International Interdisciplinary Conference on

Land Use and Water Quality

Agriculture and the Environment

Aarhus, Denmark, 3-6 June 2019

LU WQ 2019

Volume of Abstracts

Compiled by Brian Kronvang, Dico Fraters and Karel Kovar

Organisation

AARHUS UNIVERSITY
DCE – DANISH CENTRE FOR ENVIRONMENT AND ENERGY

AARHUS UNIVERSITY
DEPARTMENT OF BIOSCIENCE

Co-organisers

National Institute for Public Health and the Environment
Ministry of Health, Welfare and Sport

GEUS

Umwelt Bundesamt

LuWQ2019

International Interdisciplinary Conference

on

Land Use and Water Quality

Agriculture and the Environment

Aarhus, Denmark,

3 June - 6 June 2019

Final
Conference Programme

Version 26 May 2019

International Interdisciplinary Conference on
Land Use and Water Quality
Agriculture and the Environment
Aarhus, Denmark, 3-6 June 2019

Jointly convened by

- DCE - Danish Centre for Environment and Energy, Aarhus University, Denmark
- Department of Bioscience, Aarhus University, Denmark
- National Institute for Public Health and the Environment (RIVM), the Netherlands
- Geological Survey of Denmark and Greenland (GEUS), Denmark
- Umweltbundesamt (UBA), Federal Environment Agency, Germany

AARHUS UNIVERSITY
DCE – DANISH CENTRE FOR ENVIRONMENT AND ENERGY

AARHUS UNIVERSITY
DEPARTMENT OF BIOSCIENCE

National Institute for Public Health and the Environment
Ministry of Health, Welfare and Sport

GEUS
GEOLOGICAL SURVEY OF DENMARK AND GREENLAND

Umwelt Bundes Amt
For our Environment

Scientific sponsors and institutional supporters:

- Institute of Bio- and Geosciences (IBG), Forschungszentrum Jülich, Germany
- Flanders Environment Agency, Department Operational Water Management, Belgium
- IAH, International Association of Hydrogeologists
- Our Land and Water National Science Challenge, New Zealand
- Institut National de la Recherche Agronomique, Agrocampus Rennes, Rennes, France
- Johann Heinrich von Thünen Institute, Federal Research Institute for Rural Areas, Forestry and Fisheries, Germany

FLANDERS ENVIRONMENT AGENCY

Flanders
State of the Art

JÜLICH
FORSCHUNGSZENTRUM

iah aih

National Science Challenges
OUR LAND AND WATER
Toitū te Whenua, Toiora te Wai

THÜNEN

INRA 70 Years
SCIENCE & IMPACT

Tuesday, 4 June 2019

07:30-17:30 Registration / Conference secretariat desk open
PowerPoint presentations to be uploaded at the conference secretariat desk

07:30-15:30 Posters to be installed, see instructions on page 5

PLENARY Lecture Hall: Mathematics Building Auditoria E

Session B.ii & C.i : Water quality monitoring & Impact of climate change on land use and water quality
Chairs: Chantal Gascuel-Odoux (France) & Roland Stenger (New Zealand)

08:30 – 09:00 *C. Heidecke*, S. Klages, B. Osterburg:
The impact of agricultural production and policy on water quality during the dry year 2018 (Abstract #160)

09:00 – 09:20 *P.A. Chambers*, K.J. Rattan:
Hydrological variability affects particulate nitrogen and phosphorus in streams of prairie Canada (Abstract #217)

09:20 – 09:40 *J. Rozemeijer*, B. van der Grift:
Monitoring for a spatial targeting approach for nutrients (Abstract #195)

09:40 – 10:00 *F. Hilliges*:
Opportunities and limits of official reporting data for scientific purposes in groundwater protection (Abstract #065)

10:00-10:45 Coffee break, including 15 minutes' walk to Lakeside building

Lecture Hall: Eduard Biermann Auditoriet	*Lecture Hall: Jeppe Vontilius Auditoriet*	*Lecture Hall: Merete Barker Auditoriet*	*Lecture Hall: William Scharff Auditoriet*
Session D.iii Evaluation of Action programmes **Chairs: Thomas Harter (USA) & *Mariëlle van Vliet (Netherlands)***	**Session F.i Bufferstrip & wetlands to reduce losses** **Chairs: Marianne Bechmann (Norway) & Martin Schönhart (Austria)**	**Session HI.i Economics of programmes & finding effective tools** **Chairs: Bob Middleton (United Kingdom) & Natalie Phillips (United Kingdom)**	**FAIRWAY Workshop** **Chairs: Gerard Velthof (Netherlands)**

10:45-11:00 *R.D.R. Turner*, M.St.J. Warne, R. Wallace, C. Neelamraju, B. Ferguson, R.M. Mann, R.A. Smith, A.M. Davis: The increasing risk of imidacloprid in Australia's Great Barrier Reef catchments (Abstract #144)	10:45-11:00 *E. Valkama*, K. Usva, M. Saarinen, J. Uusi-Kämppä: Nitrogen retention by buffer zones in surface runoff and groundwater: A meta-analysis (Abstract #017)	10:45-11:00 *P. Thorburn*, J. Biggs, L. McMillan, T. Webster, Y. Everingham: Insurance as a tool to help farmers mitigate nitrogen pollution from intensive cropping (Abstract #091)	10:45-11:00 *G. Velthof*: Introduction
11:00-11:15 *G.K. Bedford*, E. Graham, R. Storey: Regional-scale stream health responses to riparian management (Abstract #036)	11:00-11:15 *G. Quaglia*, I. Joris, S. Broekx, N. Desmet, W. Boënne, K. Koopmans, P. Seuntjens: Mitigating pesticide levels in surface waters: Long-term surface water monitoring in an agricultural catchment (Abstract #104)	11:00-11:15 *M. Strauch*, A.F. Cord, A. Jungandreas, A. Kaim, M. Volk: Land use optimization based on scenario analysis: An approach to foster multifunctionality in agricultural landscapes (Abstract #220)	11:00-11:15 *N. Surdyk*, S. Klages, C. Christophoridis, D. Doody, B. Hansen, C. Heidecke, A. Henriot, H. Kim, S. Schimmelpfennig: Agri-drinking water indicators (ADWIs): Linkage between agricultural practice and good drinking water quality (Abstract #078)
11:15-11:30 *A. van der Wal*, P. van Beelen: Long-term field observations may indicate phosphate leaching in sandy agricultural soils (Abstract #067)	11:15-11:30 *D. Zak*, M.V. Carstensen, J. Audet, C.C. Hoffmann, S. Hille, M. Knudsen, B. Kronvang, M. Stutter, J. Stockan, H. Watson, H.S. Jensen, S. Egemose, J.A. Strand, P. Feuerbach, B. Christen, G. Heckrath: The multi-functionality of integrated buffer zones in Northwest Europe (Abstract #120)	11:15-11:30 T.C. van Leeuwen, *M.W. Hoogeveen*, C.H.G. Daatselaar: Best performing dairy farms in the Netherlands: Their results, strategy and management (Abstract #256)	11:15-11:30 *R.K. Laursen*, J. Williams, F.A. Nicholson, L. Tendler, R. Cassidy, P. Schipper, K. Verloop, J. van Vliet: Decision support tools for reduction of nitrate and pesticide pollution from agriculture (Abstract #118)

11:30-11:45 *C. McClain*, L. Wilson, B. Mayer, P. Humez, M. Nightingale, M. Nasr: Nitrate occurrence in groundwater of Alberta, Canada (Abstract #106)	11:30-11:45 *C. Kjaergaard*, C.C. Hoffmann, B.V. Iversen: Constructed wetlands targeting nutrient removal in agricultural drainage discharge: A new cost-effective mitigation strategy in Denmark (Abstract #238)	11:30-11:45 *A.L. Collins*, Y. Zhang: The effectiveness of on-farm measures for delivering multiple benefits: Integrating farm surveys and modelling to co-design solutions at landscape scale (Abstract #013)	11:30-11:45 *M.C. Commelin*, P. Groenendijk, J. Baartman, S. Klages, I. Calciu, A. Ferreira. M. Graversgaard, I Wright, V. Geissen, O. Oenema: Effectiveness of agricultural management practices to reduce pesticide pollution to ground and surface waters – a meta-analysis (Abstract #180)
11:45-12:00 *A. Sofo*, A.N. Mininni, C. Crecchio, P. Ricciuti, C. Xiloyannis, B. Dichio: Water and soil quality in Mediterranean orchards managed with sustainable or conventional systems (Abstract #055)	11:45-12:00 *C. Tanner*, J.P.S. Sukias, S.T. Larned: How much wetland would be needed for 20% and 40% reduction in agricultural nitrogen loads into Te Waihora / Lake Ellesmere? (Abstract #149)	11:45-12:00 *M.J. Gutierrez Gines*, D. Clarke, V. Baker, I. Alderton, R. Simcock, G. Tupuhi, B.H. Robinson, M. Taylor, J. Efford, T. Nikau, T.R. Biddle, T. Moana, J. Horswell: Water quality, ecosystem restoration and traditional knowledge (Abstract #015)	11:45-12:00 *P. Groenendijk*, M. Commelin, S. Klages, I. Calciu, A. Ferreira. M. Graversgaard, I Wright, O. Oenema: Review of measures to decrease nitrate pollution of drinking water (Abstract #182)
12:00-12:15 <void slot, to be used by session chairs>	12:00-12:15 *J. Audet*, A. Kjeldgaard, S.E. Larsen, N.B. Ovesen, D. Zak, C.C. Hoffmann: Nutrient retention in restored riparian wetlands in Denmark (Abstract #117)	12:00-12:15 <void slot, to be used by session chairs>	12:00-12:15 *A.E. Boekhold*, B.I. Wright, J. Rowbottom, K. Dudman, F.M. Platjouw, S. Wuijts: Innovative governance approaches to protect drinking water resources against nitrate and pesticide pollution from agriculture (Abstract #167)
12:15 – 13:45 Lunch (no walk)			
Lecture Hall: Eduard Biermann Auditoriet	*Lecture Hall: Jeppe Vontilius Auditoriet*	*Lecture Hall: Merete Barker Auditoriet*	*Lecture Hall: William Scharff Auditoriet*
Session A.iii Model development to improve understanding **Chairs: Jenny Deakin (Ireland) & Marco Acutis (Italy)**	**Session D.iv Tools at national scale for improving water quality** **Chairs: Frank Coale (USA) & Berit Hasler (Denmark)**	**Session HI.ii Policies for improving water quality** **Chairs: Wibke Christel (Denmark) & Bob Middleton (United Kingdom)**	**FAIRWAY Workshop ii** **Chairs: Gerard Velthof (Netherlands)**

VOLUME OF ABSTRACTS (compiled by Brian Kronvang, Dico Fraters and Karel Kovar)

TABLE OF CONTENTS

Skarbøvik E., Kronvang B., Kyllmar K., Rankinen K.

Abstract number–53 Setting reference conditions for nutrients in Nordic surface waters: Methodologies, levels, uncertainty and management implications

Eva Skarbøvik / Norwegian Institute for Bioeconomy (NIBIO), P.O. Box 115, 1431 Ås, NORWAY
Brian Kronvang / Aarhus University, Dept. of Biosciences, Vejlsøvej 25, 8600 Silkeborg, Denmark
Katarina Kyllma / Swedish Agricultural University (SLU), P.O. Box 7070, 75007 Uppsala, Sweden.
Katri Rankinen / Finnish Environment Institute, P.O.Box 140, FI-00251 Helsinki, Finland

Reference condition (RC), defined as the natural or minimally disturbed state of water bodies, is an important part of the Water Framework Directive (WFD) for determination of water quality and ecological targets. Linked to this is the amount and impact of measures needed to reach the environmental targets, which means that realistically set RCs are important for both managerial and economic reasons. In this paper we explore how RCs of nutrient concentrations and loads are adopted in the Nordic countries of Denmark, Finland, Norway and Sweden, with comparison to other countries (rest of Europe, US, Canada). We investigate the methods applied to define RCs in the different countries, and assess if the choice of method have given disparate RC levels for similar water typologies. We also compare water typologies for which RCs have been particularly difficult to set, with particular focus on water bodies in marine clay areas, calcareous soils, and peatlands. Finally, we discuss some managerial and economic implications of the uncertainty in RCs.

Sofo A., Mininni A.N., Crecchio C., Ricciuti P., Xiloyannis C., Dichio B.

Abstract number–55 Water and soil quality in Mediterranean orchards managed with sustainable or conventional systems

Adriano Sofo1, Alba N. Mininni1, Carmine Crecchio2, Patrizia Ricciuti2, Cristos Xiloyannis1, Bartolomeo Dichio1

1 Department of European and Mediterranean Cultures: Architecture, Environment and Cultural Heritage (DiCEM), Università degli Studi della Basilicata, Via San Rocco, 3 – 75100, Matera, Italy.
2 Department of Soil, Plant and Food Sciences (DiSSPA), Università degli Studi di Bari 'Aldo Moro', Via Amendola, 165 – 70126 Bari, Italy.

Climate change, in terms of increased temperature and extreme precipitation regimes, will have agricultural consequences due to the interrelations between climate, land and water use, soil degradation and landscape changes. At the same time, conservation agriculture offers new chances to adapting and mitigating climate change. In sustainable agro-forestry systems, management practices are able to increase carbon (C) inputs into the soil and possibly reduce GHGs emissions due to some revised field operations (e.g., irrigation techniques, use of recycled water, pest and disease management, fertilization, soil and plant farming systems). Carbon enrichment increases biological activities by improving soil structure, as well as the soil moisture and nutrient contents, that are beneficial to plant growth and production. This study reports results on the effects of changed soil management practices of Mediterranean orchards from conventional management (Cmng: soil tillage, mineral fertilizers, burning of pruning residues) to sustainable management (Smng: no-tillage, pruning residues, cover crop retention, and compost application) on water quality and management, plant microbiota and physiological status, soil

microbiota and organic carbon (SOC). Results show that an 18-year period of Smng (including C inputs at a mean rate of 8-9 t C ha-1 year-1) increased SOC concentration (from 1.0-1.3% w/w up to 1.7-2.0% in the topsoil) and soil water retention (up to 40% more) and permeability (from 13 to 160 mm H2O day-1), so allowing farmers to save irrigation water and improve soil structure. A correct irrigation management had a key role in the potential role of orchards in C sequestration (soils become from C sources to C sinks) and in the consequent greenhouse effect mitigation. Indeed, compared to dry areas, wetted soils generally had a higher microbial respiration and SOC mineralization, and a faster bacterial C and N turnover. Finally, the Smng brought beneficial effects on plant yield, that can be improved by 30-50%, compared to Cmng. The effects of endogenous C additions on the reserves of soil water and nutrients (N, P, K, Ca, Mg), and on CO2 soil emission are also discussed. Promoting cost-effective sustainable land use strategies can avoid SOC decline, soil erosion and soil degradation, with consequent benefits in terms of reduced irrigation volumes and higher water quality. The results obtained could promote the development of new sustainable approaches for optimizing irrigation, soil C and N cycling and nutrient transport, and for sustaining and improving plant yield and quality.

Jensen D.M.R., Egemose S., Thomsen A.T.H., Larsen T.

Abstract number–57 Variations in the Danish permit practice and the resulting differences in urban discharge of stormwater to the recipients

DITTE M. R. JENSEN
Dept. of Environmental Engineering, DTU, Technical University of Denmark, Bygningstorvet bygn. 115, 2800 Kgs. Lyngby, Denmark
e-mail: dije@env.dtu.dk

SARA EGEMOSE
Department of Biology, University of Southern Denmark, Campusvej 55, 5230 Odense M, Denmark
e-mail: saege@biology.sdu.dk

ANJA T. H. THOMSEN
Department of Civil Engineering, Aalborg University, Thomas Manns Vej 23, 9220 Aalborg, Denmark
e-mail: atht@civil.aau.dk

TORBEN LARSEN
Department of Civil Engineering, Aalborg University, Thomas Manns Vej 23, 9220 Aalborg, Denmark
e-mail: tl@civil.aau.dk

In Denmark, climate changes and increasing urbanisation have pushed for new stormwater management strategies. To accommodate this need, Danish government required all municipalities to make climate change adaptation plans before the end of 2013, and 350 M euro was reserved to be invested in climate adaptation measures. For some municipalities, this has been supplemented with a cloudburst management plan, qua recommendations made by the Danish Wastewater Committee in 2017. These plans all largely rely on separating rainwater from sewers and handling it in surface-near and nature-based solutions before discharging to the natural water system - an approach which blurs the line between technical structures and the natural water environment, and causes an increase in the load onto the recipients. Concurrently environmental targets have been set for the recipients, rooted in e.g. the EU Water Framework Directive.