

Summary

In this report the economic costs of land use changes aimed at protecting groundwater resources from agricultural pollution are analysed. The study is part of the ARLAS-project which aims at developing models for scenario analysis of agricultural land use changes. Results refer to a 10x10-km study area in the county of Viborg located in the middle of Jutland.

The scenarios imply changing land use from conventional cash crop and husbandry farming to afforestation and set-aside on areas appointed as high priority with respect to groundwater. The following land use changes are Afforestation: Forests are established on agricultural land in the appointed areas. Set-aside: Set-aside of all agricultural land in the appointed areas. Combined afforestation and set-aside: Forests are established on agricultural land which are appointed by Viborg county as having high priority with respect to both groundwater protection and establishment of forest and set-aside on all other appointed areas. For the set-aside scenarios the analyses are performed for both set-aside subsidised by the hectare premiums of the CAP and for the partially nationally financed subsidies under the accompanying measures.

Table 0.1 shows the financial and welfare economic costs (measured as economic rent) of each scenario.

Table 0.1. Cost efficiency comparison of scenarios for local ground water protection (1300 ha in total)

	Financial Costs ¹	Welfare Economic Costs ¹
	1000 DKK	1000 DKK
Afforestation	-5.562	-5.687
Set-aside with EU hectare premiums	-1.131	-2.123
Set-aside under the accompanying measures	215	-3.295
Combined afforestation and Set-aside with EU hectare premiums	-1.064	-2.886
Combined afforestation and Set-aside under the accompanying measures	-804	-3.738

1) The economic rent equals the residual after remuneration of all factors and input but land.

Because both set-aside and afforestation results in the same protection of groundwater from nitrogen and pesticide leaching (fertilizer and pesticide use cease), the differences in the cost efficiency of the scenarios are given by the differences in welfare economic costs. The most cost-efficient scenario is set-aside under the EU hectare premiums, which is followed by the scenario with combined set-aside and afforestation. The least cost efficient scenario is the afforestation scenario. The cost efficient scenario i.e. the set-aside under the EU hectare premiums is a result mainly driven by the fact, that the subsidies are 100 percent financed by the EU and therefore represent an net currency income to the Danish economy. If the financial costs to the

farmers were used in stead of the welfare economic costs the cost efficiency ranking at the scenarios would change in favour of set-aside under the accompanying measures. This is an important result as it points out that the choices made by the farmers - given that they are minimising costs – will differ from the welfare economic efficient priorities of the society.

In the analyses no explicit evaluation are made as to whether reductions in nitrate and pesticide leaching will be enough to obtain a satisfactory ground water quality. Neither the analysis includes whether the changes in nitrate and pesticide leaching could be reached at lesser costs by use of other measures than land use changes. Therefore future analysis of the effects of combined measures aiming at e.g. reducing the intensity of agricultural production would be very useful from an environmental economics point of view in order to broaden the basis of cost efficient policy recommendations for local ground water protection from nitrate leaching.