News and Views

from Nordic Forest Research SNS

5 2019

The experiments with recycled ash in western Denmark have provided new information about the impact. Photo: Regin Rønn.

# NORDASH takes a broad perspective on ash recycling

**Wood ash, the waste product from combustion of bio-fuel, is a valuable resource but can also be an environmental problem. Elevated pH and nutrient status, and restoration of cation exchange capacity is the positive side. Toxic levels of heavy metals is one of the potential drawbacks. The network NORDASH will integrate research on nutrient cycling and biological responses to wood ash recycling.**

There is strong agreement that a circular bioeconomy needs to incorporate recycling not only of products, but also of nutrients being removed from forest stands. Ash applications are a means to compensate for losses due to harvesting biomass.

Whole-tree harvest and removal of harvest residues from a stand lead to losses of nitrogen, phosphorous, potassium, calcium and magnesium, and also a risk of acidification of the soil. The Swedish institute Skogforsk has shown that whole-tree harvest can lead to growth reductions in the range of 10-15%, if not compensated for by ash reapplication and fertilisation. If the ash is returned to the stand, cations can be restored. The Swedish Forest Agency suggests that ash should be recycled if the combined removal of biomass, besides stem wood, corresponds to 0.5 tonnes of ash per hectare. Finland and Norway lack recommendations that promote ash recycling, but have rules for the maximum amount to be recycled. In Denmark, a maximum load of 3 tonnes per hectare, and a maximum of 9 tonnes in 75 years, is the limit.

## Bridging ash research areas

The effects of ash removal and reapplication on tree growth and soil chemistry have been studied by researchers for some decades, but less attention has been paid to other effects. The new network NORDASH will focus on the biological impacts on organisms and food webs. The network is continuing, and thus bridging, several recent and on-going national and international projects on nutrient recycling. *AskeVerdi* in Norway and the EU-project *WOOD-*

Rasmus Kjøller: we need more knowledge about how ash recycling impacts the key processes in different forest types.

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## NORDASH 2019, cont.

*EN-MAN* are two of these. Another is the *ASHBACK* project. Rasmus Kjøller had a key role in ASHBACK and is also coordinating NORDASH.

– Previous studies show that a major impact of wood ash application is stimulation of microbial decomposition, which activates N-cycling in the topmost forest floor. This may cause release of greenhouse gases, but also increased tree growth and thus more carbon sequestration. The effects vary with soil and tree species, he says.

### Experience from ASHBACK

ASHBACK (Center for Energy Recycling) was a Danish project run during the period 2014-2018, involving five Danish research institutes and coordinated by the University of Copenhagen. The focus was on the environmental effects of ash recycling, specifically how ash affects soil services.

– We needed more knowledge about how the soil responds to heavy metals, and how the application of ash impacts greenhouse gas release and leakage of metals and nutrients to the groundwater, says Rasmus Kjøller.

The ASHBACK studies, which took place in the field, greenhouse and laboratory, found a marked increase in soil pH. This has implications for the microorganisms: in an acid spruce forest soil, bacteria became more important than fungi in the decomposer food web after ash supply.

Particular attention has been paid to heavy metals, and primarily cadmium (Cd). Heavy metal concentrations in the upper soil profile increased linearly with the added ash doses. However, no toxic effects were detected in the amounts used in the experiments. Indeed, in soil, extreme amounts of Cd need to be added before toxic effects can be observed. Nor did the researchers find a risk of bioaccumulation of Cd after ash supply.

– The studies related to forests were based on a spruce stand on sandy soil, which is a common stand type in western Denmark. These soils seem well adapted to ash recycling, says Rasmus Kjøller. Further, the very large quantity added, 30 tonnes per hectare, did not result in increased leakage of heavy metals. However, we still recommend that the Danish restriction of 9 ton per hectare over 75 years is followed, as this will not return more elements including heavy metals than were removed at harvest.

Rasmus Kjøller looks forward to the new collaboration which will result from the NORDASH network meeting.

– Soils, climate, stand conditions and ash properties vary a lot, and we need more knowledge about how ash recycling impacts the key processes in different forest types.

Checking the moss cover after ash application. Photo: Søren Christensen.

### NORDASH activities

A scientific workshop with participants from eight Nordic and Baltic countries will be held in Copenhagen, probably in November 2019. The aims include compiling a list of available research sites and identifying the most important knowledge gaps.

*Read more about NORDASH: https://nordicforestresearch.org/n2019-02/*

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### Previous ash projects

**Askeverdi** (Innovative utilisation of ash from wood for value creation and sustainable forestry) run in the period 2012-2015 in Norway. The first field test in Norway was set up during the project, to investigate the ecological effects of wood ash recycling. A final report can be downloaded from Treteknisk (http://www.askeverdi.no/images/Rapport89.pdf ).

**WOOD-EN-MAN** (Wood for energy – a contribution to the development of sustainable forest management) was an EU-project (FP5) completed in 2005. The project delivered, amongst other things, a book with recommendations for sustainable use of energy and the foundations for the decision support tool ENERTREE.

**Flis-av-flis** is a decision support tool in Swedish relating to the growth and economic effects of whole-tree harvest and removal of forest residues. The tool calculates growth losses, amount of extracted nutrients and costs of pre-commercial thinning, thinning and final harvest in different stand types. www.skogskunskap.se/flisavflis.

**"Ash recycling – long term effects on tree growth"** was an SNS-supported project run in the period 2009-2011. Read the final report (search SNS-106): www.nordicforestresearch.org

# Golden award to communicating researcher

Johanna Witzell receives the award from HM King Carl XVI Gustaf. Johanna Witzell is associate professor with a focus on forest pathology at SLU. She is also the scientific editor of Scandinavian Journal of Forest Research.
Photo Johan Marklund, pressbild Skogsindustrierna.

**Congratulations Johanna Witzell. You have been awarded the "Guldkvisten" (golden branch) prize by the Swedish Forestry Association (Föreningen Skogen). Why do you think you were given the prize?**

–First of all, I was fortunate because someone was kind enough to nominate me! The nomination emphasised my efforts to communicate research on forest diseases, and I think the Association decided to reward my efforts because they think the science-society interaction is important and necessary.

**Research on pathogens and diseases in forest trees have been heavily covered in media in the last few years. Why this interest?**

– Most people have a personal relationship with trees, in one way or other. When trees get sick or die, people get worried and want to know what is happening and if there is something they can do about it. During the past decade, we have seen an upsurge of several new forest diseases, especially here in the southern part of Sweden. This development has led to great interest in our research.

**Do you have any tips for other researchers who want their results disseminated?**

– Tricky question. Some topics are easier to translate to popular science and disseminate than others. In general, I would say be active and find your audience. Sick trees is not only a matter for forest managers, but also for gardeners, urban planners and the general public. You shall also be available when your expertise is needed – a journalist don't give you the time to wait for your deep thoughts, they want immediate information. Finally, be genuine in your communication. Communicate what you know, if you don't have the answers, say so.

**What are the media channels you use?**

– It is often the journalists who contact us first, but of course we issue press releases when we have interesting results. New pests with a risk of becoming a threat always draw attention. We are also active on social media, for example Facebook. Through this channel, we reach an international public.

**Is time spent on communication in conflict with your research?**

– In a way yes, because I am not financed to work as an extension pathologist. However, I feel it is my duty as an employee in a state university to provide advice to people when they ask for it, even if it comes at the cost of not having time to author more research publications. And it is also a two-way interaction because through the contacts with people I get to know the relevant research questions.

## SNS saddles up for Curitiba

Nordic Forest Research SNS will be on show at the IUFRO World Congress in Curitiba, Brazil, in September-October 2019. One of the activities will be an open seminar with the tentative title "Forests and society towards 2050 – a dilemma for the Nordic model". The seminar will be co-organised with SIFI (the Think Tank for International Forest Issues). An international panel will focus on elements of the Nordic forestry model, and how the model is sustainable for the environment and society even in an uncertain future.

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*Read more: News & Views No. 1 2019.*


## Call for applications: Networks 2020

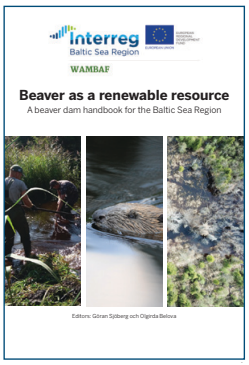
The annual call for research networking applications will be open between 1 March and 1 June. Proposed networks should address topics relating to sustainable forest management in a growing bioeconomy, maintenance and utilisation of ecosystem services, or climate change mitigation and adaptation. Funding will be given for activities in 2020, and networks must include participants from at least six different countries, with at least three being affiliated with research institutions in the Nordic region.

*Read more on www.nordicforestresearch.org*

# WAMBAF provides tools for better water quality

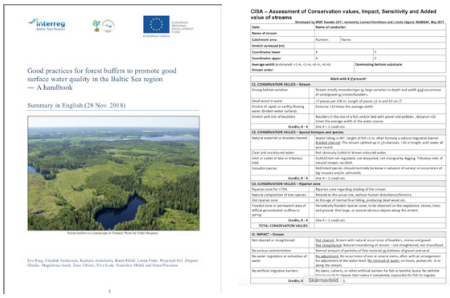
The WAMBAF project (Water management in Baltic forests) was completed in February 2019 (read about the project in News & Views No. 1, 2017). Its overall aim was to reduce nutrient and mercury export from forestry to streams. New planning tools, films, guidelines for good practice and a management handbook have been produced during the project. Focus has been on three main factors that significantly impact water quality: riparian forests, forest drainage and beaver activity.

For each of the factors, a toolbox including films and additional best practice guidelines is available. A comprehensive handbook about management of beavers is one significant product of WAMBAF. Another is an app for ditch inventory. The mobile application supports inventory and ditch management by using topographic information. Most of the material is available in all languages of the partners, including Polish.




All about beavers. The beaver management handbook from WAMBAF.

*All material is available from www.skogsstyrelsen.se/en/wambaf/*


Examples from the riparian buffer zone toolbox: a film, a book outlining good practice and forms for assessing conservation values.

## Shortcuts from Nordic forest research

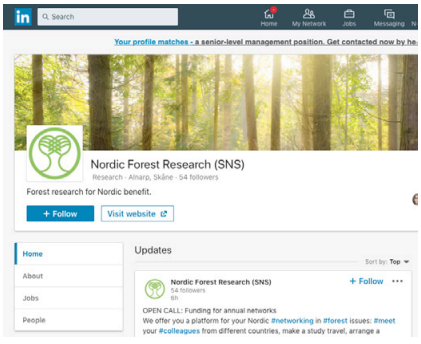
### Wanted: Healthy ashes

Help the SNS researchers save the ash. Have you noticed a healthy ash among other, sick-looking ashes? Please report it to Lars-Göran Stener at Skogforsk: lars-goran.stener@skogforsk.se More information on www.nordicforestresearch.org.

Photo: Mats Hannerz.

### SNS on Linkedin

Follow Nordic Forest Research (SNS) on the Linkedin community. All information about calls, news and events. https://www.linkedin.com/company/nordic-forest-research-sns/

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SNS Nordic Forest Research

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