

# MATERIAL CYCLES IN ECOLOGICALLY SUSTAINABLE SANITATION: THE ACCRA EXPERIENCE, GHANA

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Creek heavily polluted with human excreta and refuse (Nsawam - Ghana)

## Introduction

Sanitary sewer installations were already developed by the ancient Mesopotamians and Romans, but only in the era of European urbanisation from around 1870 onwards has sewerage sanitation become a widely accepted solution for removing liquid waste from houses and cities. Today, with growing human population and increasing pressure on freshwater and nutrient resources, this human waste disposal system is no longer able to meet pressing global needs. Ecological sanitation is a new approach to handling raw materials that have so far been perceived merely as municipal waste. The concept emphasises resource recovery by keeping wastes with different properties apart, treating contaminated effluents and promoting hygienically safe agricultural use.



Dry urinals



Urine collection tanks

## Objective

At Valley View University (VVU), Accra, Ghana, types and quantities of organic material generated on campus, and present modes of disposal are assessed. This information is used to identify appropriate collection, transport, storage and field application technologies that ease handling and enhance the agricultural value of the collected materials. Use of the materials to improve the organic matter and nutrient situation of soils, as well as the potential to enhance crop yields are investigated.

## Approach

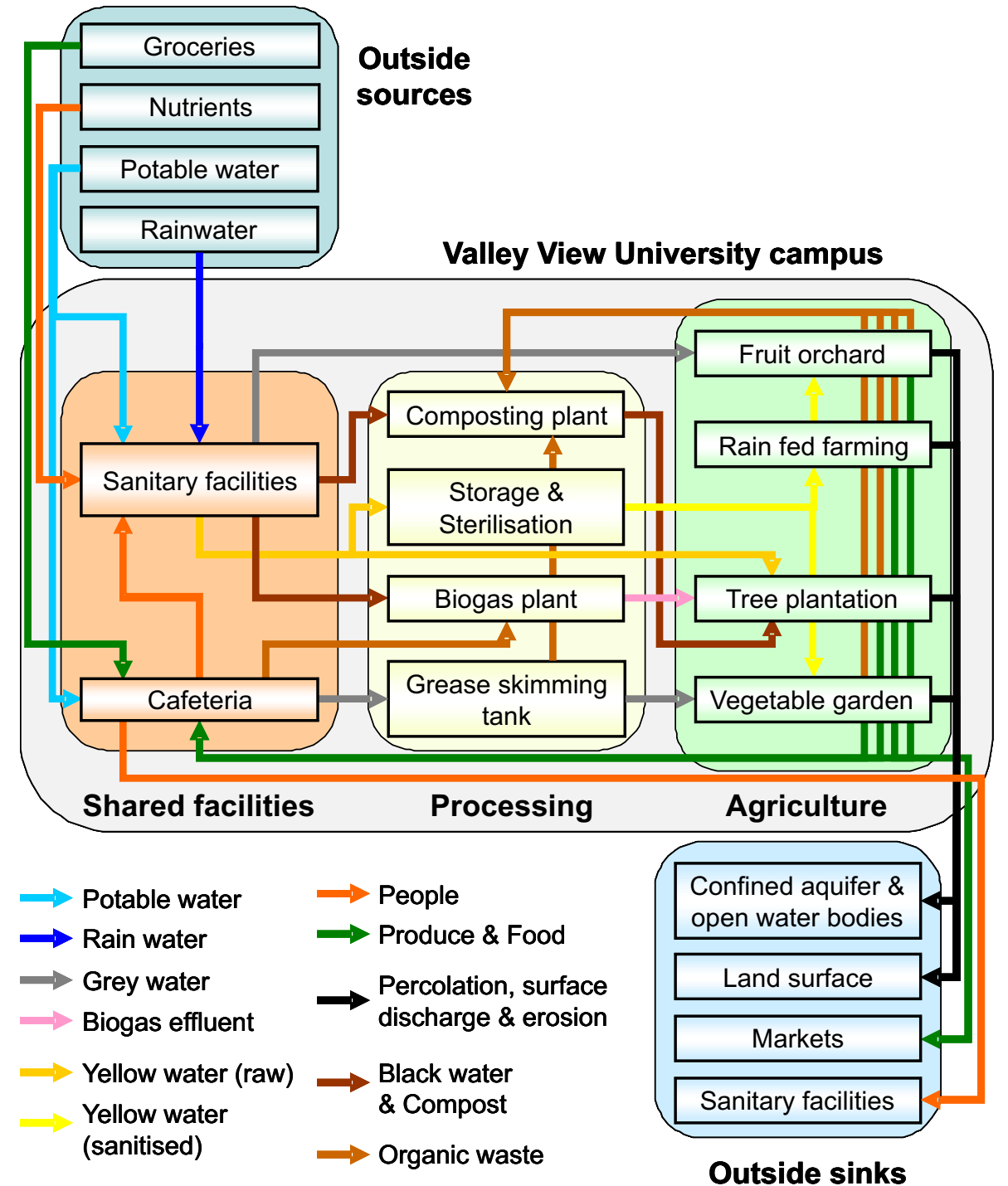
Dry urinals and water-saving separation toilets, which allow convenient recovery of nutrients, have been installed along with storage capacities. Organic waste products, e.g. pure urine, urine-water mixture and grey water from student hostels and kitchen are applied in field trials where sorghum, papaya, cashew and mango are grown. Co-composted faecal sludge from septic tanks and scum from the kitchen's fat separator are utilised as soil conditioners. The materials applied are monitored with respect to nutrient contents, hygienic safety and the risk of soil contamination with micro-pollutants (e.g. pharmaceuticals). Along with the study of technical feasibility, acceptance of the implemented systems by farmers and consumers is continuously examined.

## Preliminary results

Results of ongoing research show nutrient supply from urine to enhance crop growth to a degree comparable to mineral fertilisers. Despite semi-arid climate, grey water irrigation facilitates cultivation of water-demanding species without further nutrient supply. Questionnaire investigations revealed no fundamental objections based on religion, culture or health considerations. Requests by non-governmental organisations for technology transfer underline the existence of an actual demand for ecological sanitation to use nutrients and organic components contained in excrements.



Rain fed trial - right urine treatment



V.V.U. nutrient and water flow chart



Greywater irrigated plantain



Farmer interview