

Promoting Resource- Oriented Sanitation in Peri-urban Ethiopia through the Production of Struvite from Digested Sludge Filtrate Process

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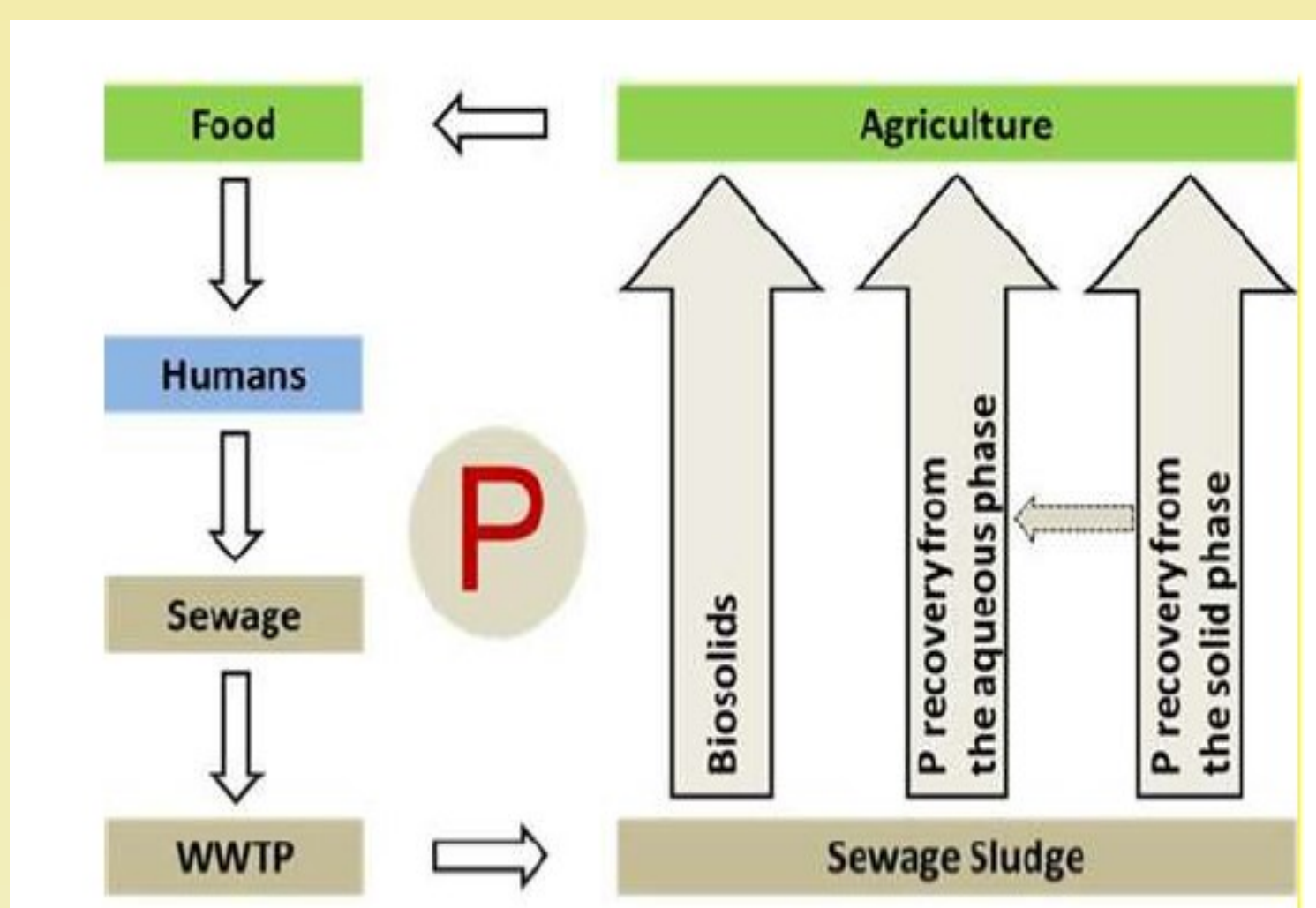
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Background

- In the domestic wastewater community, phosphorus and nitrogen are pollutants that require proper removal prevent eutrophication.
- Domestic sewage offers a great potential for the recovery of phosphorus and Nitrogen, thereby closing the food-waste cycle

Project Motivation

- To an average farmer, Phosphorus and Nitrogen are essential for the healthy abundant growth of crops.
- Development of WWTPs to recover nutrients used for agricultural applications such as struvite fertilizer.



Research is required to look for the optimal strategy or combined strategies efficient in providing us recovery of nutrients with minimum risk of contaminants

The three approaches to close for P recovery (after Kabbe, 2013)



Usage of sludge water for phosphorus recovery in the form of struvite (MAP) and its potential application in urban agriculture

Methods

- Study site survey and documentation of the WWTPs
- Physico-chemical analysis of the wastewater in different fractions



One of the condominium sites where MBR is applied for treatment of the wastewater



Membrane bioreactor (MBR) technology design deployed in the two condo sites at Kara Kore area

Capacity = 400 and 1000 cubic meter per day (Lot 1 and 2 respectively)



The MBR system - primary screening (left) and pre-aeration (right)

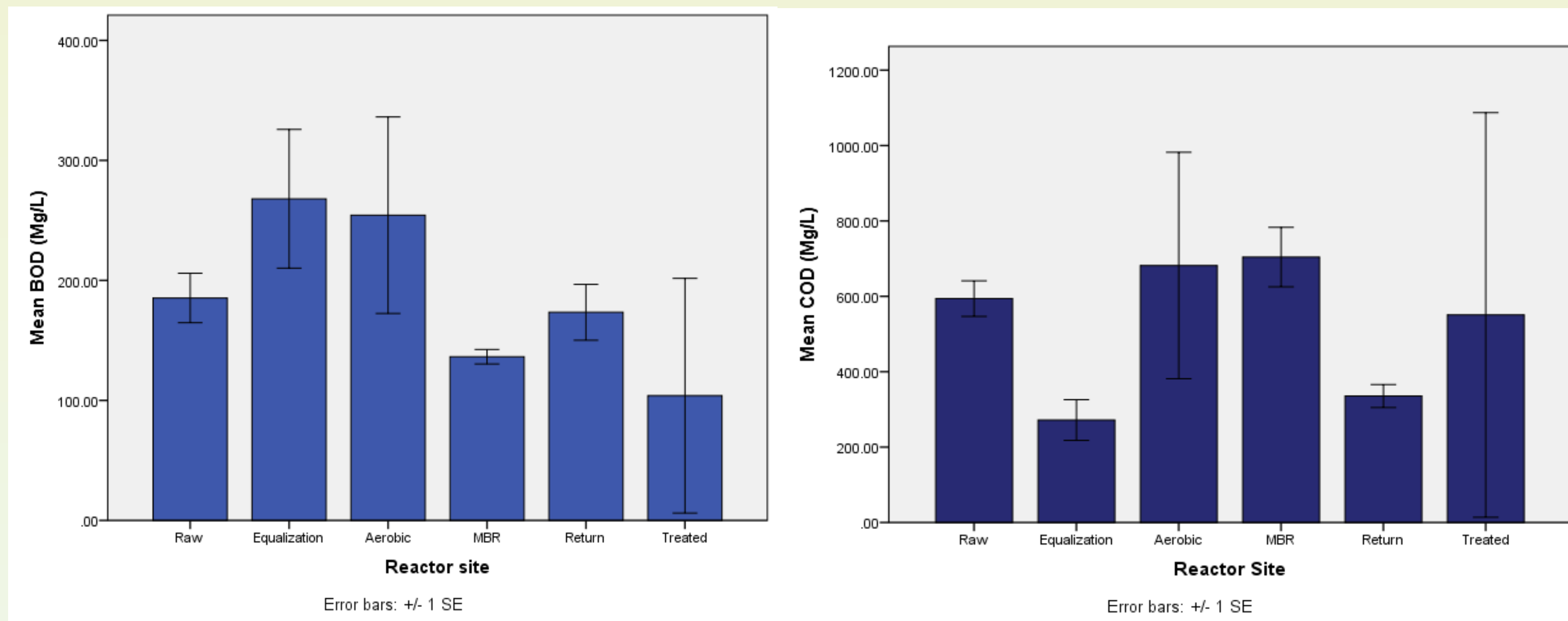


Treated effluent (left) sampling for physico-chemical analysis, onsite pH and TDS measurement (right)

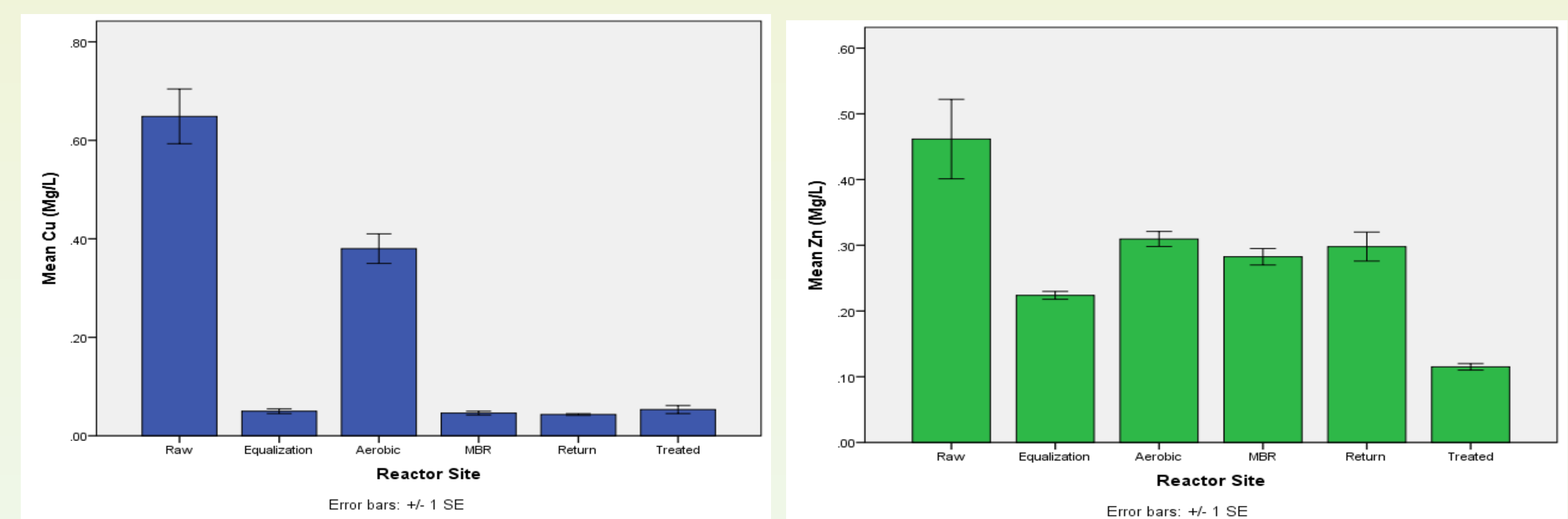


Results

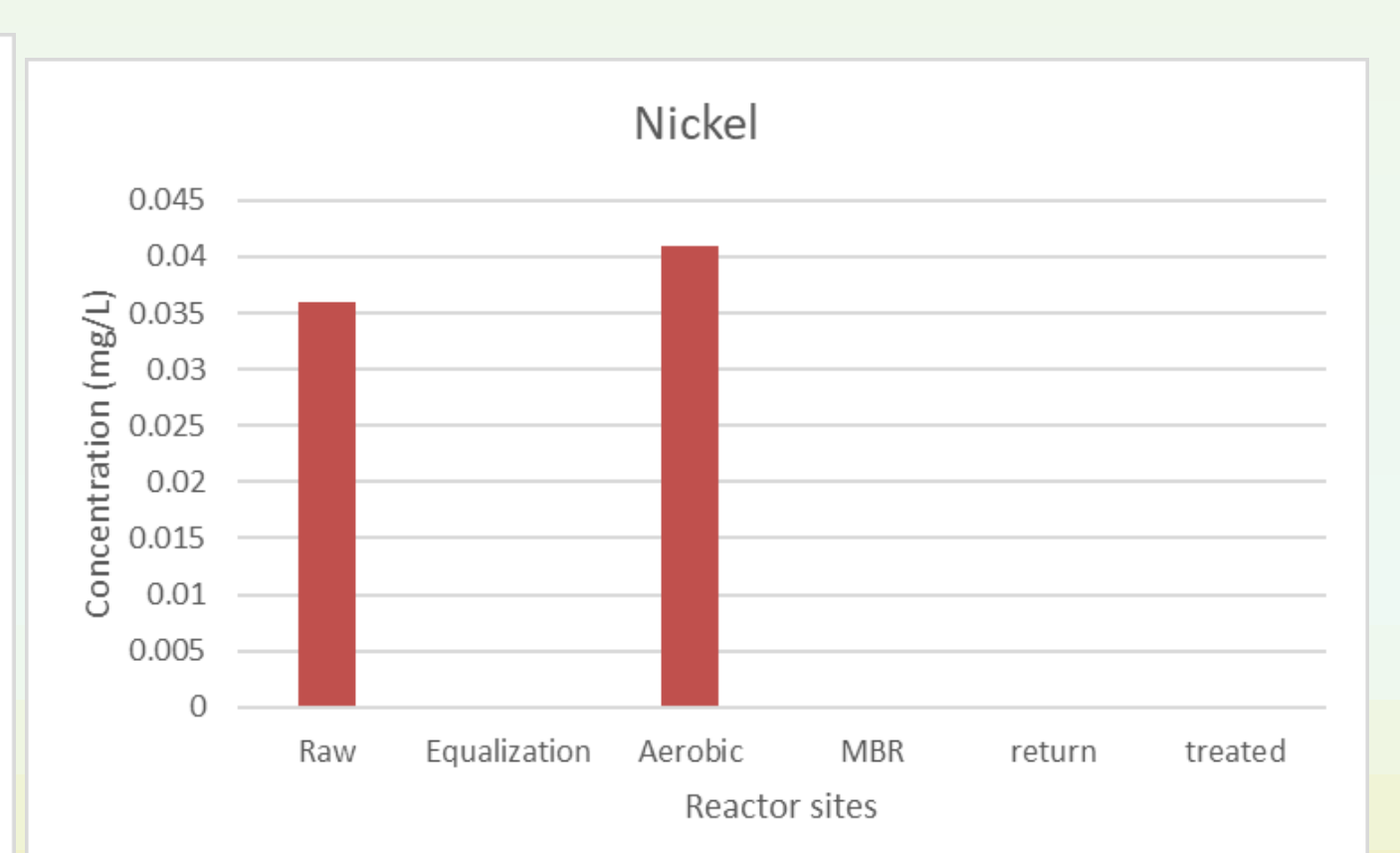
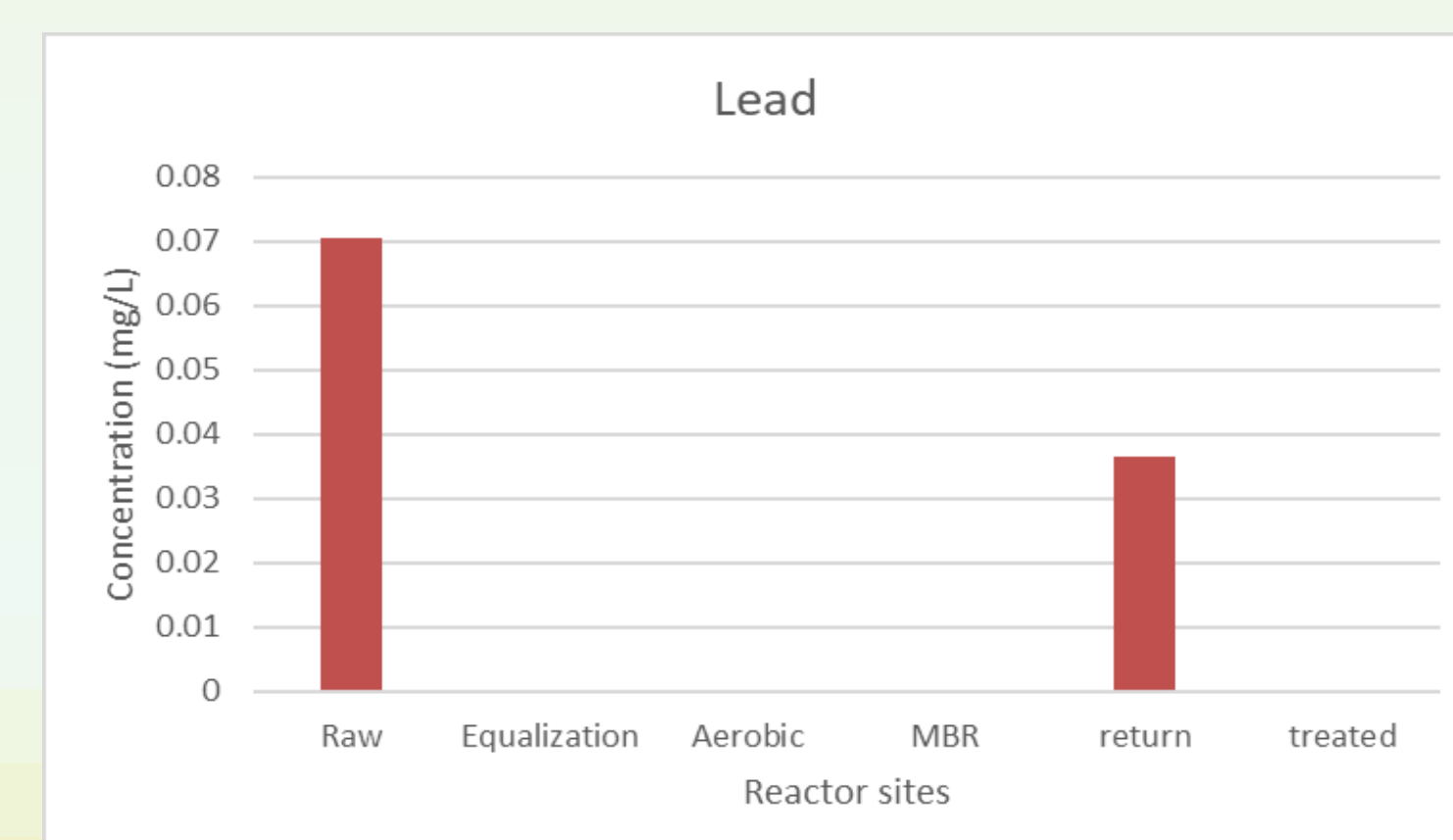
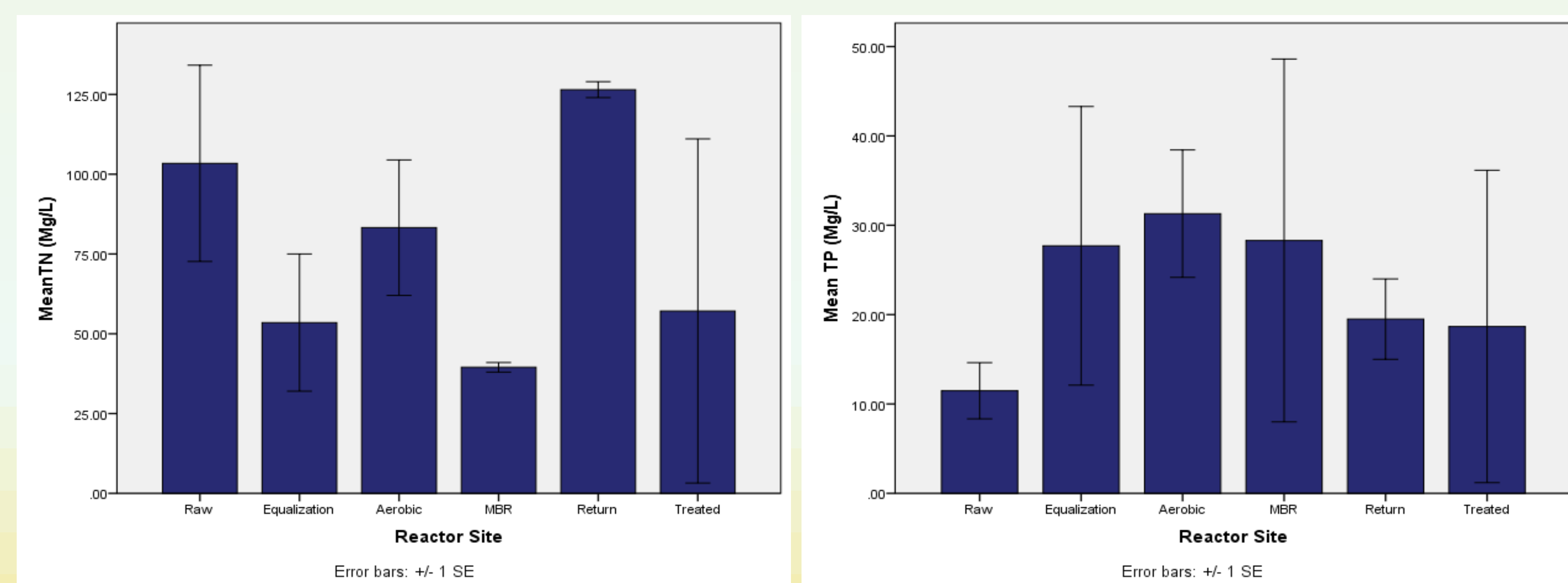
- The influent domestic wastewater from Kara Kore condo contains an average BOD and COD of 172 ± 24 and 600 ± 11 mg/l, respectively



- The Detected heavy metals in the influent domestic wastewater include (in mg/l) Cu 0.64 ± 0.06 , Cr 0.7 ± 0.04 , Zn 0.47 ± 0.06 , Pb 0.07 and Ni 0.04



- Total Nitrogen, and total Phosphorus levels are beyond the permitted emission levels in the effluents



Preliminary Conclusion and recommendation

- The removal efficiency Nitrogen and Phosphorus remains to be lower than the expected performance during design – this paves an opportunity for recovery of these nutrients via struvite production
- The effect of heavy metals in the struvite production process and its safe application should be evaluated