

Determination of the prevailed effluent disposal methods and their impacts with emphasis on wastewater reuse in agricultural production in Turkey

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An inventory of the urban wastewater treatment plants in Turkey is presented in this study. There are a total of 129 urban wastewater treatment plants (WWTP) in Turkey within 43 cities. According to the 2001 figures of the State Institute of Statistics (SIS) of Turkey, 35% of the total population is served by urban wastewater treatment plants, the figure being in a continuously increasing trend from 20% of the population in 1994. In this study, the surveyed region of Turkey covered the most of Central Anatolia, Southeastern Anatolia and a part of the cities on the Mediterranean and Black Sea coast. According to this distribution, 56 urban WWTPs are investigated in detail, both in terms of their treatment technologies, and especially regarding the reuse of their effluents in agricultural irrigation. According to the results, 6 WWTPs utilize advanced wastewater treatment processes, 37 have some form of biological treatment (activated sludge, trickling filter, stabilization pond systems), and 13 utilize physical treatment (any one or more of screening, grit removal, primary settling or lagoon). When the treated effluent quantities are compared, 13.7% of the urban wastewaters are treated by advanced technologies aiming for organic as well as nutrient removal, 73.5% and 12.8% are treated by biological and physical treatment methods, respectively.

Data from the aforementioned 56 treatment plants revealed that 64 % of them discharge their effluents into streams and rivers of various sizes. Approximately 21 % practice marine disposal (Black Sea or Mediterranean) whereas the rest discharge into drainage and irrigation canals, lakes and reservoirs, and onto the land.

For all the WWTPs studied, quantity and type of reuse was examined. Results indicated that wastewater reuse is accomplished through “direct” and “indirect” irrigation. Direct denotes reuse of effluents directly in agricultural irrigation, whereas “indirect” indicates reuse through a receiving body. Among the studied WWTPs; only a minor portion of the effluents is being used directly whereas the majority of the effluents are reused indirectly. Main examples include Eskisehir WWTP (24,820,000 m³/year) and Gaziantep WWTP (73,000,000 m³/year) where treated wastewater is used to irrigate 50,000 and 80,000 hectares of field, respectively. Some WWTPs indicated no reuse for their discharges; however, the TP effluents discharged to rivers are presumably being indirectly used for irrigational purposes.

Most of the treatment plant effluents meet the discharge standard of Turkey. These do not cause a substantial impact on the receiving body quality. On the other hand, a few of the plants which consist of only physical treatment are observed to cause a great impact on the receiving bodies.

There are no direct records of epidemiological evidence concerning the agricultural use of wastewater in Turkey. Instead, there are statistics on the number of incidents of the waterborne diseases, which may give an idea about the situation. According to these statistics, the occurrences of waterborne diseases have been persistent in certain locations along with some declines and improvements in others. South Eastern Region (GAP) of Turkey appears as the most problematic region having the cities with the incident risk values above the average for Turkey (0.093%).