

## From the toilet to the fields – Nutrient recycling in Botswana

As the world's population increases, the need for fertilizers is also increases. However there is also a demand of finding sustainable fertilizers that does not deplete the natural resources. A possible alternative meeting these criteria is sewage sludge, a cheap and nutrient-rich by-product from the treatment of wastewater. However, the content of hazardous compounds in the sludge must be within acceptable limits in order to meet the requirements for fertilization.

Sewage sludge reflects the society, meaning that it can contain organic matter, nutrients, but also hazardous contents like heavy metals and micropollutants. Organic matter and nutrients are important components for plant growth and therefore a demand for a fertilizer product.

Heavy metals on the other hand can in too high concentrations be harmful both for human health and the environment. Studies have also shown that heavy metals contained in fertilizers (both conventional and sewage sludge) that are spread on agricultural fields tend to accumulate in plants and further to animals and humans.

To eliminate the hazardous compounds in sewage sludge, source tracking can be used – A method to track and reduce hazardous compounds at the source. This is thus a way to prevent that hazardous compounds are even discharged to the sewer network.



Glen Valley Wastewater Treatment plant, GWWTP, receives wastewater from Gaborone city and surrounding areas. The incoming wastewater to the plant originates both from households and industries.



This master thesis investigates the fertilizer potential in sludge from GWWTP and to suggest possible improvements to increase the quality.

Sludge is sampled from five different stages along the plant and the result shows that the fertilizer potential differs for the different sludge sampled. The results was only based on one sampling occasion, which was not enough to determine the fertilizer potential, but there is however indications of too high heavy metal contents and improvements must be made in order to higher the sludge quality.