Master thesis proposal:
Is a circular economy for phosphorus possible in Sweden?

Phosphorus in commercial fertilisers used in agriculture originate from limited mineral reserves. Eventually, extraction will be very costly, and the lower quality reserves that will be employed in the future will contain more cadmium. Further, the large flows of phosphorus in society are currently threatening earth system functioning according to researchers behind the planetary boundaries concept. What if we could plan for local circulation of phosphorus flows so that we could avoid both the depletion of mineral reserves and eutrophication of waters? Is such a situation possible for Sweden?

The proposed master thesis project is related to on-going research at the Division of Environmental Systems Analysis, for example the on-going projects “Improved life cycle assessment modelling of fertilisers – the case of sewage sludge” and “Sustainable Management of Phosphorus in Baltic countries”, and the upcoming “Phosphorus recovery for fertilizers from dairy processing waste”. The student will be working in close collaboration with researchers involved in those projects. The project aims at making a material flow analysis of phosphorus for Sweden and, based on that, evaluating if a circular economy for phosphorus would be possible. This includes looking into the plant availability of different potential phosphorus sources and the practicality of closing loops for some flows. The project will answer questions like:

- Is there enough phosphorus in different flows to support Swedish needs if new mineral phosphorus inputs are removed?
- Are these flows useful in practice in terms of amount, form, location etcetera?
- Would any particular technologies be needed to treat or change these flows to make circulation possible?
- Should the system be redesigned in other ways to allow for a circular economy?
- What are remaining knowledge gaps?
- What stakeholders need to do what to achieve a circular economy for phosphorus in Sweden?

The suggested project is to be conducted by a student with a large interest in environmental systems analysis and who is interested in cooperating with researchers in an ongoing academic research project. The student should have completed a sufficient amount of coursework in environmental systems analysis at master level, e.g. a course on life cycle assessment. The thesis work will be performed at the division of Environmental Systems Analysis at Chalmers, Campus Johanneberg, during spring 2019.

Are you interested? If so, do not hesitate to contact us!

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