Take home messages from the 4th LuWQ Conference 2019 in Aarhus
A lot is going on in Denmark ...

<table>
<thead>
<tr>
<th>Parti</th>
<th>Stemmer</th>
<th>Mandater</th>
<th>+/-</th>
<th>Stemmer i %</th>
<th>+/-</th>
</tr>
</thead>
<tbody>
<tr>
<td>Socialdemokratiet</td>
<td>915,415</td>
<td>48</td>
<td>1 ▲</td>
<td>25,9%</td>
<td>-0,4% ▼</td>
</tr>
<tr>
<td>Venstre</td>
<td>825,450</td>
<td>43</td>
<td>9 ▲</td>
<td>23,4%</td>
<td>3,9% ▲</td>
</tr>
<tr>
<td>Dansk Folkeparti</td>
<td>308,241</td>
<td>16</td>
<td>-21▼</td>
<td>8,7%</td>
<td>-12,4% ▼</td>
</tr>
<tr>
<td>Radikale Venstre</td>
<td>304,427</td>
<td>16</td>
<td>8 ▲</td>
<td>8,6%</td>
<td>4% ▲</td>
</tr>
<tr>
<td>SF</td>
<td>272,062</td>
<td>14</td>
<td>7 ▲</td>
<td>7,7%</td>
<td>3,5% ▲</td>
</tr>
<tr>
<td>Enhedslisten</td>
<td>244,664</td>
<td>13</td>
<td>-1▼</td>
<td>6,9%</td>
<td>-0,9% ▼</td>
</tr>
<tr>
<td>Konservative</td>
<td>233,348</td>
<td>12</td>
<td>6 ▲</td>
<td>6,6%</td>
<td>3,3% ▲</td>
</tr>
</tbody>
</table>

**VALG 2019**

**Resultat**

- **91**
- **5** Å
- **79**
One moment of anxiety .....
The people behind LuWQ2019
Great support from registration desk and assistance from many colleagues of Brian
Really nice and well prepared talks and posters
... sometimes with tongue-in-cheek humour

...A NEW GOVT, A NEW WAY OF DOING THINGS. GIVE ME A MOUNTAIN STREAM ANY DAY...

Rod Emmerson, NZ Herald
Very fine and plenty of food
Also time for socialising and relaxing during the fantastic Conference Dinner
And enough time to discuss important issues during breaks
LuWQ participants over the years

![Bar chart showing the number of participants over the years 2013 to 2019.](chart.png)

- **2013**: New
- **2015**: New
- **2017**: New
- **2019**: New

Legend:
- **New**
- Also once before
- Also twice before
- Also three times before

Number of participants: 0, 50, 100, 150, 200, 250
Participants from all over the world

- **Canada**: 6 participants
- **USA**: 17 participants
- **Europe**: 178 participants
- **China**: 2 participants
- **Australia**: 7 participants
- **New Zealand**: 26 participants
LuWQ scheme and themes

A. Systems function

B. Monitoring

C. Climate change

D. Assessment of policies

E. Impact of land management practices

F. Impact of eco-technological mitigation measures

I. Implementation of programmes of measures

H. Decision making on programmes of measures

G. Management of protected areas

Special session sustainable bioeconomy

Fairway workshop
Importance of themes at LuWQ’s

Number of orals and poster presentations per theme

Special sessions since 2017, new in 2019: Workshop in co-operation with FAIRWAY project
Relative importance of themes at LuWQ’s

Percentage of orals and poster presentations per theme

Slight increase of attention for Social and economic sciences & Management of protected areas

Slight increase of attention for more fundamental research,
- More climate change
- Less monitoring

Slight decrease of attention for Research of impact of policy and measures
Some overall trends over the series of LUWQ

✓ Many countries with top down approach of implementing measures are adding a bottom up approach (Denmark, #237; NL, Netherlands #000; Ireland #227)

✓ However, experiences show this means a long term investment in building relation, gaining trust and raising awareness (UK, #288; New Zealand #36, #132; USA #71)

No quick fit, No guarantee
Some overall trends over the series of LUWQ

✓ Share our data and make sure that data and information is readily available (USA #109; Germany #65), BUT .. without scaring of farmers to participate

✓ Have an evidence based approach (UK #288; Ireland #267)
Theme A:
Increasing our understanding of systems’ function

27 Orals & 21 Posters

R.M. Waller, 1994
Take home messages Theme A

✓ Need to consider small scale spatial and temporal variability to improve prediction systems and identify Best Management options

✓ Use machine learning in combination with deterministic models to extract information and set up management

✓ To be able to interpret measurement, we have to assess residence time during transport in the vadose or/and in the saturated zone to the respective observation well, spring or stream
Theme B: Water quality monitoring

As cited by Falk Hilliges

A study in Scarlett (Sherlock Holmes):

“...I have no data yet. It is a capital mistake to theorize before one has data. [...]”

(Sir Arthur Conan Doyle)
Take home messages Theme B

- We need long term monitoring, strong relations with policy development and open date (#214)
- Citizen science, participation of stakeholder, and use of informatics tools should be considered to improve monitoring (#195)
- Missing: monitoring strategies for the national scale evaluation of mitigation actions?
Theme C:
Impact of climate change on land use and water quality

7 Orals & 9 Posters

Zhuyongming & Getty Images / Moment RF
Take home messages Theme C

✓ There is a need to consider not only long-term weather extremes, but also short extreme events (#257)

✓ There are many uncertainties in modelling effect of climate change (CC) on water quality and uncertainty due to socio-economic approximation can not be neglected (#125)

✓ In general estimated effects of CC on water quality overwhelm gains from Best Management Practices (#214)
Theme D:
Assessment of national or regional policy

20 Orals & 3 Posters
Take home messages Theme D

✓ To get things moving on the right direction public raising public awareness is crucial (#144)

✓ Better to have small changes on broad scale, a long term perspective, act locally and keep personal information confidential (#288)

✓ N surplus is widely used as agri-environmental indicator, but the relation with instream N concentrations is not good (#163)
Theme E: Improving water quality by farm management

8 Orals & 16 Posters

Ministry of Primary Industries, New Zealand, 2017
Take home messages Theme E

- Changing the diet of livestock may help to decrease nitrate leaching both by decrease nitrogen load to soil and blocking nitrification (#107)

- The acreage of irrigated land is increasing in the World, this may also lead to increased nitrogen leaching if no action is undertaken (#047)
Theme F:
Improving water quality by establishing ecotechnological mitigation measures

11 Orals &
8 Posters

Hoffmann and Kjærgaard, 2017
Take home messages Theme F

✓ Technical and chemical measures may significantly reduce losses to surface waters and there are many different techniques available

✓ ... but still more research is needed to ameliorate techniques, challenges are abundant.
Theme G:
Managing protected areas for water supply and nature conservation

7 Orals &
6 Posters
Take home messages Theme G

✓ Pesticides and nitrate are still main pressures in many drinking water protection areas

✓ Campaigns to reduce pesticides and nitrate pollution in well fields are carried out in co-operation with multiple parties: water supplier, local authorities and farmers

✓ Groundwater dependant terrestrial ecosystems are overlooked in many countries
Theme HI: Decision-making on and implementation of Programmes of Measures

20 Orals & 7 Posters

Ken Taylor: We need a carrot that can be used as stick
Take home messages Theme HI

✓ Combination of carrots, e.g. compensation, and stick (regulation-control-enforcement) are more effective than only carrots or only a stick

✓ However to change farming practices to reach good water quality always request a (very) long term investment in building relations, gaining trust, education and a lot of patience

✓ Decades of top-down regulation may challenge the ability to develop a way on how to implement voluntary measures and the willingness to take ownership for challenges within a water catchment.
Special Session 1: Land and water management for a sustainable bioeconomy

8 Orals & 8 Posters

University of Oulu, Finland
Take home messages Special Session 1

✓ Land use might change as a consequence of ‘the green shift’

✓ One of the challenges is how to downscale the impacts of the green shift to catchment scale
FAIRWAY Workshop:
Land and water management for a sustainable bioeconomy

7 Orals &
2 topics discussed

fairway-project.eu
Take home messages FAIRWAY Workshop

- Main barriers in creating good drinking water quality (nitrate, pesticides):
  - Lack of enforcement
  - Financial consequences for farmers

- Redesigning agriculture / farm structure could be an option to decrease nitrate and pesticide pollution, e.g.
  - different crops
  - less livestock & less meat consumption
Gain from this conference

The exchanges of knowledge and ideas and of successes and failures of approaches to improve water quality at LuWQ conference should help to:

✓ meet a growing need for exchange of knowledge on the recent science improvements and
✓ sharing of this evidence with policy makers and managers
Thanks from all of us to you that made the Conference such a great success by assisting and helping us during the entire conference – without your help - no Conference ! And it all went very smoothly !

Many thanks to
The people from the Kongres Kompagniet, a/o Mariann Ravbjerg
The people from Klinkhamer Conference Management, a/o Robbin Grouwels
The people from Aarhus University: Else Staalsen, Ninna Skafsgaard, Anne Mette Poulsen, Mette V. Carstensen, Fatemeh Hashemi, Helle Holm, Sofie Van't Veen, and students
Many thanks also to

The Members of the Scientific Advisory Committee and sessions chairs:


They have done a splendid job in setting up the themes and topics, reviewing the abstracts and chairing sessions.
Not least, we as participants are very grateful to the three people who, as the main organisers of the conference, did a wonderful job:

**Brian Kronvang, Karin Balle Madsen & Karel Kovar**

Without the great work of Brian, Karin and Karel this 4th LuWQ2019 conference would not have been an enormous success!
Once again we have all enjoyed attending the LuWQ2019 Conference

And therefore ...

... we look forward to meeting you at the 5th LuWQ2021 Conference ...

... that will be held in the Netherlands, *maybe in Maastricht*, early June 2021