# Co-composting of Faecal Sludge and Municipal Organic Waste for Urban and Peri-urban Agriculture in Kumasi, Ghana

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## 1.Introduction

- **Alarming increase in global population associated with rapid urbanization**
- **This is a major challenge to urban planning with regard to environmental protection, waste management and urban food security**
- **Challenge is greater in developing countries**

## The case of Kumasi, Ghana…

- **Second largest city in Ghana. Population is 1.12 million**

***Solid Waste generation***

- **Average SW generation is 850 tons/day**
- **Solid waste is collected by the private sector.**
- **Two main collection methods: House-to-house and Communal Container Collection systems are employed.**
- **The House-to-house collection service covers about 1,500 houses in selected communities out of 45,000 houses in the metropolis**
- **The Communal Collection System is through skips located at transfer stations, shared, by few houses within the community. There are 124 transfer stations spread over the city**

## Kumasi …*Sanitation*

- About 38% of residents use public toilets for which they pay between ¢20 and ¢100 per visit
- 26% use household water closet facilities
- 12% of the population use bucket latrine system
- 8% rely on sewerage
- 10% use pit latrines and
- the bush provides for the rest of the population.
- **Average FS generation from on-site sanitation systems is 500 cubic meter/day**

## Kumasi…Waste disposal

- No proper disposal mechanism in Kumasi
- Waste are deposited on bare soil and water bodies without adequate treatment
- The Kumasi Metropolitan Assembly started in June, to construct the first engineered sanitary landfill

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## Urban Agriculture in Kumasi

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## Urban Agriculture…

- Decline in soil fertility – nutrients, OM
- Subsidy on fertilizer withdrawn
- Farmers search for alternative – compost, untreated poultry manure

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- Scramble for untreated manure produces undesirable effect:
  - Reduced yield and quality of produce
  - E.coli on leafy vegetables
- Need to provide a safe and rich source of nutrient.
- It is expected that co-composting of organic SW and FS could prolong the life span of landfill, and supply nutrients as well as organic matter into the soil

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## 2. Co-composting Project:

## Objectives

- To gain scientific and technical knowledge on the options of co-composting SW and FS
- to have at hand strategies that will ensure its sustainability for the benefit of city authorities and farmers.
- Specifically, the project:
  - Studies the technical and operational aspects of co-composting
  - Assesses the agronomic and socio-economic aspects of co-composting
  - Enhances human capacity for co-composting

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## Institutions involved:

- IWMI
- SANDEC/EAWAG
- KMA/WMD
- KNUST – Researchers and M.Sc Students

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## 3. Project Evaluation

**Specific Obj. 1: Technical and Operational Aspects**

- **Construction of a pilot co-composting plant located at the feacal sludge (FS) treatment plant of KMA**
- **The plant has been operated since February to monitor components of the co-composting process:**
  - **Pretreatment/dewatering of FS in sludge drying beds**
  - **Composting of dewatered FS with sorted SW to produce mature compost**

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### 3.1 Sludge pretreatment

- **Objective: to have appropriate recommendations for design and operation of a faecal sludge pre-treatment system for co—composting**
- **Activities: sludge loading, mixing, frequent sampling and analysis of: solids, organic loading, N, pH and pathogens to test efficiency of drying beds**

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**Progress so far:**

**In the earlier cycles, within 2 weeks, the sludge depth on the beds reduces from 20cm to 3cm equivalent to solid concentration from about 3.2% to 20%**

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**In the current loading, the beds are covered during rains to prevent prolonged drying**

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**3.2 Wastewater management:** monitoring of the quality and quantity of wastewater to know appropriate management system

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### 3.3 Composting

**Objective:** ***to test different SW : FS mixing ratios to know the optimum that will allow a well functioning composting process and produce rich/hygienic compost***

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**Activities:**

- Sorting of SW
- Characterisation of initial materials
- Weighing and heaping
- Turning and watering of heaps
- Daily measurement of heap temperature
- Weekly sampling for analysis of C, N, pH, moisture and pathogens
- Observations for colour change, odour, presence of insects, etc
- Quality assessment of final product
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**Next steps: Feasibility of compost use through field trials with selected vegetables**

- Alternative fertiliser
- Soil modifier
- Water use efficiency
- Phytopathology

- Evaluation of cost and benefits of processing and utilization of co-compost

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**Conclusions**

- Monitoring of co-composting process is going on
- Sludge pretreatment takes longer time than expected so slows down composting process
- Dewatered sludge contributes little nitrogen and microorganisms to the SW/FS mixture
- Field trials with mature compost will start this month

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- THANK YOU