Wastewater Production, Treatment, and Use in KENYA

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Water quality guidelines for irrigation in Kenya

GUIDLINES STARDARDS FOR WATER IRRIGATION

PARAMETER	PERMISSIBLE LEVEL
PH	6.5-8.5
ALUMINIUM	5(mg/L)
ARSENIC	0.1(mg/L)
BORON	0.1(mg/L)
CADMIUM	0.5(mg/L)
CHLORIDE	0.01(mg/L)
CHROMIUM	1.5(mg/L)
COBALT	0.1(mg/L)
COPPER	0.05(mg/L)
E.coli	NIL/100ml
FLUORIDE	1.0(mg/L)
IRON	1(mg/L)
LEAD	5(mg/L)
SELENIUM	0.19(mg/L)
SODIUM ABSORPTION RATIO (SAR)	6(mg/L)
TOTAL RESOLVED SOLIDS	1200(mg/L)
ZINC	2(mg/L)

Wastewater production and treatment

- Kenya generates a lot of wastewater from industries, households, etc.
- Wastewater reuse has not been adopted, neither recognized by the existing guidelines/laws
- The country is a chronically water scarce and has one of the world's lowest water replenishment rates per capita (World bank, 2009)
- Given the low national average rainfall of 400mm, the government should encourage efforts to harvest, store and re-use wastewater .

Wastewater use and/or disposal

- Wastewater use is illegal, restricted and limited due to lack of a policy and recognition by the existing legislations e.g Water Quality Regulations 2006
- The poor urban population continue to use untreated wastewater for irrigation purposes for generate income and sustain household food requirements
- They mainly grow maize, sugarcane, fodder crops (napier grass), vegetables (kales, spinach and indigenous African leafy vegetables such as amaranth and black nightshade) (Githuku, 2009).
- Rely heavily on the conventional treatment plants, which are not adequate (most cities are unsewered), non-functional due to technical hitches and/or lack of O &M, or totally lacking due to costs and capital investments.
- For instance, 50% of the wastewater generated in Nairobi ends up in the treatment facilities while the rest is used for cultivation of over 720 ha using raw sewage (Githuku, 2009)

Regulations and implementation of guidelines

- Kenya's National Environmental Management Authority (NEMA) has set out guidelines on irrigation water quality and quality requirement for discharge into the environment
- Schedules 3, 8, 9 and 10 of the NEMA water quality standards give the quality standards for water to be discharged into the environment or to be used for irrigation or recreational purposes (Government of Kenya, 2006)
- Studies have shown that the quality of waste water in Nairobi generally falls within the NEMA guidelines.
- Githuku (2009), for example, analysed the quality of wastewater in Nairobi and found the levels of nitrates (100 mg/l) and TDS (630 mg/l) falling within the acceptable NEMA standards. Similarly, cadmium (0 mg/l) and chlorides (47.7 mg/l) were also with the acceptable limits.
- However, the levels of BOD and Coliform bacteria in the raw sewage were higher than NEMA limits
- Treated waste water in Kenya can contribute greatly in ameliorating the low availability of irrigation and potable water in the country

Challenges

- ***Fragmented*** and outdated ***legal*** and regulatory frameworks: Agriculture Act Cap 318, Water Act 2002, EMCA 1999 etc resulting into low enforcement and conflicting sectoral mandates. There is no policy
- Weak ***institutions*** mandated with wastewater management: facility-based conventional treatment systems
- ***Financial***: treatment systems are capital intensive, costing millions of shillings and often require EIA/SEA during planning and implementation stages. Therefore not affordable to most local authorities charged with this mandate
- ***Technical*** capacity/skills: treatment plants/systems require localized hands-on-training as O & M activities need to be carried out regularly

Government's approach to wastewater management

- Mostly use Conventional treatment systems and approaches to wastewater management
- An EIA is required for a facility-based treatment plant/system and this is often the Conventional Wastewater Treatment Systems (CWTS) inform of wastewater stabilization ponds (WSPs)/oxidation ponds and septic tanks,
- Little effort has been geared towards embracing other technologies of managing wastewater

Possible solutions

- Develop and implement a wastewater reuse policy with guidelines for the maximum allowable levels of pesticides, herbicides, and heavy metals in wastewater to be used in irrigation
- Encourage eco-friendly and cost-effective technologies for managing wastewater for different uses
- Mount awareness and build capacity towards wastewater management for reuse
- Sensitize local communities to de-construct the underlying myths and perceptions regarding wastewater reuse for agriculture aimed at improving food security in the plight of climate change
- Adopt low-cost (waste)water efficient irrigation infrastructure eg Rice Intensification System (RIS)