

Preparing to scale up river restoration in Norway

Anders Iversen and Jo Halvard Halleraker

Norwegian Environment Agency

Nordic Water Framework Directive Conference, Gothenburg 25. September 2024

International and European objectives











SDG 6.6 and 15.1 Restore freshwater and water related ecosystems

2021-2030 UN Decade for nature restoration

<u>Target 2</u> Restoration of 30 % of degraded ecosystems

<u>Article 4</u> Protect, enhance and restore all water bodies <u>Article 9</u> Restore the connectivity of rivers and functions of the floodplains



Hymo impacts and measures in river and lakes



Hydropower impacts and mitigation



Aura in Eikesdalen, Photo: Jo H. Halleraker

Approximately **137 TWh** annually from

- Close to 1.800 hydropower plants
- > 90 % of inland, electricity consumption
- 42 % of Europe's storage capacity

Impact on:

- 15 of the 20 highest waterfalls
- 70 % of the no. of river basins
- 17 % of river stretch
- 30 % of lake area

Relevant mitigation of ecological effects:

- Reduced/altered flow of water/sediments
- Rapid variation in level (ramping) of > 3000 km rivers
- Reduced connectivity of fish/sediments
- Fish injured/killed in turbines
- Change in water temperature
- Harmful supersaturation





License revision – progress and plans 2024



National assessment of costs/benefits in 2013.

A total of 67 license revision are planned:

- RBMP 2016-2021: 11 license revisions completed.
- RBMP 2022-2027: 26 license revision expected.
- RBMP 2028-2033: 30 license revisions planned.

These also includes some cases of summoning of old HP stations for licensing.

Estimated production loss so far is less then 30 % of the original Q_{95} estimate (NVE 49:2013).

Revision of terms (2021) – Surna/Trollheim HP

- Minimum tailrace flow of 15 m³/s and automatic **By-pass valve** (2008)
- New **minimum flow** release
- \rightarrow Flow release in 3 of 8 by-passed side tributaries
- Restriction of down-ramping
- → to **reduce stranding**
- Additional intake in reservoir
- →Mitigate temperature stress in Surna



5 x safe fishpass in the Kragerø catchment (S-Norway)

- Nature management requirements
 - HP company pays for these measures
- Skagerak Energy operator of 5 Run-of-River HP
 - required to do feasibility studies to ensure safe fish pass for anadrome salmonids and European Eel
 - Reintroduce these long-distance migrators to more than 70 km or river and many lake habitats





Sustainable hydropower – EU taxonomy



<u>General requirements</u>: **do no significant harm** to the good status or the good ecological potential of water bodies.

Checklist for hydropower:

- Comply with the WFD aim for GES or GEP.
- All technically feasible and ecologically relevant mitigation measures:
 - ✓ Ensure downstream and upstream **fish migration**.
 - ✓ Ensure minimum **ecological flow**, incl hydropeaking mitigation.
 - ✓ Protect or enhance **habitats**.
- Monitoring of the ecological efficiency.

European Commission – FAQ:

'A water body which would remain under the 'lowered' objective under Article 4(5) of WFD without putting in place the necessary measures (ecologically and technically relevant) towards good potential, does not fulfil the DNSH criteria'.

R&D of measures and HyMo classification



Examples of R&D handbooks on hymo measures:

- Environmental design in regulated salmon rivers (<u>CEDREN</u> - 2013).
- EnviPeak Advice for ecofriendly hydropeaking (CEDREN - 2016)
- Measures to **improve physical conditions** in the water environment (NORCE 2023).
- More to come in <u>FME RenewHydro (2025 \rightarrow)</u>

Systems for hymo classification:

- System for **classification of hymo** i rivers and lakes (SINTEF 2023).
- Test of new criteria for identifying **free-flowing rivers** at catchment scale
 - NORCE Norwegian cases to ECOSTAT

A national strategy for river restoration



Mars 2022





Objectives:

- Restore at least 15 % of degraded watercourses by 2030.
- Reverse the negative trend by 2030, restoring watercourses at a higher pace than they are degraded.

'The most cost-effective environmental measure is to avoid deterioration'.

Focus Areas:

- Improved coordination across authorities.
- Reinforced knowledge base.
- Enhanced dissemination.

Aiming for synergies with:

- The updated River Basin Management Plans 2022-2027.
- Wetland restoration.
- Climate adaptation.

Annual National seminars – next on October 22 – 23: LINK to information.

Foto: Anders lversen

National Action Plan for river basin restoration



Increased focus on nature-based solutions



- NBS is a central element in the new white paper on Climate adaptation (2023).
 - ✓ Natural water retention by restoring meanders, floodplains, oxbows and wetlands, and stormwater handling by reopening urban rivers.
 - ✓ NBS often provide for multiple benefits: biodiversity, climate adaptation, reduced pollution, recreational possibilities etc.
- The Government aims to increase the knowledge base and tools for applying NBS.
- National guidelines for climate adaptation (2018) and land use planning (2023) both require municipalities and other authorities to first consider the possibility to use NBS: *If other solutions are chosen, it must be justified why NBS are not chosen.*

Increased focus on fauna passability



- Promotion of the Amber barrier tracker App (Citizen science).
- New handbook by National Roads Authority on fish passable culverts, released in april 2024.
- First national culvert seminar in April 2024. LINK to recording.
- Developing a better national database for culverts.



Source: amber.international

Biodiversity Strategy 2030 Barrier Removal for River Restoration

Frie fiskeveger

ering av frie fiskeveg

Figure 2. Number of new records in the countries that the DRE campaign was focused on, from mid-luly till early



Culvert that blocks fish passage. Photo: Morten André Bergan.

Culvert that allows fish/fauna passage Photo: Morten André Bergan.

Sharing knowledge and experience







• Norway participates in the ECRR network for best practices of river restoration.

• We send experts and water managers to conferences and training courses organised by the UK River Restoration centre.

• 34 Norwegian case studies in the River-Wiki, which contains almost 1.500 examples from 31 countries.

• Sustainability in Hydropower (Sus HP 2023)



NORDIC COLLABORATION ON IMPLEMENTATION OF THE WATER FRAMEWORK DIRECTIVE

- STATUS AND FURTHER CHALLENGES

30 rahada halandari (Jannari Sorty), Antion Karli, Iwaban Gahmadali (19) (adao)
10. Noongani Discharker (Niture Management (DM), Pah Teodhani, Nisong
20. Seedeh ayapis (Mahaneu Mitan Management (Vila), ada P Kothana, Swelin
30. Panak Environment Antibus (2022), Pal Ada Qui J P Kothana, Swelin
40. Panak Environment (Antibus (2022), Pal Ada Qui J Palahan, Palahan
40. Panak Environment (Antibus (2022), Palahan)
40. Panak Environment (Antibus (2022), Palahan)



The Participants at the 5th Nordic WED conference in Reykjavik, Iceland, 26 September 2013

			Nordic				Other		
Workshop place	Date	DK	FIN	IS	NO	SE	AT	SC/IR	Tot
Gothenburg (SE) ¤	Aug.07	1	3	1	6	8	0	0	19
Brekstad (No)#	May 08	0	3	1	10	11	1	0	26
Helsinki (FIN)#	0ct. 09	0	14	1	8	14	0	0	37
Sigtuna (SE)	Sep.10	0	9	3	10	23	0	0	45
Hurdalsjøen (NO)	Sep.11	1	13	8	19	15	1	1	58
Reykjavik (IS)	Sep.12	0	12	15	18	15	0	3	63
	Total	2	54	29	71	86	2	4	

"The Nordic WFD alliance" since 2007

- Sharing best practises
- Strengths and weakness varies
- The similarities are more common than the differences
- Highest % of HMWBs due to hydropower (FI, SE, NO, IS) - 2013
- Hymo & HMWBs issues have been on the agenda each time...

Table 7. Overview and number of participant for the Nordic WFD workshops 2007-2012.

Halleraker et al (2013) Nordic-Collaboration-implementationwater-framework-directive-english.pdf (havochvatten.se)



Every EUR spent on restoration brings an economic return of 8 to 38 EUR.

(European Commission when launching the Nature restoration Law, 2022).