

Ecological recycling agriculture

– A possible way to try and save the environment of the Baltic Sea

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The goal to reduce the nutrient load to the Baltic Sea to half has not been achieved. Despite major efforts there has been no meaningful reduction. Instead there are great risks that nitrogen and phosphorous loads to the Baltic will increase now that the Baltic countries and Poland have joined the EU. With an increasing number of their farms changing over to a western European type of specialised agriculture the consequences are likely to be increased algae flowering and increasing areas of the Baltic Sea with a dead bottom. This specialised agriculture, where grain farms are separated from intensive animal production farms, results in increased nutrient surpluses and leaching. This is apparent in the report⁴ that I, in collaboration with colleagues from Baltic States, have recently written as part of the EU financed INTERREG project: Baltic Ecological Recycling Agriculture and Society (BERAS). Published by CUL (Centrum for Sustainable Agriculture) at SLU (Swedish University of Agricultural Sciences), this report also makes it clear, however, that there is still time to stop these negative developments. Plant nutrient losses per hectare cropland are still low in Estonia, Latvia, Lithuania and Poland compared to the other EU countries within the Baltic Sea drainage area.

According to HELCOM's most recent collation Poland contributes the most nitrogen (28% of the total load in the Baltic Sea drainage area), followed by Sweden (21% of the total). Poland's population and area under cultivation are however almost as large as all the other countries combined. The Swedish per capita nitrogen load is 21 kg, while in Poland it is only 6 kg. According to official Swedish calculations about half of the anthropogenic nitrogen load to the Baltic Sea is from agriculture. For phosphorous it is about a third. Swedish, Finish and Danish agriculture have the highest nutrient losses per hectare farm land.

The BERAS report mentioned above describes the dramatic changes that agriculture has undergone during the second half of the 1900s. At the beginning of the 1950s we still had mixed farms with both crop and animal production. Plant nutrients in the form of manure were recycled within every farm unit. Today farms are either specialise in crop production of mainly grains or in animal production of milk, beef, pork or poultry. This specialisation of production has broken the circular flow of plant nutrients within each production unit. About 80% of the cropping area produces fodder crops, but animal production has been concentrated to increasingly fewer farms that are concentrated to certain regions of the country. This system of specialised farms results in a mainly linear flow of plant nutrients: artificial fertilisers > grain production > animal feed >

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⁴ Granstedt, A., Seuri, P., and Thomsson, O. Effective recycling agriculture around the Baltic Sea – Background report. Ekologiskt Lantbruk nr 41. CUL, SLU: (<http://cul.slu.se/information/publik/BERAS2.pdf>)

animal production > emissions to the air and water. The inputs and losses of plant nutrients increased between 1950 and 1980 to today's too high average level of approximately 80 kg nitrogen per ha in Swedish agriculture.

The surplus of plant nutrients in the form of too much animal manure that builds up on the specialised animal farms has its origin in purchased feed from both the specialised crop production farms as well as from imported feed such as Soya protein. Dairy farms with ley cultivation often purchase artificial fertiliser for their pasture cultivation despite their excessive amounts of manure. This further contributes to plant nutrient surpluses. Calculations of plant nutrient balances on dairy farms show nitrogen surpluses that can be more than 150 kg nitrogen per ha. The concentration of specialised animal production farms to areas near the coast in southern Sweden has exasperated the problem and no changes in this situation are apparent. In the long run a regional redistribution of animal production will be necessary in order to achieve a better balance and reduce plant nutrient losses to the Baltic Sea.

These trends in the agriculture sector of increased specialisation and the resulting increasing plant nutrient surpluses are similar in Finland. In Denmark the specialisation has gone much further with a much greater reliance on imported feed and the resulting higher losses from farms throughout the country. In Denmark as in southern Sweden there is an additional problem that also exists further south in Europe: the leaching of nitrogen compounds into the groundwater.

There are now great risks for a dramatic increase in the nutrient loads to the Baltic Sea when Poland and the Baltic states quickly restructure their agriculture to an intensified export oriented production. Europe already suffers from two problems: that of excess production and considerable environmental damage – the results of a too intensive chemically dependant agriculture. The problem is well illustrated in the article about the successful Polish farmer in number 52/53 (13th December) in the agriculture section of the Swedish weekly magazine *Land*. The headline was spread across the top of two pages: *The first half-year a success for Polen's farmers*. When the farmer took over the farm from his parents there were 10 cows. Now this has increased to 60 high milking cows on a farm that with the additional rented land has 60 ha. Generous loans from the dairy cooperative have made these changes possible. The increasing number of animals on a limited number of hectares can result in a doubling of nitrogen losses from this farm. The same mistake is being made in Poland as has already been made in Sweden, Finland and Denmark. The increasing farmer debts are also familiar. These specialised farms take out loans to invest in animals, buildings and machinery. As a result the farmers have tied themselves economically to a specialised production that demands the use of purchase of feed, artificial fertiliser and even chemical biocides. Together all this leads to damage to the surrounding environment including the water system that in the end flows into the Baltic sea.

The example presented in *Land* is now repeating itself throughout the Baltic States and in Poland. It is either young energetic farmers who are investing and locking themselves into an unecological specialised system or it is investors with capital from other EU countries. More and more people are becoming financially dependent on a system that in the long run damages both the environment and the economy. Until quite recently the Baltic countries were a dumping market for the European agricultural surpluses. Now it is other countries that will suffer because of an agriculture that in Europe both damages the environment and is costly, demanding both producer subsidies as well as the financing of export losses.

The study of farming systems shows that the surplus plant nutrients and the losses of both nitrogen and phosphorous that this results in are much smaller when there is a balance between crop and animal production on a farm compared to the more specialised conventional production. A reduction of the nitrogen surplus by half is possible through a more effective recycling of the plant nutrients within each production unit. Another possibility is to develop close collaboration in the use of feed and manure among neighbouring farms so that together they build an ecological unit. Within the framework for the BERAS project mentioned above plant nutrient studies on more than 50 farms in the 8 countries around the Baltic Sea are being carried out. They represent the different cropping conditions that exist within the Baltic Sea region. On these ecological farms animal production is adapted to the farm's own capacity for fodder production. The needed nitrogen is obtained through biological nitrogen fixation. No chemical biocides are used. The farms vary in size - small family agriculture as well as several large farms with their own processing capacity are included. What they have in common is that they are almost completely self reliant when it comes to both fodder and fertiliser. The production and surplus of plant nutrients is studied taking into consideration our average consumption of animal and vegetable foodstuffs. The consequences of other scenarios, such as a lower consumption of meat products, are also being studied.

Both state research resources as well as practical programmes have, up until now, tried to deal with the symptoms, i.e. the consequences of too great a surplus of plant nutrients in agriculture. These efforts have not led to any improvements of the environment in the Baltic Sea. Nor are any major results to be expected if the underlying causes are not dealt with. Today's problems are a result of the structural rationalisation that was pushed through during the 60s and 70s. The need to reduce the plant nutrient losses now requires a recycling agriculture in the whole region. The threat of an increase rather than a reduction makes the issue all the more urgent. The intention is that the continued the work within the BERAS project will provide a basis that can give direction for changing over to an ecological and nutrient recycling agriculture in the whole of the Baltic Sea region.