

One Step at a Time: Incremental Implementation of a Water Quality Permit Program

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Eutrophication caused by an overabundance of nutrients (nitrogen and phosphorus) in bodies of water is one of the leading water quality issues in developed countries. Achievement of mandated water quality standards has increasingly focused on the role of nonpoint pollution source (NPS) discharges, in particular, runoff of nutrients from agricultural activities. Numerous abatement measures have been identified which could reduce nutrient losses coming from NPS. A market for tradable discharge permits (TDP) has the potential of achieving water quality targets in a cost-effective manner. Unfortunately, the attempts to start up permit markets that are able to exploit abatement cost differences between sources have not met with the success expected (EPA, 2001). Two of the reasons for the lack of success have been the problem of transaction costs and in the case of nonpoint sources, undefined property rights (Collentine, 2002).

The composite market design is a proposal for a TDP system that specifically includes agricultural NPS dischargers and addresses both property rights and transaction cost problems (Collentine, 2006). An integral component of the composite market model is the use of natural science models for calculating nutrient losses. The simulated quantification of losses allows these modelled values to be used for assigning limited property rights to NPS discharges. The structure of the composite market allows this system to be phased in over time with existing institutions and limited demands on financing.

This paper describes the implementation process for a composite market program in a catchment based on partial information. Implementation is based on a series of steps. In the first step costs are estimated for potential abatement measures in the catchment. In the second step discharge sources are regulated based on the best available technology (BAT) for limiting nutrient losses associated with the targeted activity. This second step creates a potential demand for discharge permits where the constrained sources must choose between investing in the BAT or purchasing permits to allow the estimated level of discharge. Prices for these discharge permits are based on the marginal cost of abatement calculated in the first step. Allowing these permits to be traded increases the economic efficiency of the regulation.

To demonstrate the implementation process, a numerical analysis is performed on a sub-catchment in Sweden. In this study, land use data for selected activities is combined with the modelled effects on nutrient losses from these activities to determine prices for discharge permits, the supply of abatement measures. Hypothetical regulation of selected discharge sources is then used to estimate the demand for permits from these particular sources. Finally, the cost of the program is estimated as well as the net effect of the program on nutrient losses from the catchment.

References

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