

BIOWATER NEWSLETTER May 2019

Welcome to this first BIOWATER newsletter. BIOWATER (2017-2022) is a Nordic Centre of Excellence, with a main goal to examine the impacts of the bioeconomy on land use and freshwater quality and quantity. We are PhD-students, post.docs., and senior researchers from eight institutes in four countries (Denmark, Finland, Norway and Sweden), with collaborating European institutes.

From our website www.biowater.info



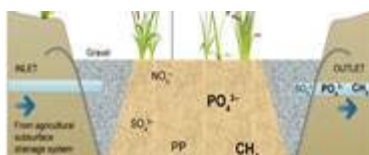
STAKEHOLDER INTERACTIONS ON SCENARIOS

In all four Nordic Biowater countries, national stakeholder interactions are presently on-going to discuss how a future with bioeconomy will affect the rural land use. The scenarios will be used in models to predict how freshwaters will be affected by increased focus on bioeconomy.



BIOWATER CONTRIBUTED AT FINNISH BIOFUTURE2025 IN LAHTI 2019

The annual BioFuture2025 seminar was organized in Lahti on 16 – 17 April 2019. The BioFuture2025 programme is funded by the Finnish Academy. Biowater contributed with both presentation and posters.



REDUCING NEGATIVE SIDE-EFFECTS OF CONSTRUCTED WETLANDS

Constructed wetlands, with filter beds of wood chips, can reduce nitrogen losses, but can also release methane and phosphate during the filtering process. In this study, it was found that methane production was suppressed when the hydraulic retention time was decreased.



BIOWATER WITH SPECIAL SESSION AT LUWQ (AARHUS, DENMARK).

In this LUWQ Special Session, the first results from the BIOWATER project will be presented, but we have also invited other speakers to contribute to the session with oral or poster presentations. The Special Session will be held on Wednesday, June 5, 10-45-12.15 and 13.45-15.15.



REVIEW OF INTEGRATED BUFFER ZONES IN THREE COUNTRIES

A review of the functionalities of 11 integrated buffer zones (IBZ) located in Denmark, Great Britain and Sweden has recently been published. The IBZs under investigation were established between 2012 and 2014 at five locations in Denmark, Great Britain and Sweden.



[NEW PAPER ON INTEGRATED BUFFER ZONES](#)

Biowater scientists and PhDs have contributed to a paper on integrated buffer zones. These differ from common riparian buffer strips, since they not only handle surface runoff but can also reduce runoff from tile drainage.



[SYNTHESIS PAPER ON BUFFER STRIPS](#)

This paper synthesizes the findings of 16 papers enclosed in a special issue from LUWQ 2017 (Land Use and Water Quality Conference). The paper explores how buffer strips between land and waters can be used in the future for pollution mitigation, improved biodiversity, and societal benefits across scales.

[HYDROPEAKING IN NORDIC RIVERS](#)

Biowater PhD and scientists have published a paper on the driving forces for hydropeaking in Nordic rivers using extensive datasets from 150 sites, and also the influence of increased wind power production on hydropeaking.



[CARBON FLUX IN LAKES](#)

Biowater is investigating the cycles of nutrients, carbon and water, and how these are affected by land use and climate change. This paper (open access) examines the impact of global change on carbon cycles in a small, forested catchment. The paper gives the results of 30 years of measurements, as well as sediment dating and modelling, of a small humic lake and its catchment in southeast Norway.



Upcoming events – conferences and courses



Biowater PhD-Course on SWAT: Aarhus, Denmark, May 27-29 2019. SWAT – Soil and Water Assessment Tool – is a much-used modelling tool for simulation of catchment processes. BIOWATER's first course in this model was held during the last week of May 2018, at the University of Aarhus. In this new SWAT Course, students will acquire a working, state-of-the-art knowledge of the basic concepts and methods used in SWAT. (2 ECTS)



LUWQ Conference – Land Use and Water Quality Conference. Aarhus, Denmark. June 3-6 2019

Biowater is organising a special session at this conference, where our results so far will be presented.



PhD course organized by BIOWATER partner SLU in Sweden: September 19-25, 2019. '[Watershed Ecology and Biogeochemistry](#)'. The course addresses the foundational concepts and modern challenges within the broad field of watershed science. Sign-up by May 2019. 7.5 credits.



Biowater PhD-course, Oulu, Finland. 29 September-2 October 2019,

The topic of this PhD-course is: COUPLING WITH CATCHMENT HYDROLOGY, BIOGEOCHEMISTRY AND PROCESSES - UNCERTAINTY IN WATER QUALITY MEASUREMENTS. (2 ECTS). The programme for the course is presently being developed.



Biowater Annual Camp 2-4 October in Rokuanhovi, Finland. Each year, the Biowater team gathers for our annual meeting. Here we take stock and plan ahead. Photo by the hotel.

Young scientists for future challenges: Our PhDs and post docs

If the future is bioeconomy, then it is important that young scientists are educated in the potential environmental effects of this change. Hence, presently nine PhD-students and two post docs from all four countries are funded or associated with the centre. They are vital to our scientific progress, since they carry out large parts of the tasks, and are operational in all BIOWATER's modules. Their topics span a wide range of issues relevant for our centre, including

- ✓ Valuating ecosystem services of water and rural landscapes
- ✓ Understanding catchment processes and the pathways of water, nutrients and carbon through landscapes
- ✓ Modelling impacts of different land use on water resources
- ✓ Energy demand and the role of hydropower in bioeconomy
- ✓ Effects of various mitigation measures, including constructed wetlands and riparian vegetation zones

You can read more about our PhD-students and post-docs [here](#).

BIOWATER organises courses for the PhD students, and also advocates other institutes' courses of relevance for BIOWATER's goals.

Publications (by April 2019)

Biowater scientific papers

Carstensen, M.V., S.E. Larsen, C. Kjærgaard and C.C. Hoffmann. 2019. [Reducing adverse side effects by seasonally lowering nitrate removal in subsurface flow constructed wetlands](#). Journal of Environmental Management 240: 190-197. doi:10.1016/j.jenvman.2019.03.081.

Zak, D., B. Kronvang, M.V. Carstensen, C.C. Hoffmann, A. Kjeldgaard, S.E. Larsen, et al. 2018. [Nitrogen and phosphorus removal from agricultural runoff in integrated buffer zones](#). Environmental Science & Technology 52: 6508-6517. doi:10.1021/acs.est.8b01036.

Ashraf, F.B., A.T. Haghghi, J. Riml, K.Alfredsen, J.J. Koskela, B. Kløve & H. Marttila 2018: [Changes in short term river flow regulation and hydropeaking in Nordic rivers](#). NATURE, Scientific Reports volume 8, Article number: 17232 (2018)

Zak, D.; M. Stutter; H.Jensen; S. Egemose; M.V. Carstensen; J. Audet; J.Strand; P. Feuerbach; C. Hoffmann; B. Christen; S.Hille; M. Knudsen; J. Stockan; H. Watson; G. Heckrath; B. Kronvang 2018. [An assessment of the multi-functionality of integrated buffer zones in NorthWest Europe](#). J. Environ. Qual. 0.doi:10.2134/jeq2018.05.0216

de Wit, H. A., Couture, R.-M., Jackson-Blake, L. Futter, M. N., Valinia, S., Austnes, K., Guerrero, J.-L., Lin, Y. 2018. [Pipes or chimneys? For carbon cycling in small boreal lakes, precipitation matters most](#). Limnology and Oceanography Letters 00, 2018.

Biowater posters

Carstensen, M. V., van't Veen S., Zak. D., Kronvang, B 2019. Integrated buffer zones for agricultural nitrogen removal: a Danish case study. 32nd Fertilizer and Lime Research Centre workshop 'Nutrient loss mitigations for compliance in agriculture', Massey University, Palmerston North, New Zealand, 12-14 February 2019.

Rajakallio M., Jyväsjärvi J., Taipale S., Louhi P., Huusko A., Muotka T. 2019. Diving into murky waters – effects of brownification and canopy removal on stream biofilm quality, functioning and structure. BioFuture2025 Annual Seminar ,16 -17 April 2019, Lahden Seurahuone, Lahti, Academy of Finland, Finland.

Jarno Turunen, Janne Markkula, Maria Rajakallio, Vasco Elbrecht, Jukka Aroviita. 2019. Riparian forests mitigate harmful ecological effects of agricultural diffuse pollution in streams. BioFuture2025 Annual Seminar ,16 -17 April 2019, Lahden Seurahuone, Lahti, Academy of Finland, Finland. (Partly Biowater-funded).

Skarbøvik, E., Vermaat, J., Hellsten, S., Lepistö, A., Kløve, B., Rankinen, K., Juutinen, A., Pouta, E., Kronvang, B., Solheim, A.L., de Wit, H., Collentine, D., Kyllmar, K. 2019. Environmental effects of the green shift. BioFuture2025 Annual Seminar ,16 -17 April 2019, Lahden Seurahuone, Lahti, Academy of Finland, Finland.

Collentine, D., Rakovic, J., Kyllmar, K. and Futter, M. 2018. Trickle down impacts on water: Filtering Bioeconomy Storyline data from the national to the small catchment scale. The poster describes aspects about working with stakeholders. Prepared for the conference "Governing sustainability of bioenergy, biomaterial and bioproduct supply chains from forest and agricultural landscapes" Copenhagen 17-19, April 2018. [Collentine et al. The bioeconomy poster](#)

Rakovic, J., Collentine, D., Kyllmar, K., Vermaat, J. and Futter, M. 2018. Nordic Bioeconomy futures. EGU in Vienna, April 2018. [JelenaRakovic EGU Bioeconomy](#)

Ashraf, F., B., Haghghi, A. T., Riml, J. Koskela, J.J., Alfredsen, K. Kløve, B. and Marttila, H. 2018. Analysis of Status and Trends in Short Term Flow Regulation in Nordic Rivers. BioFuture2025 Annual Seminar 2018 15 – 16 May 2018, Joensuu, Finland. Poster presentation.

Bhattacharjee, J. H Marttila, A. T. Haghghi, M. Parviainen, A. Tolvanen, A. Lepistö, M. N. Futter, and B. Kløve, 2018. Evaluation of Past Land Use Practices in Peatlands Using Aerial

Photos. BioFuture2025 Annual Seminar 2018 15 – 16 May 2018, Joensuu, Finland. Poster presentation.

Skarbøvik, E., Vermaat, J., Solheim, A.L., de Witt, H., Kronvang, B., Kyllmar, K., Futter, M., Collentine, D., Kløve, B., Martilla, H., Muotka, T., Hellsten, S., Lepistö, A., Rankinen, K., Juutinen, A., Pouta, E. 2018. BIOWATER, A Nordic Centre of Excellence on integrated land and water management for a sustainable Nordic bioeconomy. Nordic Hydrological Conference, Bergen, Norway, August 2018.

Biowater Conference Presentations

Hellsten, S., Lepistö, A., et al. 2019. Biowater – recent development related to effects of bioeconomy on water courses in Nordic countries. Environmental effects of the green shift. BioFuture2025 Annual Seminar ,16 -17 April 2019, Lahden Seurahuone, Lahti, Academy of Finland, Finland.

Vermaat J.E. 2019. “Ecosystem services: sobering down to an empirical tool.” Post-conference workshop of the Norwegian Ecological Society (NØF, Tromsø, Norway, 11-14 February 2019): ‘Do ecosystem services provide a bridge between ecology and society?’

Kronvang, B., van’t Veen, S., Windolf, J., Larsen, S., Trolborg, L. and Tornbjerg, H. 2018. A conceptual catchment typology for analyzing eutrophication risks in surface waters in Denmark. Nordic Hydrological Conference, Bergen, Norway, August 2018.

Rankinen, K., Rakovic, J., Collentine, D., Kyllmar, K., Vermaat, J., Futter, M. & Hellsten, S. 2018. BIOWATER – Extending the shared socioeconomic pathways to assess climate and land-use change impacts on water resources. BioFuture2025 Annual Seminar 2018 15 – 16 May 2018, Joensuu, Finland. Conference presentation

Kronvang, B., van’t Veen, S., Windolf, J., Larsen, S., Trolborg, L. and Tornbjerg, H. 2018. A conceptual catchment typology for analyzing eutrophication risks in surface waters in Denmark. Presentation at EGU, Vienna, April 2018.

Carstensen, M.V., S.E. Larsen, C. Kjærgaard and C.C. Hoffmann 2018. Diminishing sulphate reduction by lowering nitrate removal seasonally in full-scale subsurface flow constructed wetlands. 13th SWS Europe Chapter Meeting ‘Management of Wetland Ecosystem Services: Issues, Challenges and Solutions’, Ohrid, Macedonia, April 30 – May 4, 2018.

Other relevant papers by our scientists:

Stutter, M., B. Kronvang, D. Ó hUallacháin, and J. Rozemeijer. 2019. Current Insights into the Effectiveness of Riparian Management, Attainment of Multiple Benefits, and Potential Technical Enhancements. J. Environ. Qual. 48:236-247.
doi:10.2134/jeq2019.01.0020 [Summary Paper JEQ Special Issue Riparian Buffers](#)

Other Biowater products

We have prepared a [Stakeholder brochure](#) that gives a short overview of the Centre's aims and activities related to user interests.

The brochure is so far translated to Norwegian ([Norsk Biowaterbrosjyre](#)) and Danish ([Stakeholder brochure Dansk](#)).

Contact information

Biowater NCoE Leaders

Eva Skarbøvik, Centre Leader
(+47 416 286 22)
eva.skarbovik@nibio.no

Jan Vermaat, Centre Co-Leader
(+47 672 31 802)
jan.vermaat@nmbu.no

Team leaders of each Biowater institute

University of Aarhus, Denmark: Brian Kronvang

LUKE, Finland: Artti Jutinen

SYKE, Finland: Seppo Hellsten

University of Oulu, Finland: Bjørn Kløve

NIBIO, Norway: Eva Skarbøvik

NIVA, Norway: Heleen de Wit

NMBU, Norway: Jan Vermaat

SLU, Sweden: Katarina Kyllmar

Biowater on Twitter: [@biowater_info](#)

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