



Photo: Geir Harald Strand

Norwegian policy and practises regarding mitigation measures in agriculture

Norway has adopted the Water Framework directive and intends to achieve good ecological status in all water bodies by 2021. The environmental condition of Norwegian rivers and lakes are good compared to those in most other countries in Europe. A preliminary survey of the status of all Norwegian water bodies shows that around 50 % probably will meet the EU objectives/requirements for the freshwater environment, while around a quarter are at risk with regards to the requirements (Snellingen Bye et al., 2010). For the remaining water bodies, data are not available or their status is uncertain. Agriculture has been identified as the third most important factor influencing the status of Norwegian fresh water bodies.

Around 2.7 % of Norway's surface area is occupied by agricultural land, where the dominant production system is animal husbandry. In 2013 the area of cereal production constituted 29 % of the total agricultural area in use. Cereal production is mainly located in the southeastern and central part of Norway, often on marine sediments that are prone to erosion. Cultivated grassland and animal production are concentrated in the western part of Norway and in districts where runoff from areas where animal manure is applied has a significant influence on water quality. The most important mitigation measures in agriculture in Norway are management of manure, fertilizer planning, reduced soil tillage, grassed buffer zones along

open water, mitigation of point sources and sedimentation ponds. In Norway, phosphorus (P) has been shown to be the limiting nutrient for eutrophication in lakes and streams and therefore the main focus of policies is on the reduction of P loading. Despite the introduction of numerous measures in recent years, problems with eutrophication still remain.

LEGISLATION AND SUBSIDIES

The implementation of mitigation measures consists of general production grants, legislation on manure management and subsidies for measures. The regulations relating to production subsidies include a number of environmental standards that farmers must meet to receive production support including pesticide journal, fertilizer application plan, and two meter buffer zone along water ways. A farmer who does not comply with the requirements may lose part of the production subsidies. Farmers must develop and carry out a plan for fertilizer application, and there are rules that limit the number of livestock that may be kept per unit area of land.

In 1991 subsidies for measures to reduce erosion and loss of nutrients was established. There are two systems of subsidies for environmental measures in agriculture to encourage farmers to reduce erosion and P-losses. The Regional Environmental Programme (RMP) gives annual subsidies for management practices and measures that can solve specific regional challenges. The other system is for special measures requiring longer term investments and maintenance (Special Environmental measures in agriculture, SMIL). Under the SMIL system farmers can apply for subsidies to establish constructed wetlands or sedimentation ponds, hydrotechnical installati-

ons, waste water treatment facilities or re-open closed (levelled) streams. Local county authorities are responsible for the administration of these schemes.

Practices that may be eligible for subsidies in Regional Environmental Programme (RMP) include:

- Changed tillage, stubble/minimal tillage rather than bare soil during winter
- Buffer zones along streams and lakes
- Grassed water ways
- Grass on flooded areas
- Catch crops
- Manure application in spring and growing season

For reduced tillage the subsidies are paid /rated after erosion risk of the areas.

Since 2005, the national agri-environmental programme was changed to regional programmes where the county administrations are responsible for the management of these support schemes. They have the freedom to choose the level of payments, to adjust measures and to implement new measures. However, these decisions are made in collaboration with NGOs, farmer organizations, advisory services, municipalities and should be approved by the the state. The regional environmental programmes adapt measures to suit regional conditions like the agricultural production system, the main environmental problems in the county, i.e. erosion risk and pollution level. In 2014 around 23 million Euro was given in subsidies to environmental measures in agriculture.

COST-EFFECTIVENESS OF MEASURES

The cost-effectiveness of mitigation methods is an important criterion for selection of mitigation methods to be recommended. Two studies on the cost-effectiveness of various soil tillage methods for different counties and areas in Norway are analysed in Refsgaard and Bechmann (2015). A key message to policy makers was the very large variation in cost-effectiveness due to variation in erosion risk, with the best cost-effectiveness obtained by implementing mitigation measures on high risk areas of erosion. An analysis of farmers' gross margins for different tillage practices in different counties in Norway, found that changing tillage practices most often reduces farmers' gross margin, but there are significant variations in these costs. The costs of reducing P losses by 1 kg ranged from EUR 200 to 300 on areas with low erosion risk, and EUR 20 to 30 on land with high erosion risk. As such, the subsidies aimed at tillage on areas with low risk do not cover the costs for farmer.



Buffer zone. Foto: Anne-Grete Buseth Blankenberg.



Reduced tillage. Photo: NIBIO



Reduced fertilization. Photo: Svein Skøien



Grassed water way. Photo: Fylkesmannen i Østfold



Sedimentation pond. Photo: Svein Skøien

CHANGED TILLAGE

Soil tillage methods in cereal areas are highly important for the risk of erosion and the risk of P losses to water bodies. Autumn ploughing has shown to increase both erosion and P losses (Bechmann et al., 2014). The highest P losses are measured from winter wheat fields, which are ploughed before drilling, but also autumn ploughing of spring cereals causes high P losses during autumn runoff and the spring (snow-melt) period. The traditional soil tillage method until 1990 was autumn ploughing. From 1991 subsidies are given for reduced autumn tillage and during the period from 1990 to 2002 the autumn ploughed area was reduced from 82% to 43% of the cereal area (Bechmann, 2015). In 2009 about 53% of the grain area is tilled only in spring, 42% is ploughed in autumn and 5% is harrowed in autumn (Snellingen-Bye et al., 2010).

Subsidy levels for changed tillage are based on erosion risk of the area, in high erosion risk areas a farmer is entitled to ca. 100 euro/ha for reduced autumn tillage. In exposed watersheds, like those used for drinking water supply, farmers are obliged to implement

stricter management practices to receive production support. The farmers in these catchments get higher subsidies than those in other catchments.

BUFFER ZONES

Mitigation measures, such as catch crops and grassed water ways received special subsidies from autumn 1991. A buffer zone along a creek should be a minimum of 6 meters wide and a farmer is entitled to 0.40 Euro per meter buffer zone. In 2012, subsidies were given for 424 km grassed water ways, 1232 km vegetated buffers and 5770 ha of other types of grassed area.

SEDIMENTATION PONDS

Sedimentation ponds and constructed wetlands are nature based systems to reduce fluxes of soil particles and P. Subsidies for the establishment of sedimentation ponds and constructed wetlands are part of the SMIL. Both the initial investment for construction and subsequent maintenance may be paid by subsidies (70 % support of the cost). During the period from 1994 to 2012 subsidies for in total 941 sedimentation ponds and constructed wetlands were given.

THE AGRICULTURAL MITIGATION MEASURE CATALOG

The catalogue is an online publicly available guideline on mitigation measures against water pollution from agricultural activities. It has been prepared to assist in the implementation of the EU Water Framework Directive (WFD) in Norway.

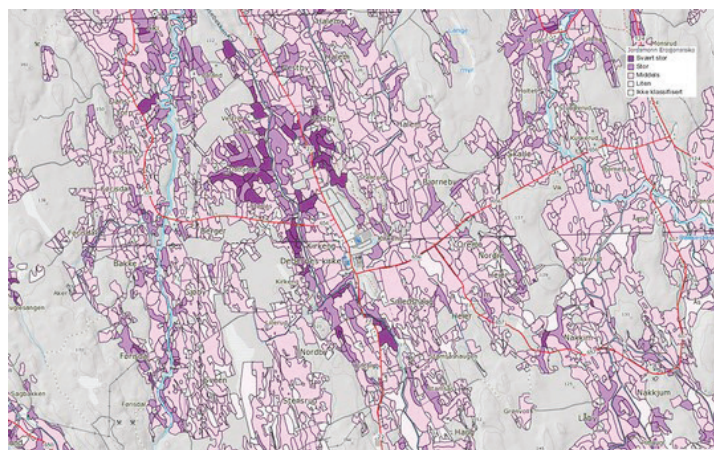
www.bioforsk.no/agri_measures

The online catalogue presents a list of measures suitable for Norwegian agricultural areas and gives recommendations for measures in areas dominated by cereal production, vegetable production or animal husbandry. A short overview on the implementation of the WFD in Norway is also given.

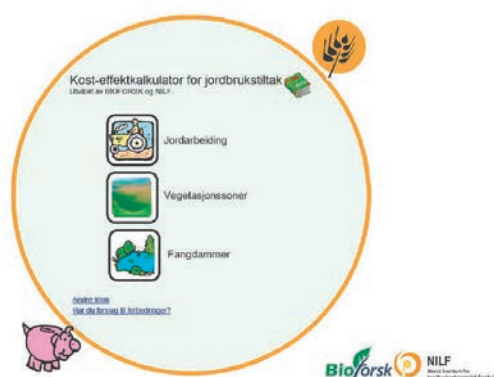
It also contains information about the legal and economic instruments that regulate agriculture and environmental measures, and examples of how to calculate the cost-effect of measures. Furthermore, practical tools are presented, ranging from GIS-based tools for planning on catchment, farm and field scale and calculating nutrient losses to advise on the amount of fertilizer needed (e.g. a phosphorus calculator).



Large collection of Fact sheets on mitigation measures, fertilization, tillage, drainage, water quality and guidelines for subsidies, etc.



Link to maps of erosion risk: Areas with high erosion risk get higher subsidies.



Cost-effect calculator for changed tillage, buffer zones and sedimentation ponds.

REFERENCES

Snellingen, Bye, A. and Løvberget, A. 2010. Landbruksteljing 2010. Statistisk sentralbyrå Rapport 2014/5.

Refsgaard, K., Bechmann, B. 2015 Kostnadseffektivitet av tiltak i landbruket.

Bechmann, M., Collentine, D., Gertz, F., Graversgaard, M., Hasler, B., Helin, J., Jacobsen, B., Rankinen, K. and Refsgaard, K. 2016 Water management for agriculture in the nordic countries. Background document for NJF seminar 487. NIBIO report 2/2/2016.

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