

CHAPTER 5

CONCLUSION

This study represents a preliminary investigation which has identified some of the important substance flows in the SLC. More research is needed to investigate flows in detail and further research needs to be done to develop the model.

5.1 The balance and flows of P and Cd in the agricultural soil of SLC

The P and Cd cycles in the SLC are influenced primarily by agricultural activities. It can thus be concluded that long-term application of phosphate fertilizer is the main contribution (over 90%) to P and Cd stocks in agricultural soils. This finding agrees with similar results which have been reported from several countries. Care should be taken and/or an application rate limit should be imposed when applying fertilizers which contain high Cd concentration.

Estimates cannot be made for precisely how long P and Cd have been accumulating in soil, or for the annual rate of accumulation, which is presumed to be increasing even though soil erosion is known to be the major outflow component. Loss of each substance via soil erosion, reckoned to be the largest emission pathway, is a key parameter in simulation of the balance of P and Cd in agricultural soil. This is because the volume and concentration of emissions depend on the levels of P and Cd present in the soil.

Higher proportions of these substances in drainage water may result from higher fertilizer application rates. The large emission flows of P and Cd could be the reason for low accumulation of these substances in soil. The small stockpiles of P and Cd reflect a near balance between inputs and outputs. It should also be noted that pH could affect the release of soil P and Cd. Soil P and Cd contents would decrease and emissions increase when the soil pH drops.

Inhabitants in Songkhla and HatYai Nakhon Municipalities generate around 58,000 m³ of wastewater per day. The P and Cd contents are typically halved after treatment; therefore approximately 16 t P/y and 0.06 t Cd/y are drained into natural watercourses and subsequently to the Songkhla Lake.

Despite their relatively small areas, landfills are the most concentrated waste storage points. The contents of landfills therefore represent extreme hot spots for groundwater contamination. Nonetheless, landfills should be regarded as spots which can slowly disperse P and Cd into the environment, in contrast to the rapid runoff from agricultural soil, and as a precautionary measure they should be monitored.

5.2 Recommendations

- 5.2.1 P and Cd are currently accumulating in the SLC and therefore controls should be imposed on their use. Appropriate management techniques should reduce P and Cd losses to water, which is a necessary step if their input to soil is to be controlled. The overall goal of reducing P and Cd losses from agriculture to surface water should aim to control application of these substances in manure and fertilizer so that they do not exceed crop demands.
- 5.2.2 This study demonstrates how the SFA approach can be applied to construct a conceptual model. The results are only valid at the order of magnitude level. To obtain more realistic figures, further investigations are required into each product and process displayed in the flow paths identified through the study.
- 5.2.3 Thus far, only a handful of the measurements required to satisfactorily describe the substance balances in the SLC have been taken. Further research should look into areas where no data is available, for example on the amounts of P and Cd leaching out of soils and on the net content of consumer products (i.e., fertilizer 16-20-0 grade which is among the most commonly used in SLC) also MSW in landfills.