PhD Open Days

Irrigation with treated wastewater and heavy metal contamination in vegetables in Tete city, Mozambique

ENVIRONMENTAL ENGINEER

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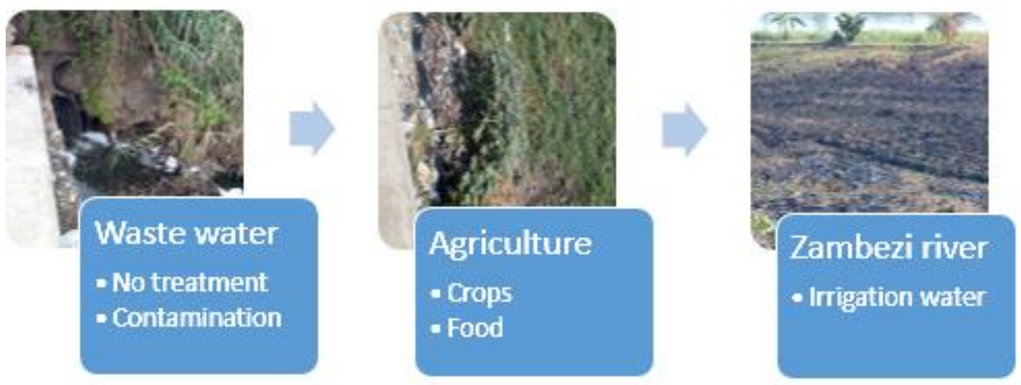
Introduction

One of the threats to food quality and safety in peri-urban areas in developing countries is the presence of heavy metals in the waters used for irrigation of horticultural crops. In Mozambique there is no maximum levels for metal concentration in water, soil or food. In the city of Tete, near the Zambezi River, all urban and industrial effluents are discharged the river, without any previous treatment. Water from the river is currently used for irrigation of crops.

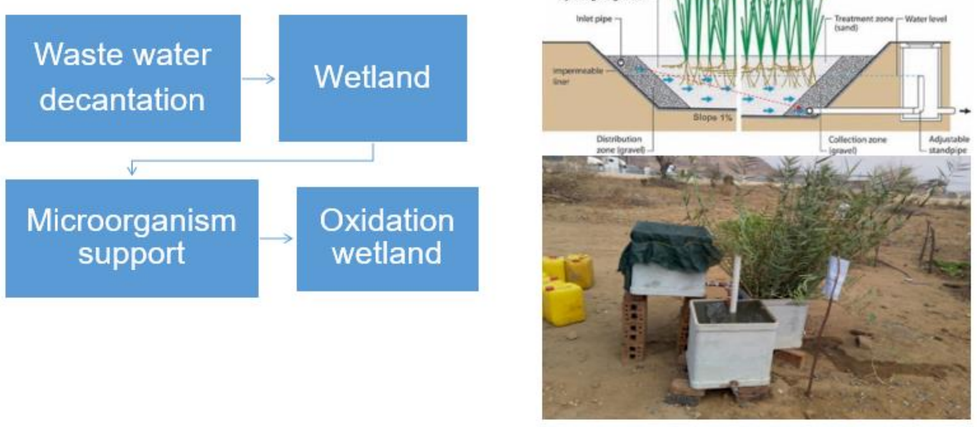
The objective of this study is to detect and compare the concentration of heavy metals in crops irrigated with river water and with waste water treated by constructed wetlands.

Crop irrigation and drying at 65-70ºC.

Problem



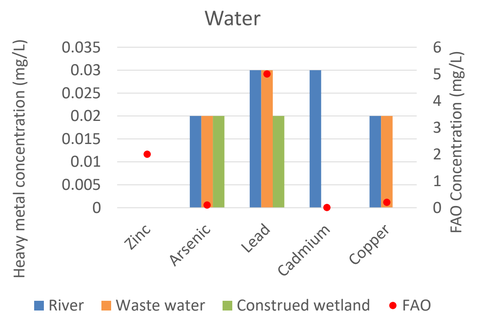
Methodology

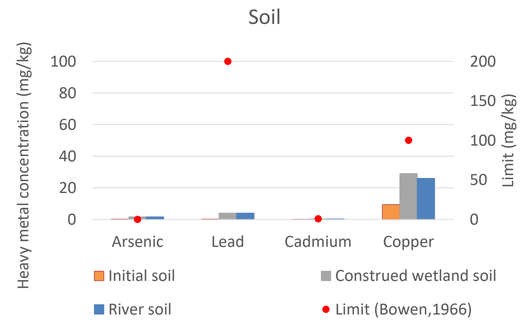


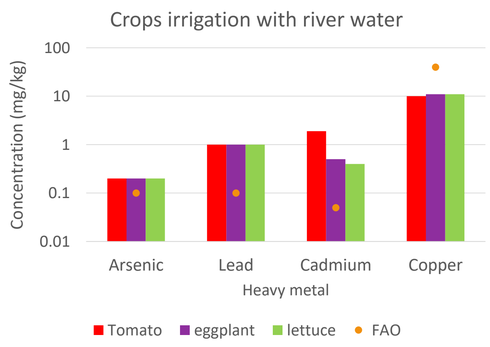
The experimental work was done in the regional administration of the watershed of the Zambezi river (ARA-Zambezi) in Tete-Mozambique. A pilot constructed wetland was monitored from June to December 2018. The system was batch fed with wastewater from the local sewage system filtered with a coarse mesh and treated water was reused for irrigation of lettuce, tomato and eggplant crops. A parallel set of crops was irrigated with water from the river.

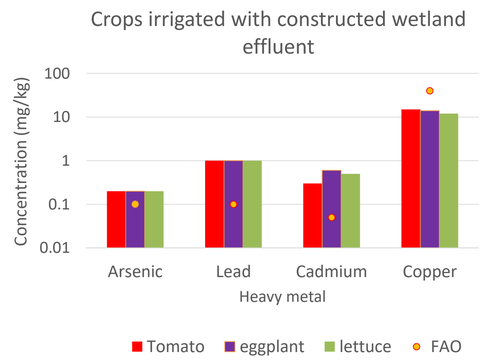
Results

Water, soil and crops were tested for Zinc, Arsenic, Lead, Cadmium and Copper (at the beginning and at the end of the experiment) and total produce crops amount









Crops	Lettuce (kg)	Tomato (kg)	Eggplant (kg)
Irrigated with river water	2	1.80	3
Irrigated with construed wetland water treated	4	3	3

Water from the river and raw wastewater revealed similar concentrations of heavy metals. Constructed wetlands seemed to reduced the levels of Lead, Cadmium and Copper. The levels of heavy metals were similar in crops irrigated with river water and treated wastewater, but crop yield was higher in tomato and lettuce crops irrigated with treated wastewater.

Constructed wetlands can be an appropriate low-cost wastewater treatment technology in the case study area, with benefits in crop irrigation.

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PhD in ENVIRONMENTAL ENGINEERING

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