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Sludge of water treatment works: Are disposal practices sustainable?

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Sludge of water treatment works remains an inescapable byproduct of the treatment process. Sludge, which is regarded as a waste, is in a particulate or gelatinous form consisting of varying concentrations of microorganisms, organic and suspended matter, coagulants and other chemical elements. The nature of sludge depends on the type of coagulant and other chemicals used for treatment. In a conventional water treatment plant, the main source of sludge is the clarification stage. Some additional sludge may also be generated from the settlement of filter backwash water. Direct discharge of water treatment sludge to water bodies affects water quality and aquatic biota of the receiving water body. The handling and disposal of sludge is a significant challenge for the management of a water treatment facility.

A detailed review of existing legislations demonstrates that water treatment sludge is classified as an industrial waste. Thus, the management and disposal should be carried out in compliance with the relevant environmental regulations and it will be a licensable activity in the near future according to the environmental regulations. The National Water Supply and Drainage Board (NWSDB) is the main water supplier in the country. However, inadequate attention is currently drawn for the treatment of sludge and, therefore, investigations are needed for alternative treatments, reuse techniques and disposal routes for treatment plant generated sludge. This study examined the existing sludge disposal methods of water treatment plants in Sri Lanka in order to identify cost effectiveness and conformity to environmental regulations of the management methods of sludge produced in water treatment plants of the NWSDB.

A questionnaire survey was conducted to obtain the information on characteristics, treatment and disposal of sludge from 35 water treatment plants in Sri Lanka maintained by the NWSDB. Special attention was paid to the capacity, raw water source and quality, water treatment process/method used, chemicals used in the treatment process, especially coagulation, quantity and composition of sludge produced by water treatment plants, methods of handling and treatment of sludge, ultimate sludge disposal method and beneficial uses and cost of sludge treatment and disposal, if available.

According to the results, treatment works associated with rivers or reservoirs generate a higher amount of sludge while most of them use alum as coagulant. Altogether 61 % of the treatment plants directly discharge the sludge into inland surface waters with no treatment while 36 % of the treatment plants use the sludge as fill material or for land filling. It was revealed that sludge from only one treatment plant, namely the Thirukkovil treatment plant, is used for agricultural purpose. Sludge production is an inevitable outcome of potable water treatment and it is evident from the study that sludge is mostly released into the waterways, and no sustainable practises are adopted at present. Investigations are thus needed for developing recycling techniques such as producing burnt bricks, cement blocks for sustainable reuse of sludge.

Keywords: water treatment sludge, disposal methods, sustainable practises, burnt bricks

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