

Changes in land management and nitrogen balance at different scales in the Weiße Elster river basin, Germany

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ABSTRACT

Sound river basin and environmental management depend on accurate data for land use and management. To date, the appropriate sources of agricultural land management data for different planning levels have not been determined. Hence, our study investigated the use of three different information sources of land management: (i) statistical data, (ii) postal surveys, and (iii) interviews. For different aggregation levels, comprising (i) district/community level, (ii and iii) farm level, a detailed analysis was conducted to identify the information about land management and its impact on the nitrogen balance. Land management data are used as the basis for calculation of nutrient balances. Therefore, the analysis included the use of the nutrient balance model REPRO (reproduction of the soil organic matter) on the small scale for the years 1999–2003. The benefits and limitations of the three information sources were assessed using the example of the “Weiße Elster” river basin in Central Germany. Statistical data are suitable for an overview and first classification, but information about fertilizer application is not available. Postal surveys are suitable for the generation of questionnaires that give specific information about the topic. However, although the low rate of return gives information on land management distribution, it does not provide area-wide information. Interviews are appropriate for smaller areas, and there is a higher response than compared to postal surveys, however interviews are very time consuming. We detected remarkable changes in land management due to the structural changes in the agricultural sector since German unification in 1990. The three different information sources all showed that there has been a marked decrease of livestock densities and land management intensity since German unification. The high resolution data for the “Parthe” sub-basin of the “Weiße Elster” river basin showed that nitrogen balances are significantly influenced by the weather conditions: both very dry and wet conditions led to lower crop yields, and consequently to higher nitrogen balances.

Keywords: EU Water Framework Directive (WFD); Land management; Nitrogen balance; River basin; REPRO model; Weiße Elster

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