

Assessment of Water Quality at the Source and Water Distribution System during Dry Season in Kannad City of Maharashtra

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Abstract

A major source of water for cities in the central and western Maharashtra are earthen dams constructed on rivers most of which are non-perennial. During monsoon, rivers and tributaries cause influx of organic matter into the reservoirs, which forms a layer of sludge at the bottom. When water level drops below dead zone particularly during dry season, bottom sludge gets introduced into the system contaminating water being supplied for potable use. In this study, the performance of the municipal water treatment and its distribution system in Kannad city was assessed during May 2019. The parameters were analyzed as per the water quality criteria given by the Central Pollution Control Board, India. The samples were collected from the reservoir, water treatment plant, distribution network and from consumer end. Despite the best efforts by the Municipal Council, the occurrence of reddish worms was frequent during months of March to May, every year. Based on the complete analysis distribution network, various measures are suggested to improve the quality of supplied municipal water and to resolve the recurrent occurrence of reddish worms. The findings can be useful for other townships and cities of Indian subcontinent facing similar issues in the face of depleted freshwater sources especially during summer.

Keywords: *Reddish Worm, Reservoir Water Quality, Water Supply, Reservoir Sedimentation.*

1. Introduction

The increase in the population of India has resulted in the growth of the agricultural and industrial sectors, which has led to increased water demand (Brinda et.al 2015). Persistent droughts have caused water scarcity in many regions. Besides meeting the requisite water demand, supplying good quality of water is also of major concern owing to its direct impact on health of the consumers (Brinda et.al, 2015, Tian et.al 2019, Khan et.al 2013, Havelaar, 2003, Joint Monitoring Program, 2019). Domestic water treatment has proven to be one of the most effective means of reducing the risks to public health (Chadhuri et.al 1990). However, treatment of water at the consumer end may not be effective when the supply water is highly contaminated.

One of the major sources of freshwater in India are the dams built on rivers. sediments carried by the rivers settle at the dams due to reduced velocity (Annandale et.al, 2006). These include both coarse and fine Sediments. The coarse sediments consist of gravel and sand, whereas fine sediments consist of silt and clay (Kondolf et.al, 2014). The coarse sediments settle at the top set slope, and mild slope at the upstream of the reservoir, whereas finer sediments settle near

the dam structure (Kondolf et.al, 2014). Dams with smaller watershed will have more influx of sediments than the dams with large watershed because of the smaller channels (Alemu, 2018). The fine sediments are nutrient-rich and can degrade the quality of water (Kondolf et.al, 2014). One such impact of poor quality of water is the appearance of several hundred species of chironomid midges found worldwide. Different species dominate populations in neighboring lakes, ponds, or streams. Some chironomid species favor water of drinking quality and others prefer sewage treatment ponds and similar habitats that are rich in nutrients. Chironomid midge larvae live at the bottom or on submerged plants and other objects. They feed on plankton algae and decaying matter. Under favorable conditions, midge larvae may number up to several thousand per square meter. Like all dipterans, their life cycle has four life stages: egg, larva, pupa, and adult. Chironomidae generally lay their eggs on weed, floating scum or on the surface of clear stagnant water. They hatch out of their eggs within 5 weeks. These larvae are half inch to an inch in length, swim in undulating motion and are bright red hence called blood worms (Bahlman et al, 1932). Chironomid midge larvae play a highly beneficial role in the aquatic food web as they help to break down organic sediments and serve as fish food. They are

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