

Environmental and economic effects of regulating phosphorus use and losses from the agricultural sector – an empiric study

Line Block Hansen¹, Berit Hasler¹ and Lars Gårn Hansen²

¹University of Aarhus, Institute of Environmental Science, Frederiksborgvej 399, DK-4000 Roskilde

²University of Copenhagen, Institute of Food and Resource Economics, Rolighedsvej 25, DK-1958 Frederiksberg

Abstract:

In an earlier paper (Hansen & Hansen, forthcoming); we analyzed the farmers profit function coupled to the phosphorus system in agricultural soils. This implies that the farmer include phosphorus in feed in his profit function and implicitly phosphorus in manure. In addition is the stock of phosphorus accumulated in the agricultural soil over time included in the social welfare function due to the different loss ways which releases phosphorus to the water ecosystem. Phosphorus can be lost directly to the water ecosystem when it is applied through chemical fertilizer or manure. Or it can be lost through soil erosion or surface run-off which both depends on the phosphorus stock capacity in the soil. The model is dynamic because the phosphorus stock changes over time which means that there is a time lag between phosphorus application and phosphorus losses to the water ecosystem.

In this paper we run the model using empirical data from a Danish case study area. Several studies before aim to model phosphorus losses in combination with farmer profit maximization (eg. Helin et al. 2006, Goetz and Zilberman 2000). But the new in this empirical study is the focus on intensive animal husbandry farms that produce a phosphorus rich waste product (manure) and therefore have no incentive to reduce their application of phosphorus to the field. We analyze the effect of implementing a tax on phosphorus surplus and what happens if we supplement with subsidies for measures to reduce erosion and/or a manure reallocation scheme.

References:

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