

SAVE

Saving the Archipelago Sea by applying gypsum to agricultural fields

Gypsum application to fields is a promising measure for reducing the phosphorus load originating from agriculture. Could it also help reduce eutrophication of the coastal waters of the Archipelago Sea? A joint project of the University of Helsinki and the Finnish Environment Institute is studying this question by implementing a large-scale pilot study of gypsum treatment in fields. The pilot will take place in the Savijoki river basin in Lieto and Paimio, in collaboration with local farmers. The project studies the effects gypsum has on phosphorus loads, river biota and soil.



IMPROVING THE ARCHIPELAGO SEA USING GYPSUM

SAVE - Saving the Archipelago Sea by applying gypsum to agricultural fields gathers experiences of gypsum treatment as a means to reducing the phosphorus load originating from agriculture. A hydrologically uniform area is treated with gypsum, and the effects on the water quality of river Savijoki and the nutrient state in the fields are monitored. Phosphorus loading and erosion are expected to reduce significantly, clearing the water in river Savijoki, thus making the river more attractive for recreational use. The same effect can be achieved on a larger scale if the gypsum treatment would later be expanded to cover the entire catchment area of the Archipelago Sea.

PARTNERS, COLLABORATORS AND FUNDING

During project SAVE, the University of Helsinki is responsible for implementing the pilot, while the Finnish Environment Institute is responsible for water quality research. SAVE is a key project of the Finnish Government, funded by the Ministry of the Environment (2016–2018). The gypsum pilot is also involved with project NutriTrade (**NutriTrade - Piloting a Nutrient Trading Scheme in the Central Baltic**), funded by the EU Interreg Central Baltic programme (2015–2018). NutriTrade creates a scheme for voluntary nutrient reduction measures and funding. NutriTrade has been nominated a flagship project of the EU Baltic Sea Region Strategy and is led by the John Nurminen Foundation.

SAVE collaborates with the Baltic Sea Action Group (BSAG), The Central Union of Agricultural Producers and Forest Owners (MTK), and the ELY Centre of Southwest Finland. YARA is contributing half of the gypsum needed for the pilot free of charge.

The nutrient loading originating from agriculture is substantial during snowmelt.





Water clarification is visible due to gypsum treatment.

Gypsum used in project SAVE originates from YARA's factory in Siilinjärvi.

A REMARKABLE PROSPECT FOR WATER PROTECTION

Gypsum has the potential to significantly lower the phosphorus loading originating from agriculture and ending up in the Baltic Sea. The method is easy for farmers to apply, and as a water protection measure it is quick and effective. Earlier studies suggest that gypsum can reduce the phosphorus load by half without requiring changes in farming practices or a decrease in cultivation area or yields. The gypsum can be spread using the same machinery as lime. Gypsum application to fields is more cost-efficient at reducing phosphorus loading than any other water protection method currently in use.

PHOSPHORUS FOR FIELDS – NOT FOR WATERS

Gypsum ($\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$) enables phosphorus to remain in the soil. It increases the ionic strength of soil, creating larger aggregates of soil particles and, thus the phosphorus release to run-off is decreased. Phosphorus remains available for plants, but erosion will lessen and the soil structure will improve. Gypsum reduces the run-off of both dissolved and particulate phosphorus, along with organic carbon run-off. The effects begin immediately after the dissolution of gypsum and last for several years.

GYPSUM SUPPORTS THE CIRCULAR ECONOMY

The gypsum used in project SAVE is pure gypsum from YARA's factory in Siilinjärvi. This gypsum is a by-product of the fertiliser industry and can be used for soil amendment. The gypsum is free of any heavy metals and safe to use in fields.



A measuring weir in the upstream of river Savijoki.

A view of Savijoki river valley bordered by fields.

Aims of project SAVE

AN EXTENSIVE EXPERIMENT ON GYPSUM APPLICATION

Project SAVE is researching gypsum application as an agricultural water protection measure in a large-scale pilot in collaboration with farmers. The pilot is unique both on a domestic and a global scale. The aim is to apply gypsum to up to 2000 hectares of agricultural land in the Savijoki river basin. The pilot provides information concerning the applicability of gypsum treatment as a part of cultivation practices, and on the general opinion of the method as a means for protecting waters.

The target is a cleaner Archipelago Sea.





Run-off turbidity is monitored hourly using automatic sensors.

The effect of gypsum on the nutrient state of fields will also be studied.

IMPACTS ON WATER SYSTEMS WILL BE STUDIED

Research conducted in the project provides a comprehensive view on the effects that gypsum has on phosphorus loading and aquatic biota. Water quality is monitored using continuous measuring and with manual sampling, providing information on the amounts of dissolved and particulate phosphorus, solid matter, turbidity and sulphate from gypsum in the river water. Regarding aquatic biota, the responses of the thick-shelled river mussel and aquatic moss are studied.

PLANS FOR LARGE-SCALE APPLICATION

Based on farmers' experiences and the research results, a plan will be compiled for the large-scale application of gypsum in Southern Finland. The potential for gypsum treatment in other countries in the Baltic Sea region will be assessed. Another issue under examination is the possibility of incorporating gypsum treatment into the Finnish agri-environmental scheme. The results of the pilot will also be utilised for developing a scheme to promote voluntary nutrient reductions and funding in project NutriTrade.



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Pictures by Petri Ekholm and Saara Kirjalainen (SYKE),
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