



Nordic Water Framework Directive Conference 2024



Implementation of the Programmes of Measures in surface and groundwater – successes and difficulties in the Nordic countries.



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Preface

Nordic seminars with varying themes for the implementation of the EU's framework directive for water (directive 2000/60/EC) have been arranged 11 times since 2007. These meetings have proven to be valuable for the exchange of knowledge and experience between national and regional authorities in the Nordic countries. Through the seminars, contact networks and platforms for common Nordic positions and strategies are developed, for example within the work of the EU Commission's working groups (Common Implementation Strategy). The Nordic countries are facing challenges, including the need to increase the pace of action to achieve good ecological status in the aquatic environment and policy instruments needs to be designed to achieve sustainable water use.

The purpose of this year's Nordic meeting in Gothenburg was the implementation of measures with the aim of generally exchanging knowledge and experiences regarding difficulties and opportunities. Through the exchange of experience, the hope is to find common solutions to some difficulties in balancing the water environment and societal benefits, which will ultimately strengthen Nordic cooperation.

The first day of the conference focused on exchanging experiences of progress in the work on EU water legislation and was open to both authorities and various sectors, etc. to participate. The second day contained various workshops for participants with different specialist skills for different environmental problems.

Thank's to the Program committee

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Sammanfattning

Den 25-26 september 2024 arrangerade Havs- och vattenmyndigheten en tvådagars nordisk konferens i Göteborg. Evenemanget fokuserade på genomförandet av EU:s vattendirektiv (WFD) för både yt- och grundvatten. Konferensens syfte var att främja kunskapsutbyte och regionalt samarbete mellan de nordiska länderna, med fokus på praktiska lösningar, att lyfta fram framgångar samt identifiera utmaningar i genomförandet av åtgärdsprogrammen (PoM) och uppfyllandet av EU:s miljö kvalitetsnormer. Totalt deltog ca 225 personer varav 110 fanns på plats i Göteborg och resterande on-line.

Dag 1 var öppen för alla intressenter som arbetar med genomförandet av EU:s vattendirektiv, inklusive beslutsfattare, forskare och representanter från industrin. Presentationerna fokuserade på nationella strategier, utmaningar och innovativa lösningar inom vattenförvaltning. Deltagarna kunde delta antingen på plats eller via webblänk.

Anna Ledin, generaldirektör för Havs- och vattenmyndigheten, betonade vikten av att balansera ekologiskt skydd med industriella behov, hantera klimatrelaterade utmaningar som översvämningar och torra samt att adressera framväxande föroreningar som PFAS. Luca Perez, som representerade Europeiska kommissionen, presenterade den europeiska vatten resiliensstrategin och framhöll målen för hållbar vattenförvaltning fram till 2050, inklusive att främja cirkulär vattenanvändning och digitala vattenförvaltningslösningar. Representanter från Finland, Norge, Island, Danmark och Sverige redogjorde för framsteg, utmaningar och innovativa program kopplade till genomförandet av vattendirektivet.

Dag 2 var reserverad för specialister inom EU:s vattendirektiv som arbetar direkt med genomförandet i Norden. Dagen innehöll fördjupade arbetsgruppsdiskussioner som fokuserade på specifika områden som hydromorfologi, eutrofiering, farliga ämnen och innovativa övervakningsteknologier.

Konferensen betonade vikten av samarbete och regional samordning för att hantera gemensamma utmaningar som påverkan från vattenkraft, eutrofiering och hantering av farliga ämnen. Bland nyckelrekommendationerna fanns ökad finansiering och kapacitetsbyggande för genomförandet av WFD samt harmonisering av riktlinjer och övervakningsstandarder över nationsgränser.

Summary

On September 25-26, 2024, the Swedish Agency for Marine and Water Management hosted a two-day Nordic conference in Gothenburg. The event focused on the implementation of the EU's Water Framework Directive (WFD) for both surface and groundwater. The conference aimed to promote knowledge sharing and regional cooperation among Nordic countries regarding practical solutions, acknowledging successes, and identifying challenges in implementing the WFD Programmes of Measures (PoM) and meeting EU environmental quality standards. A total of about 225 people participated, of which 110 were on site in Gothenburg and the rest online.

Day 1 was open to all stakeholders involved in the WFD implementation, including policy-makers, scientists, and industry representatives. Presentations centered on national strategies, challenges, and innovative water management solutions. Participants could join in person or via web link.

Anna Ledin, Director General of the Swedish Agency for Marine and Water Management, emphasized balancing ecological protection with industrial needs, tackling climate-induced challenges like floods and droughts, and addressing emerging contaminants such as PFAS. Luca Perez, representing the European Commission, introduced the European Water Resilience Strategy, highlighting goals for sustainable water management by 2050, including promoting circular water use and digital water management solutions. Representatives from Finland, Norway, Iceland, Denmark, and Sweden outlined progress, challenges, and innovative programs in implementing WFD measures.

Day 2 was reserved for WFD specialists directly involved in Nordic implementation, with in-depth working group sessions focusing on specific implementation areas, including hydromorphology, eutrophication, hazardous substances, and innovative monitoring technologies.

The conference underscored the importance of collaboration and regional alignment to tackle shared challenges such as hydropower impacts, eutrophication, and hazardous substance management. Key recommendations included enhanced funding and capacity-building for WFD implementation and cross-border harmonization of guidelines and monitoring standards.

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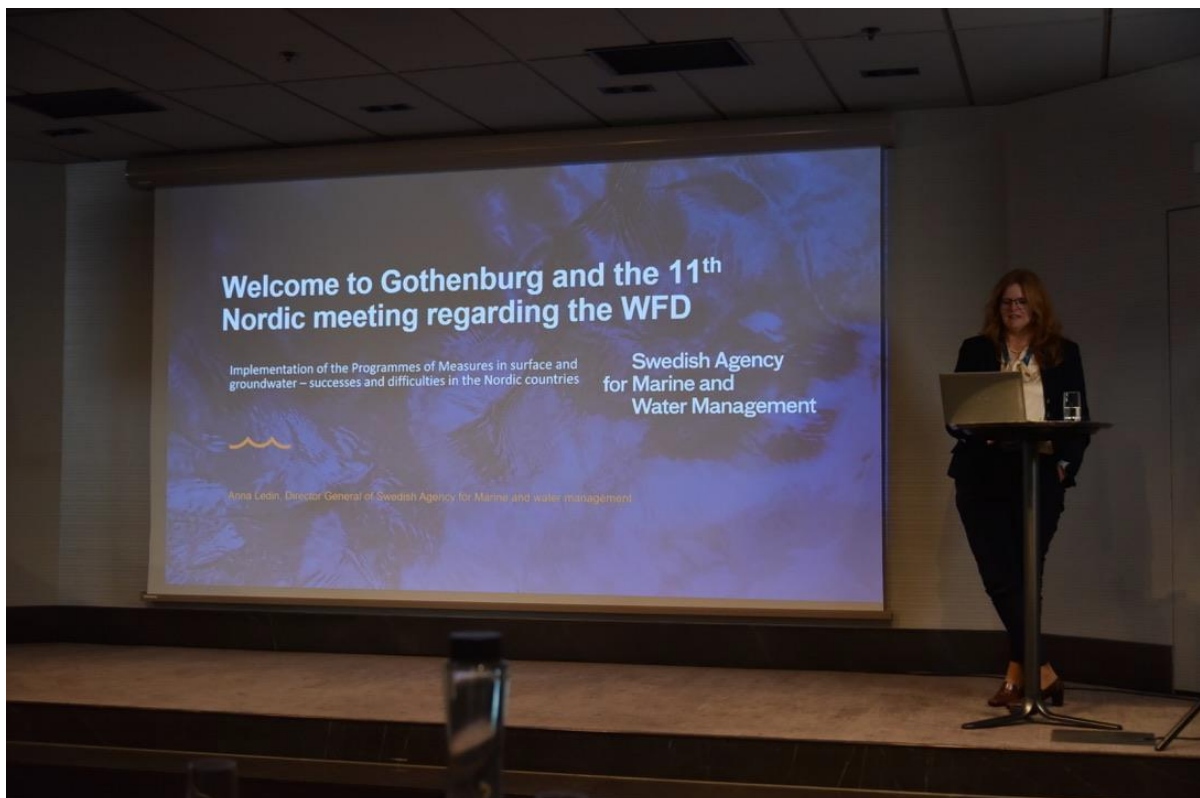


Figure 1. The 11th Nordic Water Framework Directive (WFD) aimed to promote knowledge sharing and regional cooperation among Nordic countries regarding practical solutions, acknowledging successes, and identifying challenges in implementing the WFD Programmes of Measures (PoM) and meeting EU environmental quality standards. The meeting gathered about 225 people, of which 110 were on site in Gothenburg and the rest online. Photographer: Ida Vartia.

Day 1 - Introduction and National overviews

The first day of the Nordic Water Framework Directive meeting focused on national strategies, challenges, and innovative solutions in water management across Nordic countries. Key topics included resilience strategies, biodiversity restoration, water quality issues like PFAS pollution, and the implementation of specific national programmes. The day fostered collaboration, with a focus on shared frameworks, learning from experiences, and adapting to environmental and regulatory challenges.

Opening of the conference

Anna Ledin, Swedish Agency for Marine and Water Management, Director General

Anna Ledin, Director General of the Swedish Agency for Marine and Water Management, welcomed attendees to Gothenburg for the 11th Nordic Water Framework Directive (WFD) meeting. Ledin highlighted several emerging challenges in Nordic Water Management. There is a need to balance water protection with industry amid rising pressure from mining activities driven by the EU's Critical Raw Materials Act, emphasizing the importance of addressing both ecological protection and resource needs for the green transition. She discussed the urgency of water security considering the current geopolitical climate and climate change, including the need to protect drinking water and wastewater systems and cope with severe flooding and droughts. Moreover, pollution from emerging contaminants like different chemicals of PFAS poses significant risks to surface and groundwater quality, requiring updated monitoring and response strategies. Ledin underlined the importance of the WFD (including directives for groundwater and priority substances) and the Floods Directive as crucial frameworks for addressing these issues. In closing, Ledin encouraged participants to leverage this collaborative setting to foster practical, sustainable water management solutions across the Nordic region.



Figure 2. View from Gothenburg harbour area and Göta Älv close to the venue of the Nordic water framework directive (WFD) meeting in September 2024. Photographer: Natalie Greppi

Presentation and policy update from the European Commission

Luca Perez, DG Environment, European Commission, Deputy Head (on-line)

Luca Perez from the European Commission outlined the EU's strategic approach to water resilience, aiming for sustainable water management by 2050. Emphasizing the pressures on water from agriculture, industry, climate change, and geopolitical factors, Perez introduced the European Water Resilience Strategy as part of the 2024-2029 agenda. This strategy seeks to secure water resources by enhancing water security, balancing supply and demand, and protecting ecosystems while ensuring safe drinking water. Key focuses include improving water efficiency, promoting circular water use, and digitalizing water management, with investments directed toward technology, cross-border infrastructure, and digital tools to position the EU as a global leader in water resilience and sustainable resource management.

In alignment, the European Economic and Social Committee's EU Blue Deal promotes policies to secure Europe's water resources, addresses water scarcity and climate impacts by tackling water poverty, raising awareness of water footprints, promoting water-efficient practices, and supporting resilient infrastructure.

Revisions to the WFD, Floods Directive, and Habitats Directive include stricter targets for achieving good ecological status with associated new guidelines. The new Nature

Restoration law expands habitat restoration efforts, focusing on essential aquatic environments like inland wetlands and seagrass beds to further support ecosystem health and climate resilience. To meet biodiversity and water quality targets, the Commission has also committed to restoring at least 25,000 km of free-flowing rivers by 2030. This involves removing outdated barriers, enhancing river connectivity and sediment transport, expanding floodplains and wetlands, and ensuring adequate water flow to support biodiversity, ecosystem health, and related services. Moreover, Perez presented recent legislative updates to strengthen water resilience and adaptation to emerging challenges.

Finally, Perez clarified the specific conditions under which the WFD exemptions could be applied beyond 2027, the conditions are stricter, and each exemption requires robust justification and clear reasoning. See WFD Articles 4(4), 4(5), 4(6), 4(7).

National overview of the WFD-progress in the Nordic countries - Presented by ministry, agency, or corresponding representatives

Finland - Turo Hjerppe, Ministry of the Environment

Turo Hjerppe from Finland's Ministry of the Environment discussed updates on river basin management, EU reporting, the Ahti Water and Marine Protection Program, and upcoming regional administrative reforms. The updated Finnish RBMP includes new water bodies, reclassified lakes, and refined groundwater delineations expected by late 2024, along with ongoing updates on pressures and risk assessments (ground water). National classification guidelines are also being updated to meet EU standards, with the classification of heavily modified water bodies set to start in 2025. There are ongoing challenges with electronic reporting for EU compliance. For other EU reporting progress has been made, notably with the data collection for the PoM that is underway, EU harmonization, Nitrates Directive reporting nearly completed, and the 2022 Urban Waste Water Treatment Directive report was submitted on time in June 2024. To streamline environmental processes, Finland plans to centralize environmental permitting and supervision into a national agency by 2026, providing uniform services across regions. Hjerppe also presented the Ahti Program, aimed at improving and protecting marine and freshwater environments with a particular emphasis on the Archipelago. The program focuses on reducing nutrient loads, improving soil structure and health, increasing management efficiency, and hazardous substance management. The program has successfully facilitated and intensified the implementation of various measures in Finland.

Norway - Vilde Wiik Terum, Ministry of Climate and Environment

Vilde Wiik Terum from Norway's Ministry of Climate and Environment focused on water management, restoration efforts, and the challenges still faced in the progress of implementing the WFD. Norway's 16 River Basin Districts (RBDs) are overseen through multi-level governance, from the Ministry to municipalities. Terum put a lot of emphasis on the crucial role of catchment coordinators at the local level, who assist municipalities in implementing WFD measures. The RBDs encompass 33,850 classified water bodies, with data centralized in the "Vannmiljø" database, supporting RBMPs and PoMs. Various significant pressures on Norwegian water bodies include hydropower, agriculture, acid rain, wastewater, and aquaculture, each impacting water bodies differently and to various degrees. When displaying an overview of the ecological

status and potential of water bodies, it is evident that northern regions with lower population density generally have higher ecological status.

The EFTA Surveillance Authority has expressed concerns about Norway's transparency and compliance with WFD deadlines and stated that Norway has not sufficiently implemented the CIS 37 guidance document. EFTA is urging for more regular reviews of environmental control (Article 11(3)), more effective reassessment of permits (Article 11(5)), and clearer justifications for extended timelines (Article 4(4)).

Terum presented Norway's National River Restoration Strategy (2021-2030), aiming to restore at least 15% of degraded rivers by 2030, improving connectivity and fish migration. Efforts include updated guidelines and annual seminars to promote best practices in river restoration. Norway's RBMPs and PoMs for 2022-2027 aim for ecological improvements but some objectives may not be fully met by 2033 due to gaps in current capacities, legal tools, use of existing tools, and funding. Despite the introduction of new national tools to strengthen WFD compliance, challenges persist and a significant gap remains between the current status of water bodies and necessary measures. Progress in implementing these measures is essential, and many proposals must be effectively executed soon. An extensive evaluation by Norway's Committee of Agencies in 2023 suggested over 30 improvement areas, aiming to refine Norway's RBMPs and PoMs in the next planning cycle. It was noted that financial and organizational stability were ongoing challenges. While Norway already has made significant progress, achieving all WFD goals by 2033 will require continued adjustments, increased resources, and improved inter-sectoral coordination.

Iceland - Lilja Ólafsdóttir, The Environment Agency

Describing the process as a "marathon rather than a sprint," Lilja Ólafsdóttir presented Iceland's progress in implementing the WFD since its adoption into national law in 2011. Iceland operates as a single river basin district with 2,700 classified water bodies, most of which maintain high or good ecological status.

However, transitional waters remain unclassified, and methods for assessing groundwater status have not yet been defined and require further revision.

Iceland's first RBMP for 2022-2027 includes a PoM and a Monitoring Programme. The main pressures identified include hydropower impacts, pollution, wastewater issues, groundwater use, and aquaculture. The implementation of the Urban Wastewater Directive has posed challenges, and the Floods Directive has yet to be implemented. Since 2020, 59 water bodies have been preliminarily designated as heavily modified or artificial, with further designations, pressure analysis, and classification systems for ecological potential and hydro-morphological quality elements still in process.

The first RBMP has provided foundational steps toward integrated water management and better understanding of pressures, but Iceland faces ongoing increased water demands, leading to a need for applicability assessments and Article 4(7) tests. Ólafsdóttir noted that some permits have been annulled by the ENR Board of Appeal due to legal non-compliance, highlighting the need for clearer regulatory guidance and more simplified procedures. The administration is small yet faces a significant workload, but Iceland hopes to learn from other countries' experiences to strengthen its WFD compliance.

Denmark - Kirsten Vielwerth, Ministry of the Environment

Denmark's third RBMP for 2021-2027 prioritizes water quality improvement, ecosystem restoration, and agricultural pollution reduction. There was a broad political agreement on a Green Transition of the Agricultural Sector in Denmark 2021. The ongoing revisit of the agreement aims to integrate updated data and legal standards, has resulted in the Tripartite Agreement on a Green Denmark, and the final plan is under inter-ministerial clearance, overseen by the Ministry for the Green Tripartite to enhance WFD compliance.

The agreements primarily target nutrient runoff reduction, especially nitrogen from agriculture, with significant funding directed to address poor ecological status in coastal waters—currently, only four coastal areas meet good ecological standards. Measures in this area have included removing agricultural land from production, establishing wetlands, and implementing afforestation. Water Councils at the municipal level play a key role in recommending cost-effective measures.

Additional funding supports river and lake restoration, with initiatives such as the removal of barriers, reducing phosphorus levels, and the purchase of low-tech fish farms. Challenges remain due to limited data on chemical status for many water bodies, stemming from high monitoring costs and difficulty identifying pollution sources. To address this, Denmark has established a Partnership for Environmentally Hazardous Substances to develop concrete measures and improve water quality data.

Sweden - Martin H Larsson, Ministry of Climate and Enterprise

Martin H. Larsson from the Swedish Ministry of Climate and Enterprise outlined Sweden's water management progress, key actions, and ongoing challenges. Hydropower and dams are primary pressures on water quality in Sweden, with recent legislation requiring hydropower license revisions over a 20-year period to align with the WFD. However, given hydropower's role in energy supply, the government has paused revisions and is adjusting legislation to prevent adverse impacts on the energy system while aiming to conform with the objectives within the WFD. Additional pressures on Swedish waters include wastewater, agriculture, and industry, particularly nutrient runoff leading to eutrophication. To combat this, Sweden's Marine Bill emphasizes coordinated, catchment-level nutrient management and efficient phosphorus use, with a focus on evaluating outcomes. Sweden's WFD efforts are supported by major projects like LIFE IP Rich Waters, TRIWA LIFE, LIFE CONNECTS, Improve Aquatic LIFE, and the Water Wise Societies Program, which advance restoration and sustainable water management. To address the remaining challenges, it is noted that climate resilience needs to be considered to a larger extent in water management to ensure sustainable water use without compromising ecological goals and enhance funding and stakeholder collaboration. Larsson also highlighted the problem of following the changes in the environment, and that it is essential to develop methods to demonstrate the actual environmental changes.

Implementation of measures - Hydro morphological measures

Preparing to scale up river restoration - Anders Iversen and Jo Halvard Halleraker, Environment Agency, Norway

Halleraker and Iversen outlined Norway's strategy to upscale river restoration efforts, aimed at restoring 15 % of degraded rivers, and reversing environmental degradation faster than it occurs, aligning with global and European goals. Given Norway's heavy reliance on hydropower and its significant ecological impacts on rivers and lakes, the strategy planned 67 hydropower license revisions between 2016 and 2033. These revisions, guided by a national assessment of environmental costs and benefits, aim to mitigate ecological impacts by adjusting water flows, installing fish passages, and limiting hydropowering. Halleraker and Iversen also made reference to the EU taxonomy, underscoring that sustainable hydropower should not compromise the ecological status or potential of water bodies.

Norway's National River Restoration Strategy will integrate with climate adaptation initiatives, wetland restoration, and updated RBMPs for 2022-2027, focusing on better coordination across authorities, a reinforced knowledge base, and enhanced dissemination of results and benefits.

The upcoming National Action Plan for river restoration will give priority to rivers with important environmental values including protection status, migratory fish like the Atlantic salmon and the sea trout, as well as endangered species like the European eel and freshwater pearl mussel, including their habitats. The plan will also emphasize nature-based solutions (NBS), using natural structures like floodplains, meanders, and wetlands to retain water, reduce pollution, and offer recreational spaces. This approach aligns with national climate adaptation and land use planning guidelines, requiring municipalities to choose 'green' NBS instead of traditional 'grey' methods when possible. A new handbook on fish-friendly culverts for safe fauna passage (2024) was introduced in the presentation, along with several other useful handbooks regarding restoration, HyMo classification, and measures.

Halleraker and Iversen highlighted the economic benefits of restoration and advocated for sharing best practices and strengthening Nordic collaboration on HyMo issues, river restoration, and management of Heavily Modified Water Bodies.

New national guidance for HMWB, EP and exemptions - Katarina Vartia, Swedish Agency for Marine and Water Management, Sweden

Katarina Vartia presented Sweden's five newly adopted national guidance documents regarding designation of Heavily Modified Water Bodies (HMWB), defining Ecological Potential (EP), limits for disproportionately expensive, and setting exemptions where achieving good water status is not feasible. These guidelines align with the WFD and associated CIS guidance documents, aiming for all water bodies to reach "good status or potential" by 2027. The Swedish guidance for managing HMWB and EP, has clarified the analysis method of HMWB designation and definition of EP, based on the CIS guidance documents 4 and 37.

This designation allows for different environmental objectives tailored to these modified waters. However, it mandates certain management practices to maximum ecological quality that could be achieved within the modified context. The Swedish guidelines reference CIS guidance document No. 37 and clarify the definition of EP and the steps for determining EP for a specific waterbody.

For cases where water bodies cannot meet the target status by the WFD's 2027 deadline, Vartia presented specific scenarios where extended deadlines or less stringent objectives can be applied, as outlined in the associated guideline.

A significant part of the presentation focused on defining what constitutes “disproportionately expensive”. The Swedish guidance requires that the costs of reaching good ecological status exceed the benefits significantly, with both qualitative and quantitative costs considered. The margin for disproportionality must be substantial, typically requiring that the lowest achievable cost is at least double the maximum estimated benefit. The guidelines provide Swedish water authorities with a framework to manage modified water bodies responsibly, ensuring that efforts are impactful, cost-effective, and aligned with European standards.



Figure 3. Hydropower is highly important for the energy production but has large ecological impacts on, for example, migratory fish movements. Hydropower plant Sikforsen and railway bridge in Pite river Sweden. Photographer: Mats Svensson

Governmental migratory fish programme - Antti Parjanne, Ministry of Agriculture and Forestry (TBC), Finland

Antti Parjanne presented Finland's efforts to restore migratory fish living conditions and restore the natural cycle in stream waters in order to achieve good ecological status. Dams and weirs have large ecological impacts, with the main one being the loss of connectivity and impact on migratory fish movement. Parjanne highlighted that these types of barriers have led to huge declines in migratory fish species like Atlantic salmon in Finland. Parjanne presented the Finnish Migratory fish program NOUSU, that was launched in 2020. The NOUSU program specifically targets the restoration of migratory fish populations by funding and supporting projects that improve river connectivity, often by removing dams, installing fish passages, or decommissioning

small hydropower plants. NOUSU has been found to work well, and it is based on versatile measures, volunteerism, extensive cooperation and collaborative funding.

The program's success was illustrated by several case studies. The Hiitolanjoki River Project, completed in 2023, removed three hydropower dams, restoring rapids and spawning grounds. High juvenile salmonid densities were observed, showcasing the project's effectiveness. The Saramojoki River Restoration project opened 120 km of potential spawning grounds for brown trout, supported by the hydropower plant owner. Lastly the Virtaankoski River Project restored the Tainionvirta River by removing a hydropower plant, re-establishing critical spawning areas for migratory fish. The NOUSU program has completed 105 projects, restoring over 870 km of rivers. It has fostered collaboration among government, local authorities, NGOs, and private donors, building public support for ecological restoration while balancing energy needs.

Implementation of measures - Eutrophication measures

The Oslofjord - from deterioration to improvement - Henriette Givskud, Norwegian Environment Agency

In response to the ecological decline in the Oslofjord, the Norwegian government launched an action plan in 2021 to restore the fjord's environmental health. The plan targets issues such as overfishing, nutrient pollution, oxygen depletion, and biodiversity loss, which have led to the collapse of key species like cod and the degradation of essential habitats such as eelgrass beds.

Organized around seven priority areas, the plan includes measures to improve water quality, restore ecosystems, and manage land use and recreational activities. Key actions include stricter agricultural regulations to reduce nitrogen runoff, upgraded wastewater treatment, and new restrictions on bottom trawling. To oversee these efforts, the Oslofjord Council—comprising local leaders and stakeholders—was established to coordinate and monitor progress.

While initial progress is promising, Henriette Givskud emphasized that restoring the Oslofjord's health will require long-term commitment, substantial resources, and community involvement. Nonetheless, there is optimism that these coordinated efforts will gradually return the fjord to a more balanced state, with the primary objective being to achieve good ecological status for the Oslofjord.

UNESCO Biosphere Reserves as testbeds for Nature Based Solutions - Case study Kristianstads Vattenrike: multifunctional wetlands - Johanna MacTaggart, National coordinator of UNESCOs MAB Prgm in Sweden, Carina Wettemark, Biosphere reserve coordinator of Kristianstads Vattenrike

The presentation highlighted the role of UNESCO Biosphere Reserves (BRs) as innovative spaces for testing Nature-Based Solutions (NBS), focusing on Kristianstads Vattenrike in Sweden. BRs, found in 136 countries, act as "living laboratories" that promote sustainable practices, foster community engagement, and balance human activity with ecological health. In Sweden, seven BRs, including Kristianstads Vattenrike, operate as neutral, non-legal arenas that facilitate collaboration among residents, industries, and conservationists, encouraging sustainable development and local governance.

Kristianstads Vattenrike, established in 2005, spans over 100,000 hectares along the Helgeå river and prioritizes multifunctional wetlands. These wetlands, covering more than 300 hectares, support numerous ecosystem services, such as nutrient retention, biodiversity conservation, climate resilience, and water management, benefiting both agriculture and local ecosystems. The Biosphere Reserve (BR) office collaborates with landowners, researchers, and funders to secure 25-year contracts for wetland projects, with 90% financing provided.

One key project, completed in 2019, involved a 10-hectare wetland designed for irrigation, nutrient retention, and biodiversity. This wetland captures runoff from drainage systems, providing surface water for irrigation and reducing the need for groundwater extraction. It also traps nitrogen and phosphorus, preventing these nutrients from polluting surrounding waters and providing a more resilient water source for crops like potatoes and carrots.

Another initiative focuses on managing iron-rich acidic sulfate soils. In collaboration with Danish experts, the BR established a wetland to capture toxic iron sediments before water is released back into the ecosystem, improving water quality and protecting biodiversity.

These projects in Kristianstads Vattenrike exemplify how BRs can foster sustainable practices, enhance local governance, and promote environmental education. However, limited funding for monitoring remain a challenge. The presentation underscored the importance of continued evaluation to build landowner trust and demonstrate the effectiveness of NBS.



Figure 4. Measures to improve water quality, restore ecosystems, and manage land use and recreational activities in agricultural areas was discussed during the Nordic meeting. Photographer: Natalie Greppi

Archipelago Sea Programme - Essi Hillgren, Southwest Finland Center for economic development, transport and the environment (online)

The Archipelago Sea Programme for 2024-2027 aims to tackle nutrient pollution in Finland's Archipelago Sea, remove the catchment area from HELCOM's list of environmental "hot spots" by 2027 and restore water quality. The program emphasizes sustainable agriculture and effective nutrient cycling in the Archipelago Sea's catchment area to improve water quality and align with Finland's environmental objectives, extending through at least 2027.

Actions and measures within the program are based on governmental programmes, the Road Map of the Water Protection in Agriculture as well as RBMP and PoM. Main topics include enhancing soil quality, reducing runoff, water restoration projects, and engaging companies to shift towards sustainable practices. Furthermore, Hillgren underlined concerns regarding the program's reliance on voluntary participation from farmers, emphasizing the necessity of spreading information about the mutual benefits of water protection, and correcting misinformation to build community support. The program takes a targeted approach, focusing on three pilot areas to implement intensive water protection measures. These actions are designed to achieve visible improvements in soil and water quality, experiment with new water protection techniques, and monitor the effectiveness of combined measures using catchment-based planning. Monitoring efforts track water quality improvements, nutrient load reductions, and the efficiency of implemented measures, with specific goals for the pilot areas.

Implementation of measures - Environmentally hazardous substances

Trifluoroacetic acid (TFA: ultrashort PFAS) - in groundwater - Maria Åkesson, Geological survey of Sweden

The presentation focused on the challenges of managing diffuse PFAS pollution in Sweden, particularly in soil and groundwater, with growing concerns about trifluoroacetic acid (TFA). PFAS compounds, known for their persistence in the environment, pose risks to groundwater quality and, consequently, drinking water safety. In response, the Swedish Geological Survey (SGU) has received SEK 3 million for 2023, and 8 million for 2024 from the Swedish Environmental Protection Agency to enhance basis for national PFAS risk assessments through comprehensive soil and groundwater sampling.

In 2023, SGU conducted extensive sampling campaigns, to investigate ambient PFAS levels in soil and groundwater. Groundwater results showed PFAS presence in 30% of samples when excluding ultrashort PFAS, and nearly 90% when including them, highlighting their widespread distribution and mobility, even in remote forestry areas. TFA was detected in nearly all samples. Soil sampling was conducted at various depth and revealed that PFAS presence is depth-dependent, rarely found in deeper soil layers. The findings revealed different PFAS behaviour in soil versus groundwater, suggesting that selective adsorption and transport mechanisms result in distinct PFAS signatures and signals. TFA levels showed regional variation, with decreasing concentrations from south to north. Statistical analyses further showed an indication of higher concentrations in agricultural areas and lower levels associated with wetlands, alkaline pH, and ammonium presence. Trends suggest that TFA may increase in prevalence due to its widespread use and environmental persistence.

The results suggest a more nuanced approach to assessing the risks of PFAS, indicating that these compounds are more common in Swedish groundwater than previously thought. Due to TFA's persistence and mobility, there are questions about whether it should be included in regulatory frameworks, such as the drinking water directive. Åkesson emphasized that these findings provide a foundation for stricter regulations and the necessity for ongoing regional PFAS monitoring, intersectoral collaboration, and a unified strategy to tackle this complex pollution challenge.

PFAS National Danish Action Plan - Martha Meilstrup, Danish Ministry of Environment

The presentation outlined Denmark's comprehensive National Action Plan Against PFAS, designed to address contamination across water, soil, air, food, and consumer products. "The more we look for PFAS, the more we find it" Meilstrup said. Triggered by heightened public concern following a 2021 case of elevated PFAS in local meat, the plan gained strong political support and funding. The Action Plan consists of three main initiatives of focus, each addressing different aspects of PFAS including Decontamination (removal, elimination, and storage), Aversion (out phasing, banning, and alternatives), and Containment (awareness, monitoring, and finding new more efficient solutions).

The action plan, backed by all parties in Parliament with DKK 404 million allocated for 2024-2027, reflects Denmark's commitment to addressing both current and future PFAS issues and find

solutions for these. Denmark seeks to minimize the long-term impact of PFAS on health and the environment, setting a model for comprehensive PFAS management. The intense public attention and political awareness has created an open window for acting on the matter.



Figure 5. Water pollution and contamination from industry are important issues that needs to be adressed within the Water Framework Directive and an important topic that were discussed during the Nordic meeting. Photographer: Natalie Greppi

Day 2 - Discussions in working groups

WG1 - Hydromorphology (Lead country – Norway and Iceland)

Working Group 1 discussed strategies for managing heavily modified water bodies (HMWBs) across Nordic countries, focusing on upscaling effective measures and aligning guidelines. Led by Iceland and Norway, the session explored challenges like prioritizing ecological flows, dam removal, public participation, and harmonizing classifications between countries. Key takeaways from the working group involved broadened Hymo applications, cross-border harmonization and knowledge sharing. Participants expressed the need to expand Hymo assessments beyond hydropower to include agricultural, urban, and coastal areas. Norway and Sweden are aligning river typologies, with the potential for a broader Nordic collaboration. Given the complexity of Hymo management, participants highlighted the value of sharing best practices and tools, such as Finland's new hydro-classification tool for ecological flow assessments and standards for Good Ecological Potential. Regular webinars and an annual meeting were suggested to foster continuous dialogue and knowledge exchange on effective mitigation strategies and solutions for specific Nordic challenges.

WG2 - Eutrophication (Lead country – Sweden)

Working Group 2 focused on tackling eutrophication by setting reduction targets, addressing nutrient loads, and implementing strategic interventions across Nordic countries. The session emphasized harmonizing water quality goals under EU directives, focusing on long-term strategies, adaptive monitoring, and fostering public support for Good Ecological Status. Key challenges included managing nutrient loads from various sources, such as legacy phosphorus in agricultural soils and nutrient leakage from forestry. Effective measures require precise placement and scaling, particularly in high-flow conditions, and consistent monitoring to assess long-term effectiveness. Regional regulations have been effective, but easing restrictions has led to regrowth in poor practices. Voluntary measures alone were deemed insufficient and difficult to target geographically. The session highlighted the importance of a coordinated, region-specific approach to eutrophication, integrating measures of synergistic effects of nitrogen, phosphorus, and climate change. Enhanced cooperation, catchment-level planning, and long-term data collection will be essential to achieve lasting nutrient load reductions across Nordic waters.

WG3 - Environmentally hazardous substances in surface and groundwater (Lead country – Denmark)

Working Group 3 focused on strategies for managing hazardous substances, particularly PFAS, across the Nordic region. Key topics included source tracing, emission monitoring, and reducing discharge into surface and groundwater. The group shared that there is a need for standardized data on PFAS emissions, as it is not currently covered by the European Pollutant Release and Transfer Register (E-PRTR), and suggestions included a shared database for transparency. They discussed strategies for high-pollution zones, such as deep fjords and groundwater, and the difficulty of monitoring these complex areas. The need for standardized monitoring methods was discussed, especially with frequent updates to the Watch List for surface water. Interpretations of WFD Article 4(4) on managing persistent substances like mercury and PFOS varied among countries. For water bodies unlikely to meet good chemical status by 2027, options include

extended deadlines for natural recovery or setting less stringent objectives under WFD Article 4(5). The Weser and Detmold ECJ rulings informed discussions on concentration increases for substances exceeding EQS, and where to place representative monitoring stations. Participants also discussed the use of mixing zones and how to standardize definitions for these zones across Nordic regions.

The group underscored the importance of transparency, consistent monitoring standards, and regulatory alignment across Nordic countries to effectively manage hazardous substances and meet WFD objectives. WG3 emphasized the importance of aligned monitoring strategies, enhanced data transparency, and regulatory consistency to manage hazardous substances effectively. Nordic cooperation on these issues will be essential to meet the WFD objectives and adapt to emerging challenges in hazardous substance regulation.

WG4 - New methods/technology (Lead country – Finland)

Working Group 4 explored innovative water monitoring technologies, highlighting their potential to enhance water quality assessments across the Nordic region. Key topics of the discussions in this workgroup involved eDNA, satellite observations, drones and underwater vehicles, data accessibility and EO integration for WFD. Finland is leading in molecular monitoring, while Sweden is developing DNA-based ecological assessment methods. Norway finds eDNA particularly promising for classifying invertebrates but emphasizes the need for further standardization across countries. Norway's ØKOSAT project and Sweden's use of Sentinel data since 2020 underscore growing applications in coastal and lake monitoring, with Finland's TARKKA interface providing open EO data access. Iceland explores underwater drones for lake monitoring, while Norway uses drones for coastal mapping, showing strong potential for aquatic habitat assessments. The group discussed the need for accessible interfaces and historical data comparison, with Iceland's Water Portal and Finland's Pisara systems offering models for streamlined data access. Challenges remain, such as the lack of common guidelines and integration issues, underscoring the need for collaborative frameworks and updated WFD guidelines.

WG4 stressed the transformative potential of these methods, advocating for standardized guidelines, enhanced collaboration, and updated WFD frameworks to integrate advanced tools and optimize water monitoring across the Nordic region.



Figure 6. During Day 2 of the Nordic meeting specialists directly involved in Nordic implementation of the Water framework Directive met in working group sessions focusing on specific implementation areas, such as hydromorphology, eutrophication, hazardous substances, and innovative monitoring technologies. Photographer: Ida Vartia.

Nordic Water Framework Directive Conference 2024

Implementation of the Programmes of Measures in surface and groundwater – successes and difficulties in the Nordic countries.

This report covers the key outcomes of the 2024 Nordic Water Framework Directive (WFD) Conference, which brought together policy-makers, environmental agencies, researchers, and industry representatives to address water management challenges and opportunities in the Nordic region. It covers updates on the implementation of the Water Framework Directive, including key topics such as hydromorphology, eutrophication, hazardous substance management (particularly PFAS), and the integration of innovative monitoring technologies like eDNA and satellite imaging. The report details national progress from countries including Sweden, Norway, Denmark, Finland, and Iceland, highlighting successes such as river restoration initiatives, strategies to mitigate nutrient pollution, and advancements in ecological classification. It also discusses ongoing challenges, including the impact of hydropower on ecosystems, administrative complexities, and the need for harmonized monitoring standards across the region. The report offers insights into effective water management strategies, highlighting best practices such as nature-based solutions and collaborative approaches. It highlights the significance of cross-border cooperation and knowledge sharing to achieve sustainable water management and enhance ecological resilience. The report is aimed at policymakers seeking actionable strategies to align with EU directives, environmental agencies implementing water management measures, researchers and technologists advancing innovative monitoring tools, industry stakeholders balancing sustainable practices with regulatory compliance, and NGOs and community organizations advocating for ecological restoration and public engagement.

SwAM, The Swedish Agency for Marine and Water Management is the responsible government agency tasked to protect, restore and ensure sustainable use of freshwater resources and seas including fisheries management.