World Academy of Science, Engineering and Technology
International Journal of Environmental and Ecological Engineering
Vol:18, No:09, 2024

Effect Of Sewage Treatment Plant's Effluent On Early Life Stages Development And Sex Determination Of Brown Trout (Salmo Trutta M. Fario)

Authors : Ning Zhang, Kateřina Grabicová, Pavel Horký, Zuzana Linhartová, Jan Turek, Martin Pšenička, Linan Gao, Roman Grabic, Tomáš Randák

Abstract : Sewage treatment plant (STP) effluent is a significant source of pharmaceuticals and personal care products (PPCPs) in the aquatic environment. Exposure laboratory studies have a limited reporting capacity to capture the complex effect of actual pollution on exposed organisms in the aquatic environment. This study aimed to study the impact of contamination originating from the STP's effluent on early life stages development and sex determination of brown trout (Salmo trutta m. fario) – a native coldwater species with a long period of embryo-larval development – by using special floating egg incubators usually used to support native fish species within fisheries management. Brown trout eggs were placed upstream (the control group) and downstream (the exposure group) of the STP Prachatice situated on the Zivny stream. Up to 72 PPCPs were detected in at least one water sample with higher concentration downstream than upstream. Compared with the control group, the mortality of brown trout in the exposure group was significantly higher; after statistical correction of temperature, the size, growth rate, and metabolic rate of brown trout in the exposure group were significantly lower than those in the control group. After several months of natural growth in the stream, the male-to-female ratio of randomly caught brown trout in the exposure group was 1: 1.9, showing the imbalance of sex ratio. These results suggest that STP effluents can negatively affect the early growth and development of fish in watersheds, and these negative effects may further affect the population density of aquatic organisms and the balance of the whole aquatic ecosystem. The use of floating egg incubators proved to be a promising approach for studying the effect of pollution on the early developmental stages of fish in natural conditions.

Keywords : fish egg incubator, PPCPs, real exposure scenario, STP
Conference Title : ICTWAME 2024 : International Conference on Technologies in Water, Agriculture Microbiology and Ecotoxicology
Conference Location : Rome, Italy
Conference Dates : September 12-13, 2024