



WASTEWATER REUSE POTENTIAL IN SANA'A BASIN

By

Abdullah Mohammed Ali Derhem

A Thesis Submitted to the
Faculty of Engineering at Cairo University
in Partial Fulfillment of the
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MASTER OF SCIENCE
in
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Title of Thesis:

Wastewater Reuse Potential in Sana'a Basin

Key Words:

Sana'a Basin; Wastewater Reuse; GIS; Hydraulic Analysis; Economic Analysis

Summary:

Reuse of wastewater in agriculture is considered one of the most recommended alternatives for alleviation of water shortage in Sana'a Basin, Yemen. The results showed that the reuse of wastewater can cover up to 30% of the agriculture demand, and can increase the period of usable groundwater resources from 20 years to 35 years. However, the results of economic analysis for different scenarios of reuse under the proposed cropping pattern showed that it is feasible under gravity conveyance, while the economic return is not attractive under pressurized systems. Government support to implement the reuse options is required for environmental protection and social welfare.

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Nomenclature

BOD	Biological oxygen demand (mg/l)
CLIMWAT	Climatic database to be used in calculation of crop water requirements, irrigation supply and irrigation scheduling for various crops for a range of climatological stations worldwide.
COD	Chemical oxygen demand
EIA	Environmental impact assessment
EPA	US Environmental Protection Agency
FC	Fecal Coliform
TSS	Total Suspended Solids
USAID	U.S. Agency for International Development
WASP	Water Quality Analysis and Simulation Program
WWTP	Wastewater Treatment plant
GIS	Geographic Information System
DPPR	(The third Socio-Economic) Development Plan for Poverty Reduction
ETa	Actual Evapotranspiration
FAO	Food and Agriculture Organization of the United Nations
JICA	Japan International Cooperation Agency
MAI	Ministry of Agriculture and Irrigation
MWE	Ministry of Water and Environment
NWRA	National Water Resources Authority
NWRA-SB	National Water Resources Authority Sana'a Branch
NWSA	National Water and Sanitation Authority
SBWMP	Sana'a Basin Water Management Project
SWSLC	Sana'a Water Supply and Sanitation Local Corporation
WEC	Sana'a University Water and Environment Centre
WHO	World Health Organization
U.S. EPA	United State Environmental Protection Agency