

WATER AND NITROGEN MASS BALANCE FOR NABLUS-EAST

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Abstract

Analyzing the urban water cycle is crucial for adequate urban water management and pollution control of the natural water cycle. Knowledge about exfiltration from sewer networks is very limited; but the few available studies indicate that exfiltration pollution loads pose un-counted serious threat to groundwater. The research was carried out on Nablus-East with a population of 94,910 inhabitants, to assess the pollution load of wastewater exfiltration from the sewers network and outlets. The investigations were carried out mainly on two catchments; a sub-main small controllable catchment, and a main catchment representing 86% of Nablus-East. The wastewater flows and loads from the two catchments were measured, and water consumption records were obtained as ArcMap software shapefiles. The results revealed that 82.2% of the consumed water ends up in the sewer network. The exfiltration wastewater from the sewer network resembles 12.8% of the consumed water, while 65.2% drains untreated to wadi Al-Sajor through the outlets, and 4.2% ends up in cesspits. The specific water consumption, wastewater production, wastewater exfiltrated from the sewer network and wastewater reaches the outlet are respectively 79.6, 65.4, 10.2 and 55.2 L/c.d. The specific pollution loads exfiltrated from the sewer network are 2.4(g N/c.d), 0.25 (g TP/c.d), 23.5(g CODt/c.d) and 13 (g BOD/c.d). The total nitrogen load of the produced wastewater from Nablus-East is 1.88 (kg N/ha*day), out of which 1.49 (kg N/ha*day) reaches the outlets as a major point source pollution. The remaining 0.39 (kg N/ha*day) routes into exfiltration from sewer network of 0.29 (kg N/ha*day) and in cesspits is 0.10 (kg N/ha*day). The annual urban nitrogen loading of Nablus-East wastewater is 688 (kg N/ha*yr), which is very high due to high population density. Therefore, a wastewater treatment plant should be constructed as a first priority, and the sewers network should be rehabilitated.

Keywords: Sewer network, Municipal Sewage, Exfiltration, Pollution fluxes, Groundwater pollution, urban water cycle, natural water cycle