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MODELLING OF MICROFILAMENT ACCUMULATION IN AQUATIC MEDIA CAUSED BY LAUNDRY: A SYSTEM APPROACH

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Abstract

In this study, the accumulation of microfilaments in aquatic systems due to domestic laundry activities in the Thrace Region of Turkey was investigated by adopting the dynamic system modelling approach. The parameters regarding the population of the region, prevalence of washing, filtration, wastewater treatment efficiency and microfilaments discharge were linked and the relationship between them was determined mathematically. Two different scenarios based on technological improvements in fabrics and behavioural laundry changes of the society were produced to examine the microfilament accumulation in the long term with Monte Carlo Sensitivity Analysis. In the 1st scenario, microfilament accumulation was examined when advanced techniques are used in treatment efficiency and filters are located in washing machines, while in the 2nd scenario, filament shedding during washing is limited with the improvements to be made in fabric technology and frequency of washing laundry is decreased by raising awareness of local people on environmental issues. As a result, microfilament accumulation from laundry activities is estimated to reach approximately 500 tonnes by the end of 2035 in the project region. In the 1st scenario, it was seen that the microfilament accumulation varies between 25 and 450 tonnes during the project period. This value changes between 30 and 150 tonnes in the 2nd scenario. The results show that initiatives to prevent pollution at its source (such as increasing fabric technology) are more effective in reducing particles accumulated in aquatic systems in the long run compared to pollution cleaning-up efforts.

Key words: dynamic system modelling, laundry activity, microfilament accumulation, Monte Carlo analysis

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