International Interdisciplinary Conference on
Land Use and Water Quality
Agriculture and the Environment
Aarhus, Denmark, 3–6 June 2025

Session summaries LuWQ2025

This document includes the non-edited session summaries as provided by the session chairs. They provide a quick overview of the topics discussed during the Land use and Water Quality 2025 conference. We did not receive a session summary form of all sessions, in the case it’s missing the session is left blank.

LuWQ2025 at a glance

A changing world is reflected in the presentations

- Stagnation in improvement of water quality over the past 1-2 decades
- Voluntary measures help but are often insufficient to achieve environmental objectives, is there political will to proceed?
- How can we make the parties work together and take steps forward?
- Room for both food, livelihood and environmental objectives?
- Much more focus on local management – knowledge sharing, co-operation, pilot testing in catchments of local developed management plans
- New more holistic management including both nutrients and climate actions - reduction goals for both nitrogen and GHG emissions.
- EU and national legislation drive new development, as can other external economic drivers

Version 30-06-2025

Plenary sessions: Implementation challenges and results, EU and worldwide (mornings of 03-06-2025 to 06-06-2025)

Main findings:

- Green deal in Denmark illustrates cooperations between antagonists. Ownership for all parties can bring change, when the existing regulation regime is exhausted
    - The agricultural sector
    - The Environmental NGO's
    - The state, municipalities etc.
- The Danish Green deal realised that more radical measures are needed: 15 % agricultural land is to be converted to forest or nature.
- The world's first tax on green house gas emission from livestock in Denmark.
- In Germany the never ending story now shows improvements with 40 % artificial fertiliser reduction.
- Climate change may challenge the achieved improvements and effectiveness of the measures implemented so far.

Theme B: Understanding of system functions

Session B.1, 03-06-2025

Main findings:

- Relation of denitrification and groundwater age
- To explain the fate of N on landscape level, groundwater and denitrification have to be included.
- All countries have different models; how about combining forces and develop a more generalized model with harmonized data

Presentations that exemplify the main findings:

#53, #52

Session B.2, 04-06-2025

Main findings:

- Natural systems are inherently very dynamic (while we try to mitigate eutrophication, we discover brownification (#14))
- In Europe, we started with nationwide maps of hydraulic properties, now we add denitrification maps (#103,#204)

Presentations that exemplify the main findings:

#14, #103, #204

Session B.4, 05-06-2025

Main findings:

- Importance of experimental fields and devices for modelling and decision making (#57)
- Open access to farmer's data (#70)
- Availability of very high resolution maps, indicating how to do interventions

Presentations that exemplify the main findings:

#173

Session B.5, 06-06-2025

Main findings:

- Machine learning techniques are complementary to compex distributed models and create additional value
- Striving for even higher resolution, which leads to general lower accuracy: there is balancing to do here.

Presentations that exemplify the main findings:

The whole session was of high quality and well-inked

Theme C. Water quality monitoring: improving the effectiveness and increasing the added value of monitoring

Session C.1

Main findings:

- Summer averages in WFD does not match with nitrate variability stream water
- High frequency measurements are (still) too expensive to scale up
- High frequency measurements can help to understand the uncertainty in water systems

Presentations that exemplify the main findings:

#25, #93

Session C.2

Main findings:

- #29: Water logged areas -> Nutrient emissions, detrimental effects on crops, anoxia, use data to identify these patches
- #59: easy tool to identify buffer strips based on land cover model and orthophotos
- #107: pesticide risk metric species-specific, whole water bioassay
- #118: marcoinvertrebrate and diatom species competition responds to pollution, but not biodiversity per se
- #128: Stream water quality indices based on diatom: Outcome varies a lot between seasons
- #226: Comparison between NL and DK pesticide trends in groundwater

Presentations that exemplify the main findings:

See numbers listed in main findings

Session C.3, 05-06-2025

Main findings:

- #37: Most of the temporal pattern of solute come in groundwater is due to transport processes in the soil
- #39: Soil mineral N output predicted using machine learning: N output from the field, crop species and weather data identified as most important features
- #131: Organic N and C in streams, investigated in more detail, tile drain DOC composition differs strongly from that of groundwater and stream
- #176: PFAS-profile in groundwater shows major shifts of single substances due to emission history, retardation in the soil; approach using “forensic” approaches
- #198: TP and NP export from fields to streams, differences between grab samples and sensor based sampling

Presentations that exemplify the main findings:

#37, #39, #131, #176, #198

Theme D. Impact of weather variability and climate change: assessment of impact on the quality of groundwater and surface waters.

Session D.1, 03-06-2025

Main findings:

- Impact of climate change on N losses will be important (water scarcity)
- Various agricultural adaptation strategies exist but need more evaluations
- Current work seems to lack considering new crops that reflect climate change conditions
- Impressive trans-national projects!

Presentations that exemplify the main findings:

#124 (soil erosion as another important water quality issue), #219

Session D.2, 05-06-2025

Main findings:

- Higher temporal resolution data needed for better quantification and interpretation
- Sediment removal has high impact on N&P removal efficiency

Presentations that exemplify the main findings:

#154

Session D.3, 06-06-2025

Main findings:

- Depends on catchment characteristics how climate change is going to influence nutrient losses
- There are several models to use from simple to complicated – good to combine results

Presentations that exemplify the main findings:

#76, #79

Theme E: Assessment of national or regional policy: effectiveness of programs of measures on water quality on a regional and national scale

Session E.1, 03-06-2025

Main findings:

- Clear need to follow-up/monitor effectiveness of policy (changes)
- Revisiting of environmental targets (i.e. nutrient concentrations in rivers) might be needed to achieve good ecological status (#117)
- Important of post-harvest management & crop choice on environmental parameters (#11)

Presentations that exemplify the main findings:

See numbers in main findings

Session E.2, 04-06-2025

Main findings:

- Diverse suite of presentations addressing theme assessment:
  - 2 modeling optimization studies
  - Institutional aspects
  - Monitoring
  - Groundwater, surface water, coastal waters
  - Nutrients, pesticides
  - Policy compliance

Presentations that exemplify the main findings:

None or all presentations in the session

Session E.3, 05-06-2025

Main findings:

- N+P together important – several pressures (#189 + #171 + #91)
- Winter concentrations (#189)
- Conversion to grassland is an interesting measure (#171, partly #05)
- Not more livestock!
- Closing cycles (#171)

Presentations that exemplify the main findings:

#171

#189

Theme F. Managing protected areas for water supply and nature conservation

Session F.1, 03-06-2025

Main findings:

- Inspiring example from Aarhus municipality; benefits for all and need for land we change rated higher than profiting the current interest (of few which can block transition (#63&#184)

Presentations that exemplify the main findings:

#63, #184

Theme G: Improving water quality by farm management practices

Session G.1, 03-06-2025

Main findings:

- Catch crops are effective to lower Nitrate, but not enough to get below 50mg/L (#3).
- Crop rotations are important for water quality (#68)
- Ongoing work on explaining N-surplus with many variables (#142)
- Satellite imagery shows potential to explain N-leaching (#153)
- Effects of drain systems on N leaching shows high variability (#162)

Presentations that exemplify the main findings:

#3, #153

Session G.2, 05-06-2025

Main findings:

- Modelling approaches increase system understanding, but are increasingly also used to support stakeholder processes to find solutions at the scale of catchments.

Presentations that exemplify the main findings:

#71

Session G.3, 06-06-2025

Main findings:

- Climate change effects override impacts of best management practices (BMP) (#185)
- Not everywhere it is possible to meet objectives with BMP (#192)
- Stoechiometry P/Ntot changes a lot and could be a good indicator (#111)
- Avoid autumn tillage (within a wide climate range) (not too much water in the system)
- Credit points for farmers when they reduce Nsurplus (#182)

Presentations that exemplify the main findings:

#185, #192, #111, #182

Theme H: Improving water quality by eco-technological measures

Session H.1, 03-06-2025

Main findings:

- Lack of funding is a perceived barrier for the adoption of land-use/management change, although the diversity of responses can sometimes be contrasting (#24).
- Constructed wetlands can provide multiple services. Under climate change, constructed wetlands will still be functional in the future; the specific location in the landscape is critically important for efficiency (#38).
- Dams in open ditches- leaky barriers, sediment traps, but measures need to take minimal land off the farmer, to be successful. Bespoke, simple and easy to maintain, having a catchment model is critically important for understanding the efficiency and efficacy (#206).

Presentations that exemplify the main findings:

#24, #38, #206

Theme I. Development and Decision-making on Programs of Measures: the role of stakeholder input and science in policy decision-making.

Session I.1, 04-06-2025

Main findings:

- It is about right measures in right location(s) (there can be several solutions) (#41&#183)
- Part of agricultural pollutants go unnoticed (#60)
- Constant important of stakeholders involvement (all presentations)

Presentations that exemplify the main findings:

#42, #167

Theme J. Implementation, Evaluation and Adaptation of Programs of Measures

Poster presentations

Poster pitches, 03-06-2025

Main findings:

- Working together is nice, also on a smaller scale it can be useful
- Soil conditions are important, differ per region, and may affect the results of experiments or explain the low presence of nitrate
- Very different presentations
- One model it, and then work with it
- Maybe combine the different posters

Presentations that exemplify the main findings:

#152 Arno Hooijboer, working together with farmers

Special Session S1. ‘Finding solutions for a good ecological and chemical quality in freshwater and marine water bodies in the Baltic Sea, North Sea and Irish Sea regions’.

Special session S2. Special Session on the Water Framework Directive: challenges and pathways towards 2027.

Session S2.1+S2.2, 04-06-2025

Main findings:

- Active participation in extensive discussion section
- Better late than never attitude
- All have a responsibility to achieve goals/healthy water
- Differences in cultural insights explain why things work or not

Presentations that exemplify the main findings:

- Results discussion with Mentimeter

Side Event: Drinking water – agriculture

Wednesday 04-06-2025

Main findings:

- Central question that was discussed: How do we achieve (the much needed) rapid scale up of 'groundwater-friendly' agriculture?
- Scenarios that were discussed:
    - By knowledge development
    - By setting area oriented goals
    - By financing ecosystem services
    - By developing (new) market chains

Presentations that exemplify the main findings:

- #195: Martin de Jonge (poster)
- See website Special sessions & Side events - LuWQ2025

Side Event: Nutrients Governance (New Harmonica)

Thursday 05-06-20205

Main findings:

- Agricultural policy and water policy objectives are in conflict. We need to create new narratives and future visions in which food, water and environmental ambitions can be realized simultaneously.

Presentations that exemplify the main findings:

- Slides from introduction provide a good overview of the topics discussed.