

## ABSTRACT

The aim of this thesis is to discuss and analyse the influence of data uncertainties with regard to the reliability of material flow analysis (MFA) studies. MFA, as a part of environmental systems analysis, is a method belonging to the research field of industrial ecology and more specifically industrial metabolism. As such, the method strives at giving a holistic view of the complex world we live in, in order to reduce negative environmental impact. Among other things, MFA studies have been proposed to be useful for priority setting and following up in municipalities.

Serving as a starting point is a local case study of flows of nitrogen in a Swedish municipality, Västerås. The case study has been performed using the ComBox-model. The years studied are 1995 and 1998. The main sectors in society emitting nitrogen to water were identified as the agricultural and household sectors. The dominating sectors emitting nitrogen to air were identified as the agricultural, transport and infrastructure sectors.

As a basis for discussing data uncertainties qualitatively and quantitatively a literature survey was performed. 50 articles and books were identified as in some way or another dealing with data uncertainties in MFA. The literature survey showed that the uncertainties for results from a MFA study might vary between  $\pm 30\%$  and a factor 10 depending on what kind of parameter is investigated. Only one method was found that dealt with data uncertainties in MFA in a complete way; a model developed by Hedbrant and Sörme (HS model).

When applying the HS model to the case study of nitrogen flows in Västerås, it was found that when uncertainty intervals were calculated the possible conclusions changed. Of the two pair of flows compared in relation to priority setting, none of the earlier conclusions remained. Of the three flows analysed in relation to following up, only the flow from one point source supported the same conclusion when uncertainty was considered.

In all, it is concluded that data uncertainties in MFA analysis are an important aspect and that further research is needed in order to improve input data quality estimations and frameworks for determining, calculating and presenting data, data uncertainties and results from MFA studies. However, the underlying reality remains, e.g. that management of material flows are important for understanding and reducing the negative environmental impact. Thus, MFA is one useful tool in this work.

**Keywords:** data uncertainties, sensitivity analysis, Material flow analysis, MFA, method to determine data uncertainties, case study, ComBox model, nitrogen flows.