

Title: Capacity development project on safe water use in agriculture in Tanzania

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1.0. Waste water production and treatment (estimated volumes; and treatment methods)

Waste water production and treatment in Tanzania can be categorized into three main groups: domestic, municipal and industrial. However, wastewater production per capita in Tanzania varies with the amount of tap water available and therefore consumed. In many places, high cost-low density areas and beach hotels tend to have high water consumption and thus high wastewater production per capita, whereas areas of informal settlements and low cost high density settlements which are not serviced with running water or do not get constant supply of running water, tend to have low wastewater production per capita. The estimated volume of wastewater generated from the population using septic tanks and sewerage systems in Tanzania are $18.17 \times 10^6 \text{ m}^3/\text{yr}$ and $28.87 \times 10^6 \text{ m}^3/\text{yr}$ respectively, while the volume of industrial waste water is $683,717 \text{ m}^3/\text{day}$ (UNEP - Municipal Wastewater Management in the Western Indian Ocean Region: An overview assessment, 2009).

The most commonly used sanitary facility in Tanzania is the traditional pit latrine (99%), followed by central sewer (12%), and septic tank (10%). The data for the regional analysis also shows that 10% of the population in the region has no facilities and practice open defecation (UNEP - Municipal Wastewater Management in the Western Indian Ocean Region: An overview assessment, 2009). Stabilization ponds are also common in Tanzania and were introduced due to the favourable tropical climate and the availability of natural wetlands. They are reported to operate in the municipalities of Morogoro, Dodoma, Iringa, Arusha and Songea and in the cities of Dar es Salaam and Mwanza. Wastewater samples are collected from these wastewater treatment plants.

2.0. Waste water use and disposal

The infrastructures used for wastewater treatment in Tanzania include conventional (activated sludge systems, etc) and non-conventional (waste stabilization ponds) systems. In Tanzania, nine sets of waste stabilization ponds have been installed having a total area of 23.2 hectares and an overall volume of $304,376 \text{ m}^3$ for wastewater collected from part of Dar es Salaam city (Mgana, 2003). Most of industries in Tanzania lack infrastructures for adequate industrial wastewater collection and treatment and thus discharge untreated or partially treated wastewater into surface water bodies such as rivers and the ocean. The estimated flow rate from the industries located in Dar es Salaam is $689,666 \text{ m}^3/\text{day}$ (Mohammed et al, 2005). For example in Dar es Salaam, Msimbazi River receives untreated or partially treated wastewater from several industries and hence it is heavily polluted.

In Tanzania, waste water is used in a number of ways including agricultural activities. Wastewater is recognized as a resource, particularly in water-scarce areas as it is free or has only a low cost, is reliable in time and close to urban markets. In addition to direct benefits to farmers who would

otherwise have little or no water for irrigation, wastewater improves soil fertility and reduces water contamination downstream. For irrigation use, wastewater should be subject to primary and secondary treatment, but in poor countries like Tanzania this is often not the case and raw sewage is sometimes applied. Disadvantages and risks related to use of insufficiently treated wastewater concern the exposure of irrigation workers and food consumers to bacterial, amoebic, viral and nematode parasites as well as organic, chemical and heavy metal contaminants. Given water scarcity and the relatively high cost of obtaining potable freshwater for municipal uses, the use of treated wastewater in the urban context is projected to increase in the future.

3.0. Policies and institutional set up for waste water management

The Tanzanian political commitment for addressing management waste water problems is expressed through the existence of respective policy and legal frameworks. Both the Environmental Management Act (2004) and the Public Health Act (2009) and the related regulation are used as enforcement tools to provide the mechanisms of removing the burden from the public. Urban Water and Sanitation Authorities are responsible for the collection, conveyance and treatment of waste water. However the Vice President's Office – Division of Environment; Ministry of Health and Social Welfare; National Environment Management Council; and Prime Minister's Office – Regional Administration and Local Government; are responsible for the formulation and enforcement of legislations and guidelines.

4.0. Research/ practice on different aspects of waste water

There has been very little investments on research in Tanzania to enable choose appropriate technologies for wastewater management especially in industries. The country is mainly using the onsite sanitation solutions which have proved very appropriate where water conservation and pollution prevention issues are concerned. Research on the use of waste water in agriculture in Tanzania is even more limited. The government is thus now encouraging more research on sustainable wastewater treatment technologies that can be supported by the economy.

5.0. Status and need for the knowledge and skills on the safe use of waste water

The current knowledge and skills on the use of waste water in agriculture in Tanzania is limited. This is aggregated by the fact that most treatment options/ technologies are not efficient enough to ensure the safety of waste water. The obvious reason that public authorities have not embraced wastewater use is its potential negative public health impact and the lack of adequate knowledge and skills to handle it as it may contain pathogens (bacteria, viruses and protozoa) and helminthes that cause gastro-intestinal problems and other illnesses in humans.

Tanzania has no guidelines or standards for the use of waste water in agriculture despite the fact that the World Health Organisation (WHO) has recognized both the potential and risk of untreated wastewater use and so has developed guidelines for policy makers attempting to legislate permission for the safe use of wastewater (Mara and Cairncross, 1992). The guidelines stipulate that two parameters, fecal coliforms and intestinal nematodes be used to assess the microbiological quality of water. While the WHO standards are somewhat flexible, the capability of Tanzania to attain them is limited by cost, knowledge and skills.