient use of wastewater is very important because of growing population and limited resources of water. The effect of wastewater on the man and environment is also important aspect in this regard [1]. The industrial wastewater contains organic as well as inorganic pollutants [2]. These pollutants have long and short term effects on human beings and aquatic life. The waste water can be treated for metal removal by various methods, both biological and non biological [3, 4]. Effective removal of cadmium and chromium has been reported by adsorption, biological and other advanced separation techniques [5, 6]. Removal of phenol is also possible by using biological as well as nonbiological methods [7, 8, 9]. Methods such as membrane separations are also used effectively for water treatment [10, 11, 12]. Organic matter from wastewater can be removed by using batch and column adsorption as well as biological methods [13, 14]. The treatment of domestic effluent also showed promising results [15]. The challenge to the

human community is to reuse and recycle the wastewater in order to reduce the demand of fresh water. The present review aims at summarizing the studies carried out on this aspect. Various researchers have reported various means for efficient use of industrial and domestic wastewater. The economical and effective use of water is the key to tackle the growing problem of depleting ground water levels and water sources.

Research and Studies on Recycle and Reuse of Water

Haruvy discussed about tackling of decision-making questions regarding the disposal of wastewater from an economic standpoint[16]. According to him the use of wastewater may reduce the cost of fertilizers and irrigation simultaneously. The wastewater, many times contains nutrients required for plant growth and metabolism. He compared various wastewater reclamation and reuse options .He discussed many alternatives such as river disposal, local agricultural reuse of wastewater. According to his study wastewater irrigation saved

considerable cost. Al-Jasser presented a review of policies with respect to wastewater reuse in agricultural irrigation[17]. According to his discussion most of the plant in Riyadh was working as per standards. For agricultural use, he found that standards were too stringent to follow and there was a need to further redefine the standards. Yang et. al. synthesized an optimal water reused network[18].By using this network it was possible to reuse the water to maximum extent and thereby reduce the use of fresh water. Jhansi and Mishra discussed various aspect of water reuse[19]. According to the Water Reuse Association ,reused, recycled, or reclaimed water is water that is used more than one time before it passes back into the natural water cycle. Water can be reused for beneficial purposes such as agricultural and landscape irrigation, industrial processes, toilet flushing, or replenishing a groundwater basin (referred to as groundwater recharge).Because of use of this, wastewater communities becomes less dependent on the groundwater resources and thus help in preserving groundwater levels. As discussed earlier less requirement of fertilizers is added advantage. The reuse aspect plays important role in sanitation policies in developing nations.

Hajjami et.al. discussed wastewater reuse for irrigation in Morocco[20]. Their study was aimed to evaluate potential risk that humans and animals exposed to reused wastewater. According to them, several actions may be made in order to reduce sanitary risk associated to this practice of reusing wastewater. Ruma and Shaikh carried out investigation aimed at examining the status of wastewater reuse in urban farming in Katsina[21]. They found out that the reuse of wastewater in urban farming in the area is an occupation that is practiced as a fulltime work. Some important aspects of water reuse and recycling were discussed by M. Gopalakrishnan[22]. According to his information, 20 million ha in 50 countries are irrigated with raw or partially treated wastewater.10 percent of the irrigated area in the world is irrigated by wastewater. It is very important to safeguard the health of people

who eat produce grown in recycled water and prevent contamination of land.

Vigneswaran and Sundaravadivel discussed recycle and reuse of domestic wastewater[23]. The demand for water has dramatically increased due to technological advancement, population growth, and urbanization. They carried out many case studies related to the reuse of wastewater. According to the study there is enough know how to take the challenge of maximum utilization of wastewater. According to Choukr-Allah the driving forces for the recycling and reused of wastewater includes aspects such as reduction of emission of pollutants and their discharge into receiving water bodies, and the improvement of the quantitative an quantitative status of water, alleviating scarcity by promoting water efficiency, improving conservation, reducing wastage and balancing long term water demand ,reducing the need for chemical fertilizers through treated wastewater reuse[24].

According to Kumar recycling generally means reuse of waste water back in the same cycle where it is generated[25]. Wastewater recycling is important due to many environmental benefits which are public health requirements; environmental requirements; appropriate technology selection; and management system development. He also explored the complex relationship between waste recycling and its impacts. He concluded that recycling was better for the environment. Tsiridis et.al. discussed wastewater reclamation and reuse [26].They evaluated the application of an integrated wastewater management aimed for the protection of water environment as well as for the conservation of water resources of the target areas. The reuse applications include the agricultural and landscape irrigation and the enrichment of the groundwater bodies.

Conclusion

Water scarcity in some major part of the world need to be tackled in order to supply sufficient water for agriculture and drinking purposes

effectively, economically with minimum wastage. Recycling and reuse of water is practiced in many countries. The studies and research carried out in this field revealed that the reuse and recycling is economically profitable compared to disposal of wastewater and use of fresh water for various application. It can be concluded that the increasing need for water for growing domestic and industrial demand can be fulfilled by incorporating recycle and reuse of water and minimizing the requirement of fresh water.

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