Wetland restoration benefits both climate and biodiversity

Restoration of drained wetlands is a highly relevant issue in Sweden. The GRIP on LIFE IP project takes a comprehensive approach to increasing knowledge about the benefits of restoration. The project also includes research and monitoring of the effects of restoration on both climate and biodiversity.

GRIP on LIFE's Martin Hederskog at the recently restored wetland next to the Sandvadsbäcken stream in southern Sweden. Birch trees, grasses, shoreline plants, and herbs thrive in the moist environment.
Photo: Richard Lindor

GRIP on LIFE IP is led by the Swedish Forest Agency and is a knowledge and capacity-building project running until 2026. The focus is on improving environmental considerations for watercourses and wetlands in the forest landscape while continuing active forest management. The goal is to improve the environment and conditions for animals and plants living in these habitats.

"An important area we work on is increasing the forestry sector's knowledge of restoration of watercourses and drained wetlands. To some extent, we also carry out physical restoration, but acquiring new knowledge through monitoring and research, and spreading that knowledge further is our mission in GRIP on LIFE. The restoration of watercourses and wetlands has significant positive effects on the environment," says Project Manager Gunilla Oleskog from the Swedish Forest Agency.

Multiple benefits of rewetting

Sweden is home to one of the world's largest wetland ecosystems, spanning 60 000 to 90 000 square kilometres. However, nearly a quarter of the original wetland area has disappeared over the past century. Historically—from the nineteenth century to the mid-twentieth century—this occurred mainly through drainage and the straightening or deepening of watercourses to increase the area of forest and agricultural land. Starvation and poverty made more land necessary for cultivation and people's livelihoods.

Today, wetlands lose their original function primarily because they become overgrown due to nitrogen deposition, the presence of old ditches, and fewer grazing animals, according to the Swedish Environmental Protection Agency.

"Functioning wetlands are among the most species-rich environments we have, and they play an important role in the ecosystem. There are many benefits to restoring wetlands, not least in terms of promoting biodiversity and the climate. Drained wetlands that contain peat can emit large amounts of greenhouse gases," explains Gunilla.

Reducing greenhouse gas emissions

The restoration of drained peatlands has become a highly topical issue in Sweden in recent years as part of the country's efforts to reduce greenhouse gas emissions. Although the area of drained peatlands only accounts for a few per cent of the total agricultural and forestry land area, the greenhouse gas emissions from these lands are significant. According to Sweden's reporting to the EU, emissions from drained peatlands used for agriculture and forestry amount to approximately 11 million tons of carbon dioxide equivalents annually.

"Net emissions from drained peatlands correspond to the emissions from Sweden's passenger car traffic each year," notes Åsa Kasimir, a docent at the University of Gothenburg, Sweden, and one of the country's leading researchers in the field of drained peatlands.

The need to restore wetlands is, in other words, substantial – even though this climate measure alone, according to experts, is not enough to achieve Sweden's climate goals.

"But rewetting is a very important climate action," she emphasises.

Landowners play a crucial role, as their willingness to restore is essential for implementing any measures, given the ownership rights over the land.

Gunilla believes that informing landowners about the importance of restoration is central. Much effort is put into this issue in the GRIP on LIFE project, including through various communication efforts and meetings with landowners. Information is also provided about the financial contributions that the state pays to landowners who are willing to restore wetlands. However, despite the need for restoration from a climate perspective being fairly well-known in Sweden, progress is slow.

"It is, of course, a concern that not as many landowners as we had hoped for have been interested so far. This can have various reasons, such as hesitation due to the administration, which many find complicated. Some landowners also think that the compensation for no longer being able to carry out the same forestry activities as before is too low," says Gunilla.

Increasing knowledge about restoration

Knowledge about how much greenhouse gases drained peatlands emit, which lands emit the most greenhouse gases, what the effects are after wetland restoration, and how to best plug ditches in drained peatlands is increasing over time. GRIP on LIFE contributes to this knowledge gathering. Together with the Swedish University of Agricultural Sciences, the project has financed and established a forestry demonstration and experimental area in Västerbotten County in northern Sweden, where research is conducted on ditch clearing, wetland restoration and ditches left without action. The measures are monitored to see how water quality and water flow are affected.

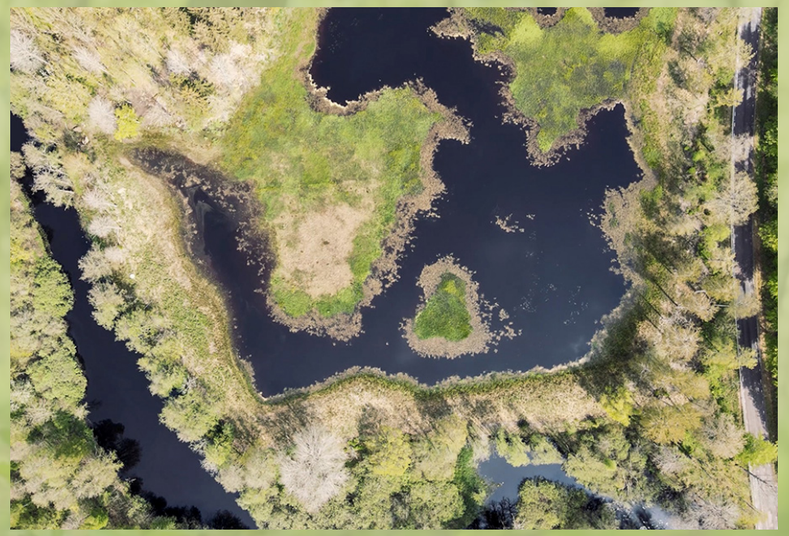
Since measurements and surveys began within GRIP on LIFE in 2018, a large number of external research projects have joined the experimental area. Among other things, studies are underway on the effects of the measures on greenhouse gases, mercury, vegetation and water flows.

GRIP on LIFE also funds research and monitoring of past wetland restoration efforts carried out in a previous project, Life to ad(d)mire. Åsa Kasimir, University of Gothenburg, has compared greenhouse gas emissions from restored mires with those from untouched mires in both southern and northern Sweden five to ten years after the restoration. One conclusion is that restored mires have greenhouse gas fluxes similar to untouched wet mires if water levels are similar.

When drained wetlands are restored in Sweden, it is common to choose a simple and cheaper method of plugging the ditches so that the water level slowly rises in the area. An alternative is to fill in the ditches with an excavator, but this is a more extensive and costly effort.

Equipment used to measure greenhouse gas emissions from both restored and untouched mires. Photo: Bitzer Productions AB

Tufted loosestrife (Lysimachia thyrsiflora) is an example of plant that thrives in the wetter environment. Photo: Richard Lindor



The Strågeryd wetland after restoration. The water level was high when the photo was taken. Photo: Bitzer Productions AB

"Since attention was drawn to the restoration of drained wetlands as an important climate measure, the need to find the best method for plugging ditches increased. We took note of this within GRIP on LIFE and established a test area where we can try different variants of ditch plugs," says Gunilla.

After several years of various trials in wetland environments, GRIP on LIFE's experts have identified several suitable methods that can be recommended based on the conditions of the individual site.

"Historically, methods have been used that we can no longer recommend as they, over time, give unsatisfactory results or use unsuitable materials. Unfortunately, we cannot say that 'one plug fits all.' But the benefit of our trials is that we now know which type of plug is suitable for which type of wetland environment," says Magnus Lindh, a forest consultant at the Swedish Forest Agency and coworker within GRIP on LIFE.

Restoration benefits biodiversity

However, it is not just the climate aspect that is in focus when the need for wetland restoration is highlighted; it is also important to consider the importance of biodiversity. About 10% of Sweden's red-listed animal and plant species depend on wetlands as a habitat. The animals and plants in wetlands are specially adapted to survive in their unique environment, leading to high species richness, though this varies between different wetland types.

After a wetland is restored, many species often return quite quickly. This is demonstrated by inventories conducted by Blekinge County Administrative Board, a partner in GRIP on LIFE, of the Strågeryd wetland. This wetland was restored in 2019, and after two years, there has already been a significant increase in wetland birds, vascular plants and day butterflies. In 2019, 24 different bird species were recorded; in 2021, the number was 34.

"We were pleasantly surprised to get such an incredible response after just two years. It will be very exciting to continue following this," says Therese Stenholm Asp from the County Administrative Board and theme leader in GRIP on LIFE.

This year, 2024, GRIP on LIFE is conducting another inventory of Strågeryd to compare the number of species before and after the wetland restoration. Inventories of birds, insects, vascular plants and amphibians have been ongoing throughout spring and summer and the results are being compiled. In the case of vascular plants, the compilation is complete and shows that the number of species has increased to 22, compared to ten species in 2019.

Collaboration with forest owners

Strågeryd wetland is owned by a private landowner, and their great commitment to getting the wetland restored was very important.

"The landowner's willingness to restore is key," emphasises Martin Hederskog, Wetland Coordinator at Kalmar County Administrative Board, who, among other things, works with restoration within GRIP on LIFE. Martin mentions the trust between the various stakeholders as very important for ensuring smooth cooperation.

"I believe that we have a high level of trust in each other, which has been built up over the years that GRIP on LIFE has been ongoing. Dialogue, knowledge and careful preparations are the cornerstones," he says.

In Kalmar County, GRIP on LIFE has developed a collaboration with Sweden's largest forest owner, the state-owned company Sveaskog, and restored several wetlands.

GRIP on LIFE has also developed a method to support private landowners in the process of restoring a wetland so that the result is the right wetland in the right place—a wetland that benefits both the landowner and society at large.

"Step one is that we provide tips and advice to landowners who have expressed interest in restoration at an early stage to facilitate the entire process. This includes, for example, informing them about the various state subsidies that are most suitable and informing them about different laws and regulations. We also make an assessment based on map data and, if necessary, visit the area to ensure that the site is suitable for restoration. Step two is about offering the landowner free advice," says Martin.

The method is currently only used within the Kalmar County.

"Hopefully, the approach will spread further," says Gunilla.

She continues: "Testing and evaluating methods is something we are heavily invested in within GRIP. Regarding wetland restoration, we are in the process of compiling a synthesis report based on the monitoring we have conducted on restoration efforts. We are all eagerly awaiting the results," she concludes.

An Introduction to GRIP on LIFE IP

https://youtu.be/SbtAKdslw54
(English subtitles are available).

Living Wetlands – The Road to Recovery

https://youtu.be/D7Bks5AUNAg
(English subtitles are available).

Peatlands and greenhouse gases

Wetlands with peat contain large amounts of carbon, but when drained, they shift from storing carbon to releasing carbon dioxide. Rewetting these wetlands can reduce emissions, as raising the groundwater level to just below the surface restores the conditions for the land to become a carbon sink again. Rewetting drained fertile peatlands offers the greatest climate benefit.

PROJECT NAME

GRIP on LIFE IP

PROJECT SUMMARY

In GRIP on LIFE IP, public authorities in Sweden work together with forest owners' associations, non-governmental organisations and researchers to improve environmental consideration of waters and wetlands in the forest landscape while continuing active forest management. Our goal is to improve the environment and conditions for animals and plants living in the forest's watercourses and wetlands.

PROJECT PARTNERS

GRIP on LIFE IP involves a total of 16 partners: Swedish Forest Agency, Swedish Environmental Protection Agency, Swedish Agency for Marine and Water Management, County Administrative Boards of Västerbotten, Jämtland, Västmanland, Jönköping, Kalmar, Blekinge, and Halland, The Wetland Foundation, Ume/Vindel River Fishery Advisory Board, Baltic Sea Water District Authority, Swedish Forest Associations Södra Skogsägarna, Mellanskog, and Norra Skog.

PROJECT LEAD PROFILE

The lead partner is the Swedish Forest Agency, the national authority responsible for forest-related issues. Its main function is to promote the management of Sweden's forests to meet forest policy goals. The forest policy places equal emphasis on two main objectives: production goals and environmental goals. The agency cooperates with forest industries and the environmental sector.

PROJECT CONTACTS

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