Active Wetlands

In the Active Wetlands project the Estonian and Finnish farmers, rural advisors and decision-makers will learn how restored wetlands can be used in reducing the nutrient load from agriculture. Simple and environmentally friendly, active methods are tested for their nutrient retention ability in improving the efficiency of agricultural wetlands for water protection.

Agriculture in both Estonia and Finland is a large-scale industry. Consequently, the intensive use of land, soil erosion, and the unwanted nitrogen- and phosphorus-leaching have negative impacts on the environment. The most visible problem is the eutrophication of the Baltic Sea, that also serves as the main threat to the biodiversity of the marine environment.

The Active Wetlands Project has identified possible solutions for how to reduce agricultural nutrient load by enhancing the nutrient retention in the watersheds. Constructed and restored wetlands are recognized as a potential tool for intervening between the nutrient leakage from arable land and the Baltic Sea water basin. Wetlands preserve eroded soil and nutrients from incoming water through sedimentation and plant uptake. They also improve species biodiversity as well as the landscape by creating habitats different from the neighbouring fields.

In Estonia and Finland, there is a demand for knowledge about the optimal wetland design, construction and, in particular, management. For water protection purposes the wetlands ought to be of large size. Yet, most of the potential wetland sites are rather small. Therefore, the project will concentrate especially in improving the functioning of small-sized wetlands, allowing better nutrient retention – and thus developing better means for fighting eutrophication.

In addition to on-site testing, the project will also further conduct catchment level modeling to estimate the cost-efficiency of the tested active measures in retaining eutrofying nutrients escaped from agriculture. Derived from the results, the project can conclude ways how to include agricultural wetlands and their active measures in the current water management policies, including the agri-environmental subsidies scheme. ▶

Important part of the project is also to raise general awareness of the benefits of agricultural wetlands, especially in Estonia, where such benefits are not widely recognized.

The Active Wetlands Project will work with farmers, agricultural stakeholders, rural advisers and decision-makers. The partnership of Active Wetlands Project consists of six partners in Finland and Estonia, each of them expert in their own field: agriculture, research, monitoring, environmental protection and working with decision-makers.

The project kicked off in November 2009 and will last for 3 years. In November 2010 there are three pilot sites constructed in Finland and one site near Tarto in Estonia, by the Estonian University of Life Sciences. More sites are planned to be constructed in spring 2011.

The active measures currently under testing

Ferric sulphate doser in Jokioinen

Ferric sulphate is commonly used in waterworks and wastewater treatment plants to precipitate solids, organics and phosphorus. The same chemical is also useful in phosphorus stripping from runoff agricultural waters.

MTT (Agrifood Research Finland) presents in Jokioinen Elonkierto pilot area one possible solution for runoff treatment in a ditch. The dosers in runoff applications need to be simple and as maintenance-free as possible. This doser consists of a container with a piece of pipe led through its bottom, and a cone-shaped netting bag attached to the end of the pipe.

The container is filled with granular ferric sulphate (e.g. Ferix-3 manufactured by Kemira Chemicals Ltd.), that dissolves from the cone at a speed that depends on the surface area exposed to water (i.e.,

Ferric sulphate doser in a ditch in Jokioinen. The iron chemical dissolves from a nylon netting cone, in adjustable rate according to the flow conditions, and precipitates phosphate from water in insoluble form.

water level in front of the v-notch weir). The doser can be scaled up and down for different ditches by simply changing a different-sized pipe and netting cone, and fine-tuned by adjusting the angle of the v-notch weir.

According to MTT´s former experiences, a dose that drops pH of runoff water by 0.5 units is adequate for precipitating up to 95% of DRP in runoff. For flocking suspended material in runoff, a larger dose is needed (and a pH decline of >2 units). In higher doses, the flocks formed, however, are fluffy and take a large volume, and need a sedimentation basin after the doser to settle out.

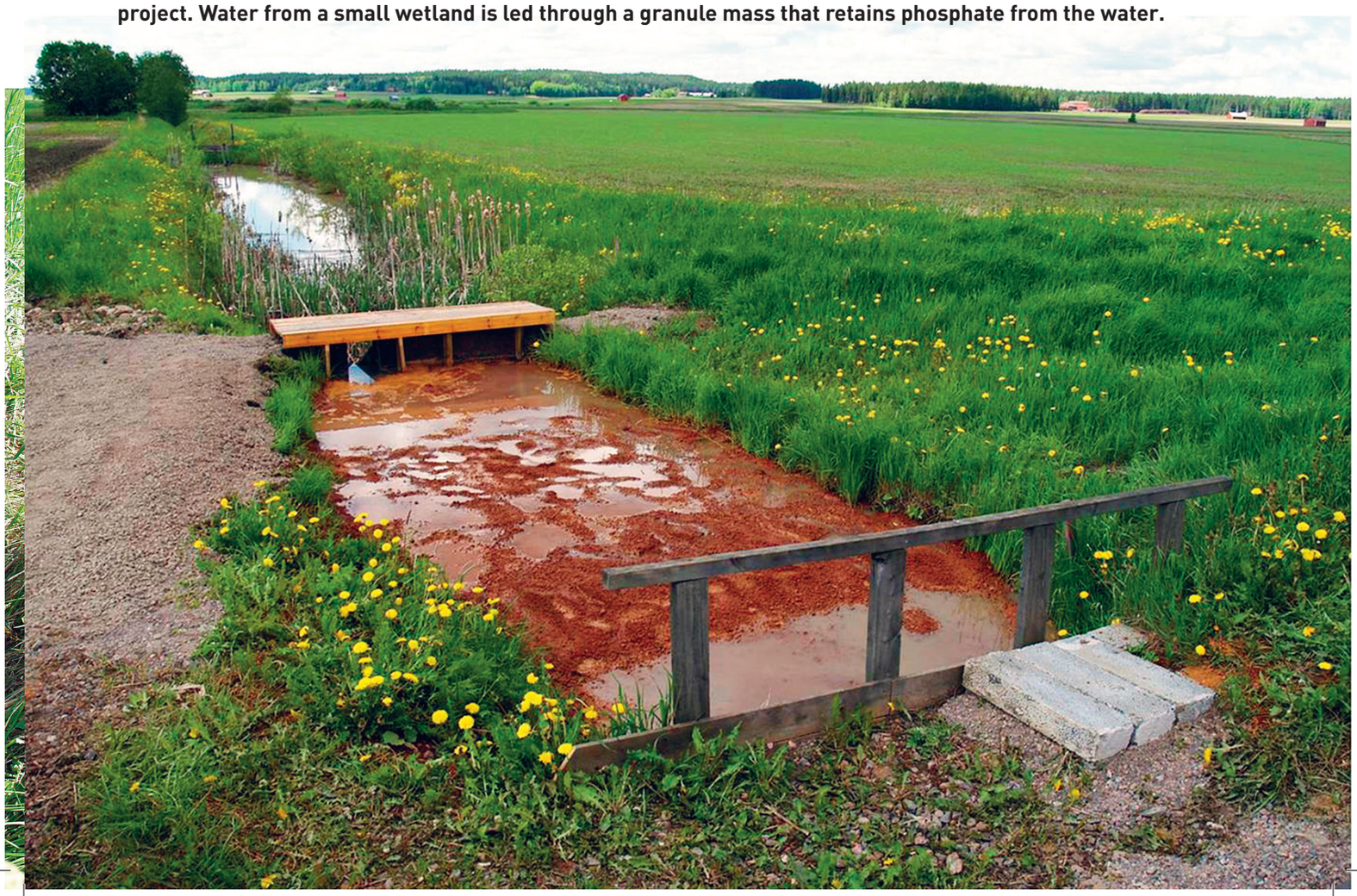
The Ferix-doser is primarily meant for treating high-phosphorus waters, because the economy of chemical stripping is strongly dependant on the phosphorus concentration in runoff.

Sachtofer PR granules

Reactive permeable barrier is ideally combined with a wetland that, to some degree, even out flow peaks. In the site located at the Elonkierto area, MTT has utilized an old dam construction and attached a perforated PVC-pipe into a pre-existing flow regulation structure (inlet pipe).

The inflow into this prototype buffer is from below, through the granule mass, and out of the buffer via a v-notch weir over the lower dam. The 6.5-m area between the dam structures is filled with about 6–7 m^3 (about 9 tn) of Sachtofer PR granules, and the theoretical phosphorus retention capacity of this granule volume exceeds 60 kg of phosphorus. If the granule buffer works as well as the laboratory tests suggest, this buffer would have an effective life-cycle of up to ten years.

Calcium-iron oxide buffer in Jokioinen, the first test site with boosted phosphate removal in the Active Wetlands project. Water from a small wetland is led through a granule mass that retains phosphate from the water.



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Partners of the project are:

- MTT Agrifood Research Finland, Jokioinen
- Finnish Environment Institute (SYKE); Research Department/ Research Programme for Integrated River Basin Management, Helsinki, Finland
- WWF Finland
- Turku University of Applied Sciences (TUAS)
- Estonian University of Life Sciences, Institute of Forestry and Rural Engineering, Department of Water Management
- Estonian Fund for Nature (ELF).

www.wwf.fi/activewetlands

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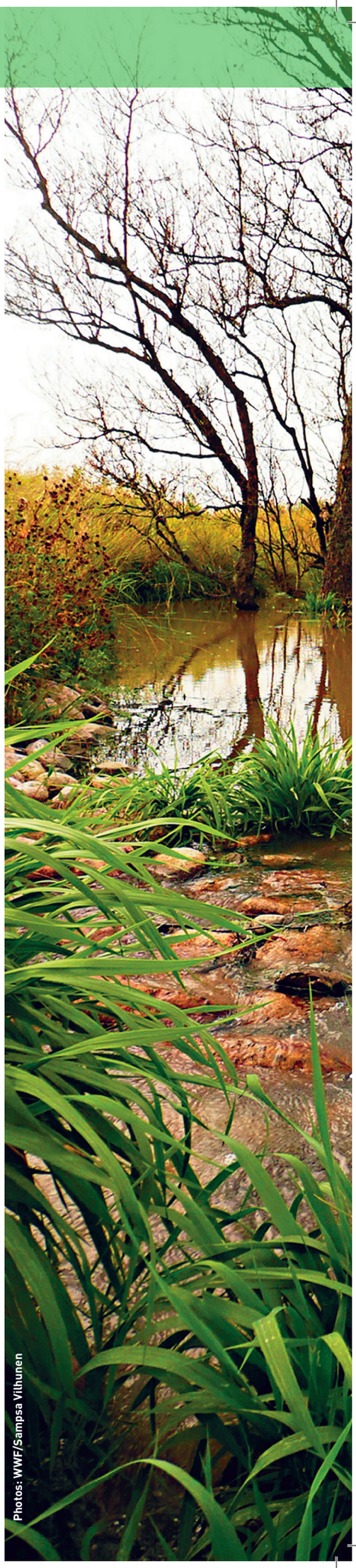

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