



Protecting the Baltic Sea from agricultural nutrient emissions

– strengthening the
policy framework

Greening of payments from EU's Common Agricultural Policy (CAP) to farmers must be more consistent with protecting water quality. Switching to performance-based payments is possible, as data and models are now available, allowing for good estimations of nutrient losses. Farmers taking measures in their operations, that are truly effective in controlling nutrients, should see that reflected in their receipts – and vice versa.



BONUS

SCIENCE FOR A BETTER FUTURE OF THE BALTIC SEA REGION

| **BONUS TOOLS2SEA** | Policy tools for Baltic Sea nutrient management

Our policy briefs are summaries of scientific knowledge produced in TOOLS2SEA, connected to current management and policy actions concerning the Baltic Sea. The briefs engage in and respond to important issues that support long-term sustainability of ecosystem goods and services of the Baltic Sea.

The shortcomings of prescription-based payments

Countries in the Baltic Sea Region are offering farmers the opportunities for payments additional to basic EU-CAP support if they adopt measures on agricultural land to control nutrients, e.g. buffer zones around water bodies, catch crops off-season, wetlands etc. Such payments come from the European Union's Rural Development Funds or from national support schemes.

Today these payments are mostly **prescription-based**, rewarding predefined measures rather than the actual nutrient reductions. This provides farmers with the perverse incentive to locate environmental measures where they have the lowest cost for them (i.e., on their least productive land), rather than where they have suitable benefits for the environment. With payments provided per ha of farmland, they are too often simply a top-up on basic area support.

Why performance-based payments?

To achieve deep emissions reductions, while maintaining agricultural productivity, it is essential that farmers are rewarded for engaging in pollution abatement. For these purposes, switching to **performance-based** payments will be a significant change. The better the effect, the higher the farmers' payment when based on performance and results. Conversely, potential payments will be low where the effect is poor, thereby discouraging farmers from implementing measures where they have too little effect relative to the cost – and payment – to be a sensible use of farmers' and taxpayers' resources.

Additionally, payment instruments based on performance will provide incentives for innovations in farming practices that improve the effectiveness of existing measures over time and reduce costs. Therefore, it is crucial that farmers appreciate that they receive payments for environmental performance, and not in relation to the farmland affected.

What tools for gauging nutrient management performance?

Performance-based payments depend on having evidence of abatement effects. On-site measurement for each and every farm would be very demanding, if at all feasible. Instead, estimations can be made with adequate precision and as a proxy for measurements, as is done in many other instances for environmental pressures (air pollution, chemicals etc.).

Today nutrient management performance is routinely estimated by considering the aggregate outputs in farm products against the inputs from fertilizer, biological fixation and atmospheric deposition, thus accounting for the surpluses of nitrogen and phosphorus at national and local level. Calculations at the level of the individual farm based on readily available data from farm operations are perfectly feasible. Bookkeeping systems for fertilizer applications will however be helpful for achieving full precision.

Moreover, it would be possible by using modern GIS software, hydrological leaching models (e.g. MONERIS, NLES) and available spatial data to take account of differences in retention and leaching (depending on proximity to water bodies, soil quality etc.) in the design of performance-based payments. By applying these tools at catchment level, estimations of annual leaching rates can provide a more sophisticated evidence-based approach for making payments to farmers. A scheme for payments to farmers for construction of mini-wetlands in Denmark thus relies on estimates of the potential nitrogen reduction effects related to each specific site, ruling out those with least impact.

Fair and targeted payments

There are vast differences in the natural preconditions for farming in the Baltic Sea Region, as well as in how the farming sector has evolved over time in the various countries. Farmland productivity ranges from a low standard output of €6–700/ha in the Baltics to a high of €3,000/ha in Denmark and Germany, with Poland, Finland and Sweden at about €1,600/ha in between, according to Eurostat. The productivity differences reflect crop yields as well as concentrations of livestock, in turn responsible for generating huge volumes of nutrient-rich manure.

CAP payments to farmers tend to reinforce these productivity differences, rather than to alleviate them (see Table 1). Baltic countries and Poland receive less support per farmer, and thus hardly use Rural Development Funds to provide payments for nutrient management, giving priority to conventional purposes. Still, the numerous small-scale farmers in the east manage large tracts of farmland, with Poland alone accounting for 48% of all farmland in the littoral countries to the Baltic Sea. More fair and targeted payments are necessary to enable farmers in the east to manage their nutrients sustainably. Huge investments in manure storage capacity and appropriate spreading equipment are required in the east, to enable higher nutrient use efficiencies.



Table 1: Producer Support Estimate 2017 (Farms > 2 ha).

Farmer payments	€/ha	€/farmer
Denmark	489	38,021
Estonia	350	23,926
Finland	583	27,254
Germany	503	32,053
Latvia	308	10,407
Lithuania	368	8,443
Poland	412	5,406
Sweden	375	18,288

Source: Mitchell and Baker, 2019 and Eurostat.

The nutrient surplus

The **nutrient surplus** (see Table 2) reflects the difference between inputs of nutrients and outputs in agricultural products. From the HELCOM baseline period 1997-2003 and to the most recent years for which data is available there have been significant reductions in both phosphorus and nitrogen surpluses in several countries (see Table 2). **High pressures** per unit of farmland nevertheless remain in Russia, Denmark and Germany, reflecting an intensive mode of agriculture with high livestock densities, and Poland with 48% of all farmlands seems on a trajectory to catch up with them in its western regions.

Table 2: Agricultural nutrient surplus per unit of farmland

	Nitrogen surplus				Phosphorus surplus			
	1997–2003 Kg N/ha	2015–2017 Kg N/ha	Change Kg N/ha	Change %	1997–2003 Kg P/ha	2015–2017 Kg P/ha	Change Kg P/ha	Change %
Denmark	127	80	-47	-37	13.1	7.0	-6.1	-47
Estonia	*36	22	-14	-39	-5.0	-7.0	-2.0	40
Finland	61	49	-12	-20	9.3	4.7	-4.6	-50
Germany	103	70	-33	-32	3.1	-3.3	-6.5	-206
Latvia	14	25	11	80	0.4	1.3	+0.9	211
Lithuania	34	25	-9	-27	5.5	1.0	-4.5	-82
Poland	43	47	4	8	3.7	1.5	-2.2	-60
Sweden	52	35	-17	-33	2.3	0.7	-1.6	-71
Russia	144	130	-14	-9	n/a	n/a	n/a	n/a

Sources: Eurostat and Russia's Federal State Statistics Service; *2004;

The Baltic Sea region has within its catchment **303,000 million km² of agricultural land**, while the Baltic Sea itself covers 415,000 km². Reducing nutrient losses from agriculture is challenging because the region is large and heterogeneous in terms of societal, geographical and agricultural conditions. The share of arable land differs, from about 60% in Denmark and Germany to just 7–8% in Sweden and Finland. Germany, Denmark and Russia have relatively large farms, whereas small farms are widespread in the Baltics and Poland. **Farming activities differ**, with high livestock densities in Denmark, Germany and western Poland as well as in Russia's Leningrad Oblast. Agriculture is most extensive in the Baltics, with high shares of permanent grasslands, while there are substantial areas of arable grasslands in Finland and large tracts of Sweden.

The European legal framework

While the requirements of the EU's Water Framework Directive aim at inland and coastal waters, its preamble highlights the need for an effective and coherent water policy to take into account the vulnerability of 'relatively closed seas'. The Marine Strategy Framework Directive (MSFD) explicitly states that it should contribute towards the fulfillment of obligations in Regional Sea Conventions. By making a more active use of the institutions of the European Union for implementation of the Baltic Sea country allocated reduction targets, it would be possible to mobilize an economic and legal enforcement potential with regard to 90–95% of the livestock and farmlands draining nutrients to the Baltic Sea.

Recommendations

To engage farmers in finding the best ways to reconcile nutrient management with agricultural productivity a new green architecture for offering payments financed by taxpayers via EU is required;

- Make targeted use of the Rural Development Funds of the Common Agricultural Policy to support manure storage, spreading equipment and other relevant measures to reduce nutrient surpluses
- Make payments performance-based, so that farmers will be rewarded for identifying the measures that provide the highest reductions in nutrient surpluses relative to the costs, and vice versa
- To enable and sophisticate the measurement of performance, field level nutrient bookkeeping with digital reporting should be conditional for support
- Develop integrated assessment modelling frameworks of hydrological leaching and retention rates with high spatial resolution

These recommendations are relevant for ensuring that the national CAP Strategic Plans prepared by each country will be able to deliver on the challenges that the agricultural sector is facing in reducing its environmental pressures.



BONUS

SCIENCE FOR A BETTER FUTURE OF THE BALTIC SEA REGION

BONUS TOOLS2SEA is a synthesis project of the BONUS research program.

It will summarize research results and insights from a broader array of studies, projects and publications available in the international literature, as well as in national languages of the Baltic Sea region.

It will synthesize potentials and practical experiences with specific policy instruments designated for nutrient management, while placing and analysing these in context of the domestic and regional governance institutions in place in Baltic Sea countries and beyond.

projects.au.dk/bonus-tools2sea

BONUS TOOLS2SEA | POLICY BRIEF |

Protecting the Baltic Sea from agricultural nutrient emissions – strengthening the policy framework

For further information: Prof. Mikael Skou Andersen, msa@envs.au.dk, phone: +45 8715 8616.

BONUS TOOLS2SEA is funded under the BONUS programme (art. 185), funded jointly by the EU and FORMAS (Swedish Research Council for Environment, Agricultural Sciences and Spatial Planning).

Infograph & layout: Matti Lindholm and Satu Turtiainen, Finnish Environment Institute SYKE.

Cover photo: Mauritius Images / Lehtikuva.

ISBN 978-952-11-5423-2 (PDF). Helsinki, Finland. 7/2021. **Supplement to the 1st Edition published 6/2020:**

Articles

Brady, M.V., M.S. Andersen, E. Kilis, S. Saarela and M.H. Thorsøe, 2021. Strengthening the policy framework to resolve lax implementation of the Baltic Sea Action Plan for agriculture. *Ambio – a journal of environment and society*.
<https://doi.org/10.1007/s13280-021-01573-3>

Andersson, A., M.V. Brady, and J. Pohjola. 2021. How unnecessarily high abatement costs and unresolved distributional issues undermine nutrient reductions to the Baltic Sea. *Ambio – a journal of environment and society*
<https://doi.org/10.1007/s13280-021-01580-4>

Thorsøe, M.H., M. S. Andersen, M.V. Brady, M. Graversgaard, E. Kilis, A.B. Pedersen, S. Pitzén, H. Valve, 2021. Promise and performance of agricultural nutrient management policy: lessons from the Baltic Sea. *Ambio – a journal of environment and society*.
<https://link.springer.com/article/10.1007/s13280-021-01549-3>



FORMAS



Swedish University
of Agricultural Sciences

