Chapter 32
An Environmental and Socio-Cultural Perspective of Textile Dye Pollution in Rivers

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ABSTRACT

With an increasing inclination of the world towards fashion and clothing, textile industries are becoming one of the major contributors. This has led to a simultaneous upsurge of various recalcitrant synthetic dyes. The effluents from textile industries are rich in dyes, which when dumped without treatment into rivers, deteriorate the entire ecosystem. Despite various remedial technologies and governmental regulations in this regard, lack of public attention towards the concern is worsening the situation further. The chapter, therefore, focuses on the current status of the water crisis due to water pollution with special reference to textile dye pollution in rivers. The chapter brings a unique amalgamated approach by aiming to bring in front advanced treatment methods using biotechnology that can help in efficient treatment of dye-rich textile effluents along with a deeper understanding of socio-cultural reforms that will ultimately help in the implementation of these solutions.

DOI: 10.4018/978-1-7998-7356-3.ch032

INTRODUCTION

Water is an essential component of human life. It has a huge economic and social impact on the world-wide economy. Water has been a central area of many policy reforms all across the world due to its role in putting together almost all the requirements of human beings. Even though 71% of the earth surface is covered with water, the distribution of fresh usable water is highly uneven. 96.5% of water is present in oceans and only 2.5% of earth's water is freshwater. Being saline, the larger portion of the earth's water is not suitable for human usage. Apart from this, 68.7% of the freshwater is trapped in glaciers and ice caps, 30.1% is available as groundwater and as little as 1.2% of the fresh water is available on the surface. This 1.2% is further divided into ground ice and permafrost (69%), lakes (20.9%), soil moisture (3.8%), atmospheric water (3%), swamps and marshes (2.6%), and rivers (0.49%) (Guppy & Anderson, 2017). It is quite evident that even though rivers account for a very small proportion of freshwater it is the most utilized freshwater resource by humans. However, the agony is that with rapid industrialization rivers have become the dumping site for toxic industrial wastes making it a source of concern for most of these rivers all across the world. As estimated by WHO, around 10 to 20 million people suffer from water-borne diseases every year due to hazardous chemicals found in water.

Out of many industries, the textile industry has seen a boom in the last decade but the development has a huge cost to the fresh water bodies. The textile industry is known for the use of numerous chemicals; dyes being the prominent ones. This industry consumes a very high quantity of water and in turn, generates gallons of wastewater which ultimately reaches the rivers. This not only deteriorates the river water quality but also destroys the flora and the fauna of the water body. Many parts of the world especially the Asian countries like India, Bangladesh have lost many rivers to these textile industries.

The current chapter, therefore, presents a consolidated global view of industrial wastewater pollution with special reference to the environmental and social cultural dimension of wastewater treatment. The chapter also aims to present the current status of dying fresh water bodies due to the addition of enormous toxic dyes from the textile industries along with the mitigation practices followed for the treatment of such dye-rich effluents. The major objective of the chapter is to point out lacunas in the effluent treatment solutions with both technological and social aspects in the textile industry and therefore to suggest potential by socio-technological solution required for effective implementation of advanced wastewater treatment technologies.

BACKGROUND

Despite being one of the essentialities of human life water has become a grave societal and geopolitical issue. UNO has predicted that by 2035, 40% of the world population will be residing under serious water stress. This has led to the establishment of sustainable goal 6 which is focused on the motto of ensuring availability and sustainable management of water and sanitation for all. However to achieve this goal it is very much necessary that there is a narrow margin view of the freshwater ecosystem and the status of water scarcity associated with constantly growing global industrial wastewater pollution.

The fact that most of our planet is covered by water is a meager mirage. As stated earlier the portion of freshwater which is actually available for human usage is extremely low. With the increasing population, the problem of water scarcity is spreading its roots at a faster pace. The projected population of the world by 2050 will be 9.7 billion. This simultaneously means that the limited freshwater resource will