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Occurrence and Fate of EDCs in Wastewater and Aquatic Environments in the West Bank of Palestine

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Abstract : The presence of endocrine disrupting compounds (EDCs) in raw sewage and effluents from wastewater treatment plants (WWTPs) has been increasingly studied in the last few decades. Higher risks are said to characterize situations where raw sewage streams are found to be flowing, or where partial and inadequate wastewater treatment exists. Such conditions are prevalent in the West Bank area of Palestine. To our knowledge, no previous data concerning the occurrence and fate of EDCs in the aquatic environment has ever been systematically evaluated in the region. Hence, the main objective of this study was to identify the occurrence and concentrations of major EDCs in raw sewage, wastewater effluents produced by treatment plants and in the receiving environments, including streams and groundwater in the West Bank, Palestine. Water samples were collected and analyzed for four times during the years of 2013 and 2014. Two large-scale conventional activated sludge WWTPs, two wastewater watercourses, one naturally perennial stream, and five groundwater locations close to wastewater sources were sampled and analyzed by GC/MS following EPA methods (525.2). Five EDCs (estriol, estrone, testosterone, bisphenol A, and octylphenol) were detected in trace concentrations (ng/l) in wastewater streams and at inputs to WWTPs. WWTPs were not able to achieve complete removal of all EDCs, and EDCs were still found in the effluents. In this regard, the most significant environmental estrogenic impact was due to estrone concentrations. Nevertheless, no EDCs were detected in groundwater. Yet, in order for effluents to be reused, significant improvement in treatment infrastructure should be a top priority for environmental managers in the region.

Keywords : endocrine disrupting compounds, raw sewage streams, conventional activated sludge WWTPs, WWTPs effluents
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