Nordic Council of Ministers

Exploring Rewetting Efforts in the Nordic countries

POLICY TOOLS AND MEASURES FOR SUCCESS

Contents

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Preface

This report has been commissioned by the Nordic Working Group for Environment and Economics (NME). The report has been prepared by Norion Consult.

NME has with this project aimed at taking stock of the situation with regard to rewetting activities in the Nordic countries. A special field of interest has been the application of policy instruments as part of the rewetting activities studied.

The Nordic countries share some common goals for their rewetting initiatives such as climate change mitigation, biodiversity conservation and water management. On the other hand national circumstances lead to differing specific priorities and implementation measures. The study reveals significant variations in how economic instruments are used for rewetting activities across the Nordics. Financing approaches for rewetting range from annual budgets to project-based compensations or reliance on EU funding. It seems clear that EU legislation will affect rewetting measures in the Nordic countries to an increasing extent in the future. Based on its findings the report presents a set of policy recommendations on rewetting activities.

Members of the Nordic Working Group for Environment and Economy have provided comments and inputs to the report during the work. The authors of the report are responsible for the content as well as the assessments and recommendations, which do not necessarily reflect the views and the positions of the governments in the Nordic countries.

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Magnus Cederlöf

Chair of the Nordic Working Group for Environment and Economics

Executive summary

This report examines policy instruments for rewetting and their impacts on wetland restoration across five Nordic countries: Denmark, Finland, Iceland, Norway and Sweden. The study synthesises the country-specific objectives that drive rewetting measures as well as their supporting economic instruments, policy evaluations and monitoring approaches, providing a cross-country comparison.

While the Nordic countries share the overarching goals for rewetting initiatives such as climate change mitigation, biodiversity conservation, and water management, national circumstances lead to differing specific priorities and implementation. Denmark prioritises emissions reduction and nutrient pollution control to improve water quality. Iceland adopts a carbon-centric rewetting strategy to meet CO_2e targets, with increased biodiversity as a co-benefit. Finland takes a more holistic approach, targeting biodiversity, water quality, and carbon emissions. Norway emphasises ecosystem restoration, while Sweden mainly focuses on climate mitigation effect, reflecting diverse approaches to sustainable wetland management across the region.

The study investigates economic instruments for rewetting efforts in each country, revealing significant variations in funding sources, allocation sizes, and target groups. Differences in policy priorities, land ownership, and political frameworks influence these mechanisms. Financing approaches for increased rewetting range from annual budgets to project-based compensations or reliance on EU funding.

The report highlights key challenges in transitioning rewetting measures from state-owned to private land, including underdeveloped compensation schemes for private landowners and limited understanding of the effectiveness of said funding schemes. In Denmark, policies focus on privately owned farmland, while in Finland, where there is extensive experience and well-structured rewetting programmes, state-owned drained forestry peatlands have mainly been prioritised so far. Icelandic policies emphasise agricultural land, primarily involving private farmers. In Norway, initial rewetting efforts focused on protected areas and focus has recently started to cover private lands as well. In Sweden, efforts are focused on privately owned forest land and municipal land, excluding agricultural areas from government priorities.

Evaluation and monitoring of rewetting policies and programmes across the five Nordic countries remain limited, with significant differences in approaches and reporting. In Finland, focus lies on monitoring water quality, hydrological effects, biodiversity and fish stocks. However, national statistics on total rewetted areas are missing. In Iceland, annual follow up reports on rewetting are published. In Iceland, the agencies are also exploring outsourcing monitoring to landowners, while the Swedish EPA has tasked a university with following up on the rewetting initiative since 2021. In Sweden, sub-evaluations of legal and economic barriers for rewetting have also been carried out which can offer insights for other countries. In Norway, the EPA aims to develop methods for calculating emission reductions and has conducted a socio-economic analysis of its wetland restoration plan. Across all countries, uncertainties in emission calculations, inconsistent methodologies, and limited funding for monitoring hinder comprehensive evaluation of the implementation of rewetting policies.

Recommendations

- Establish clear area-based targets with timelines and monitoring processes.
- Establish earmarked budgets for rewetting.
- Set monitoring requirements and provide guidance.
- Design policies for adaptive management.
- Strengthen incentives for private landowners.
- Invest in knowledge building.
- Use site mapping to guide measures.
- Involve and mobilise stakeholders.

Sammanfattning

Den här rapporten presenterar politiska styrmedel för återvätning och deras effekter på restaurering av våtmarker i fem nordiska länder: Danmark, Finland, Island, Norge och Sverige. Studien sammanställer de landspecifika målen som driver investeringar i återvätning, stödjande ekonomiska instrument samt utvärdering- och övervakningsmetoder.

De nordiska länderna har flera överlappande mål för återvätning, som att begränsa klimatförändringar, bevara biologisk mångfald och förbättra vattenförvaltning. Trots detta skiljer länderna sig åt i hur de prioriterar och genomför återvätning beroende på nationella förhållanden. I Danmark prioriteras minskade klimatutsläpp och minskad övergödning för att förbättra vattenkvaliteten. Island har en klimatcentrerad strategi för att uppnå CO_2e-mål, med biologisk mångfald som en sidoeffekt. Finlands återvätningsmål gör en holistisk ansats med biologisk mångfald, vattenkvalitet och klimatutsläppsminskning som fokus. I Norge betonas naturrestaurering, medan målen i Sverige huvudsakligen riktas mot att begränsa klimatutsläpp. Dessa mål återspeglar olika strategier för återvätning för att uppnå hållbar våtmarksförvaltning i Norden.

Studien undersöker de ekonomiska styrmedel som används för återvätning i de nordiska länderna och visar på betydande variationer i finansieringskällor, budgetstorlekar och målgrupper. Skillnader i politiska prioriteringar, struktur för markägande och politiska ramar påverkar dessa mekanismer. Finansieringsmetoder för ökad återvätning sträcker sig från årliga statliga budgetposter till projektbaserade ersättningar och EU-finansiering.

Rapporten belyser nyckelutmaningar i övergången från återvätning på statligt ägd mark till privat mark, till exempel underutvecklade ersättningsprogram för privata markägare och en begränsad förståelse för programmens effektivitet. I Danmark fokuserar man på att återväta privatägd jordbruksmark, medan man i Finland, där det finns mycket erfarenhet och välstrukturerade återvätningsprogram, hittills främst har prioriterat utdikad skogsmark som ägs av staten. I Island prioriteras jordbruksmark i återvätningsinsatsen. De norska återvätningsinsatserna fokuserades initialt på naturskyddsområden, och har på senare tid börjat riktas mer mot privatägd mark. I Sverige fokuseras insatserna på privatägd skogsmark och kommunal mark, medan jordbruksområden inte är en del av de statliga prioriteringarna.

Utvärdering och övervakning av återvätningspolitik och -program i de fem nordiska länderna är fortfarande begränsad. De metoder som finns för övervakning och rapportering är olika i de olika länderna. I Finland fokuserar man övervakning på vattenkvalitet, hydrologiska effekter, biologisk mångfald och fiskbestånd. Däremot saknas nationell statistik över storleken på återvätta områden. I Island utges årliga uppföljningsrapporter på återvätningsinsatsen och myndigheterna undersöker möjligheten att låta markägare ansvara för övervakningen för bättre resultat, medan man i Sverige har gett uppdrag till ett universitet att följa upp på återvätningsprogram sedan 2021. I Sverige har även delutvärderingar av juridiska och ekonomiska hinder för återvätning genomförts, vilka kan ge värdefulla insikter för andra länder. I Norge strävar Miljödirektoratet efter att utveckla metoder för att beräkna utsläppsminskningar och har genomfört en socioekonomisk analys av sin våtmarksrestaureringsplan. Det finns gemensamma utmaningar för uppföljning i de nordiska länderna så som osäkerheter i utsläppsberäkningar, inkonsekventa metoder och begränsade resurser för övervakning, vilket försvårar omfattande utvärdering av implementeringen av återvätningspolitik.

Rekommendationer

- Sätt tydliga arealbaserade mål med tidsram och övervakningsprocesser.
- Upprätta en öronmärkt budget för återvätning.
- Ställ krav och tillhandahåll riktlinjer för övervakning.
- Utforma policyer för adaptiv förvaltning.
- Stärk incitamenten för privata markägare.
- Investera i kunskapsuppbyggnad.
- Använd kartläggningsverktyg för att prioritera åtgärder.
- Involvera och mobilisera intressenter.

Acronyms

CAP	Common Agricultural Policy
CRF	Common Reporting Format
CSO	Civil Society Organization
EAFRD	The European Agricultural Fund for Rural Development
EEA	The European Economic Area
EPA	Environmental Protection Agency
ESR	EU's Effort Sharing Regulation
ETS	Emission Trading System
IPCC	Intergovernmental Panel on Climate Change
LIFE	EU Programme for the Environment and Climate Action
LONA	Lokala Naturvårdssatsningen
LOVA	Lokala Vattenvårdsprojekt
LULUCF	Land Use, Land-Use Change and Forestry
METSO	Forest Biodiversity Programme for Southern Finland
NINA	Norsk Institutt for Naturforskning
NOVANA	the National Monitoring Program of Water and Nature
NRL	Nature Restoration Law

1. Introduction

On a global scale, the Nordic region is rich in wetlands.[1] These lakes and wetlands maintain water quality, regulate groundwater levels and soil moisture, help mitigate floods, sequester carbon, and are habitat to rich biodiversity, such as high concentrations of birds, mammals, reptiles, amphibians, fish, and invertebrates as well as a diversity of plants.[2][3] The Ramsar Convention defines wetlands as areas of marsh, fen, peatland, or open water with a maximum depth of six meters. They can be natural, artificial, permanent, or temporary, with static or flowing water, fresh, brackish, or salt water.[4] Wetlands provide numerous essential ecosystem services such as pollution control, water purification, soil formation, nutrient cycling and recreational values.[5] Wetlands also provide great economic benefits, e.g., water supply, fisheries, wildlife resources, transport, recreation, and tourism. Finally, wetlands have special attributes as a part of the cultural heritage and religious beliefs.[6][7]

Wetlands have, through the anaerobic conditions, resulted in poor decomposition of organic material and subsequent peat accumulations, and have therefore been a significant historic carbon sink. These processes were however reversed when wetlands were drained during the last centuries, because lower water tables expose the organic matter to oxygen and thereby increase decomposition rates and CO_2 emissions. The degraded wetlands cause significant environmental deprivation and socio-economic issues such as soil degradation, increased fire risks and degradation of buffer zones vital to prevent flooding. Several factors must be carefully considered though, to ensure the positive impacts from wetlands. Hambäck (2024) highlights the importance of maintaining a diversity of wetland types within different landscapes to optimize their functions and benefits. The effectiveness of these functions depends on factors like location, design, and management, which can enhance different ecosystem services while potentially disadvantaging others.

Despite their diverse use, wetlands have long been considered unproductive since agricultural and forestry cultivation of these areas was difficult. But when these carbon-rich peatlands were drained during the 1800s and 1900s, these drained peatlands became productive agricultural lands. This was during a time when there was an urgent need for increased food production due to a growing population. The only option at the time, was to increase the area used for croplands. This resulted in a rapid expansion of drainage concentrated in Europe, the United States and China, causing a 21% global loss of wetlands between the 18th century until today. Peatland drainage for forestry reasons occurred much later during the 20th century to expand the forest industry. The highest global rates of wetland area loss happened in the mid-twentieth century when governments offered subsidy programmes to encourage wetland conversion to crop- and forestland. These programmes sped up the drainage of wetlands, resulting in a 50% total loss of wetlands in Europe.[8]

The long-term net effect of rewetting on greenhouse gas emissions is negative, meaning that

1. Lehner et al. (2022)
2. Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 Establishing a Framework for Community Action in the Field of Water Policy, EP, CONSIL, 327 OJ L (2000)
3. Marttila et al. (2022)
4. Ramsar Convention on Wetlands (2007*)*
5. Ramsar Convention on Wetlands (2018*)*
6. Ramsar Convention on Wetlands (2007)
7. Pascual et al. (2023)
8. Fluet-Chouinard et al. (2023)

carbon sequestration will offset greenhouse gas emissions when an area is rewetted. Rewetting effectively stops the emission of CO_2 due to the re-establishment of anaerobic conditions, which gradually prevent the decomposition of organic matter into CO_2. However, raising the water level starts the process of anaerobic decomposition, which releases methane, a greenhouse gas with much larger radiative effects than CO_2 but with a shorter lifespan in the atmosphere. However, studies have shown that the radiative effects of methane emissions from rewetting do not undermine the greenhouse gas mitigation potential of peatland rewetting. Therefore, postponing rewetting efforts only increases the long-term warming effect through continued CO_2 emissions.[9]

Drained peatlands are estimated to cause 4% of global CO_2 emissions.[10] In the EU, peatlands cover 7.7% of the land surface, yet the EU is the world's second-largest emitter of greenhouse gases from drained peatlands, producing 220 Mt CO_2e/year – around 15% of global peatland emissions and 5% of the EU's total GHG emissions (in 2017).[11] Among the top EU peatland emitters are Finland and Sweden. In most countries, drained peatlands account for over 25% of emissions from agriculture and agricultural land use.[12] Hence, rewetting initiatives are important to reduce EU greenhouse gas emissions. According to the Convention on Wetlands (2021), meeting the Paris Agreement objectives may require rewetting of virtually all drained peatlands.

The focus on wetlands has expanded in recent years as climate change has led to severe impacts following extreme weather events in the Nordic countries, such as flash floods, extreme precipitation, or wildfires caused by long dry periods. Also, heightened awareness of the biodiversity crisis has amplified the attention on wetlands, which serve as critical habitats for aquatic and terrestrial species. This is seen through the presence of numerous wetland species on the IUCN Red List of Threatened Species. Nevertheless, different wetland functions vary in effectiveness based on location, design, and management, leading to some services being enhanced while others may be disadvantaged. While wetlands are diverse and often provide synergies between ecosystem services, it's important to note that interests do not always overlap, and effective management will require navigating trade-offs to maximize benefits.[13]

Rewetting policy space in the Nordics

The Nordics have a long tradition of managing water resources, and some approaches have proven harmful to the natural wetlands. Due to more than two hundred years of expansion and intensification of agriculture and forestry, the Nordic wetlands are under significant pressure.[14] Despite a long list of regulatory global mitigation measures and international agreements and conventions, such as the Ramsar Convention, Kunming-Montreal Global Biodiversity Framework and the Bern Convention, wetlands are still highly threatened. Today, EU (European Union) laws and directives such as the Habitats Directive, the Water Framework Directive, the Land Use, Land-Use Change and Forestry regulation (LULUCF), the Common Agricultural Policy (CAP), the EU Strategy for Biodiversity and the Nature Restoration Law (NRL), form the wetland and rewetting policy space in the Nordic countries. NRL was adopted by the European Parliament in February 2024 and has been called the most significant piece of nature legislation in the EU since

9. Günther et al. (2020)
10. Convention on Wetlands (2021)
11. FACCE ERA-GAS (n.d.)
12. Greifswald Mire Centre **(n.d.)**
13. Stockholms universitets Östersjöcentrum (2024)
14. Marttila (2022).

the 1992 Habitats Directive.[15] The regulation is expected to significantly change rewetting policy space for European wetlands, as the targets are significantly more ambitious than previous, the legislation which will be crucial to restore biodiversity, support water scarcity and reach climate neutrality by 2050. NRL is also a key instrument to help the EU, and its member states meet international biodiversity commitments under the Kunming-Montreal Global Biodiversity Framework. As part of the legislation, each member state must within two years submit a draft national restoration plan, specifying the measures the country will put in place to fulfill the obligations and achieve the targets stated by the law. One major overall target is that at least 20% of all land and sea area should be restored by 2030, which must be specified with dedicated measures in the national restoration plan.[16] Another major target is that all EU countries must restore at least 30% of drained peatlands on agricultural land by 2030 (of which as least a quarter should be rewetted), 40% by 2040 and 50% by 2050 (where at least one-third of the area should be rewetted).[17]

There are diverse challenges and opportunities for rewetting drained peatlands in the Nordic region, which has encouraged the Nordic Working Group for Environment and Economy (NME) under the Nordic Council of Ministers to address the issue. This study assesses the political landscape of rewetting objectives and targets, looking into economic instruments in place and to what extent monitoring and evaluation of rewetting policy measures is conducted. By mapping and understanding the differences and similarities across the Nordics, the project aims to gain deeper insights into the region's status and knowledge of rewetting practices. The findings from this evaluation can help inform policymakers and how the Nordic countries can learn from each other and how rewetting can play a pivotal role in future environmental and climate policymaking.

The study was carried through in 2024 by Norion Consult. The authors are Linda Stafsing, Elvira Borgman, Sofie Kjøller Jørgensen, Laura Schou Bagh and Agnes Plesner Skårup. Quality assurance has been done by Rikke Fischer-Bogason.

15. Aubert et al. (2024)
16. Directorate-General for Environment (2024)
17. Regulation (EU) 2024/1991 of the European Parliament and of the Council of 24 June 2024 on nature restoration and amending Regulation (EU) 2022/869

2. Methodology

This study covers rewetting policies in five Nordic countries: Denmark, Finland, Iceland, Norway and Sweden. The Nordic autonomous regions: Greenland, Faroe Islands, and Åland Islands, are not included in the scope of the study.

The study has focused on national policies, strategies and roadmaps for rewetting practices and assessed whether there are targets or clear objectives associated with the rewetting work. Rewetting refers to raising the water level on wetlands that previously have been drained for production purposes, such as agriculture or forestry. Hence, the study does not include the establishment of new wetlands or restoration of wetlands that have not been drained.

2.1 Literature review

A literature review has been carried out, which focused on current strategies, policies, and action plans for implementing and strengthening rewetting initiatives. The focus here has mainly been on government reports, government budgets and regulation letters as well as national strategies for climate and biodiversity. Literature from research institutes and civil society organisations has also been included, such as publications by national Nature Conservation Society organisations, to ensure a broad understanding of the rewetting efforts and policies. Furthermore, the desktop study has focused on evaluations of implemented rewetting instruments, assessments of effects and social impacts. The literature has been mapped country-wise and assessed in a cross-Nordic context. The desk study has been systematically conducted through the following steps:

- Identification of relevant literature
- Criteria for short list of literature
- Review of selected literature

The review of the selected literature has been carried out country-wise, in three overarching categories: national policies and objectives, economic mechanisms for rewetting practices and rewetting policy evaluations and monitoring.

2.2 Interviews

Interviews with experts from each country have been conducted to support the analysis of rewetting policies in each country. For each country, between two and four interviews have been conducted with experts from governmental bodies or civil society organisations (CSOs). In total, twelve interviews have been conducted through the study. The interviews have been carried through based on a semi-structured interview guide. In Denmark, only one interview could be carried out, due to ongoing political negotiations during the fall in 2024 regarding new rewetting targets and regulations as part of the Green Tripartite Agreement. As a result, it was not possible to secure further interviews, as the relevant experts were engaged in these negotiations and the political landscape was undergoing significant changes during the preparation of this report. This has to the extent possible been captured in the report, based on the available official documents.

2.3 Sounding board

To ensure an independent expert review of the findings of this study, a sounding board has been installed, consisting of three researchers from Denmark, Norway and Sweden respectively. The sounding board members were Jan Vermaat, Research Dean at the Faculty of Environmental Sciences and Natural Resource Management and professor in Aquatic Ecology at the Norwegian University of Life Sciences, Peter Hambäck, Professor at the Department of Ecology, Environment, and Plant Sciences at Stockholm University, and Martin Rudbeck Jepsen, Associate Professor in Human Geography and Geoinformatics at the Department of Geosciences and Natural Resource Management**,** University of Copenhagen. These researchers are experts in wetlands and wetland practices in each country of belonging. Insights regarding rewetting in Finland and Iceland have to some extent been included through the sounding board. The members of the sounding board are part of several research projects regarding wetland evaluations, trade-offs and synergies among wetland ecosystem services as well as improved accuracy of national emission inventories and measurements of reduced greenhouse gas emissions. The sounding board has been part of suggesting key informants and institutions for the interviews. They have also contributed to the country analysis including rewetting policies and practices.

3. Rewetting policies across the Nordics

The following chapter outlines each of the Nordic countries´ policy landscape, objectives, strategies and economic instruments for rewetting, and to what extent rewetting is being monitored or evaluated. The chapter is divided per country, where each section is divided into three sub-sections describing:

1. National rewetting policies and objectives
2. Economic instruments for rewetting initiatives
3. Rewetting policy evaluations and monitoring

→ 4. Denmark

→ 5. Finland

→ 6. Iceland

→ 7. Norway

→ 8. Sweden

4. Denmark

The Danish policy landscape concerning rewetting measures is strongly rooted in agriculture policies. Agricultural land use consists of almost 60% of Danish land area[18] and approximately 5% of that area consists of drained peatlands used for agricultural production.[19][20] This corresponds to approximately 117,000 ha of agricultural land.[21] However, those 5% account for around one fourth of the total CO_2e-emission level in Danish agriculture.[22][23] The area estimates of peatlands and the associated emission factors for greenhouse gases have been updated as an effect of new research in 2024, which has concluded that peatlands were less widespread than what was presented in previous assessments.[24][25] Still, rewetting of peatlands is considered to have great potential for CO_2 mitigation, and their climate mitigation effect is the primary basis for the most recent rewetting measures in Danish policy. Moreover, rewetting measures are targeted towards mitigation of nutrient pollution of nitrogen and phosphorous to the water environment from agricultural production.

Through the Climate Act, the Danish government has committed to fulfil the objectives of the Paris Agreement[26]

- Reduction of greenhouse gas emissions in 2025 by 50–54 % compared to 1990 levels.
- 70 % reduction of greenhouse gas emissions in 2030 compared to 1990 levels.
- Climate neutrality in 2050.

It is moreover described in the Climate Act that the fulfilment of the climate goals should be carried out in the most cost-efficient way possible.

18. Danmarks Statistik (n.d.)
19. Beucher et al. (2023)
20. Miljøstyrelsen (n.d.-e)
21. Gyldenkærne & Callisen (2024)
22. Hansen (2024)
23. Gyldenkærne & Callisen (2024)
24. Møllgaard et al. (2024)
25. Gyldenkærne & Callisen (2024)
26. LBK nr 2580 af 13/12/2021. *Bekendtgørelse Af Lov Om Klima*

4.1 National rewetting policies and objectives

Danish agriculture has historically been regulated to protect and conserve the water environment. Since the 1980s, the Danish Aquatic Environment programme has focused on safeguarding Danish groundwater, freshwater bodies and coastal waters from nutrient pollution caused by agricultural practices. This has been regulated through measures such as regulations on fertilizer use.[27][28] Since then, the objective in regulating Danish agriculture has broadened from water protection to include the conservation of biodiversity, increasing natural habitats and decreasing CO_2 emissions. For this reason, rewetting is becoming more relevant as a policy tool in climate adaptation plans and biodiversity strategies and as a means to reach the overall climate goals and Danish obligations, both in the National Climate Act and EU obligations.[29][30] Since the Danish landscape is mostly agricultural land, rewetting as a measure is mostly discussed in the agricultural policy sphere.[31]

The main policies regulating rewetting in Denmark are presented in Table 1 below. The policies are further described below.

27. Grant & Waagepetersen (2003)
28. Miljø- og ligestillingsministeriet (n.d)
29. Regeringen (2022)
30. Miljøstyrelsen (n.d-a)
31. Landbrugsstyrelsen (n.d-d)

Name of policy	Kind of policy	Responsible actor	Source of funding
Agreement on a green transition of the agricultural sector, 2021. *Aftale om grøn omstilling af dansk landbrug*	Political Agreement between the Government parties and other Parliament parties	The Governmental Parties and supporting parties	State budget
River Basin management plans 2021-2027[32] *Vandområdeplaner 2021-2027*	Regulation of water management through LBK nr.126, especially §19 and §20 of law in water management[33] Initiation of projects to rewet 800 hectares of phosphorous wetlands.	The Danish Environmental Protection Agency	European Maritime, Fisheries and Aquaculture Fund (2021-2027) The European Agricultural Fund for Rural Development (EAFRD) Government Budget to the Danish Environmental Protection Agency
The Green Tripartite Agreement (2024)[34] *Aftale om et Grønt Danmark*	Trilateral voluntary agreement between the government and stakeholders to achieve goal of extensification and rewetting of 140 000 hectares agricultural areas.	The Danish Ministry for Green Tripartite	State budget The European Agricultural Fund for Rural Development (EAFRD)[35] Denmarks Green Land-use Fund (Danmarks Grønne Arealfond) Private funding
The Danish Nature protection Act[36] *Lov om naturbeskyttelse*	Regulation ensuring active measures to protect nature types. §2 describes obligation to re-establish e.g. wetlands	All official regulatory bodies	State budget

Table 1: Key policies governing rewetting in Denmark.

32. Miljøministeriet (2023)
33. LBK nr.126 of 26/01/2017, Chapter 6. *Bekendtgørelse af lov om vandplanlægning.*
34. Regeringen et al. (2024a)
35. Regeringen et al. (2024b)
36. LBK nr. 240 of 13/03/2019. *Bekendtgørelse af lov om naturbeskyttelse*

Agreement on a green transition of the agricultural sector

In 2021, the Danish Government made an Agreement on a green transition of the agricultural sector, setting a goal of taking land out of agricultural production and rewetting 50,500 hectares of agricultural land.[37] The area-based goals for rewetting have since been revised in the Green Tripartite Agreement (see section below), but the measures from the Agreement on a green transition of the agricultural sector are still in place. Through rewetting and other measures, the Agreement on a green transition of the agricultural sector aims to reduce the CO_2e emissions from agriculture and forestry by 1.9 million tons.[38] The main responsible actors in implementing rewetting instruments are primarily The Danish Agriculture Agency, the Danish Environmental Protection Agency and the Danish Nature Agency. They administer measures concerning private landowners and public management in the municipalities. The implementation of the agricultural agreement from 2021 has been followed up with progress reports in 2023, one in February[39] and one in June.[40]

A task force comprising diverse stakeholders has been established to address the challenges of removing agricultural soils from production, focusing on identifying and prioritising solutions to barriers that arise throughout the process.[41] In 2024, the task force published an overview of solutions for barriers to taking agricultural soil out of production.[42] The task force includes members from relevant ministries, municipalities and relevant industry stakeholders. In addition to the task force, an expert group for low-lying carbon-rich soils was established through the agreement. The expert group was provided a sum of approximately €402,000 for their operations each year in the years 2022, 2023 and 2024.[43][44] The expert group consists of members from relevant agencies and researchers and has published two reports, providing recommendations for how to take low-lying carbon-rich soils out of agricultural production quickly and successfully.[45][46] Based on the agreement, funds are annually allocated to a corps of consultants for takeout of agricultural soils for wetlands until and including 2027.[47]

River Basin Management Plans

The River Basin Management plans have been pointed out in the Agreement on a green transition of the agricultural sector as the main policy for the regulation of measures that are meant to limit nitrogen pollution of coastal waters. The measures have been termed '*kollektive virkemidler*' or collective measures.[48] These consist of four types of measures:

- Nitrogen wetland projects
- Lowland projects
- Mini wetland projects
- Private afforestation

37. Finansministeriet & Ministeriet for Fødevarer, Landbrug og Fiskeri (2021)
38. Finansministeriet & Ministeriet for Fødevarer, Landbrug og Fiskeri (2021)
39. Ministeriet for Fødevarer, Landbrug og Fiskeri (n.d)
40. Ministeriet for Fødevarer, Landbrug og Fiskeri (2023)
41. Landbrugsstyrelsen (n.d.-c)
42. Landbrugsstyrelsen (2024b)
43. Landbrugsstyrelsen (n.d.-c)
44. Finansministeriet & Ministeriet for Fødevarer, Landbrug og Fiskeri (2021)
45. Ekspertgruppen for udtagning af lavbundsjorde (2023)
46. Ekspertgruppen for udtagning af lavbundsjorde (2024)
47. Promilleafgiftsfonden (2024)
48. Miljøstyrelsen (n.d.)

Each of these wetland measures, and their funding mechanisms, are further described in the section on Economic instruments further down in this chapter. Private afforestation is not further described, as it is not relevant for rewetting.

The current River Basin Management plans run from 2021 to 2027.[49] They are financed primarily through EU funds (e.g. LIFE-project funding) and the Government Budget to the Danish Nature Agency.

The Green Tripartite agreement

As of 2024, the latest policy on rewetting measures is the *Green Tripartite Agreement*[50] (June 2024, agreement on implementation in November 2024). The agreement aims to achieve solutions for reducing greenhouse gas emissions from Danish agriculture, set up frameworks to decrease nutrient loading in water bodies and thereby reach the goals of the Water Framework Directive, and finally provide more area for nature and biodiversity, mainly through protected forest. The agreement is based on input from the Danish Government and stakeholders from agricultural organisations, nature conservation and industry organisations. It sets specific goals for how to increase the area of certain nature types in Denmark and the means to get there. Here, a pivotal tool is the aim of ceasing agricultural production on 140,000 hectares of drained peatlands and their buffer zones by 2030. Rewetting carbon-rich drained wetlands on agricultural land is expected to reduce emissions by 0.3 million tons of CO_2 emissions in 2030, and 0.8 million tons in 2032. This will mainly be accomplished by voluntary measures of private landowners, who will be financially compensated for the rewetting of their property. Apart from the government budget and the CAP, one of the main pillars that finance the Green Tripartite Agreement is the creation of the Green Land-use fund (Den Grønne Arealfond) financing the policy goals with €6 billion (see more under the section on Economic Instruments further down in this chapter).

Table 2 gives an overview of funding allocated for measures that may support rewetting in the Green Tripartite Agreement. As part of the agreement's implementation, the parties have agreed on budgets to remove low-lying, carbon-rich soils from agricultural production, implement nitrogen-reducing measures, and provide agricultural consultants to support the process of taking land out of agricultural production.[51] The first measure, removing low-lying carbon-rich soils from agricultural production, means that landowners get compensation for stopping agricultural production, and in many cases, the land is rewetted by blocking existing drains. The agreement also supports agricultural consultants for supporting landowners and municipalities in these processes. The third measure, the Framework for nitrogen-reducing measures, is a common pool for different types of measures, including strategic land acquisition for larger land areas, such as parts of watersheds or areas that can be restored to lakes. This can support land acquisition by private actors, such as funds, to cooperate to secure larger nature areas. These three measures all contain rewetting projects to some degree. However, it is not known to what extent rewetting specifically will be a part of these budget shares.

49. Miljøministeriet (2023)
50. Regeringen (2024)
51. Regeringen et al. (2024a)

Funding	2024	2025	2026	2027	2028	2029	2030	Total
Remove agricultural production on low-lying carbon-rich soils	53.6	281.5	324.3	324.3	194.4	80.4	67	**1,325.7**
Agricultural consultants for taking out land from agricultural production	1.3	1.3	1.7	5.4	0	0	0	**9.4**
Framework for nitrogen reducing measures	126.3	160.8	285.1	288.7	269.7	265.2	259.4	**1,666.2**

Table 2: Funding (million euros) for measures supporting rewetting under the Green Tripartite Agreement. The funding categories are not exclusively for rewetting but include it as one of the tools. This list is not exhaustive; other funding sources may also contribute to rewetting projects. [52]

The Nature Protection Act

The Nature Protection Act plays a role in rewetting policy as it sets the framework for the expropriation of land for rewetting purposes. It is stated in the Act that:

"§ 2 The powers of the Act must also be used to combat sand drift and increase the forest area, as well as restore wetlands and river valleys, which must contribute to improve the water environment." [53]

The Act authorises the Danish Ministry of Environment to expropriate land outside of urban areas to restore wetlands or river dales to decrease nutrient leaching. The authorisation can also be given to municipalities. Since the Danish government practice voluntary approaches to rewetting, the expropriation based on the Nature Protection Act is not currently used as a measure.

52. Regeringen, Socialistisk Folkeparti, Liberal Alliance, Det Konservative Folkeparti, & Radikale Venstre. (2024b).
53. *LBK nr 927 af 28/06/2024. Bekendtgørelse Af Lov Om Naturbeskyttelse*

4.2 Economic instruments for rewetting initiatives

The main overall instrument of rewetting measures in Denmark consists of subsidy schemes for both municipalities and private landowners. These schemes are both directed towards projects for establishing wetlands on local/municipal level as well as funding for initiating projects on larger scales.[54] As Table 3 illustrates, most funding schemes are partly financed by funding measures within the European Union.

Instrument	Responsible authority	Total amount	Who does it apply to	Land type
Funding for water- and climate projects 2024 and 2025[55][56] ***Vand- og klimaprojekter***	The Danish Agricultural Agency	€36.2 mio. (2024) €36.9 Mio. (2025)	Municipalities and local departments of the Danish Nature Agency	Agricultural and other productive land
Funding for Climate-Lowland[57] ***Klima-Lavbundsprojekter***	The Danish Environmental Protection Agency	€19.7 mio. (2024)	Municipalities, private landowners, funds	Agricultural and other productive land
Funding for mini wetland projects	The Danish Agricultural Agency[58]	€.18 mio. (2024)	Private landowners	Agricultural
Denmark's Green Land-use Fund (Danmarks Grønne Arealfond)	The Ministry for Green Tripartite	Total of €6.03 billion for all measures	Not yet specified.	Not yet specified.
Tax on CO_2e emissions from agricultural soil.	The Ministry for Green Tripartite	€ 3.5/tons CO_2e	Agricultural holdings	Agricultural

Table 3: Overview of economic instruments for rewetting in Denmark

54. Miljøstyrelsen (n.d-d)
55. Landbrugsstyrelsen (n.d-e)
56. Landbrugsstyrelsen & Miljøstyrelsen (2024)
57. Miljøstyrelsen (n.d-b)
58. Landbrugsstyrelsen (2024a)

Funding for Water- and Climate Projects 2024 and 2025

Funding for Water- and Climate Projects 2024 and 2025[59] is a funding scheme for projects concerning the rewetting of drained peatlands for municipalities and local departments of the Danish Nature Agency. It is administered by the Danish Agricultural Agency. The water and climate projects are a part of the Danish CAP-plan 2023–2027 and are primarily financed through the EU via the European Agricultural Fund for Rural Development (EAFRD).[60] The funding scheme supports four types of measures:

- **Nitrogen wetland projects**
    1. Nitrogen wetland projects are often constructed near the coast. The main aim of these wetlands is to reduce nitrogen emissions to fjords and coastal waters.
    2. The total grant sum for Nitrogen wetland projects is around €25 million in 2024 and expected to be similar €25 million in 2025.[61]
    3. Nitrogen wetland projects are financed 80% through EAFRD and 20% through national funds from the Ministry of Food, Agriculture and Fisheries.
- **Lowland projects**
    1. The main aim of lowland projects is to reduce greenhouse gas emissions from soils with high carbon content. Lowland projects can also contribute to reducing emissions of nitrogen to coastal waters, and to enhance ecological conditions.
    2. The total grant sum for Lowland projects is €6.7 million in 2024 and is expected to be € 33.5 million in 2025.
    3. Nitrogen wetland projects are financed 100% through EAFRD.
    4. The Environmental Protection Agency have developed methods to calculate the expected effects of lowland projects on nitrogen, phosphorous and CO_2 emissions. The calculation sheets are available online on their website.[62]
- **Phosphorous wetland projects**
    1. Phosphorous pollution is the main cause of eutrophication in Danish lakes, and phosphorous wetland projects aim at reducing phosphorous emissions to the freshwater environment.
    2. The total grant sum for Phosphorous wetland projects is €1.9 million in 2024 and expected to be €1.7 million in 2025.
    3. Phosphorous wetland projects are financed 80% through EAFRD and 20% through national funds from the Ministry of Food, Agriculture and Fisheries.
- **Projects about watershed restoration**
    1. Watershed restoration projects are large-scale projects meant to restore natural hydrology and enhance conditions for fulfilling environmental goals
    2. The total grant sum for watershed restoration projects is €2.4 million in 2024 and expected to be similar € 2.4 million in 2025.
    3. Watershed restoration projects are financed 80% through EAFRD and 20% through national funds from the Ministry of Food, Agriculture and Fisheries.

59. Landbrugsstyrelsen (n.d-e)
60. Landbrugsstyrelsen (2021)
61. Landbrugsstyrelsen & Miljøstyrelsen (2024)
62. Miljøstyrelsen (n.d.-d)

All projects go through a preliminary study before they are implemented, to examine the potential positive and negative effects of rewetting the specific area. Nitrogen wetland projects, lowland projects and phosphorous wetland projects can be very similar in their implementation, but they are separated in the application process. The Environmental Protection Agency states that the wetland measures implemented through Water and Climate projects can also contribute to flooding mitigation as they can hold more water.

Recipients of the funding scheme are compensated for all expenses related to the preliminary study and the project implementation, including technical surveys, consultant services, and materials.[63] Landowners can choose to sell the land to the Agricultural Agency at an agreed price or to keep the land and receive economic compensation for loss of value (værditabskompensation), or economical one-off compensation (engangskompensation). In compensation for loss of value, landowners are compensated for any loss of value resulting from the extensification of land and its potential conversion to wetter conditions as part of a project. The Danish Agricultural Agency determines the loss of value for each area based on several conditions, calculating it individually for every plot included in the project zone. One-off compensation is another option for landowners choosing to keep the project land. The one-off compensation builds on pre-determined compensation rates, which vary depending on whether the land has been used for intensive or extensive agricultural production in the time up until the project period. For Water and Climate projects 2024–2025, the compensation is €11,060 per hectare for intensively cultivated agricultural land such as areas used for crop production, and €4,759 per hectare for nature areas and grassland, with or without grazing animals.[64][65] Landowners are also able to request compensational land instead of economic compensation, meaning that the state supplies another land area that the landowner gains ownership of.

Economic compensation for the project is disbursed after the project has been carried out, and a final report is submitted together with a request for reimbursement of expenses. The project period is set to a maximum of four years for the project implementation, and a maximum of two years for the preliminary study.

Funding for Climate-lowland projects

Climate-lowland project funding support projects that take agricultural land out of production in carbon-rich wetlands to support CO_2 reduction.[66] They are also meant to support goals for nature, good water quality and climate adaptation. The overall policy about climate-lowland projects were subject to an environmental impact assessment from the Environmental Protection Agency before the decision of their implementation.[67]

Grants can be given to municipalities, private landowners, national park foundations, and foundations that support nature, environment or climate. Moreover, the Nature Agency can carry out climate-lowland projects. All projects go through a preliminary study before they are implemented, to examine the potential positive and negative effects of rewetting the specific area. To qualify for grants in a specific project area, the area must meet the following criteria:

1. Soil composition: At least 60% of the project area must consist of organogenic soil with a minimum carbon content of 6%.
2. Size requirement: The total area must be at least 10 hectares.

63. Landbrugsstyrelsen & Miljøstyrelsen (2024)
64. Landbrugsstyrelsen & Miljøstyrelsen (2024)
65. Landbrugsstyrelsen (2024c)
66. Miljøstyrelsen (n.d.-b)
67. Miljøvurdering af klima-lavbundsindsats, 2020/2021

The compensation for Climate-lowland projects is based on pre-determined compensation rates. The rates are the same as for Water and climate projects, so the funding schemes do not compete. This means that the compensation rates are €11,060 per hectare for intensively cultivated agricultural land such as areas used for crop production, and €4,759 per hectare for nature areas and grassland, with or without grazing animals. Just as for the Water and climate projects, compensation can be received after the project, when a final report is submitted.

The Environmental Protection Agency and the Agricultural Agency have developed a map tool with all land areas in Denmark, mapping the areas that are relevant for the funding schemes for Climate-lowland projects and Lowland projects. The map platform is publicly available for all at www.udtagning.dk developed in cooperation with The Danish Environmental Portal.[68]

Funding for Mini wetland projects[69]

Private landowners can apply for funding for mini wetland projects through a specific pool of funding at the Ministry of Agriculture.[70] The scheme is partially funded by the EU under the Danish CAP plan, with additional support for maintenance and area compensation from national funds from the Ministry of Food, Agriculture and Fisheries. In 2024, approximately € 18 million are available for mini wetland projects.

Mini wetlands are small, constructed wetlands which consist of components like sedimentation basins, deep basins, and shallow vegetated zones, which work together to filter sediments and remove nitrogen and phosphorus from water. The size requirement for the wetland depends on the drainage basin of the wetland and can therefore vary.

Many mini wetland projects may not be considered as rewetting as their placement is determined by nitrogen reduction capacity, and not by the placement of historical wetlands. It is a requirement from the funding scheme that projects are coordinated with larger rewetting projects.[71]

Denmark's Green Land-use Fund

The Green Land-use Fund, implemented through the Green Tripartite Agreement, is a dedicated financial resource aimed at accelerating land conversion in the Danish landscape, from productive agricultural land to nature areas or less intensive agriculture such as pasture.[72] In terms of rewetting, the purpose of the fund is to strengthen the existing efforts and support the state's ability to strategically acquire agricultural land ahead of lowland projects. In this way, the state can also to a greater extent provide replacement land. This can help ensure that lowland projects can be implemented more quickly. The Green Land-use Fund will also support increased land consolidation, facilitated distribution processes where landowners can buy or exchange land areas. Through the land consolidation processes, the government and municipalities can also buy land from private landowners.[73] It is however outlined in the Green Tripartite Agreement that it is not an ultimate goal for the Danish Government to own more land through the Green Land-use Fund, but that the fund is put in place to facilitate land re-distribution, strategic land acquisition and resale.[74] Moreover, measures implemented through the Land-use Fund should not be more attractive than existing funding schemes (described above), or than selling land at market conditions.

68. Miljøstyrelsen & Landbrugsstyrelsen. (n.d.)
69. Landbrugsstyrelsen (2024a)
70. Landbrugsstyrelsen (n.d.-)
71. Landbrugsstyrelsen (n.d.)
72. Regeringen et al. (2024a)
73. Landbrugsstyrelsen (n.d.-a)
74. Regeringen et al. (2024b)

Tax on CO_2e emissions from agricultural soil

Through the Green Tripartite Agreement from 2024, the Danish government has decided to implement a tax on greenhouse gas emissions from low-lying carbon-rich soils. The aim of the tax is to provide incentives for landowners to enter rewetting projects through the above-mentioned funding schemes. Landowners that take part in these projects will therefore be exempted from paying the tax. The tax is based on calculations made in the Green tax reform proposal in 2024.[75]

The proposed tax for greenhouse gas emissions from organogenic low-lying soils is €3.5/tons CO_2e.[76] The tax will be revisited by the parties behind the Green Tripartite Agreement in 2027, where there will be an evaluation of whether the tax should be increased to reach the goal of ceased production on 140,000 hectares of low-lying carbon-rich soils before 2030.[77]

Details regarding the implementation of the tax are not in place as of November 2024 and will be decided on in forthcoming political agreements.

4.3 Rewetting policy evaluations and monitoring

In general, there are no large-scale monitoring efforts of the environmental and climate effects of rewetting policies in Denmark. The measures which are directed towards rewetting agricultural soils are followed up through monitoring of the rewetted area. There is currently no large-scale monitoring of the greenhouse gas emissions, nutrient load and ecological effects of these rewetting projects. There are a few pilot projects that have monitored or evaluated specific effects of rewetted areas through research projects.

Monitoring rewetting area-based goals

In Denmark, there are some overarching efforts to monitor the area-based goals of rewetting. Since the Agricultural Agreement in 2021, The Environmental Protection Agency, The Agricultural Agency and the Nature Agency have continuously followed up on their respective efforts to rewet peatland agricultural soils in Denmark. This is reported as the area (hectares) of lowland projects that are in the pre-investigation phase, under implementation, or finished.[78] The reporting has so far been carried out approximately once per year. Results from the reporting are presented in Table 4.

75. Svarer et al. (2024)
76. Regeringen et al. (2024a)
77. Regeringen et al. (2024b)
78. Landbrugsstyrelsen (n.d.-b)

Type of project	2022, September	2023, November	2024, May
Nitrogen wetland projects	0	2,641	3,590
Lowland projects in preliminary study phase	15,562	31,433	43,369
Lowland projects under implementation	530	4,368	9,059
Established lowland projects	187	187	187

Table 4: Overview of area (hectares) in lowland projects and nitrogen wetland projects.[79]

As seen in Table 4, projects covering over 40,000 ha in total have gone through a preliminary study, while projects covering only 187 ha in total are established. According to the Agricultural Agency, the project period from preliminary study to actual establishment of the wetland usually takes between four and seven years, which may be an explanation for the low wetland establishment so far.

The Environmental Protection Agency also reports on the implementation of nitrogen-reducing efforts from The Agricultural Agreement from 2021, and the prior policy, the Food and Agricultural Package from 2015. The nitrogen-reducing efforts (collective measures) are implemented through the River Basin Management Plans and cover the four funding schemes for nitrogen wetlands, lowland projects, mini wetlands and private afforestation. The Environmental Protection Agency reports on the number of projects applied for, approved and implemented, and the expected nitrogen emission reduction from these projects.[80] Since project applications and approved projects count towards the reduction goals it is difficult to figure out the actual reduction in nitrogen emissions from this reporting.

Monitoring through research projects

In several cases, the Danish agencies have entered into partnerships with research institutions to monitor the effects of rewetting measures on nutrient emissions, biodiversity, climate adaptation potential, and greenhouse gas emissions.

A research project focusing on the water and nutrient balances of 12 restored wetlands was performed between 2018 and 2022.[81] The monitoring was carried out by Aarhus University through the National Monitoring Program of Water and Nature (NOVANA). Based on the monitoring, the researchers calculated the nutrient retention potential for each of the wetlands. The results showed that the studied restored wetlands are effective in retaining or removing nitrogen primarily through plant uptake and denitrification, although retention rates and efficiency vary due to factors such as nitrogen load and climatic conditions such as precipitation rates and winter temperatures. Phosphorus retention also exhibits significant variation, with some areas achieving high retention rates while others experience losses. Over half of the

79. Landbrugsstyrelsen (n.d.)
80. Miljøstyrelsen (n.d.-c)
81. Hoffmann et al. (2021)

monitored wetlands retain total phosphorus, and many areas successfully retain phosphate, though some re-established lakes lose organic phosphorus.

Another project which started in 2019 also focuses on measuring nutrient balances in three project areas. The project is run by Aarhus University and University of Southern Denmark. The project has specific focus on phosphorous emissions from newly established wetlands. Monitoring began prior to the initiation of the projects and will continue for a number of years following the rewetting of the sites.[82]

Aarhus University, University of Southern Denmark and the Geological Survey of Denmark and Greenland have also been awarded funds from the Climate-lowland scheme in 2020 to carry out eight research projects on the nutrient balance, biodiversity, climate adaptation and greenhouse gas emissions from rewetted agricultural soils. As a result of this, a report on prioritization of biodiversity in restoration of lowland soils was published in 2023.[83] The study used the bioscore, a national biodiversity metric based on red-listed species and habitat data, to examine the biodiversity potential of rewetting. It revealed that most agricultural fields hold low biodiversity value, with 96% falling into categories 9–11 (category 12 has the lowest expected positive effect on biodiversity). Meadows and fens exhibit relatively higher biodiversity values but still show a substantial portion in lower categories. While the climate benefits of rewetting are immediate with regards to CO_2 emissions, biodiversity improvements may take time without proactive restoration efforts such as hydrology regulation, grazing, and nutrient management. The study underscores the need for a strategic approach to maximize the synergistic benefits for both climate and biodiversity.

Another report examining the climate adaptation potential of rewetting lowland soils was published the same year.[84] The study concluded that rewetting of low-lying soils typically has minimal climate adaptation potential in Denmark, as the areas selected for these projects often receive substantial upstream water flow relative to the rewetted area's capacity. The impact is further limited by saturated soils during winter, when high water flows occur, reducing the potential for additional water retention. While some upstream areas show potential for moderate flow reductions, significant retention of upstream water would require larger-scale interventions, such as dams or floodplain restoration. Moreover, the evaluation concluded that detailed hydrological models are essential to accurately assess the effects of rewetting projects, and GIS mapping can help identify areas where further modeling could be beneficial.

82. Miljøstyrelsen (n.d..d)
83. Brunbjerg et al. (2023)
84. Schneider et al. (2023)

4.4 Concluding remarks

Denmark's rewetting policies represent a deliberate response to the dual challenges of mitigating greenhouse gas emissions and reducing nutrient pollution from agriculture. With agricultural peatlands contributing disproportionately to national GHG emissions, the rewetting measures align with an ambition to fulfil national and EU climate objectives, notably the targets of the Danish Climate Act and the Water Framework Directive. However, the success of these efforts is dependent on voluntary participation from private landowners and the availability of significant public funding, highlighting the reliance on cooperative, rather than mandatory, frameworks. Compensation schemes play a large role in the Danish rewetting policy landscape, and the funding assigned for these schemes will increase in the coming years. Meanwhile, the implementation of a CO_2e emission fee on low-lying carbon-rich soils will be implemented to provide stronger incentives to enter the voluntary compensation schemes.

The effects of rewetted areas on climate, biodiversity and surrounding environment in Denmark are not extensively monitored or evaluated. The area-based targets put in place through political agreements are, however, followed up on.

5. Finland

As much as one-third of the total land area in Finland is covered by mires and peatland, constituting 9.3 million hectares. Mires encompass various types, including bogs. The peat layers vary significantly between regions, with those in the southern areas being notably thicker than those in the north. Due to the large peatland areas, Finland has a peat industry that covers 1.2 million hectares. Peat is used for energy and heating and sold as sphagnum for horticultural and environmental use.[85] Almost 6 million hectares of peatland are drained for forestry purposes. The drainage of peatlands disrupts water flow, degrades water quality, and increases nutrient runoff from the soil.[86] Most drainages occurred between 1960–1980, mainly for forestry reasons to improve tree growth and intense peat mining for fuel. Compared to Sweden, e.g., drainage took place much later in Finland, so machines were used to a larger extent than digging by hand. This has caused deeper ditches in a more methodological pattern. Due to this, the environmental effects have been worse compared to neighbouring countries. As a result of the historical situation on drainage of peatland fields and the subsequent severe environmental impact, Finland has a long history of restoration of peatlands. The ongoing restoration programmes have several objectives, including climate, biological, and hydrological.[87]

The following sections will describe the Finnish policy landscape for rewetting. The assessment does not cover rewetting policies and funding programs for rewetting in Åland Islands.

5.1 National regulations and policies

Finland's main objectives for rewetting can be divided into two distinct focuses. For agricultural peatlands, the primary goal is to reduce greenhouse gas emissions. In contrast, rewetting forestry lands primarily aims to protect and enhance biodiversity and improve water quality. The Finnish government has committed to reaching carbon neutrality by 2035, with a commitment to transition to negative carbon emissions thereafter. A central element in Finland's climate policy is the new Climate Change Act from 2022, which outlines the targets and trajectory for Finland to become carbon neutral by 2035 and emission targets for 2040 and 2050.[88] In the 2022 update, the act has been extended to address emissions from the land use sector, including forestry, and agriculture. For the first time, the act also included a specific goal to enhance carbon sinks.[89] Part of the Climate Action Plan is a roadmap for agricultural peatlands, where rewetting is

85. Vitranen (2012)
86. Nieminen et al (2010)
87. Laudon et al. (2022)
88. Republic of Finland State Treasury (n.d)
89. Ministry of Agriculture and Forestry (2023)

pointed out as a measure to efficiently reduce emissions from the land. The Ministry of Agriculture and Forestry is responsible for the act. An overview of the policies is shown in Table 5 below.

POLICY	KIND OF MEASURE	RESPONSIBLE ACTOR	TYPE OF LAND
Government Report on the Climate Plan for the Land Use Sector[90]	A climate plan for the entire land use sector, including agriculture, forestry and other land use. Includes actions to convert peatland fields into climate wetlands.	Ministry of Agriculture and Forestry	Agriculture and forestry
Medium-term report on Climate Change Policy Plan (2022)[91]	Outlines projected change in land use until 2040. Amount of peat fields that should be rewetted	Ministry of Environment	All land types.
National Climate Change Adaptation Plan 2022[92]	Wetlands and mires are mentioned as one of the key environments to have rapid impact on climate change.	Ministry of Agriculture and Forestry	All land types.
National Forest Strategy 2025[93]	Thick peatlands are described as important for carbon sinks and the importance to restore drained peatlands.	Ministry of Agriculture and Forestry	Forestry land.
CAP Strategic Plan Finland 2023–2027[94]	Five-year plan for the agricultural sector. First time carbon sinks and restoration of wetlands of agricultural land is included.	Ministry of Agriculture and Forestry	Agriculture land
National Action Plan for the conservation and sustainable use of biodiversity in Finland 2013–2020[95]	New action plan is currently underway. Main objective to halt loss of biodiversity by 2020.	Ministry of Environment.	Forestry land.

Table 5: Key policies governing rewetting in Finland

90. Ministry of Agriculture and Forestry (2023)
91. Ministry of the Environment (2022)
92. Ministry of Agriculture and Forestry (2014)
93. Ministry of Agriculture and Forestry (2019)
94. Ministry of Agriculture and Forestry (2022)
95. Government of Finland (2012)

The Climate Plan for the Land Use Sector

The Climate Plan for the Land Use Sector will be part of the planning system under the Climate Change Act. The plan contains both an implementation and monitoring plan to measure the impacts. The implementation plan will be monitored in the annual climate change reports to the Parliament. The plan also includes climate wetland investments, where cultivated peatland fields are transformed into wetlands or bog-like areas. The plan takes a point of departure in overall climate objectives and lists all different measures targeted to land use change and CO_2 emissions from agriculture and forestry. The key principle in developing the plan has been to prioritise measures in the most cost-effective way to achieve the climate targets. Measures 7.4.2 and 7.4.4 focus on wetland investments to convert peatland fields into so-called climate wetlands, while Measure 7.4.5 outlines a plan to develop a utilisation roadmap for peatland fields, including wetlands, as part of the strategy. These measures are described below.

Measure 7.4.2 "*Climate wetland on peatland fields*" is funded through the CAP (Common Agricultural Policy) and supports so-called "non-productive wetland investment", where CO_2 emission reductions are one of the targets. The policy instrument is part of the current CAP plan, which runs from 2023–2027. According to the plan, the goal is that 4,000 hectares will be turned into climate wetlands by 2030 and 7,500 hectares in 2035. The projected annual emissions reduction is estimated to be 0.07 million tonnes CO_2e in 2030 and 0.13 million tonnes CO_2e in 2035. The responsible authorities for the measure are the Ministry of Agriculture and Forestry, the Finnish Food Authority, and the Centers for Economic Development, Transport and the Environment (ELY).

Measure 7.4.4 "*Wetting low-yield, thick-peat fields and cut over peatlands to establish climate wetlands"* is funded directly through the government budget. Thick peat fields can enable more cost-effective emission reductions compared to low-peat fields, as they contain higher carbon concentrations, allowing for sustained emissions over a longer period. The plan states a target that 30,000 hectares of the so-called low-yield, thick-peat fields or cut-over peatlands should be taken out from production and rewetted to climate wetlands by 2035. The action is estimated to reduce CO_2e emissions by 0.175 million tonnes by 2030 and another 0.175 million tonnes by 2035. The responsible authority is the Ministry of Agriculture and Forestry.[96]

Measure 7.4.5 outlines the plan to develop a **roadmap for the utilisation of peatland fields**. The roadmap aims to clearly define how to make the best use of peatland fields from a climate perspective. The roadmap will define the different types of peatlands, and their properties, and assess their potential climate impact from peatland fields. The responsible authorities to feed in with knowledge to the roadmap are the Ministry of Agriculture and Forestry, Ministry of Economic Affairs and Employment, Ministry of the Environment, Finnish Food Authority, Geological Survey of Finland, Natural Resources Institute Finland and Finnish Meteorological Institute.

National Action Plan for Conservation and Sustainable Use of Biodiversity

The Finnish Ministry of Environment is responsible for the National Action Plan for Conservation and Sustainable Use of Biodiversity (2013–2020) as well as a mid-term report on the Climate Change Policy Plan towards carbon neutrality, published in 2022. The National Action Plan for Biodiversity is currently being updated and is expected to be completed by the end of 2024. The

96. Ministry of Agriculture and Forestry (2023)

Action Plan serves as a national guiding document for the restoration of forestry peatlands, outlining only a broad national objective. The strategy does therefore not contain specific actions or policy instruments put in place to achieve the targets.[97] The forestry sector has included elements from the Action Plan in the overarching National Forest Strategy for the Industry until 2025, where drained peatlands are included in rewetting initiatives.[98]

The mid-term report on carbon neutrality

The mid-term report on carbon neutrality outlines the projected change in land use until 2040, where around 11,600 hectares of peatland fields with a water level between -5 to 10 cm should be rewetted. The report further explains how the current CAP plan supports the establishment of climate wetlands on agricultural land. The support for rewetting under the CAP plan compensates for non-productive investments, meaning the land cannot be used for production once rewetting has been carried out. The support covers the conversion of peatland fields into wetlands or swamp-like areas. The peatland fields should contain at least 40% organic matter in the tillage layer.[99] Emissions from climate wetlands are reported annually as part of the national monitoring program and are classified under their own category. The estimated impact of reduced emissions from the land use sector is 0.1 Mt CO_2-eq in 2030 and another 0.1 Mt CO_2-eq in 2035.[100]

The National Climate Change Adaptation Plan, National Forest Strategy and CAP Strategic Plan

The National Climate Change Adaptation Plan, National Forest Strategy and CAP Strategic Plan are general steering documents for peatlands and wetlands. However, these documents do not provide guidance on the amount of land, or which land should be prioritised, nor do they specify actions to ensure the rewetting and restoration of wetlands. Instead, they should be regarded as strategic policy documents for forestry and agriculture, outlining overarching development plans for these sectors.

5.2 Economic instruments for rewetting initiatives

Finland has structured its funding schemes for rewetting into different programmes that run between 5–10 years at a time. It is only the CAP plan from the EU that is not funded through government money. The funding can be divided into four different schemes, that is, both for private landowners in agriculture and forestry but the main part of the government funding is directed to rewetting on protected state-owned land. It has, however, been difficult to get an overview of the funding opportunities and the different programmes running at the same time, since there is no centralised responsibility delegated to any of the involved parties. The rewetting efforts are, therefore perceived to be scattered between different stakeholders and a comprehensive approach is lacking.

97. Government of Finland (2013)
98. Ministry of Agriculture and Forestry (2019)
99. Ruokavirasto (n.d)
100. Ministry of the Environment (2022)

Funding scheme	Responsible authority	Amount of funding	Maximum support level	Who can apply	Land type
CAP aid for non-productive investments on peatland fields [101]	Ministry of Agriculture and Forestry	€60 million for program period 2023–2027. Not an exact figure for rewetting investments.	> 0.5 ha wetland possible to receive up to €12,000/ha 0.3–0.5 ha wetland possible to receive max €4,100/ha	Farmers	Agri-cultural land
METSO programme – Southern Finland[102]	Ministry of Agriculture and Forestry	€9 million annually[103]	Compensation depending on type of agreement and length of time.	State-owned land and private forest owners	Forestry land
Helmi Habitat programme[104]	Ministry of Environment and Metsähallitus (Parks and Wildlife department)	Annual rewetting practices € 1.7 million [105]	n/a	Mainly state-owned and protected land. To some extent private landowners.	Forestry land
Wetting low-yield, thick-peat fields and cut over peatlands to establish climate wetlands[106]	Ministry of Agriculture and Forestry	€30 million for 2023 to 2025. From 2026 onward €20 million annually	n/a		Agri-cultural and forestry land

Table 6: Overview of rewetting funding schemes in Finland.

101. European Commission (n.d)
102. Gummerus-Rautiainen et al. (2021)
103. Ministry of Agriculture and Forestry, expert on METSO and HELMI program, personal communication, November 15, 2024
104. Gummerus-Rautiainen et al. (2021)
105. Ministry of Agriculture and Forestry, expert on METSO and HELMI program, personal communication, November 15, 2024
106. Ministry of Agriculture and Forestry (2023)

CAP Plan

Since 2023, rewetting initiatives have been part of Finland's CAP Strategic Plan. This marks the first time economic support has been made available for converting cultivated peatland soils into wetlands. The programme runs from 2023–2027 and around €60 million is allocated to rewetting measures. The Ministry of Agriculture and Forestry manages the funds from the EU Commission and is responsible for making the national plan and measures. The implementation of the CAP plan, which includes agreements with farmers, follow-up and monitoring as well as the compensation payments, is handled by Ruokavirasto, the Finnish Food Authority. The Food Authority maintains direct contact with farmers and, for specific implementation and control matters, collaborates with municipalities or operates at the regional level.

Compensation covers costs for converting cultivated agricultural peatland into wetlands. Compensation is eligible for "non-productive investments" under the environmental compensation scheme, meaning the area covered by the agreement can no longer be used as agricultural land. If the wetland area exceeds 0.5 hectares, the maximum compensation is €12,000 per hectare. However, for smaller wetland areas between 0.3 and 0.5 hectares, the maximum compensation is €4,100 per hectare. In addition, an agreement on the management of wetlands is also agreed upon between the owner and the Ministry of Agriculture and Forestry. The farmer is also eligible to receive an annual payment of €500 per hectare for managing the land in the years following its establishment. There is however no further compensation for production losses from converting the land.[107]

According to the Ministry of Agriculture and Forestry, there were no applications during the first year (2023) and only a handful during 2024. Extensive information sharing and knowledge building on rewetting and wetland restoration are essential to motivate farmers and clarify the changes in the CAP, the funding scheme, and the associated environmental and climate benefits. Since the programme operates in five-year cycles, farmers face significant uncertainties about compensation and contract arrangements once the programme period ends. The Ministry of Agriculture and Forestry emphasises the need for clearer political support from the Finnish government. Investments in broader information sharing, public awareness campaigns, and earmarked funds from the state budget are essential to ensure long-term compensation for rewetting agreements beyond the CAP programme's end. The Ministry notes that such measures have not yet been implemented due to a lack of dedicated resources for effective communication and advisory efforts. Allocating these funds could reduce uncertainties significantly and potentially encourage more farmers to participate in rewetting agreements.

Wetting low-yield, thick-peat fields and cut-over peatlands

As part of the Government's report on the Climate Change Plan for the Land Use Sector, measure 7.4.4, titled "Wetting low-yield, thick-peat fields and cut-over peatlands to establish climate wetlands," is funded directly from the government budget. A total of €30 million has been allocated for the period 2023 to 2025, with an annual allocation of €20 million from 2026 onwards. These funds will be used to compensate landowners for repurposing their land for carbon storage. In total, 30,000 ha is targeted to be withdrawn from production and rewetted. The land will no longer be classified as agricultural land. Geospatial methods will be employed to identify and prioritise suitable areas. The funding is administered through the Ministry of Agriculture and Forestry.[108]

107. European Commission (n.d)
108.Ministry of Agriculture and Forestry (2023)

Helmi Habitat programme

The Helmi Habitat Programme is a government-funded initiative managed by the Ministry of the Environment and implemented by the Parks and Wildlife Department at Metsähallitus. Running from 2021 to 2030, the programme is a direct continuation of the National Biodiversity Action Plan, which ended in 2020. Its primary goal is to enhance biodiversity protection and prevent ecosystem degradation. One of the focus areas of the Helmi programme is the restoration of peatlands, mainly focused on state-owned protected land, but also voluntary restoration on private land is undertaken, although to a lesser extent. In the restoration programme, drained ditch lands are refilled with water, and the pristine landscape and tree stand are recreated to the best possible extent. Small dams are also constructed to regulate water flows. The programme aims to restore 60,000 hectares of peatland until 2030, everything is solely on voluntary basis.[109]

METSO programme

The METSO programme[110] is a voluntary conservation initiative for Southern Finland, managed by the Ministry of Agriculture and Forestry. The program has run in several periods since 2008, the last period running from 2021 to 2025. The program involves agreements between forest owners and the state, allowing landowners to voluntarily participate in nature conservation efforts. The forest owner can either sell the land to the state for permanent preservation or the forest owner can agree on temporary conservation for either 10 or 20 years. The forest owner is compensated for both the lost value of the land and a compensation value equivalent to the lost value of the timber. For the permanent protection programme, the compensation is tax-free, and all nature management costs are funded by the government. The programme has set clear area-based targets for its current period, which ends in 2025, but the programming period will continue for another five years until 2030 with new clear objectives and targets. By 2025, 96,000 hectares of forest are to be designated as either permanent or temporary nature reserves. Additionally, another 82,000 hectares should be protected through fixed-term environmental forestry subsidy agreements or managed and restored through specific nature management projects. However, it has been challenging to determine the total funding allocated to the METSO Programme for this period, as well as how close to the hectare target, the programme is so far.

Helmi and METSO are similar programmes with significant synergies and cooperation between them. The key difference between the two programmes lies in their focus areas. METSO targets forests on mineral soils that are closer to their natural state, while Helmi is dedicated to restoring drained peatlands to improve their ecological status. METSO is managed by both the Ministry of Agriculture and Forestry, and the forestry department at Metsähallitus. Helmi is coordinated by the Ministry of Environment and the Parks and Wildlife department at Metsähallitus. Focus lies on both state-owned protected land and privately owned land but divided between the stakeholders. Both programmes collaborate closely to ensure that different habitats are assessed and considered holistically, to ensure synergies and connections between areas.[111]

109. Gummerus-Rautiainen et al. (2021)
110. METSO (n.d)
111. Gummerus-Rautiainen et al. (2021)

5.3 Rewetting policy evaluations and monitoring

Roadmap for the Use of Agricultural Peatlands

As part of the Catch the Carbon programme, funded by the government and organised through the Ministry of Agriculture and Forestry, a project titled "Roadmap for the Use of Agricultural Peatlands" was initiated. Running from 2023 to 2024, the project developed a roadmap for the utilisation of peat fields, assessing their economic, environmental, and land-use impacts across Finland for the years 2035, 2040, and 2050. This initiative is part of the broader implementation of the government's Land Use Sector Climate Plan, aimed at achieving carbon neutrality by 2035. Led by LUKE, the Finnish Natural Resources Center, the project was a collaborative effort involving farmers, the food industry, and municipalities. While it was scheduled for completion by the end of October 2024, the final roadmap was not yet been made available as of November 2024.[112]

Helmi Habitat Programme

The Helmi Habitat Programme runs from 2021 to 2030, with the annual rewetting of land reported each year. The first evaluation of the programme will be done in 2025, and a final evaluation will be conducted in 2030 after the programme period ends.[113]

METSO Programme

The METSO Programme is evaluated regularly by Luke. The most recent review, conducted in 2022, detailed the programme's progress since its launch in 2008 and outlined an action plan for 2025. The report also included data on the total hectares restored each year and cumulatively since the programme's inception. However, the report outlines the results for the whole program, which includes different kinds of nature restoration efforts, apart from rewetting. It has therefore not been possible to find any reporting specifically on rewetting efforts linked to the program. Furthermore, it is stated that a significant part of the restoration measures is also reported in the Helmi Habitat programme, there will therefore be overlaps. The goal of the current METSO programme period until 2025 is to restore 96,000 hectares of forests, and by the end of 2022 93% of the target had been reached. It is however stated that there is a need for increased funding towards the end of programme period to reach the target.[114]

Peatland Group of the Finnish Board on Ecological Restoration

To our understanding, a lot of the monitoring and evaluation from restoration efforts in Finland is conducted through the Peatland Group of the Finnish Board on Ecological Restoration, which is an expert group consisting of researchers from universities and research institutes, as well as civil servants from the Ministry of Environment and Metsähallitus Parks and Wildlife department. The expert group focuses on ecological restoration of forestry drained peatlands, especially protected areas. The group has several purposes, the main ones being design of monitoring schemes to study the ecological effects of restoration and providing guidelines for peatland restoration. Another important purpose of the expert group is to bridge knowledge and expertise between

112. Natural Resources Institute Finland (n.d)
113. SYKE, the Environmental Research Institute, personal communication, November 22, 2024
114. Anttila et al (2023)

research and practical management.[115] The expert group also conducts primary research themselves on peatland restoration, and publishes research articles regularly, to report on the effects. It has therefore not been evident to get an overview of the monitoring and evaluation being conducted for the different restoration programmes running. The latest article being published was in late November 2024 called "*Restoration of forestry drained boreal peatland ecosystems can effectively stop and reverse ecosystem degradation".* The study covers 151 different sites, representing six different ecosystem types. The sites have been studied for ten years in a row and shows that not restoring leads to further degradation of the ecosystems, but restoration can stop and reverse that trend. The authors conclude though, that the ten-year period is still too short to capture the full effects from restoration. But variabilities across ecosystem types and outcomes over time can still be seen. The authors stress the need for more evidence-based evaluations of restoration efforts.[116] Another quite recent collection of Finnish restoration literature can be found in a report from Kareksela et al. 2021.[117]

General knowledge on the long-term climate effect

In an interview with the Parks and Wildlife Department, national conflicts related to rewetting activities were discussed. Especially two uncertainties were highlighted – the long-term climate effect on climate objectives and shifts in the job market. For over 30 years, the Finnish government has been restoring drained peatlands in protected areas to rehabilitate ecosystems, enhance biodiversity, and improve water quality. Due to Finland's long history with rewetting, research and monitoring of climate effects have been prioritized to understand the impacts. The short- and long-term climate effects from rewetting are quite well understood, but the immediate climate warming effect and its impact on short term climate objectives are uncertain. Metsähallitus notes significant uncertainty around the immediate warming effect of rewetting and its implications for global warming in the short term. This immediate effect is not currently accounted for in Finland's national climate objectives for 2035. As a result, the near-term impact of rewetting initiatives on Finland's emission targets remains uncertain.[118]

Uncertainties in job market

Estimates from Metsähallitus' forestry division suggest that approximately 3,600 jobs within the forestry sector could be lost due to rewetting practices. However, job creation in restoration management must also be considered to provide a balanced view, despite the anticipated market shift from forestry to restoration activities. Rewetting on forestry land conflicts with timber production, which is a significant export commodity for Finland. Goods from the forest sector account for one-fifth of the country's total exports. The overall effect of rewetting on GDP and the broader economy, however, remains uncertain, which is why these estimates should be.[119]

115. Metsähallitus (n.d)
116. Elo et al. (2024)
117. Kareksela et al. (2021)
118. Metsähallitus, personal communication, November 20, 2024
119. Metsähallitus, personal communication, November 20, 2024

5.4 Concluding remarks

In general, it can be noted that Finland is very active in peatland restoration and rewetting practices and has been for several decades. It was only in the early 2020s that rewetting became part of the national climate objectives, and since then, it has played a significant role in government-funded research projects and monitoring efforts. Rewetting has nevertheless played a significant role in policy objectives since long before climate objectives, to improve water quality and enhance biodiversity across the country. Finland has set clear targets for rewetting both for emission reduction purposes and for hydrological and biodiversity purposes. The programmes are funded by the government and set dedicated targets for how many hectares of land should be rewetted, as well as what type of land should be prioritised. Both forestry and agricultural land is part of the government funding, however, due to the large extent of forests in Finland, forestry areas are the main target for rewetting drained peatlands. Rewetting agricultural land to reduce emissions is an exception, as it is exclusively covered by the CAP funded directly by the EU Commission. However, the allocation of funding in five-year periods has raised concerns, as uncertainty about the structure of future funding discourages farmers from committing to rewetting practice

On a final note, it can be concluded that Finland has a long tradition of monitoring effects from rewetting peatlands. From interviews with Metsähallitus and SYKE, who both are active in restoration activities, there is a pretty good understanding of the effect of rewetting activities on different types of land in different parts of the country. The climate effects – initial warming followed by subsequent cooling – are well monitored and evaluated. However, it remains uncertain how recent and upcoming rewetting initiatives will influence overall emission reduction targets to achieve climate neutrality by 2035.[120][121]

120. Metsähallitus, personal communication, November 20, 2024
121. SYKE, the Environmental Research Institute, personal communication, November 22, 2024

6. Iceland

Iceland's inland wetlands span an estimated 9,000 km², accounting for roughly 20% of the nation's vegetated land area.[122] Drained wetlands are estimated to account for up to two-thirds of Iceland's greenhouse gas emissions; across the country, drainage trenches extend for approximately 34,000 kilometres.[123] Wetlands are found in various states of degradation, with approximately 50% having been disturbed, mainly due to agricultural activities. Like other Nordic countries, Icelandic governments have since the 1940's encouraged farmers to drain wetlands for agricultural purposes, starting with fields for cultivation followed by large-scale draining of pastures.[124] Historically, governments, including Danish and Icelandic authorities, have played a significant role in financing the drainage of wetlands. Grants covered approximately 65–70% of costs for much of the twentieth century, primarily to enhance agricultural productivity and welfare, particularly for Icelandic farmers.[125] However, since 2016, the focus has shifted, and wetland restoration has become a part of the political climate strategy.[126]

Iceland aims to become among the first carbon-neutral countries by 2040, and to reach this goal the following climate objectives have been outlined:

1. Reduce greenhouse gas emissions by 55% by 2030 compared to 1990 levels.[127]
2. Reduce emissions from sectors not covered by the European Trading Scheme by 35–46%.[128]
3. Increase carbon sequestration through land use changes.[129]

6.1 National rewetting policies and objectives

Iceland has established a number of regulations and policies to support rewetting as part of its broader climate strategy, aiming to enhance sustainable land use, reduce greenhouse gas emissions, and promote biodiversity. The administration of wetland restoration in Iceland involves multiple entities. The Ministry for the Environment, Energy, and Climate oversees wetland restoration strategies, while the Ministry of Food, Agriculture and Fisheries manages forestry and land restoration projects following a 2021 restructuring. Implementation of rewetting projects is

122. Arnalds et al. (2016)
123. Nordic cooperation (n.d.)
124. Stjórnarráð Íslands (2016)
125. Guðnadóttir & Guðmundur (2004)
126. Umhverfis- og Auðlindaráðuneytið (2016)
127. Barðadóttir (2024)
128. Icelandic climate council (n.d.)
129. Umhverfis- og Auðlindaráðuneytið (2020).

carried out by Land and Forest Iceland, a consolidation of the Icelandic Soil Conservation and Forestry Agency established in 2024.

The overall budget earmarked for wetland restoration is unclear, as it is difficult to separate from other restoration activities. However, during the last term, the government allocated an additional €173,000 annually for wetland rewetting.

Table 7 outlines the most relevant policies for rewetting in Iceland which are described further in the subsequent sections.

POLICY	KIND OF MEASURE	RESPONSIBLE ACTOR	SOURCE OF FUNDING
Iceland's Climate Action Plan 2020 *(Aðgerðaáætlun í loftslagsmálum)*	Action plan	Ministry of the Environment, Energy and Climate	State budget
Iceland's Climate Action Plan 2024 *(Aðgerðaáætlun í loftslagsmálum)*	Action plan	Ministry of the Environment, Energy and Climate	State budget
National Planning Strategy (2024) *(Landsskipulagsstefna)*	Planning strategy tool for managing all planning in Iceland and its content.	Government of Iceland	State budget
National Strategy for land restoration and forestry (2022–2031) *(Land og líf - Landgræðsluáætlun og landsáætlun í skógrækt)*	Voluntary funding scheme – individuals, companies, or organisations	Ministry of Food, Agriculture and Fisheries	State budget
Five years action plan for land restoration and forestry *(Land og líf - Landgræðsluáætlun og landsáætlun í skógrækt Aðgerðaáætlun í landgræðslu og skógrækt 2022-2026)*	Voluntary funding scheme – individuals, companies, or organisations	Ministry of Food, Agriculture and Fisheries	State budget

Table 7: Key policies governing rewetting in Iceland.

Iceland's 2020 Climate Action Plan

Iceland's 2020 Climate Action Plan emphasises wetland restoration to reduce greenhouse gas emissions. In the plan, restoration of wetlands has been estimated to contribute with a decrease of greenhouse gas emissions corresponding to 107 tons CO_2e.[130] It is assumed that the annual reduction of emissions through reduction of wetlands is 20 tons CO_2e/ha.

The Climate Action Plan set an ambitious target to increase wetland restoration from an average of 45 hectares annually (2016–2018) to more than 500 hectares in annually in the years 2019–2022.[131] However, progress has been slow, with only 166 hectares restored in 2021, falling short of the target and reflecting the significant challenges in achieving these goals.[132]

In total, a minimum of €0.31 billion was set to be spent on key climate action in the period 2020–2024 (Iceland's 2020 Climate Action Plan, 2020).

Iceland's 2024 Climate Action Plan

The Climate Action Plan was revised in 2024. The new Climate Action Plan is structured into four sections:[133]

- Community emissions (based on the EU's Effort Sharing Regulation (ESR).
- Trading system (based on EU's Emissions Trading System (ETS).
- Land use (LULUCF).
- Cross-sectoral actions (financial and social actions for systemic change).

Each section contains a number of actions, including timeline, responsible authority and status for these actions. The LULUCF section focuses on greenhouse gas emission reductions from land use and features two actions on wetland restoration:[134]

- L.1.B.1. Rewetting state-owned land. This measure will contribute to the area-based goal of rewetting until 2030. The Ministry of Food, Agriculture and Fisheries is responsible for the action.
- L.1.B.2. Creating a carbon credit methodology to encourage restoration. This action is meant to provide framework and incentive for private parties to contribute with funding to wetland projects. Development of the methodology is carried out 2023-2025 by the Ministry of Food, Agriculture and Fisheries.

The Icelandic government has actively discussed rewetting state-owned land in recent years. However, no decision has been made to dedicate public land for this purpose.[135] The main reasons cited are existing regulations mandating the use of public land for agricultural purposes and ongoing conflicts between governmental agencies.

130. Umhverfis- og auðlindaráðuneytið (2020)
131. Umhverfis- og auðlindaráðuneytið (2020).
132. Hauksdóttir, I. (2022)
133. Umhverfis-, orku og loftslagsráðuneytið (2024)
134. Umhverfis-, orku og loftslagsráðuneytið (n.d.)
135. Ministry of Food, Agriculture and Fisheries, personal communication, November 13, 2024

National Planning Strategy

The Iceland National Planning Strategy for 2024–2028, also known as *Landsskipulagsstefna,* provides a framework for land management and spatial planning under the Planning Act. Adopted by Parliament, this strategy promotes responsible land use while safeguarding natural landscapes and cultural assets. Wetland protection and restoration are integrated into spatial planning requirements, and the strategy outlines the implementation of these policies to prevent environmental degradation and overuse. The strategy aligns land-use planning with sustainable development objectives.[136]

National Strategy for land restoration and forestry

The National Strategy for land restoration and Forestry, Land og Líf, outlines a comprehensive land-use framework for 2022–2031 developed by the Ministry of Food, Agriculture, and Fisheries. This strategy identifies wetland restoration as a key objective, targeting the restoration of 5,300 hectares by 2026 and 15,600 hectares by 2031. These targets represent approximately 6% of currently disturbed wetlands and are expected to reduce emissions by an estimated 310,000 tons of CO_2 equivalents.[137]

Five years action plan for land restoration and forestry

To support the National Strategy for land restoration and forestry, the strategy includes a five-year Action Plan for Soil Conservation and Forestry, which comprises 27 actions. Among these, Action 4.6 is dedicated to rewetting drained wetlands to achieve the 15,600-hectare goal.[138]

Economic instruments for rewetting initiatives

The main economic instrument for rewetting in Iceland is grants for restoration of wetlands, targeted at private landowners Table 8. Currently, the Ministry of Environment are also looking into developing a Carbon Credit Standard for rewetting, in order to direct private funding towards rewetting projects.

Funding scheme	Responsible authority	Total amount	Maximum support level	Who can apply	Land type
Grant for restoration of Wetlands	Land and Forest	Unknown	Unknown	Private landowners	Directed towards agricultural land

Table 8: Funding schemes for rewetting in Iceland.

136. Alþingi (2024)
137. Matvælaráðuneytið (2022)
138. Stjórnarráð Íslands (2022)

Grant for restoration of wetlands

Land and Forest Iceland manages grants for restoration projects based on applications submitted by landowners, including individuals, companies, and organizations.[139] Applications are submitted through an online portal.[140] Once a project application is approved, Land and Forest Iceland carries out a site assessment, mapping the area and planning the rewetting method. A contract is established between Land and Forest Iceland and the landowner, stating that the landowner keeps ownership of the land, and that the wetland restoration activities should continue for 20 years.[141] Land and Forest Iceland then applies for development permit from the relevant municipality, and if this is granted, organizes restoration activities through entrepreneurs.[142] The grant from Land and Forest Iceland covers costs for the municipal permits and for the actual wetland construction. The landowner does not get compensation for the land. After completion of the construction phase, restoration sites are monitored and re-evaluated one year later to measure progress and ensure effectiveness.[143]

Very few applications from landowners for wetland restoration were received during the term of the grant.[144] Instead, officers from Land and Forest Iceland enter dialogue with landowners and assist them in the grant process. Few applications and large workload for the Land and Forest Officers has resulted in leftover economic funds in the grant program the past grant periods. Unused funds for rewetting may have been redirected to other purposes in the Ministry of Environment.[145]

Developing a Carbon Credit Standard for Wetland Restoration

Currently, the state is supporting the development of a carbon credit methodology for wetland restoration, as highlighted in Iceland's Climate Action Plan, action L.1.B.2.[146] This methodology will set criteria for restoration projects to qualify for the issuance of carbon credits, enabling landowners to access private financial compensation for rewetting. The initiative draws on the success of a similar approach in forestry, where the Icelandic Forest Service adopted a UK carbon credit standard (UK carbon code) for reforestation and afforestation. A comparable framework for wetlands is expected to accelerate rewetting efforts, as many companies and individuals are waiting for carbon credit opportunities to engage in these projects.

The work on developing the standard is scheduled to be finished in 2025. The state aims to finalise the standard and allow the private market to lead its implementation, fostering wider participation and upscaling of restoration activities to meet Iceland's climate goals.[147]

139. Island.is (n.d.)
140. Island.is (n.d.)
141. Landgræðslan. (n.d.)
142. Island.is (n.d.)
143. Island.is (n.d.)
144. Land and Forest Iceland, personal communication, November 13, 2024
145. Ministry of Food, Agriculture and Fisheries, personal communication, November 13, 2024
146. Umhverfis-, orku- og loftslagsráðuneytið (n.d.)
147. Land and Forest Iceland, personal communication, November 13, 2024

6.2 Rewetting policy evaluations and monitoring

Iceland has a monitoring framework in place for area-based goals as well as for individual rewetting projects. Monitoring of the rewetted area in Iceland is reported in the status reports of the Climate Action Plan. Individual rewetting project implemented through grants for wetland restoration are monitored by Land and Forest Iceland.

Climate Action Plan

Iceland's climate action plan undergoes annual evaluation by a project management group appointed by the minister, as mandated by regulation 786/2024.[148] The five-year action plan is scheduled for formal revision in 2026. Each year, the number of hectares of rewetted land counting towards the area-based goal should be presented in the Status report of the action plan. According to these status reports, Iceland rewetted more than 600 ha of wetlands between 2018 and 2021.[149] In 2020, 264 ha were rewetted.[150]

Monitoring of grants for restoration of wetlands

Monitoring of rewetting projects implemented through grants from Land and Forest Iceland involves assessing vegetation and measuring water levels before restoration, where a baseline study is carried out, and one year after restoration.[151] Water level combined with the size of the restored area is used to estimate carbon sequestration benefits. The projects are not continuously monitored after implementation. The Ministry of Food, Agriculture, and Fisheries expressed in an interview that this monitoring approach is cost-effective.[152]

Land and Forest Iceland also has experimental wetlands where they monitor greenhouse gas fluxes and vegetation. According to Land and Forest Iceland it is complicated to conduct more widespread monitoring of greenhouse gas fluxes from wetlands, because of high cost and risk of breakdown of measurement equipment.[153]

The Environmental Agency are looking into a participatory monitoring approach, where landowners can be financially rewarded for conducting monitoring themselves.[154]

Status reports from the rewetting projects have been published almost every year since 2016. The status report describes the rewetting project area and the progress of implementation of the work. The size of the rewetting project areas per year, derived from the status reports, are presented in Table 9.

148. Island (2024)
149. Umhverfis-, orku og loftslagsráðuneytið. (2022)
150. Umhverfis- og auðlindaráðuneytið. (2021)
151. Ministry of Food, Agriculture and Fisheries, personal communication, November 13, 2024
152. Ministry of Food, Agriculture and Fisheries, personal communication, November 13, 2024
153. Land and Forest Iceland, personal communication, November 13, 2024
154. Land and Forest Iceland, personal communication, November 13, 2024

Year	2016 [155]	2017 [156]	2018 [157]	2019 [158]	2020	2021 [159]	2022 [160]
Rewetting project area (ha)	116,5	164	24	149	No data available	107	11,2

Table 9: Land and Forest rewetting project area (ha) per year, 2016–2022.

6.3 Concluding remarks

Currently, rewetting is and integrated part of broader climate action plans and land use plans in Iceland. With wetlands accounting for 20% of the nation's vegetated land and up to two-thirds of its greenhouse gas emissions, rewetting initiatives are integral to Iceland's goal of carbon neutrality by 2040. These efforts are supported by policies such as the Climate Action Plan and the National Strategy for Land Restoration and Forestry, which emphasize sustainable land use and emissions reduction through rewetting. Rewetting is part of the nature restoration budget, but distinct earmarked funding is missing, which may limit its financial clarity. Grant programs for landowners and the development of a carbon credit methodology represent key economic tools for incentivizing rewetting, though uptake has so far been limited.

Monitoring actions are in place, but the scope and cost of comprehensive greenhouse gas flux measurements remain challenging. Experimental approaches such as participatory monitoring by landowners may offer solutions to address these gaps.

155. Áskelsdóttir (2017). Ársskýrsla – Endurheimt votlendis 2016
156. Áskelsdóttir (2018). Ársskýrsla – Endurheimt votlendis 2017
157. Áskelsdóttir (2019). Ársskýrsla – Endurheimt votlendis 2018
158. Áskelsdóttir (2020). Ársskýrsla – Endurheimt votlendis 2019
159. Hauksdóttir (2022). Ársskýrsla - Endurheimtar votlendis 2021
160. Hauksdóttir (2023). Ársskýrsla endurheimtar votlendis 2022

7. Norway

Norway is home to some of Europe's most diverse wetland ecosystems, covering about 15% of the mainland.[161] Wetlands provide essential ecosystem services such as flood mitigation, climate regulation, and rich biodiversity. However, human activities, including drainage for agriculture and forestry, have significantly degraded these areas in Norway.[162]

Norway has committed to enhanced climate and environmental targets:

2025 Target: Restore at least 15% of degraded ecosystems by 2025.[163]

2030 Climate Targets: Norway's climate plan is targeted to reduce greenhouse gas emissions by at least 55% compared to 1990 levels by 2030. The nation aims to achieve carbon neutrality by 2030, offsetting any remaining emissions through mechanisms like the EU Emission Trading Scheme and partnerships in international emission reduction initiatives, starting on January 1, 2030.[164]

2050 Climate Targets: By 2050, Norway is committed to transitioning into a low-emission society under its Climate Change Act, with a targeted reduction in greenhouse gas emissions by 90–95% from 1990 levels.[165]

Restoration of wetlands plays a key role in achieving the goal of reducing GHG emissions.[166]

7.1 National rewetting policies and objectives

In Norway, as in many other countries, waterlogged areas were historically viewed as wasteland. Consequently, around 7,000 km² of mires have been drained for agriculture and forestry. Further, various other wetland types have historically been dammed to create reservoirs for hydropower generation. While large-scale damming is now uncommon, it may still be considered for expanding existing facilities.[167] Table 10 outlines the Norwegian rewetting policies which are further described in the subsequent sections.

161. Klima- og miljødepartementet (2021)
162. Miljødirektoratet (2020)
163. Miljødirektoratet (2020)
164. International Energy Agency (2022)
165. Chau (2024)
166. Miljødirektoratet (2020)
167. Klima- og miljødepartementet (2021)

POLICY	KIND OF MEASURE	RESPONSIBLE ACTOR	SOURCE OF FUNDING
Wetland Restoration Plan (2021–2025)[168] *Plan for restaurering av våtmark i Norge*	Volunteer-based strategic plan for restoring and protecting wetland ecosystems	Norwegian Environment Agency	National budget for nature restoration. Earmarked for mire restoration: €2,580,000 (2024)[169] € 2,580,000 (2025)[170]
Nature strategy for wetlands[171] *Naturstrategi for våtmark*	Strategy to increase the area of wetlands in Norway as well to progress in biological status of wetlands.	Norwegian Ministry of Climate and Environment.	Land use planning, Government Budget for nature restoration
National Strategy for Restoration of Water bodies[172] *Nasjonal strategi for restaurering av vassdrag 2021–2030*	Investments and plans to restore waterbodies in Norway.	Norwegian Environment Agency	Government Budget for nature restoration

Table 10: Key policies governing rewetting in Norway.

Wetland Restoration Plan (2021–2025)

In 2016, the Norwegian Environment Agency, in collaboration with the Directorate of Agriculture, launched the first five-year wetland restoration plan. In 2016, wetland restoration was also formally included in the state budget for the first time, with an annual allocation of approximately €1.7 million.[173]

The restoration plan was updated in 2021, with a new plan running from 2021 to 2025. The new plan outlines a strategic approach focused on three primary goals:

1. Reducing greenhouse gas emissions
2. Enhancing climate adaptation
3. Improving ecological conditions

In addition to its climate benefits, the plan highlights how restored wetlands can contribute to flood buffering, drought mitigation, fire resistance, and biodiversity enhancement. These efforts create green networks that strengthen ecosystem resilience against climate change. The updated plan also expands criteria for selecting restoration sites to incorporate these aspects.[174]

168. Miljødirektoratet (2020)
169. Norwegian Nature Inspectorate, personal communication, November 15, 2024
170. Klima- og miljødepartementet (2024)
171. Klima- og miljødepartementet (2021)
172. Direktoratsgruppen for vannforvaltning (2022)
173. EJP Soil (n.d.)
174. Miljødirektoratet (2020)

The Norwegian Environment Agency serves as the national project leader of the plan, managing and allocating funds for wetland restoration. Regionally, the County Governors and the Norwegian Nature Inspectorate oversee the implementation of restoration projects. Contractors are engaged through a framework agreement to carry out the work.[175] Strengthening national capacity for rewetting is a priority for 2021–2025. Building expertise will allow more stakeholders to lead restoration projects independently, reducing reliance on environmental authorities. As an example, in the first planning phase, a regional framework agreement was established for contractors, which was later expanded nationally to include projects from different parts of the country. Contractors received training in restoration methods and a study trip to England, which made them more self-sufficient and aligned with desired restoration outcomes, reducing the need for supervision. The plan also aims to enhance cost efficiency by focusing on high-priority sites with the greatest ecological and climate benefits.[176]

From 2016–2020, most projects under the plan focused on protected areas where restoration is easier to implement due to the provisions of Norway's Biodiversity Act.[177][178] In this period, more than 140 mires were restored under the plan, with most projects located in protected areas. In 2019, a 10-year agreement was signed with Statskog SF, a state-owned enterprise managing 20% of Norway's land, to facilitate restoration on its land.[179][180] Estimates suggest that remaining mires in protected areas and Statskog land could be restored within five years. However, the plan emphasizes the need to include municipal properties and incentivize private landowners to ensure broader site access.[181]

For the future, the propositions in the plan include exploring additional tools for restoring mires and wetlands on private land, including refining subsidy rates, contract templates, and registration procedures. These efforts aim to streamline restoration processes and expand the variety of sites available for restoration, ultimately meeting Norway's climate and biodiversity commitments.[182]

Nature Strategy for Wetlands

The *Nature Strategy for Wetlands*[183] highlights that nature in Norway has long been a vital resource for value creation and economic development. The strategy aims to support sustainable value creation while safeguarding the ecological value of wetlands. The government's goal for wetland ecosystems is to:

1. Slow down the current rate of wetland degradation
2. Improve the ecological condition of wetlands

The strategy builds on existing responsibilities between departments and does not change sector responsibilities. It provides guidance for future management without retroactive effect. The strategy recognizes that wetlands provide important ecosystem services such as carbon sequestration, flood mitigation, and recreational opportunities and that there is a direct link between the ecological condition of wetlands and the quantity and quality of benefits which can be derived from them. Restoration of wetlands is one of the focus points of the strategy.

175. EJP Soil (n.d.)
176. Miljødirektoratet (2020)
177. Miljødirektoratet (2020)
178. EJP Soil (n.d.)
179. Miljødirektoratet (2020)
180. Statskog (n.d.)
181. Miljødirektoratet (2020)
182. Miljødirektoratet (2020)
183. Klima- og miljødepartementet (2021)

National Strategy for Water Bodies

Norway's *National Strategy for Water Bodies*[184] objective is to:

- Restore at least 15% of degraded water bodies in Norway between 2021 and 2030
- Reverse the current negative trend, ensuring that by 2030, the rate of watercourse restoration exceeds the rate of waterway degradation.

The strategy identifies wetland restoration as vital for climate change adaptation, helping to manage increased precipitation and flood risks while enhancing habitats for various species. It focuses on restoring wetlands to improve their natural water retention capabilities. Overall, the strategy aims to enhance aquatic ecosystems and build resilience against climate change impacts.

7.2 Economic instruments for rewetting initiatives

The Norwegian government allocate funding for nature restoration in the government budget each year. A specific funding scheme supporting nature restoration, such as rewetting, has also been in place since 2024 (Table 11).

Funding scheme	Responsible authority	Total amount	Maximum support level	Who can apply	Land type
Grant for nature restoration	The Norwegian Environment Agency	€0.9 million (2024) €2.6 million (2025)	No maximum, but minimum of €8,600	Municipalities, organisations, private landowners	All land

Table 11: Norwegian rewetting funding schemes.

Grant for nature restoration

The grant for Nature Restoration was established in 2024, with a total grant sum of €0.9 million for the first year of operation.[185] Grants are awarded from The Norwegian Environment Agency, and applications take place in the Electronic Application Centre, with a registration deadline in January each year. The grants are awarded to municipalities, non-governmental organisations, or private landowners. For private landowners, it is a prerequisite to write an agreement with the government through The Environment Agency, stating that the restored area will be upheld for at least 40 years. In 2024, only a few private landowners were awarded the grant, instead, many municipalities received funding.[186]

Grants can be directed towards any type of nature restoration, including rewetting. Funding can

184. Direktoratsgruppen for vannforvaltning (2021)
185. Miljødirektoratet (n.d.-d)
186. Miljødirektoratet (n.d.-c)

be applied to cover planning, implementation and follow-up of restoration. However, it cannot cover maintenance or monitoring.[187] The recipient is supposed to make use of the funding throughout the year where the grant was awarded. If this is not possible, the remaining funds will be returned to the Environment Agency.[188]

7.3 Rewetting policy evaluations and monitoring

Monitoring of the Plan for Wetland Restoration 2021-2025

Monitoring of the plan's implementation is divided into intensive monitoring on very few mires and extensive monitoring of all implemented projects. Extensive monitoring of all restored areas is conducted by the Norwegian Nature Inspectorate, under the Norwegian Environment Agency, and is included in the administrative costs. The intensive monitoring is tendered to and carried out by external contractors who make in-depth evaluations of climate gas emissions, ecological conditions and water levels. The methods for monitoring will be further described below.[189]

Extensive monitoring of restored wetlands

Extensive monitoring has been carried out since 2017 by the Norwegian Nature Inspectorate at all sites where wetlands have been restored under the Plan for Wetland Restoration.[190] The program only monitors vegetation, which is considered a proxy for water level and thereby functioning of natural hydrology and climate emissions. When monitoring sites, Norwegian Nature Inspectorate works by making transects across mires which they follow to register vegetation groups at 60 sites. Currently, there are limited resources, both in time and expertise, to identify vegetation at a more detailed level. Vegetation groups are recorded prior to restoration and then again after three years and subsequently monitored every five years. The data is stored in NatStat, Norway's database for protected area monitoring. In some cases, drones are employed to capture vegetation and landscape changes on a broader scale.

Monitoring of climate emissions

Under the Plan for Wetland Restoration, intensive monitoring of climate emissions is tendered by the Norwegian Environment Agency and has since 2019 been carried out by a Danish private company.[191][192] The monitoring project covers one restored mire and one reference site and runs for five years. Both sites are in Trysil Municipality.[193] In the monitoring, CO_2 and CH_4 (methane) are continuously logged by Eddy covariance towers which is measurement equipment that can measure atmospheric CO_2 and CH_4. N_2O (nitrous oxide) is monitored in closed chambers. A status report from the monitoring was published in 2023, showing the results after two years of rewetting.[194] This monitoring is very costly, totalling about NOK 9.5 million for a five-year period.

Norway plans to evaluate greenhouse gas emission reductions from wetland restoration using IPCC calculation methods.[195] These compare emissions before and after restoration. Accurate emission reporting requires data on restored area sizes, which Norway currently lacks a method

187. Klima- og miljødepartementet (n.d.)
188. Klima- og miljødepartementet (n.d.)
189. Miljødirektoratet (2020)
190. Miljødirektoratet (2020)
191. Miljødirektoratet (n.d.-b)
192. Miljødirektoratet (2020)
193. Miljødirektoratet (n.d.-a)
194. DMR Miljø og Geoteknikk AS (2024)
195. Miljødirektoratet (2020)

to estimate. The Norwegian Environment Agency aim to develop this method and collaborate with other countries to improve their reporting on greenhouse gas reductions from wetland restoration.

Monitoring of ecological conditions

Intensive monitoring of the ecological condition of rewetted bogs under the Plan for Wetland Restoration is also tendered by Norwegian Environment Agency. So far, Norsk Instittut for Naturforskning (NINA) has been rewarded all tenders and carried out all monitoring. Monitoring has been carried out on three wetlands since 2015/16, and on two more since 2021, making a total of five monitoring sites out of 180 restored mires. The methodology for monitoring was also designed and published by NINA in 2015.[196][197]

Biodiversity monitoring is carried out at three scales: macro scale through drone photography, meso scale through vegetation analysis along transects, and micro scale through species analysis along transects. The vegetation analysis is carried out along transects where vegetation groups are identified at every 0.5 meters. The number of transects varies depending on the wetland, but it is somewhere around 3–5 transects.[198] Species analysis is carried out at "species frequency lines", 2.5 m long lines every tenth meter along the transect. Along these lines, plant species are identified and registered to species level via the point intercept method.[199] The monitoring method has been examined in a recent research article, suggesting improvements to the method.[200]

Monitoring reports are published by NINA every five years, detailing the results of the monitoring efforts.[201][202][203] The reports account for the vegetation, indication of the water level of the mires, and general ecological condition.

The monitoring of ecological conditions costs approximately €43,000 each time it is carried out, and it was conducted twice during the period from 2016 to 2020. This results in a total cost of approximately €85,900 over the five-year period.

Evaluation of costs for rewetting

Under the first five years of the Plan for Wetland Restoration each restoration project averaged a cost of approximately €86.000. Wetland restoration projects vary significantly in size, with bog restoration generally being less costly than other wetland types. A review of projects from 2016 to 2020 reveals a broad range in both project scale and associated costs. However, due to a lack of data on the specific area restored in each project, it is challenging to assess cost trends over time accurately. Between 2016 and 2020, there were no clear trends in cost levels, aside from an increase in contractors competing for contracts and investing in better equipment and experienced staff. Site-specific challenges, like the extent of tree felling, often drive costs, making it difficult to compare costs across rewetting projects.[204]

Table 12 provides an overview of the total costs for restored areas from 2016 to 2020, including a breakdown of each cost component and its progression.[205]

196. Hagen et al. (2015)
197. NINA, personal communication, November 15, 2024
198. Hagen et al. (2015)
199. Hagen et al. (2015)
200Kyrkjeeide et al. (2024)
201. Kyrkjeeide et al. (2018)
202. Kyrkjeeide et al. (2023)
203. Kyrkjeeide. (2012)
204. Miljødirektoratet (2020)
205. Miljødirektoratet (2020)

Cost category	Approximate cost (2016–2020)
Direct restoration costs (planning/design and implementation)	€2.6 million for 71 restoration projects
Costs for intensive monitoring	€0.1 million
Administrative costs, approximately 20 full-time employments equivalents across County Administrative Boards, Norwegian Nature Inspectorate, and the Norwegian Environment Agency	€1.4 million
Tax financing cost	€0.95 million

Table 12: Total costs and cost categories for rewetting projects (2016–2020).

In addition to the direct restoration costs, there are expenses for post-restoration monitoring, as mentioned previously under the monitoring sections.

Socio-economic analysis

In the Wetland restoration Plan for 2021–2025 there is a socio-economic analysis of the wetland restoration measures in Norway from 2016 to 2020. The analysis includes costs and benefits (made up as ecosystem services) of the restoration of approximately 80 mires.

The socio-economic analysis concludes that available information does not allow for a definitive conclusion on the economic benefits of wetland restoration in Norway from 2016 to 2020. However, evidence suggests that restoration enhances ecosystem services, with benefits expected to last well into the future. Thus, it is likely that restoration will be economically justified in the long term when comparing these ongoing benefits to the initial costs.

Evaluation of the Nature Strategy for Wetlands

The Ministry of Climate and Environment, in collaboration with relevant ministries, will monitor the status and implementation of the *Nature Strategy for Wetlands*. The strategy will be evaluated after six years and revised after twelve years, at which point the need to adjust the target level will be assessed.

Future perspectives

The future of rewetting wetlands in Norway will depend on annual funding. The County Governor is expected to prioritise the most cost-effective areas based on availability. The Norwegian Environment Agency can promote cost-effective restoration by ensuring sensible fund allocation across counties, organizing work efficiently, and identifying suitable restoration areas.

Yearly national restoration seminars organised by the Norwegian Environment Agency present the overall status of restoration of wetlands in Norway.[206]

206.Vannportalen (n.d.)

7.4 Concluding remarks

Norway's commitment to wetland restoration reflects its broader climate and environmental goals, highlighting the importance of wetlands as key ecosystems for reducing climate emissions, safeguarding biodiversity, and flood mitigation. Policies like the Wetland Restoration Plan and the Nature Strategy for Wetlands demonstrate an increasing recognition of these habitats' value, supported by strategic funding and voluntary initiatives. Increased budget earmarked for nature restoration in the national budget also show priorities from the current government.

The Norwegian Ministry of Environment have been successful in implemented rewetting projects in protected areas. Rewetting efforts in state-owned forests and on private land lie ahead. There is extensive monitoring of the hydrology of all rewetting projects, and monitoring and cost evaluations provide insights into restoration efficiency and long-term benefits. However, gaps in data – such as the precise area restored – limit comprehensive assessments.

8. Sweden

Sweden is estimated to comprise about 9 million hectares of wetlands, the majority being mires. Since the beginning of the 1900s, wetland areas have been cultivated, mainly by draining the land for improved agricultural and forestry practices. To some extent, drainage has also occurred for infrastructure projects and the peat industry. Since the 1980s, wetlands have gained greater protection, along with increased knowledge and interest in restoring drained land. In the past five years, restoring wetlands has received growing political attention as it plays a key role in achieving national climate objectives.[207] Total net greenhouse gas emissions from organic agricultural soils are estimated at 10.8 Mt CO_2e, representing one-fifth of Sweden's total greenhouse gas emissions.[208]

Swedish climate targets and role of wetlands

- By 2045, Sweden aims to achieve zero net greenhouse gas emissions, with net emissions becoming negative thereafter. These calculations cover only emissions within Sweden's borders and exclude sectors under the EU ETS. Agriculture, which is not part of the EU ETS, accounts for about one-fourth of Sweden's total emissions.
- Restoring and rewetting peatlands are key measures for reducing greenhouse gas emissions. These measures are crucial as achieving net-zero emissions in the agricultural sector is expected to be challenging. In Sweden, peatlands are expected to play a vital role in enhancing carbon sinks and reducing CO_2 emissions.[209]

8.1 National rewetting policies and objectives

Sweden does not have a national target specifying the amount of land to be rewetted or the types of land to prioritise within a set timeframe. However, the primary goal of wetland restoration and rewetting is to achieve climate mitigation, aligning with Sweden's national climate strategy and its overarching objective to become climate-neutral by 2045.[210] In an official national assessment *Vägvalsutredningen* carried out for the government in 2020,[211] rewetting was suggested as a socio-economically efficient policy measure to reach the climate neutrality goal in time. The assessment identified that 100.000 hectares of forest land and 10.000

207.Naturvårdsverket. (n.d.)
208.Naturvårdsverket. (2023a)
209.Sveriges Miljömål (2023)
210.Regeringen (2024)
211. Statens Offentliga Utredningar (2020)

hectares of agricultural land has potential for rewetting. Rewetting drained peatlands is highlighted as a priority area for maximising emission reductions. Since 2020, the report has guided government rewetting policy initiatives, with forestry land becoming a strategic focus. Funds have been earmarked for wetland construction costs and compensation to landowners. However, there is still no overarching national goal specifying how much land or which types of land should be rewetted within a set timeframe. The national policy documents for rewetting are listed in Table 13 below.

Name of policy	Kind of policy	Responsible actor	Source of funding
Priorities of the Swedish Government 2023 – Climate and Energy[212] *Regeringens prioriteringar, Klimat och Energi*	Action plan for climate and energy.	The Environmental Protection Agency, the Forest Agency, the Agency for Marine and Water Management (private land) The National Property Board and the Fortifications Agency (state owned land)	Government Budget 2024–2030: €310 million
Regulation letter for budget year 2023 for the Swedish EPA[213] *Regleringsbrev 2023, Naturvårdsverket.*	Budget regulation letter and tasks for 2023.	The Environmental Protection Agency	€26 million divided between all responsible authorities working with rewetting.

Table 13: Key policies governing rewetting in Sweden.

Priorities of the Swedish Government 2023 – Climate and Energy

The National Action Plan for Climate Adaptation (2023) highlights how wetland restoration supports climate adaptation and mitigation while promoting biodiversity and healthy ecosystems.[214] The action plan highlights that re-establishing wetlands is essential for developing infrastructure that is resilient to climate change. Rewetting is valued for its role in preventing flooding, mitigating water scarcity during dry periods through water storage, and reducing fire risks by improving water retention. Wetlands are recognised as important CO_2 storage areas, with rewetting crucial for reducing CO_2 emissions from organic peatlands.[215] Wetland restoration and rewetting are also mentioned in specific climate strategies for the county administrative boards (länsstyrelserna).

212. Regeringskansliet (2023)
213. Miljödepartementet (2022)
214. Regeringen (2024)
215. Regeringen (2024)

Regulation letter 2023 to the Swedish EPA

The 2023 regulation letter from the Swedish government to the Environmental Protection Agency (EPA) outlines its responsibilities regarding wetland rewetting, including specific tasks to be carried out:

- **Develop a document** identifying geographical areas suitable for wetland rewetting, prioritising wetlands that contribute to climate change mitigation, biodiversity, water balancing, water quality, and groundwater. This should be done in collaboration with the Swedish Board of Agriculture and other relevant agencies.
- **Evaluate the need for a new support model** for rewetting ditches on agricultural land to enhance carbon dioxide uptake and capture, working alongside the Swedish Board of Agriculture.
- **Guide on legal issues** related to rewetting ditched peatland to ensure cost-effectiveness while respecting ownership and user rights. This should be done in collaboration with the Swedish Forest Agency and the Swedish Board of Agriculture.[216]

The government has assigned the responsibility for wetland restoration and re-establishment to several public agencies. The EPA serves as the primary coordinator, managing government funding and distributing it to the relevant agencies. The EPA also provides an overview of available funding opportunities on its website, which gives a clear overview of which stakeholders can apply, available funding schemes and public authority is responsible for the administration.

The Swedish Forest Agency focuses on rewetting privately owned forestry land, while the Agency for Marine and Water Management allocates funds to regions and municipalities for local rewetting initiatives on state-owned land. Additionally, the National Property Board and the Fortifications Agency are responsible for rewetting efforts on state-owned protected land, though their activities are on a much smaller scale compared to the other investments.[217]

The Forest Agency handles and decides on financial support for forest landowners whereas the Swedish Agency for Marine and Water Management handles funding for rewetting to the regions, municipalities and local stakeholders. Rewetting initiatives from the Swedish Agency for Marine and Water Management are divided into climate adaptation initiatives and to improve sea or water environment quality (hydrological restoration).[218]

Rewetting for hydrological and biological purposes

The Swedish term *återvätning* refers specifically to rewetting for climate purposes, while hydrological or biodiversity-focused efforts are described as wetland restoration or construction. Efforts focusing on natural hydrology and biodiversity have been ongoing since the early 2000s, but according to this study there are no national targets or references to them in government policy documents.

In Sweden, rewetting for nature restoration serves different purposes than återvätning for climate. Wetland restoration is primarily guided by Sweden's Environmental Quality Objectives, with Objective 11, "Thriving Wetlands" (Myllrande våtmarker), being central to these

216. Statens Offentliga Utredningar (2022)
217. Regeringen (2024)
218. Regeringen (2024)

efforts.[219] Environmental Quality Objectives states that wetlands' ecological and water storage functions must be maintained, and valuable wetlands preserved for the future. Sub-objectives include the distribution and regeneration of wetland types, their conservation status, and their capacity to provide ecosystem services such as biological production, carbon storage, water management, purification, and regulation of water flows.[220] As part of the environmental quality objective, specific environmental quality standards for water bodies are outlined in line with the EU Water Framework Directive. The Swedish Water Authorities manage a regional action programme for 2022–2027, which includes wetland restoration to prevent drought and water scarcity.[221]

Since Sweden joined the EU in 1995, the agricultural sector has undertaken rewetting initiatives, primarily to prevent and reduce eutrophication from agricultural land by limiting nitrogen and phosphorus runoff. These efforts focus on water quality rather than climate change mitigation and adaptation. Funding for rewetting on agricultural land comes exclusively from the European CAP, as farmers are not included in the national rewetting strategy for CO_2 reduction or the annual government funding for this purpose.

The 2020 government assessment identified a rewetting potential of approximately 10,000 hectares of agricultural land to reduce greenhouse gas emissions.[222] In 2023, the Swedish Environmental Protection Agency further evaluated the climate potential of rewetting across various scenarios and land types. This assessment serves as a key foundation for deciding whether the agricultural sector should be included in future government funding to enhance rewetting efforts on organic agricultural land, aligning with climate objectives.[223]

8.2 Economic instruments for rewetting initiatives

Funding to enhance CO_2 retention and reduce emissions, in line with Sweden's climate goals, is provided exclusively by the government, with no contributions from the EU. This support targets drained peatlands in forested areas, protected areas, and municipal land. It covers direct rewetting expenses and provides lump-sum compensation for forest landowners but excludes costs like wages. For 2024, the Swedish government has allocated €30.85 million for rewetting projects, with €20.42 million for 2025 and €32.58 million annually from 2026 to 2030.[224] The funding is partially allocated for compensation and installation costs, while the remainder supports personnel at agencies and municipalities involved in rewetting activities and disseminating information about the funding. Table 14 below outlines the funding schemes aiming at reducing greenhouse gasses through rewetting initiatives.[225]

219. Regeringen (2024)
220. Naturvårdsverket. (2023c)
221. Vattenmyndigheterna (n.d.)
222. Statens Offentliga Utredningar (2020)
223. Naturvårdsverket (2023a)
224. Pourmokhtari, R. (2023).
225. Naturvårdsverket (2023b)

Funding scheme	Responsible authority	Total amount	Maximum support level	Who can apply	Land type
The Forest Agency´s compensation agreement to forestry landowners *Skogsstyrelsens återvätningsavtal*	The Forest Agency	€6.95 million	Land compensation through lump sum Up to €2,780/ha depending on soil fertility	Forest landowners	Forestry drained peatlands
LONA-wetlands *LONA-våtmarker*	The Agency for Marine and Water Management, The regions (länsstyrelser)	€8.08 million	Up to 90% of eligible expenses	Municipalities	All land types
Action program to establish wetlands in protected areas *Åtgärdsprogram för skyddade områden*	The EPA	€11.3 million	Up to 100%	The regions	Protected areas

Table 14: Funding schemes for rewetting in Sweden (2024) – Focus on CO_2 reduction

Compensation agreement for forestry landowners

In 2024, the Forest Agency received €6.95 million to compensate landowners for rewetting drained forestry peatlands.[226] The Forest Agency handles all preparations, planning, and implementation of wetland restoration. The programme involves a 50-year agreement between the Forest Agency and the landowner, primarily aimed at reducing greenhouse gas emissions. The agreement outlines how rewetting should be carried out on the designated land.

Compensation is based on the estimated economic loss from reduced tree growth, averaging 25% of normal forestry practices. Rewetting also affects the land's bearing capacity, limiting clear-cutting activities. Landowners receive compensation equivalent to 35% of the land's estimated value, with higher payments for more fertile soils due to their greater potential for net greenhouse gas emission reductions. As a result, southern Sweden, with its more fertile soils, is

226. Skogstyrelsen (n.d.-a)

prioritised for these cost-efficient initiatives.[227] Landowners do not receive compensation for timber on the land, as the agreement allows them to retain ownership and the right to fell timber throughout the contract period. The maximum compensation per hectare of land is currently €2,780.[228]

LONA Wetlands

The Agency for Marine and Water Management distributes funds to Swedish regions (*länsstyrelserna*), which are responsible for local rewetting projects through the LONA-wetlands funding scheme (*Lokala naturvårdssatsningen*). Only municipalities can apply for this funding, with grants covering up to 90% of eligible costs. In 2024, €8.08 million was allocated to the regions for these initiatives.[229]

Action Programme for Protected Areas

The EPA is responsible for wetland restoration within protected areas, including nature reserves and national parks, as part of the *Action Programme for Protected Areas*. These areas contain habitats of exceptionally high natural value. In 2024, the EPA received €11.3 million to fund hydrological restoration efforts, with a primary focus on peat-rich bogs spanning extensive areas.[230]

Funding schemes for rewetting with hydrological and biological objectives

As outlined in national policies, there is also funding available with a broader focus on wetland restoration, which includes rewetting but has more focus on the restoration of pristine landscapes and therefore not focus on climate change mitigation. This funding targets other types of land, with the primary objectives of improving hydrological conditions, enhancing biodiversity, or reducing eutrophication. It is financed through a combination of government funding, private contributions from NGOs, and EU programmes such as LIFE and the CAP.

The Swedish Board of Agriculture allocates funds from the CAP to farmers for the re-establishment and restoration of wetlands. The primary aim of these investments is to reduce the transport of nitrogen and phosphorus from agricultural land into lakes, seas, and other water habitats. Farmers in Sweden have been receiving EU funding under the CAP programme since the country joined the European Union in 1995.[231]

In 2023, for the first time, funds were allocated to the National Property Board (€0.35 million) and the Swedish Fortifications Agency (€0.09 million) to implement rewetting initiatives on state-owned land.[232] The objectives are to strengthen biodiversity and ecosystem services, reduce greenhouse gas emissions, decrease eutrophication, and improve groundwater infiltration.

Swedish regions are responsible for funding schemes for local rewetting projects, through LOVA [233] (*Lokala vattenvårdsprojekt*) and LONA. Municipalities and local CSOs can apply for funding for restoration and construction of wetlands. Projects include closing ditches, restoring water

227. To maximise climate benefits, rewetting should focus on well-drained, nutrient-rich peat soils in southern Sweden, particularly organic agricultural land. In contrast, rewetting nutrient-poor soils, especially in northern Sweden, can sometimes risk increasing net greenhouse gas emissions. (Naturvårdsverket 2023c).
228. Skogstyrelsen (n.d.-a)
229. Havs och Vatten myndigheten (2020)
230. Naturvårdsverket (2023c)
231. Jordbruksverket (n.d.)
232. Naturvårdsverket (2023c)
233. Länsstyrelsen Skåne (n.d.)

habitats and swamp forests, and preparatory work for wetland restoration or construction. Under LOVA (specifically for wetlands), 80% of eligible costs are covered.[234] However, neither LONA nor LOVA can compensate landowners for any lost economic profit on the converted land.[235] The Swedish Society for Nature Conservation provides a 10% top-up on the 90% funding from LONA-wetlands. This allows landowners to receive grants covering 100% of construction costs for rewetting and restoration projects.[236]

Municipalities, companies, CSOs, and public agencies can apply for rewetting funding through EU-LIFE, financed directly by the EU Commission. The programme primarily aims to restore and protect biodiversity. LIFE co-financing covers up to 60%, depending on the applicant type, and supports rewetting on both agricultural and forest land. The Swedish EPA provides guidance during the application process.[237]

Conflicts with other national objectives

In an interview with Swedish EPA, the multifunctional purposes of wetlands were raised with uncertainty, as rewetting is highly prioritised for climate change mitigation efforts in Sweden.[238] In the interview it was expressed that rewetting initiatives on different land types have varying effects on the environment and carbon sequestration. Prioritising only the most climate-efficient outcomes, such as peatlands with high organic matter content, risks underprioritizing other wetlands, like nutrient-poor soils in the north, which support unique biodiversity. This could potentially negatively impact red-listed species and habitats. The EPA emphasises the importance of considering both climate and environmental perspectives when prioritising rewetting initiatives to ensure a balanced mix of outcomes.

Nutrient-rich peatlands, mainly in southern Sweden, are used for agriculture, while nutrient-poor peatlands in the north (mineral soils) support unique biodiversity and are used for forestry. According to the EPA, compensating farmers for rewetting agricultural land is more costly because the land is valuable for food production and has higher nutrient content due to cultivation. Before rewetting, nutrients may need to be removed to prevent eutrophication in nearby land and water bodies.[239] While rewetting in most cases are beneficial for both climate and the environment, the EPA highlights a risk of the government focusing too narrowly on uniform rewetting for climate purposes.

Rewetting forestry land can conflict with timber production, a key industry for Sweden and a major export sector, as it significantly slows tree growth on drained peatlands. However, according to the Forest Agency, this has not yet been a major issue (as of November 2024) since rewetting efforts have primarily targeted non-productive forestry land.[240] To accelerate CO_2 emission reductions, richer peatlands may increasingly be targeted for rewetting, potentially conflicting with timber production. A researcher from Stockholm University, part of the sounding board, highlighted this issue, noting the lack of political focus on forest restoration and protection. Instead, priority is given to the economic importance of the forest industry as a key export sector, which negatively impacts investments and prioritisation of rewetting forestry-drained peatlands.

234. Naturvårdsverket (2023b)
235. Naturvårdsverket (2023c)
236. Naturskyddsforeningen (2023)
237. Naturvårdsverket (2023c)
238. EPA, personal communication, November 11, 2024
239. Stockholms universitets Östersjöcentrum (2024). *Multifunctional wetlands – reality or utopia?*
240. Skogsstyrelsen, personal communication, November 7, 2024

8.3 Rewetting policy evaluations and monitoring

Rewetting for climate purposes in Sweden has only been a political priority since the early 2020s, so evaluations and monitoring of these policies remain limited. However, a few notable surveys and evaluations, as presented in the following sections, have been conducted, with some ongoing efforts assessing rewetting policies on both agricultural and forestry land.

Peat-map to guide rewetting initiatives

In December 2023, the Swedish EPA, in collaboration with the Board of Agriculture and the Forest Agency, completed a mapping of the most suitable geographical areas for rewetting on drained peatlands. The Forest Agency manages the "peat-map," which helps landowners determine if their land is suitable for rewetting.[241]

Compensation agreement forestry landowners

A 2024 survey by the Swedish EPA explores forest landowners' attitudes toward rewetting since financial compensation and agreements were introduced in 2020. The key finding for the survey is that landowners primarily are motivated by environmental benefits, such as improved biodiversity and ecosystems, rather than the climate impact of rewetting. This is likely because biodiversity and ecosystem effects are more tangible and visible, while climate benefits are more abstract. This insight will likely influence communication and advisory efforts, particularly by the Forest Agency and the Board of Agriculture, when engaging with landowners about rewetting.[242]

A recent evaluation of compensation agreements for forest landowners examines the main drivers and barriers for committing to rewetting agreements. The study also found that biodiversity benefits are the primary incentive, while climate effects are seen as secondary. Economic compensation was considered less important, though forest owners noted that higher compensation could encourage more participation, as current levels do not fully cover their costs. A notable barrier is the historical perception of rewetting, as older generations worked hard to drain the land, and some landowners view rewetting as undoing that effort. Additionally, many landowners feel there is a lack of knowledge about rewetting and its long-term impact on their land. While those who had direct contact with the Forest Agency reported positive dialogues, uncertainties remain regarding the economic and ecological effects over time. This report is part of a larger assessment of rewetting agreements, which will be completed and available in early 2025.[243]

Additional insights on the experiences from current rewetting agreements were shared by a Forest Agency policy expert during an interview for this study.[244] Since rewetting became a priority in Sweden's climate strategy, the government expects rapid reductions in CO_2 emissions. However, many landowners remain unaware of rewetting, its effects, eligibility for compensation, and what the agreements cover, leading to a slow start. The Forest Agency representative highlighted the need for extensive efforts to inform landowners about available compensation and educate them on the benefits for climate and biodiversity. To accelerate rewetting agreements, the agency emphasises the need for greater awareness among landowners and additional resources to engage directly with landowners.

241. Skogstyrelsen (n.d.-b)
242. Naturvårdsverket (2024)
243. Isaksson et al. (2024)
244. Forest Agency, personal communication, November 3, 2024

The Forest Agency states that the compensation value for landowners has not yet been evaluated. Assessing whether it is appropriately priced or if adjustments in compensation levels could improve efficiency would be useful. The Agency states that further analysis is needed to determine if the current level is optimal from a socio-economic perspective. According to the EPA survey on landowners' attitudes toward rewetting, the current compensation level does not appear to be the primary motivator for rewetting. Instead, the positive effects on biodiversity and ecosystems are the main drivers. However, it is still mentioned by the landowners that higher compensation could potentially incentivise landowners less focused on environmental benefits to engage in rewetting. Nevertheless, there is not enough understanding today of to what extent the compensation level aligns with landowners' perceptions of their land's value when rewetted.

Legal barriers to rewetting initiatives

In 2024, the government tasked the Swedish EPA, in collaboration with the Swedish Agency for Marine and Water Management and the Swedish Board of Agriculture, to review legislation that may hinder rewetting initiatives. The agencies will assess the need for changes to soil drainage regulations to facilitate wetland restoration where no conflicting interests, such as productive agricultural or forestry land, exist. The investigation will analyse laws related to land and property ownership, identifying obstacles such as outdated drainage regulations and overly complex contracts. Many contracts are so old that finding the original landowners is difficult, and larger rewetting projects often involve multiple landowners. To make rewetting initiatives more efficient and ensure their intended climate benefits, regulations for water operations and land drainage must be updated. The results from the investigation will be finalised in 2025.[245]

Basis for rewetting wetlands – analysis from the EPA to the government

In a report to the government published by the Swedish EPA in 2023, rewetting and its climate potential are evaluated in relation to the support mechanisms implemented.[246] The rewetting potential of 100,000 hectares of forest land and 10,000 hectares of agricultural land, identified in the 2020 government assessment, was re-evaluated in light of the new available funding. The 2020 report's suggestions remain valid as effective measures to support the goal of climate neutrality by 2045. However, the report highlights that counselling efforts are crucial for achieving rewetting objectives on time. Improved local support and direct dialogue with landowners are essential to raise awareness of support mechanisms and enhance knowledge about rewetting and its effects. The EPA recommends prioritising these efforts to accelerate progress. This conclusion is echoed by the Forest Agency, which notes that insufficient resources have been allocated to these activities, despite their importance in speeding up rewetting.[247] It is furthermore recommended by the Swedish Board of Agriculture to implement previously suggested measures to restore 10,000 hectares of agricultural land into wetlands, as this is the most effective method for significantly reducing CO_2 emissions from agricultural land.[248] Consequently, the compensation scheme should be adapted to also include drained agricultural land.[249] Emission reduction calculations show a decrease of 1 to 9 tonnes of CO_2e per hectare per year for forest land and approximately 21 tonnes per hectare per year for agricultural land on organic peatlands. These figures represent net reductions, factoring in the initial rise in methane emissions after rewetting, which diminishes over time.[250]

245. Regeringen (2024)
246. Naturvårdsverket. (2023c)
247. Skogsstyrelsen, personal communication, November 7, 2024
248. Markensten et al. (2018)
249. Naturvårdsverket (2023c)
250. Statens Offentliga Utredningar (2020)

Reporting on area and emissions reductions from rewetting initiatives

The Swedish University of Agricultural Sciences has analysed the effects of rewetting activities under several national programmes, including LONA (LONA wetlands), LOVA, The Forest Agency ´s compensation agreement to forestry landowners, the Rural Development Program, the Action program for protected species, the Action program for valuable nature, and other forms of funding support. The report was commissioned by the Swedish EPA and published in 2024.[251] It states that in 2023, 2,100 hectares of drained wetlands were rewetted through the government budget initiative, including 1,500 hectares of peatlands, covering a total of 588 projects. These efforts were estimated to have reduced emissions by 6.1 kt CO_2eq. Table 15 shows an overview of the total rewetted area supported by the national programs in the years 2021-2023.

Year	2021	2022	2023
Number of sites	281	531	588
Rewetted project area (ha)	1,856	2,148	2,067
Peatland area (ha)	780	1 485	1 301

Table 15: Rewetted area (ha) from national programs per year, 2021–2023.

The climate effects of rewetting are not yet included in Sweden's official climate reporting (CRF tables). This is mainly due to the IPCC's unreliable guidance, based on limited studies, and the lack of sufficient data from various programmes. However, the report's findings will be included in Sweden's next annual climate report to the IPCC.[252]

8.4 Concluding remarks

The main objective of Swedish rewetting ("återvätning") policies is climate change mitigation. However, there are no clear political targets for rewetting or wetland restoration, including specific areas to be rewetted or expected emission reductions. While studies by the EPA, the Forest Agency, and the Board of Agriculture have estimated the hectares required to meet climate goals, as well as the types of land and incentives needed, these suggestions have not been formalised into policy. The absence of clear targets makes it difficult for agencies to prioritise initiatives. Currently, only forestry land receives government funding for rewetting, while agricultural land is supported through the CAP plan, focusing on eutrophication rather than GHG mitigation. The EPA has suggested expanding Forest Agency rewetting agreements to include agricultural land to ensure long-term protection and offer financial incentives for farmers. Despite the vague policy landscape, the centralised responsibility delegated to the EPA provides a clear and accessible overview of Sweden's rewetting policies.

251. Lundblad (2023)
252. Lundblad (2023)

9. Cross-Nordic Perspectives on rewetting

The following chapter will present a cross-Nordic comparison, looking at differences and similarities across all countries, divided into four overarching categories, *Objectives for rewetting, Policy administration, Economic support mechanisms and Evaluation and monitoring approaches.*

9.1 Objectives for rewetting policies

Rewetting initiatives in the Nordic countries share overarching goals of climate mitigation, biodiversity conservation, and water management, yet the emphasis and implementation reflect distinct national priorities and historical contexts. While all countries acknowledge the importance of wetland restoration, their approaches vary based on historical land use and specific environmental challenges.

Historically, all Nordic countries have drained wetlands predominantly for agricultural and forestry purposes. In Denmark and Iceland, the primary focus has been creating space for conventional farming, with Iceland also using ditches and drains at times to mark territory. In Sweden and Finland, extensive wetland drainage has occurred specifically to support forestry, alongside a significant peat industry in both countries. In Finland, peat extraction plays a crucial role, with harvested peat used for heating and energy production. In Norway, wetland drainage has traditionally aimed at supporting agricultural and forestry expansion, enhancing land productivity for crop cultivation and livestock farming. Furthermore, Norwegian wetlands were dammed to create reservoirs during the development of major hydroelectric power plants.

In **Denmark**, rewetting is central to the climate plan, focusing on reducing greenhouse gas emissions. An objective that is very outspoken for the Danish rewetting efforts is also mitigating nutrient pollution from agriculture, mainly, nitrogen and phosphorous to protect aquatic ecosystems.

Like Denmark, **Iceland** has made rewetting a core strategy for achieving its national and global CO_2e reduction targets. Biodiversity and ecosystem health are regarded more as positive side effects from climate measures achieved through rewetting.

Finland's Helmi Habitat Programme, alongside the METSO initiative, underscores the country's holistic approach to rewetting. These programmes aim to enhance biodiversity, prevent

ecosystem degradation, and improve water quality, with rewetting as a key tool. Finland has for a long time restored wetlands for several purposes including better conditions for biodiversity and natural hydrology alongside greenhouse gas emission reductions.

Norway's objectives in rewetting wetlands are threefold: to reduce greenhouse gas emissions, enhance climate adaptation, and improve ecological conditions. By restoring wetlands, Norway seeks to curb emissions from degraded peatlands while fostering ecosystems that are better equipped to adapt to the impacts of climate change.

In **Sweden**, rewetting initiatives are divided into "återvätning" for climate purposes and wetland restoration for biodiversity and hydrological improvements. Swedish policies heavily prioritize climate mitigation, particularly targeting drained peatlands for their significant greenhouse gas reduction potential. However, the Swedish EPA emphasizes the importance of balancing climate and biodiversity goals to avoid neglecting wetlands that support unique ecosystems, including nutrient-poor soils in northern regions. This underscores the need for diverse strategies to maximize benefits for both climate and biodiversity.

The Nordic countries demonstrate varied approaches to area-based rewetting targets. Finland has set clear goals for two programmes, aiming to restore 60,000 and 30,000 hectares of drained peatlands respectively between 2021 and 2030, though some programmes lack specific area-based targets. Denmark plans to rewet 140,000 hectares of agricultural land by 2030 under the Green Tripartite Agreement. Iceland targets the restoration of 5.300 hectares by 2026 and 15,600 hectares by 2031. In contrast, Norway and Sweden have yet to establish specific area-based targets or provide clear estimates of the emission reductions anticipated from their rewetting initiatives.

Climate change mitigation is a shared objective between the countries, but its role in national strategies has become more prominent and slightly changed during the last decade. Iceland has since 2016 integrated rewetting into a national climate action plan, critical for meeting international commitments. Norway aligns its restoration efforts with Paris Agreement obligations, focusing on slowing wetland degradation and enhancing climate adaptation. Sweden has also shifted focus just within the last five years, also targeting rewetting efforts to contribute to climate objectives and climate mitigation advantages, such as resilience against climate impacts like flooding, droughts, and wildfires.

Increasing biodiversity and ecosystem health is also an important goal for the Nordic countries, though to varying extents. Norway complements its climate goals with aims to restore and conserve biodiversity through rewetting. Finland, with its long history of wetland restoration, emphasizes the importance of rewetting to improve water quality and biodiversity, especially in forestry regions. Sweden's action plan similarly links rewetting to biodiversity, although in a more vague manner without clear targets.

In sum, while Nordic countries share commitments to rewetting for climate, ecological, and socio-economic benefits, their priorities and strategies reflect distinct national circumstances. In both Denmark and Finland, an important objective for the restoration of wetlands is to improve water quality and biodiversity, Iceland's and Sweden´s carbon-centric strategy and Norway's ecosystem focus, illustrate quite diverse pathways to sustainable wetland management in the region.

The approaches in the Nordic countries demonstrate that while rewetting is beneficial for many purposes, a singular focus on climate objectives may risk overlooking the broader ecological value of wetlands. Countries like Finland highlight the importance of maintaining a balance, ensuring that both biodiversity and climate goals are met. This integrated perspective is crucial for long-term environmental and climate resilience across the region.

9.2 Policy administration

In all Nordic countries, the responsibility for rewetting and restoration projects is shared between various ministries and agencies. Sweden stands out as the only country where the responsibility to execute policy initiatives has been delegated directly to national agencies like the EPA, excluding ministries from the responsibility.

In **Denmark**, the primary focus is on farmers and agricultural land, which is predominantly privately owned. Direct engagement with landowners is the key approach. The responsibility for rewetting projects is divided among the Danish Nature Agency, the Agricultural Agency, and the Environmental Protection Agency. Municipalities also play a key role in planning and implementing rewetting projects. However, the evolving political landscape in Denmark and negotiations during 2024 regarding rewetting have included the agricultural sector and the Danish Society for Nature Conservation, who will play a significant role in the implementation of rewetting projects in the near future.

In **Finland**, rewetting efforts primarily target forestry land, with agricultural land playing a lesser role. The focus is on drained forestry peatlands, largely comprised by state-owned protected areas. To date, the main efforts have been in protected areas due to the availability of protected state land. However, meeting the goals set for 2035, 2040, and 2050 will necessitate rewetting of privately owned land, which will require enhanced communication efforts and greater financial incentives, as stated by the Ministry of Agriculture and Forestry and Metsähallitus. Thus far, direct communication with landowners has proven more effective than waiting for applications for voluntary rewetting measures. Responsibility for these efforts primarily lies with the Ministry of Agriculture and Forestry, while the Ministry of Environment and the state-owned enterprise Metsähallitus also play significant roles. Metsähallitus oversees forestry and protected land, administers rewetting projects, and manages government funding programs. However, responsibility for rewetting efforts is scattered among ministries and research institutes who all are involved to some extent in rewetting programs and research projects. The programs and research periods last for different length of time and a coordination role between the different rewetting efforts seems to be lacking.

In **Iceland**, rewetting is predominantly carried out on agricultural land, with a smaller proportion of forestry land being included. Private landowners are the main stakeholders, though municipal land is also relevant to some extent. Responsibility is shared among the Ministry of Environment, Climate and Energy, the Ministry of Food, Agriculture and Fisheries, and Land and Forest Iceland. Like other Nordic countries, Iceland has had success with directly engaging landowners to implement rewetting measures rather than relying on applications for voluntary rewetting schemes. However, there is general resistance to rewetting among landowners, particularly regarding its effectiveness in reducing emissions. The skepticism is considered to somewhat hinder progress for voluntary agreements. Unlike its Nordic counterparts, Iceland places significant emphasis on carbon offsetting as a mean to promote rewetting. The country is currently developing a carbon credit standard for rewetting to enhance offsetting efforts and ensure more reliable calculations.

In **Norway**, rewetting efforts initially focused on protected areas until the early 2020s. Since 2021, the scope has expanded to include restoration projects on other public lands and since 2024, private lands. Funding schemes for private landowners and municipalities for nature restoration have been in place since 2024. Responsibility for these projects is shared between the Norwegian

Environment Agency and the Ministry of Climate and Environment. The implementation of state projects is carried out by Norwegian Nature Inspectorate under the Norwegian Environment Agency and by the County Governors. Additionally, the state-owned forestry enterprise, Norwegian Statskog, has entered into a ten-year agreement with the state to carry out restoration activities on state-owned land.

In **Sweden**, privately owned forest land and municipal land are the main focus of rewetting initiatives, while agricultural land is excluded from political objectives. It is only since the 2020s that rewetting has become a political priority. Direct engagement with landowners remains the main communication strategy, though awareness of policy measures among landowners is still limited. More resources and targeted outreach are needed to address this gap. To support these efforts, Sweden has developed a "peat-map" to identify fertile peat soils and prioritize rewetting initiatives. Only a small proportion of rewetting occurs on state-owned protected land. Responsibility for rewetting rests with the Environmental Protection Agency, which allocates government funding to the other involved authorities. The latter, in turn, distributes funds to regions and municipalities for local rewetting projects. The centralized responsibility for all rewetting initiatives that rests on the Swedish EPA, creates a clear structure and clearly defined responsibility from the government´s side.

9.3 Economic support mechanisms

Economic support mechanisms differ significantly among the Nordic countries, reflecting variations in policy priorities, land ownership patterns, and political frameworks. This variation makes it difficult to compare the funding allocated for rewetting across countries. Some countries have annual budgets or multi-year programs, while others rely on project-based compensation and cost reimbursement per hectare rewetted, making it challenging to identify a dedicated total budget for comparison across the Nordics. The funding driving rewetting across the Nordics is generally a mix of government budgets and EU funds.

In **Denmark**, the Ministry of Food, Agriculture and Fisheries manages compensation and cost reimbursements for rewetting projects. Four-fifths of the funding comes from the EU, with the remainder provided by the government, except for lowland projects, which are entirely government-funded. In autumn 2024, the government established a Green Land-Use Fund financed by the Danish state. Landowners can choose to sell their land to the state at an agreed price, retain ownership and receive compensation for the loss of value due to rewetting, or accept a one-off payment. Compensation for rewetting covers the planning and execution of the projects, including all necessary materials and technical expertise.

In **Finland**, forest landowners can enter into fixed-term compensation agreements for ten years. The state may also purchase land from landowners for permanent protection. Alongside reimbursement to the landowner for lost economic income, government funding is also allocated for restoration, construction and maintenance costs. For farmers, cost coverage is limited to expenses related to planning and implementing rewetting practices, as well as maintaining the rewetted land. A large share of Finland's rewetting takes place on state-owned forestry land, where drainage has not improved tree growth. These peatlands have been the primary focus of rewetting efforts, which explains the relatively limited use of compensation agreements to date.

In **Iceland**, neither private individuals nor businesses are eligible for reimbursement. It is unclear from the state budget how much funding is allocated to rewetting projects, as there is no dedicated or earmarked government funding. Restoration activities are partly supported by a

private wetland fund, which works alongside public authorities. Additionally, carbon offsetting opportunities are available to private landowners and businesses involved in restoration projects. The state is actively supporting the development of a carbon credit methodology, which is currently underway.

In **Norway**, rewetting has predominantly been carried out on protected state-owned land. However, the Wetland Restoration Plan for 2021–2025 also includes initiatives for other public lands and potentially private lands. With a grant for nature restoration available from 2024, Norway is also starting to provide incentives for rewetting on private land. The grant involves agreements between private landowners and the Norwegian Government, where landowners are obliged to uphold the restored wetland for 40 years. The funding for these efforts is expected to increase in the coming years.

Sweden funds rewetting activities through three distinct government programs. One program distributes funds to regions and municipalities for rewetting on public land, another focuses exclusively on protected state-owned land, and the third targets privately owned forestry land. For private land, a dedicated yearly budget covers costs related to planning, construction, and maintenance, as well as compensation for economic losses when land is taken out of production. While Sweden has a clear yearly budget for rewetting, the absence of defined short- and long-term targets is a notable gap.

All countries have funding schemes in place to promote rewetting on private owned land, through which landowners can get reimbursement for the expenses of planning and restoring wetlands. However, Denmark, Finland and Sweden also have funding schemes that offer compensation for the rewetted land and/or from lost income that is a consequence from rewetting, such as less productive soils for forestry. The levels for land compensation in these countries are presented in Table 16.

Country	Type of compensation	Amount
Denmark	Water- and Climate Projects Climate-lowland projects	Both compensation schemes: €11,060/ha for intensively cultivated agricultural land such as crop production €4,759/ha for nature areas and grassland, with or without grazing animals
Finland	CAP aid and METSO programme forestry land.	CAP: Up to € 12,000/ha for wetlands >0.5 ha Up to € 4,100 /ha for wetlands 0.3–0.5 ha METSO programme: no information available on how compensation level is calculated.
Sweden	The Forest Agency´s compensation agreement to forestry landowners.	Up to €2,780/ha depending on soil fertility

Table 16: Overview of compensation schemes that reimburse land and/or lost income from land to private landowners. The funding schemes available in Iceland and Norway do not entail compensation for land or lost income from rewetting (2024).

9.4 Evaluation and monitoring approaches

This report focuses on evaluations and monitoring of current policies and funding programs in the five Nordic countries. In some cases, broader research on the effects of rewetting, such as its impact on greenhouse gas emissions or nearby ecosystems and land, is conducted when prioritised by the government to improve understanding of rewetting practices.

There has been limited monitoring and evaluation of policy measures and their effects on climate and the environment across all countries. As illustrated in **Table 17** the reporting of area rewetted varies between countries.

Country	Example
Denmark	Denmark reports rewetted area yearly through the website udtagning.dk.[253]
Finland	It is not possible to provide an overview of the total rewetted area in Finland, as no national statistics have been found. Additionally, the distinction between rewetting and wetland restoration is not always clear, as wetland restoration may include existing wetlands rather than actual rewetting.
Iceland	Annual wetlands restoration reports by Land and Forest Iceland reporting restored area since 2016 can be found online.[254]
Norway	No national statistics of rewetted area have been found for Norway. Reporting is carried out by the unit of length of blocked drains.[255]
Sweden	Reporting of annual rewetting area has been reported since 2021.[256]

Table 17: National monitoring and evaluations of area rewetted.

The effect on CO_2 emission reductions is also, to some extent, evaluated in the Nordic countries, but there are many uncertainties related to the calculations. Reporting on emission reductions from rewetting in national climate accounting is still only done to a limited extent. This is mainly due to many uncertainties in estimations when comparing emissions before and after restoration. Accurate reporting requires data from the actual sites restored, where a standardised methodology is missing. Studies attempting to measure the effects of rewetting provide limited evidence, as they typically use data from small areas to generalise for the entire country, leading to significant uncertainties.

IPCC provides guidance for calculating emissions from rewetted land, but this methodology has been assessed unreliable due to the limited number of studies included in the calculations. Norway currently lacks a method to estimate emission reductions and aims to develop a calculation method and collaborate with other countries to improve their reporting on greenhouse gas reductions from wetland restoration. In Iceland, it has been raised that monitoring of rewetting initiatives could be outsourced to the landowner against remuneration to

253.Landbrugsstyrelsen. (n.d.-b).
254.Landgræðslan (2024)
255.Miljødirektoratet (2020)
256.Lundblad (2023)

improve the monitoring process. Sweden has so far not reported on emission reductions from wetland restoration to the yearly greenhouse gas inventory to IPCC, mainly due to the above-mentioned issue of unreliable calculations. However, Sweden plans on reporting on emissions starting from reporting year 2024, based on new updated estimations conducted by researchers for the Swedish EPA.

In Finland, water quality has been a key reason for conducting monitoring. Finland has many lakes, coastal areas and water bodies, which have been severely affected by the drainage of peatlands. By rewetting the drained land, the improved water quality has been profound, which has been positive for the fish stock, bird life and biodiversity. The hydrological effect from rewetting is an important aspect in the multifunctional perspective of rewetting, which is important to include in overall assessments.

Comprehensive evaluations of ongoing policy measures across all countries have not yet been conducted, as programmes in the individual countries are relatively new. All countries have planned policy evaluations during the coming years. Sweden has conducted or initiated several sub-evaluations of current funding schemes. These evaluations primarily focus on understanding forest owners' perceptions of the new reimbursement model and the motivations behind rewetting among forest owners. Another significant ongoing Swedish evaluation examines the legal framework, identifying existing legal barriers to rewetting on privately owned land. These types of evaluations could be useful for the other countries to learn from, since other perspectives are in focus that can enhance knowledge about effectiveness of the funding schemes, especially the compensation schemes to landowners.

No cost-benefit analysis has yet been conducted on wetland restoration in a Nordic context. However, various government reports and evaluations suggest that such analysis would support ongoing rewetting priorities. Evidence indicates that the long-term impact on ecosystem services and greenhouse gas emissions is positive and likely to be economically justified. Norway has, for example, made a socio-economic analysis of their current Wetland Restoration plan running until 2025. The analysis includes around 80 mire projects with estimated costs and benefits from ecosystem services. The analysis provides an interesting case and learning on how ecosystem services can be evaluated in monetary terms. However, the analysis concludes that there is insufficient information to draw definitive conclusions about the economic benefits of wetland restoration.

In a recently published article by Laudon et al. 2023,[257] 11,000 scientific articles about wetland restoration were screened, and only 40 were relevant to Swedish conditions. The authors conclude that there are more insights regarding the great importance of wetlands rather than the actual effects when rewetting. The article also concludes that restoration projects often lack funding for follow-up and monitoring of their effects, which is why such activities are rarely carried out. Different authorities have varying priorities, with some focusing on drinking water, others on climate impacts, biodiversity, or eutrophication. This highlights the need for a national commitment to collective investments in monitoring efforts to address all these interests comprehensively.

The article compares with the situation in Finland, where significantly more research articles on wetland restoration were identified. This is likely due to Finland's history of drainage, which caused severe environmental damage and degraded water quality. Consequently, Finland appears to have made greater progress in monitoring and evaluations compared to neighbouring countries, Sweden being mentioned specifically.[258]

257. Laudon et al. (2024)
258.Laudon et al. (2024)

10. Rewetting outlooks

The following section will explore uncertainties in policymaking and the evaluation process of rewetting policies. The topics have emerged from the cross-country analysis, supported by empirical data gathered through interviews with relevant authorities and organisations, scientific papers, grey literature and input from sounding board statements.

Efficiency of rewetting measures

Rewetting efforts are widely recognized for their numerous benefits, including improved biodiversity, enhanced carbon sequestration, and increased climate resilience and used by governments as nature-based solutions to a range of societal problems.[259][260] However, this report has shown that significant challenges remain in adequately and transparently quantifying these benefits from environmental, social, and economic perspectives. These challenges, among others, stem from the lack of standardized monitoring and long-term studies needed to fully capture the effects of rewetting. This lack of clarity can hinder efforts to communicate its value and integrate it effectively into policy frameworks. Moreover, the financial costs associated with rewetting –such as expenses for land acquisition, restoration activities, and monitoring – are complex and difficult to quantify. The costs however often dominate policy debates, as they directly impact budgets and resource allocation. Meanwhile, there is wide understanding, also among government, of rewetting as one of the most cost-efficient measures for climate mitigation.

Cultural ecosystem services, such as the aesthetic value of restored landscapes and their potential for recreation and tourism, play a critical role in public and stakeholder support for rewetting projects. These services can be monetized through environmental economic value estimation methods, offering tangible economic benefits through increased tourism, local business opportunities, and improved community well-being. Yet, wetland's less visible ecosystem services, such as water purification, flood mitigation, and carbon storage, are crucial to ecological sustainability and societal resilience but are rarely reflected in conventional cost-benefit analyses. Failing to account for these benefits risks undervaluing wetland restoration, potentially leading to underinvestment. This uncertainty illustrates the broader challenges of valuing complex ecosystems like wetlands, which provide services that are often taken for granted. Thus, a more integrated approach to measuring and valuing wetland benefits is essential for informed management and policy decisions.

259. Tanneberger et al. (2021)
260. Stockholms universitets Östersjöcentrum (2024)

Short-term vs. long-term climate impact

Restoring wetland functions may take several decades for ecosystems to fully recover. Rewetting peatlands presents a significant trade-off between short-term climate-warming effects and long-term benefits in reducing GHG emissions. The initial phase of rewetting often results in increased methane emissions, creating a temporary warming effect. Studies from Finland suggest this warming phase can last up to 30 years before the cooling effect of reduced CO_2 emissions takes hold. This time lag complicates efforts to measure and predict rewetting's overall contribution to national emission targets, making it a long-term strategy rather than a quick fix. This is, however, not taken into consideration in national climate objectives yet, where it is only an immediate emissions reduction effect that is accounted for.

The heavy reliance on rewetting in Nordic countries as a primary measure to achieve short-term climate goals highlights a critical gap in current policy goals. Methane emissions from rewetted peatlands can significantly undermine the anticipated climate benefits in the initial decades. This issue is problematic because the immediate reductions in CO_2 emissions, which are typically highlighted in emission accounting frameworks, give a misleading impression of progress toward climate targets. By focusing on rewetting as a major strategy for short-term reductions, countries risk overlooking the delayed climate benefits and the significant warming phase that may persist for decades. This reliance on rewetting as a "quick win" creates a false sense of progress in climate reporting, potentially delaying the implementation of other strategies that deliver more immediate climate benefits, such as reducing fossil fuel consumption or improving energy efficiency.

Delaying rewetting only worsens the long-term effect of CO_2 emissions from drained peatlands.[261] While methane emissions are a valid concern, they do not outweigh the significant climate benefits of rewetting. Policymakers must carefully consider which ecological factors to prioritise, as we know rewetting benefits extend beyond greenhouse gas mitigation. In conclusion, effective wetland management requires balancing ecosystem services and recognizing trade-offs between environmental goals, while still addressing the urgent need for climate action.[262]

Afforestation vs wetland restoration

The trade-offs between afforestation and wetland restoration for climate objectives also require careful consideration. In Iceland, for instance, pristine public wetlands have been converted into forests by municipalities aiming to increase CO_2 capture. While afforestation may offer short-term carbon benefits, it often overlooks the long-term ecological functions of wetlands, such as biodiversity support, flood mitigation, and carbon storage. This example illustrates the importance of context-specific decision-making and ensuring that restoration efforts align with both immediate climate targets and broader ecological goals.

Rewetting on privately owned agricultural and forestry land has economic trade-offs with production profit, as can be seen from rewetting efforts conducted so far in the Nordics. To a large extent, state owned land has been prioritized, and there is still little knowledge on what compensation level is enough to incentivize landowners to rewet their land. This is mirrored from the very little total area of privately owned land that has been rewetted so far across all

261. Günther et al. (2020)
262. Stockholms Universitets Östersjöcentrum (2024)

countries, as it is still a fairly new practice and too slow to live up to political ambitions. Neither is there little knowledge on the long term effects on the land when rewetted, in terms of production purposes and whether the land still to some extent can be used for production.

Using rewetting for carbon credits

The use of carbon offsets and credits in rewetting initiatives has sparked considerable debate, particularly regarding the ethical and practical implications of monetizing nature. Rewetting peatlands is widely recognized as an effective method for carbon sequestration and integrating it into carbon credit schemes could potentially contribute to restoration projects. This is currently being explored in Iceland where the state is supporting the development of a carbon credit methodology for wetland restoration. The methodology will set criteria for restoration projects to qualify for the issuance of carbon credits, enabling landowners to access private financial compensation for rewetting. This will be interesting to follow, especially as Iceland builds on existing knowledge from using carbon credits for afforestation projects. There are however critics who highlight that commodifying rewetting could enable corporations to offset emissions without significantly reducing emissions from their own operations, effectively creating a "license to pollute".[263] This raises concerns about equity and the risk of exploiting ecosystems for financial gain. Additionally, a narrow focus on carbon credits may prioritize profit-driven goals over broader ecological and social benefits, such as biodiversity restoration, improved water regulation, and community resilience.

Carbon offset for rewetting is not widely discussed in the other Nordic countries. In terms of incentivizing and standardizing rewetting, the new voluntary EU-level certification framework for permanent carbon removals, carbon farming and carbon storage in products can play a larger role moving forward.[264]

263.European Environment Bureau. (2024)
264.Council of the EU (2024)

11. Conclusions

Rewetting initiatives in the Nordic countries share overarching goals of climate mitigation, biodiversity conservation, and water management, yet the emphasis and implementation reflect distinct national priorities and historical contexts.

A significant share of rewetting efforts has historically focused on state-owned protected forestry land, particularly in Finland, Norway and Sweden. This is due to the accessibility and minimal conflicts of interest associated with state land. Finland, in particular, has large areas of drained peatlands that are unproductive for forestry, allowing cost-efficient restoration without extensive landowner compensation requirements. Finland also stands out as the most advanced rewetting country in the Nordic region, benefitting from decades of experience in wetland restoration work and structured programs linked to clear political targets. In contrast, rewetting costs in Norway are said to be significantly higher than in Finland, reflecting the relatively limited experience and smaller-scale projects. However, reliance on state-owned land alone will not suffice to meet long-term climate commitments in the Nordic countries. Hence, there is a gap between political ambitions and targets for rewetting and the voluntary measures in place.

Rewetting on privately owned land along with reimbursement to private landowners is a relatively recent practice in all countries, which is why there is limited knowledge about its effectiveness. All Nordic countries provide compensation to encourage landowners to participate in rewetting projects, however it differs whether landowners are compensated only for the planning and construction of wetlands or for the loss of land and production income. The effectiveness of these incentives and the appropriate levels of compensation are not yet evaluated. Hence, insights into the optimal socio-economic compensation level are lacking.

Transitioning from rewetting measures on state-owned land to broader inclusion of private landowners also presents other challenges, such as resistance from landowners, uncertainty on emission reductions, and need for robust and long-term compensation programs. Direct engagement with landowners has been the primary successful strategy across the Nordics, though this requires significant resources and communication efforts, which all countries need to increase to align with political expectations.

Targeted and regular monitoring of rewetting projects is crucial to better evaluate the impact of political instruments, particularly voluntary measures. Monitoring can be costly and is often de-prioritized, but it is vital for evaluating political programmes and funding to assess their combined effects and address any conflicting interests. Currently, extensive monitoring is limited, as there are no standardized methods for measuring rewetting impacts. Since effects of wetland restoration have a long timeframe, the importance of long-term monitoring should be highlighted. Understanding the type and size of rewetted land is also crucial to assessing its effects.

On a final note, EU legislation will affect rewetting measures in the member states even more in the future. The Nature Restoration Law and the Regulation on land use, land use change, and forestry will be crucial to change the current pattern of nature degradation across Europe. The Regulation on land use, land use change, and forestry is also adopted by EEA member states, including Norway and Iceland, but it is still unclear whether EEA member states will adopt the Nature Restoration Law. The Nature Restoration Law sets specific targets for drained peatlands, and area-based targets for rewetting in 2030, 2040 and 2050 respectively. These targets will be turned into actions in the national restoration plans that each member state must provide within the next two years. The Regulation on land use, land use change, and forestry specifies emission targets for the land use sector, where rewetting also will be an important measure. These regulations will therefore come to play an important role for the Nordic countries in the near future and most likely have great influence on national policy targets and measures for rewetting.

12. Recommendations

Based on the findings of this study, we provide a set of targeted policy recommendations for Nordic decision-makers. These recommendations aim to highlight key focus areas to support increased rewetting in the Nordic countries and contribute to fulfilment of national and international climate and nature obligations.

Establish clear area-based targets with timelines and monitoring requirements

National area-based targets provide an efficient policy framework for implementing rewetting measures. While some Nordic countries have established such targets, others have yet to do so. It is recommended that all Nordic countries adopt clear area-based targets. The achievement of these targets should be closely monitored and regularly reported. Given the requirements of the EU Nature Restoration Law, setting these targets will also be important to meet legislative obligations. Area-based targets can further be defined for specific policies to enhance focus and efficiency.

Establish earmarked budgets for rewetting

Ensure that funding mechanisms are clearly linked to policy targets and objectives. Allocate specific budgets for rewetting instead of merging them with broader funds for nature restoration.

Set monitoring requirements and provide guidance

Continuous monitoring and assessment of established rewetting sites is necessary to ascertain that measures have the desired effects on greenhouse gas emissions. Moreover, monitoring of other effects, including effects on biodiversity, on surrounding landscape and infrastructure, and on human health should be considered. To support this, policymakers can allocate funds for long-term monitoring and support the development of national monitoring methods and programs.

Design policies for adaptive management

Policies should include provisions for adaptive management, ensuring that wetlands remain functional over time. This approach allows for adjustments based on monitoring results and changing conditions, safeguarding the long-term success of rewetting initiatives.

Strengthen incentives for private landowners

Strengthen and expand the incentive structures for landowners to participate in rewetting. Carry out surveys and enter dialogue with landowner about values, interests and concerns regarding rewetting. Continuous research on compensation levels, effective engagement strategies, and cost reductions are essential measures to ensure long-term success, especially for rewetting on

private land. Expanding financial support mechanisms, such as compensation agreements, can potentially be one way forward in the countries where these are newly established. Financial support mechanisms should be coupled with guidance and administrative support in order to be successful.

Invest in knowledge building

Increased knowledge among regional and local decision-makers, managers and constructors can largely impact the results of rewetting measures. Policymakers should direct resources toward increasing knowledge among rewetting actors to enhance their ability to implement and oversee rewetting initiatives. Better use of scientific research and expertise can help achieve policy goals more effectively. Cross-border exchange of knowledge should also be prioritized, particularly by leveraging the experiences of frontrunner rewetting countries such as Finland.

Use site mapping to guide measures

Effective rewetting requires knowledge of local conditions and restoration potential. The methodology for Sweden's and Denmark's "peat-maps" can be adapted and shared across the Nordic region to help identify and prioritize rewetting sites based on soil conditions and environmental data.

Involve and mobilise stakeholders

Increasing rewetting efforts requires collective action, social acceptance and land consolidation processes. Policymakers must therefore address resistance from local communities and landowners by designing collaborative processes, where stakeholders are invited early on in the design of measures.

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Appendix

List of interviewed organisations

Agency/organisation	Type of organisation	Country
The Swedish Environmental Protection Agency	National Agency	Sweden
The Forest Agency	National Agency	Sweden
The Society for Nature Conservation	CSO	Sweden
The Federation of Swedish Farmers	CSO	Sweden
Ministry of Food, Agriculture and Fisheries	Ministry	Iceland
Land and Forest Iceland	National Agency	Iceland
VKST	CSO	Denmark
NINA	Academic research	Norway
The Norwegian Nature Inspectorate, part of the Norwegian Environment Agency	Ministry	Norway
Ministry of Agriculture and Forestry	Ministry	Finland
Metsähallitus, Agricultural dep. (State forestry Agency)	State owned enterprise	Finland
SYKE	Research Institute	Finland

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The Nordic Council of Ministers
Nordens Hus
Ved Stranden 18
DK-1061 Copenhagen
pub@norden.org

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