



Potential for Phosphorus Recovery from Sydney's Wastewater

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1. Importance of the recovery of phosphorous and nitrogen:

- Phosphorus and nitrogen are non- renewable
- Unlimited use can make phosphorus and nitrogen a limiting factor

These looming constraints make the recovery and re-use of these nutrients an economic as well as an environmental necessity.

3. Technologies of phosphorus and nitrogen recovery:

- physico-chemical processes such as ion-exchange coupled with membrane bio-reactor (MBR)
- The ion-exchange method offers a number of advantages including the ability to handle shock loadings and operate over a wider range of temperatures.

2. Phosphorus recovery for Sydney basin:

- Sydney imports around 391 tonnes of phosphorus in form of fertilizers and other gardening products every year.

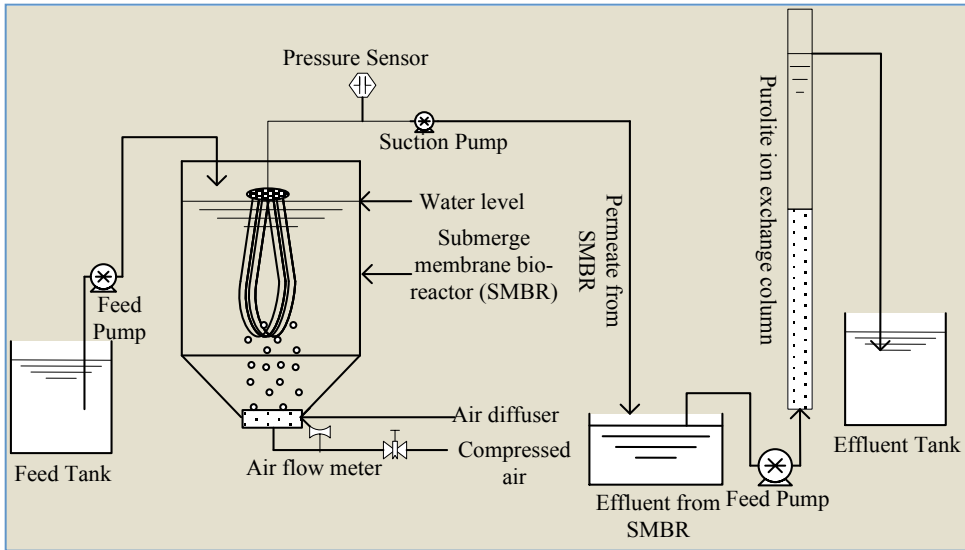
➤ Annually 3454 tonnes of phosphorus is sent down the sewerage system to Sydney's sewage treatment plants which can be recovered to use as fertilizer

4. In this study, we used

- a **high rate MBR** (HRT of 4h) to remove mainly the **organic carbon** followed by
- an **ion-exchange process** to recover almost all the nitrogen and phosphorus

7. Recovery of nutrients and regeneration of purolite ion exchange

NaCl solution of 1M can recover almost 95-96% of adsorbed NO_3^- and PO_4^{3-} from the ion exchange (within 5min)



5. The removal efficiency of $\text{PO}_4\text{-P}$ and $\text{NO}_3\text{-N}$ were almost 93-98% and 94-95% respectively

6. A comparative study made with nano-filter (NTR 729HF Polyvinylalcohol/polyamides) showed

- only 65% removal of phosphate and
- the removal of nitrate was negligible (less than 50%).

8. Economical benefit

A mass balance calculation shows that about 68 kg of NO_3^- and 24 kg of PO_4^{3-} could be recovered on a daily basis from a typical wastewater treatment plant handling 10,000m³/day. It is assumed that the MBR effluent contains 9.0 mg/L of NO_3^- and 3.2 mg/L of PO_4^{3-} .