

Waste water production, treatment and agricultural use in Ethiopia: The case of Addis Ababa city

Sisay Teklu

Ministry of Water and Energy

P.O. Box 5744, Addis Ababa, Ethiopia, Email: sisay_teklu@yahoo.com

Wastewater production and treatment

The socio political and industrial corner of Ethiopia, the capital Addis Ababa generates an estimated annual volume of 49Mm³ total wastewater from which about 4Mm³ is industrial wastewater (*Van Rooijen et al., 2009b*). Estimate of wastewater generation is indicated in Table 1.

Addis Ababa has two secondary sewage treatment plants. The first one, called Kality treatment plant, runs under its designed capacity of 7,600 m³/day. The other treatment plant, called Kotebe treatment plant, receives only sludge from vacuum trucks that empty septic tanks, with an estimated annual volume of 85,000 m³ (NEDECO, 2002) as cited by (*Van Rooijen et al., 2009a*).

the poor sewerage system, uses of old technology, low level of awareness on waste management, weak enforcement mechanisms on pollution prevention and control and low level of income of the city dwellers have aggravated the pollution problem and can be considered as the major constraints of wastewater management (Mohammed, 2007).

Table:1 Wastewater production and use in Addis Ababa for 2005

Total wastewater generation (MCM yr ⁻¹)	49
Industrial wastewater (MCM yr ⁻¹)	4
Wastewater use in agriculture (MCM yr ⁻¹)	9
% of total generated	20

Source: Extracted from (Van Rooijen et al. 2009b)

Wastewater use/disposal

Since the 1940s, a variety of vegetables have been produced within and around the city, mainly using water from the Akaki River. The irrigation is carried out informally by smallholders without conventional irrigation infrastructure. In most cases farmers take advantage of gravity by blocking waterways upstream and allowing a proportion of the water to flow through temporary channels into a larger system of furrows. In the sub-basins

of Awash Addis Ababa catchments there are more than nine perennial river tributaries, which drain to main Akaki River. Irrigated urban agriculture with wastewater mainly from Akaki catchments in and around Addis Ababa is estimated to be 1240 ha (*Van Rooijen et al., 2009b*).

The major vegetable crop grown in the schemes are lettuce, Swiss chard, carrot, kale, cabbage, potato, zikuni (cucumber), cauliflower, beans, tomato, pepper and onion. About 85% improved vegetable seeds are supplied by Agricultural Input Services Corporations (AISCO) the remaining 15% seed bulk is grown and supplied by farmers themselves (Bekele et.al.). They provide about 60% of the vegetables on the cities' vegetable markets, which provides their main source of household income (Weldesilassie 2008) as cited by (Van Rooijen et al., 2009b).

Policies and institutional set-up for waste water management

The management of water supply and sewage disposal is the responsibility of the Addis Ababa Water Supply and Sewerage Authority (AAWSSA). It operates with two wastewater treatment plants namely Kality and Kotebe and a centralized sewerage system. The sewer line is connected to Kality treatment plant and sludge is transported to Kotebe treatment plant using vacuum trucks that empty septic tanks. The treatment involves circulation of sewer in various ponds for about 30 days in order to make the level of BOD fall below 5 mg/L (Mohammed, 2007).

Ministry of Water and Energy (MoWE), Ministry of Health (MoH) and Environmental Protection Authority (EPA) are mainly responsible for quality control and regulatory aspects of pollution protection of water bodies. Ministry of Agriculture (MoA) and the Urban Agriculture Department under the Addis Ababa City Administration are responsible for provision of agricultural extension services for peri-urban agriculture.

The irrigation practices around the Akaki peri-urban areas use untreated wastewater. Therefore, guidelines for the safe use of wastewater are not implemented. Moreover, there is no published policy for urban agriculture and no clear urban agriculture extension and marketing approach to meet the demands of the urban community, both producers and consumers (Edwards, 2010).

Research /practice on different aspects of wastewater

Several researches have been carried out concerning wastewater irrigation in Ethiopia. For almost all of the researches and studies, the study area is the capital Addis Ababa and the Akaki River. The wastewater irrigation practices in Akaki River have got the attention of researchers due to its high economic benefit and adverse effects on farmers, public health, and the environment. The theme of the researches mainly focuses on Practices, economic

benefits and health impacts of wastewater irrigation. Some of the researches are listed below.

- Urban growth, wastewater production and use in irrigated agriculture: a comparative study of Accra, Addis Ababa and Hyderabad (2009).
(Daniel J. Van Rooijen & Trent W. Biggs & Ian Smout & Pay Drechse)
- The Economic Value of Improved Wastewater Irrigation: A Contingent Valuation Study in Addis Ababa, Ethiopia (2009).
(Alebel B. Weldesilassie, Oliver Frör, Eline Boelee, & Stephan Dabbert),
- Wastewater use in crop production in peri-urban areas of Addis Ababa: impacts on health in farm households (2010).
(Alebel b. Weldesilassie, Eline Boelee, Pay Drechsel & Stephan Dabbert)
- Understanding the situation of wastewater irrigation in community based irrigation schemes: The case of Akaki catchment, Ethiopia (2011)
M.Sc. Thesis by Tadesse Animaw Sinshaw , Wageningen University

Status and need for the knowledge and skills on the safe use of wastewater

Despite the great importance of the Addis Ababa peri-urban informal agriculture as food source for the urban community and as income generation means for the poor dwellers, it is subject to numerous constraints and is causing high health risks. Some of the main constraints are lack of policy and strategy on the safe use of wastewater in agriculture, insufficient access to non-contaminated or clean water, health problems resulting from the usage of contaminated and polluted water, poor water use efficiency, and lack of skilled technicians for promoting and training urban agriculture skills. Accordingly, the following knowledge or capacity is needed in order to make the informal traditional schemes efficient and safe.

- Capacity need on policy and strategy aspects
- Capacity need wastewater treatment and non treatment options for use in agriculture
- Health risk assessment, health protection measures and monitoring system
- Water use efficiency and crop production aspects

References:

- Asfaw F. 2007. Modeling on Akaki Rivers Liquid Waste Disposal and Base flow Separation. *A thesis presented to the school of graduate studies of AAU in the partial fulfillment for the Degree of Master's of Science in Environmental Science*
- Bekele T, Taddese G, Peden D. Community Based Traditional Irrigation Schemes Performance: A Case Study of Upper Awash River Basin of Addis Ababa Sub-Catchments
- Edwards, Sue (ed.), 2010. Ethiopian Environment Review No. 1. Forum for Environment, Addis Ababa.
- Ethiopian Water Resources Management Policy, 1999. Ministry of Water Resources, the Federal Democratic Republic of Ethiopia
- Ethiopian Water Sector strategy, 2001. Ministry of Water Resources, the Federal Democratic Republic of Ethiopia
- Mohammed A. 2007. Environmental analysis of a hydrologic system: the case of tinishu Akaki River, western Addis Ababa, Ethiopia. *As partial fulfillment for the degree of Master of Science in geo environmental systems analysis*
- Tadesse G, Peden D, McCornick P. Extent and significant use of low quality water in agriculture: The case of Addis Ababa Catchments the upland of the Awash Basin.
- Van Rooijen DJ, Tadesse G. 2009a. Urban sanitation and wastewater treatment in Addis Ababa in the Awash Basin, Ethiopia. *34th WEDC international conference, Addis Ababa, Ethiopia,*
- Van Rooijen DJ, Biggs TW, Smout I, Drechsel P. 2009b. Urban growth, wastewater production and use in irrigated agriculture: a comparative study of Accra, Addis Ababa and Hyderabad.