”Mandatory nutrient balancing at farm level” - fundamental practice to reach nutrient effiency and to control Baltic Sea eutrophication

GRASS conf 2022 „Sustainable agriculture for sustainable sea – the future of agriculture in Poland and in Europe”

11 May 2022, in Warzaw

Gunnar Norén
Senior Advisor
Coalition Clean Baltic

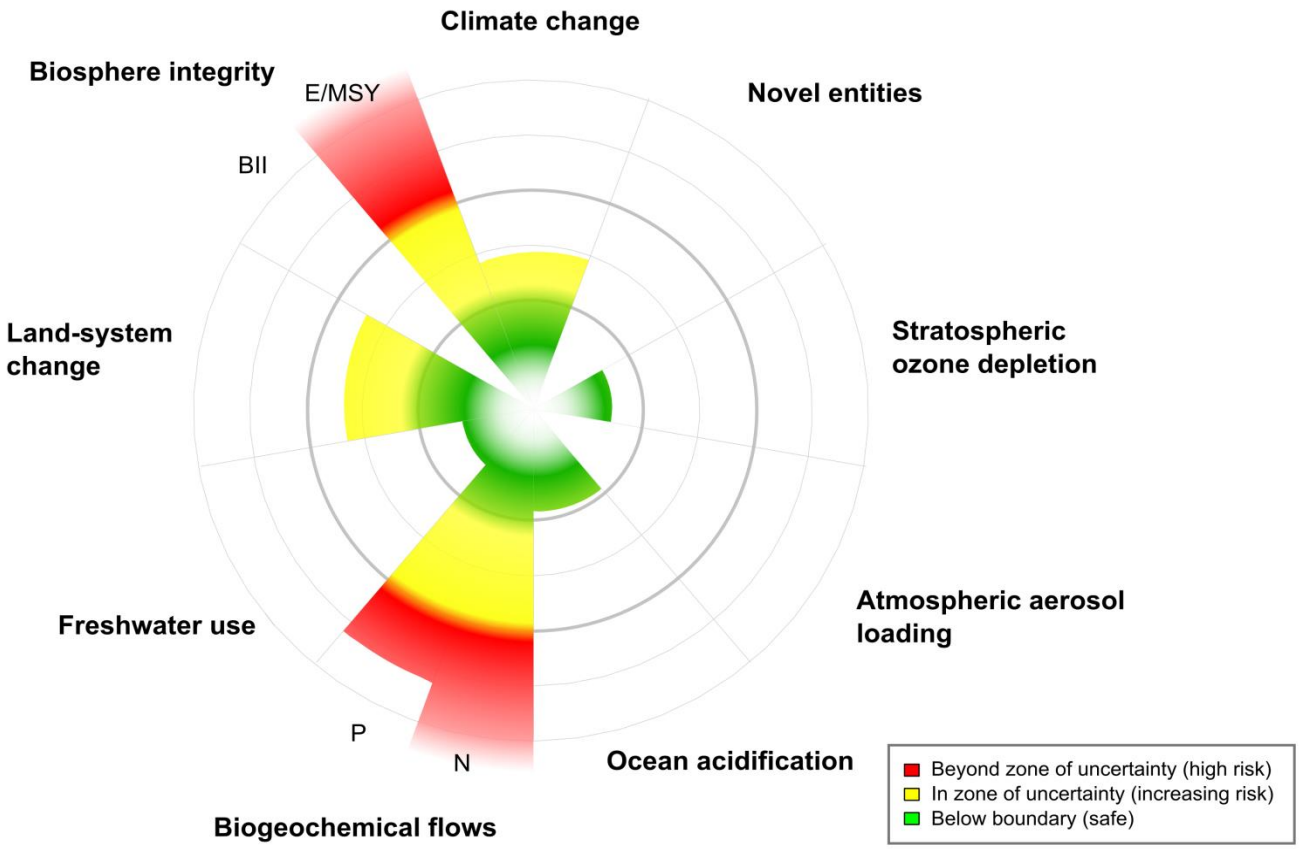
EU initiative - develop ”Integrated nutrient management plan

- **To complement the EU ”Zero Pollution Action Plan”, Green Deal; Circular Economy Action Plan; Farm to Fork strategy**

Because

- **2/3 of excessive N and P levels in EU-waters orginate from fertilizers (1/3 from Industrial & domestic wastewaters)**
- **81% of EU marine waters reported as Eutrophic**
- **Nitrous oxide (70% of total, released by agriculture) Greenhouse gas, 300 times more powerful than CO2**
- **Europe surplus of N and P in environment – exceeding safe planetary boundaries (N by factor 3,3 ; P by factor 2)**

Planetary Boundaries : The current status of the control variables for seven of the nine planetary boundaries



Source: Steffen and others, 16 January 2015, Science

"Nutrient Balanced Fertilization - the fundamental practice to reach nutrient effiency"

- ***Fertilize the crop – not the soil***

- Source for all nutrient leakage from agriculture land come via Over-Fertilization (except N from air deposition of NOx and ammonia)
- >50 % Nutrient pollution load to the Baltic Sea come from Agriculture sector
- Eutrophication problem of Baltic Sea only solved if Agri sector reduce its Nutrient load significantly. No alternative actions exist, to solve Baltic eutrophication. Agri sector is the critical nutrient polluter.

HELCOM requirements – HELCOM Annex III part 2

"The application of nutrients in agricultural land shall be limited, based on a balance between the foreseeable nutrient requirements of the crops and the nutrient supply to the crops from the soil and the nutrients with a view to minimise eutrophication"

- A nutrient balance "with a view to minimise eutrophication" imply that nutrient leakage shall be minimised at fertilizer application (tackled at source) via *minimised nutrient surplus*
- This HELCOM requirement is *legally binding* for all BSR-countries and farmers
- Balanced Fertilization with "minimised nutrient surplus" – so far not implemented because lack of national regulations.

Fertilization practice today:

- Optimal Economic Fertilization (OEF) practices is applied. Farmers fertilize to get as high crop yield as possible. Farmers-businessmen, primary aim is to optimise their production system to the benefit of themselves.
- *Optimal/Expected yield* is the reference for fertilization calculation. Such procedure can imply heavy overfertilization. *Fertilization applied for expected harvest, for the harvest you want, and not according to the need for the crop planted.*
- Profit for the farmer depend on price on fertilizer and expected world price-setting of crops after the harvest. Inexpensive fertilizers can make it more profitable to Overfertilize. *Optimal Economic Fertilization practices drives the overfertilization*
- *Sweden example: when tax on mineral fertilizers was removed , the Swedish Board of Agriculture within 3 months increased N-fertilization advice for main crops +10 kg N/ha. Not because of need for the crops, but because of higher profits for farmers.

Major aspects that control Overfertilization:

- Setting of Target yield for crops – realistic expected crop yield
- Nutrient Balanced Fertilization & Nutrient Surplus calculations, in line with Tolerable surplus limits (National limit values)
- Farmers declare purchase of fertilizers – Controlled to fulfil the adopted annual Fertilization Plan (additional fertilization stopped)

Such aspects not only for farmer to decide on

* To control overfertilization: Nutrient surplus calculation must be performed for N and P separately at field level for each crop and strict **Tolerable surplus values (kg/ha)**

- Advisory service should decide/adopt an Annual Fertilization Plan regulating fertilizer usage (violations to be punished with fines)

HELCOM ministers 2013

- WE DECIDE to investigate *measures to reduce nutrient surplus* in fertilization practices to *reach nutrient balanced fertilization* with the objective to come to an agreement on national level by 2018;
- WE AGREE applying *by 2018 at the latest annual nutrient accounting at farm level* taking into account soil and climate conditions giving the possibility to *reach nutrient balanced fertilization and reduce nutrient losses* at regional level in the countries

HELCOM Baltic Sea Action Plan Update 2021

Eutrophication section & Agriculture

* E7- *Balance fertilization rates site-specifically* and promote precision fertilization practices to *improve nutrient use efficiency and reduce nutrient losses*

- E17- *Agree* on the national level by 2023 *on measures to reduce nutrient surplus in fertilization practices to reduce nutrient losses*
- E18- Investigate opportunities for taxation of mineral fertiliser and/or taxation of nitrogen surplus and/or payments for agri-environment measures by 2024 and implement them building on the experiences available in various countries

Coalition Clean Baltic

Proposals for HELCOM actions in Baltic Sea Region (necessary to control details)

*Control overfertilization via Nutrient Balanced Fertilization practices, at *planning stage* (taking into account nutrient soil status), via *mandatory calculation of N and P-surplus (kg/ha) at field level* (for farms > 20 ha; livestock farming with > 10 Animal Units; import >1 ton manure/y) *Consider realistic acceptable surplus at planning*

*Annually declare/report purchase/storage/use of fertilizers (mineral; manure nutrients)(e.g. Online database)

Appropriate national surplus limits:

- Tolerable N-surplus – crop production: 20 kg N/ha,y
- Tolerable N-surplus – animal production: 30/40 kg N/ha,y
- Tolerable P-surplus levels: 0 kg P/ha,y (not apply more P than the crop can use annually)
- Nutrient status - nutrient soil mapping (P & N) at least every 3 year
- Wintergreen crops only fertilized for plant growth during autumn (no storage fertilization with manure/mineral fertilisers for growing season starting in spring-time)

Denmark control of overfertilization (until 2015)

•Fertilization application for Optimal Economic Fertilization reduced with 15 %.

•Farmers fertilizer purchase strictly controlled.

•***Mandatory:*** always reduce fertilizer application -15% when Optimal Economic Fertilization is applied

Management requirement for manure fertilizers

•Excess farm manure shall be transported/used for processed Organic fertilizer products (e.g. Pellets) (e.g. Cooperative org. supporting farmers)

•Full content of nitrogen and phosphorus in manure shall be applied as input figures in nutrient balance calculation (nutrient analyses of manure)

•Manure slurry speading shall use injection techniques and apply it directly into the active layer of soil (farms >20-30 Animal Units)

•Manure storage tanks shall always be covered
*Temporary storage of manure (on farmland) always covered and limited to max. one month

•Manure not allowed to spread on P-saturated soils (high P-class) where farmer has main interest of the N-content.

P-application must always balance with P-uptake of crops (P-surplus – Zero)

EU policies & Agriculture

Farm to Fork strategy

Improving nutrient efficiency is a key objective of the

EU policy Farm to Fork set targets for 2030

-reduce nutrient losses with 50% (from Zero Pollution Targets)

-reduce fertilizer use by at least 20%

EC develop Farm Sust Tool for Nutrients – FaST, www.fastplatform.eu

MS shall apply FaST or existing tools (Minimum requirements) *a balance on main nutrients at field scale. Parameters available i.e yield target

Stronger requirements and control are necessary to reduce Nutrient Surplus in BSR to fulfil coming EU policies and requirements

CONCLUSIONS

•Agri sector apply ”volontary measures” to control Over-Fertilization and HELCOM has so far not developed requirements for Nutrient Surplus calculations & ”Nutrient Surplus limits.

•Ongoing major Agriculture nutrient load to Baltic Sea is still 50% - demonstrate the failure to control and limit agri nutrient leakage with volontary measures during 25 years within HELCOM

•New approach is necessary – Strict limit for nutrient surplus on farmland. Tackling nutrient pollution at source

•Need control Agri sector nutrient pollution with same appoach as society control Wastewater sector and Industry sector, where strict limits for N and P discharge (kg/day) are set and controlled.

•The Agri sector must show willingness for more efficient mandatory measures to reduce its Nutrient Pollution at source

… must change attitude; to be credible ”Sustainable sector” ready to apply nutrient surplus limits (kg/ha)

•***The most important Nutrient leakage driver in BSR that create Baltic Eutrophication is Overfertilization practices on farmland.***