

Report for annual networks

Submit the report to sns@slu.se by 24:00 CET, 1st of March the year after the activities.
The report should not exceed 2000 words.

Please adjust the size of the boxes to the length of your answer.

1. Title of the network:	Integrating knowledge on nutrient cycling and organismal responses for sustainable use of wood ash in Nordic forests - NORDASH
2. Network number:	N2019-02
3. Main applicant:	Rasmus Kjøller
Email:	rasmusk@bio.ku.dk
Address:	Dept. Biology, University of Copenhagen, Denmark

Activities

4. Place of the activity:	Nøddebo, Denmark
Duration of the activity (start date, end date):	13-15 November 2019

5. Provide a short network summary, including:

a) The purpose of the project/main problems/background (summary from the application text)

Recycling wood ash from power plants to forests receives increasing attention as a way of mitigating nutrient depletion in production forests and thus contributes to a circular bioeconomy.

The long-term goal of the meeting was to build a dynamic network for knowledge sharing between leading Nordic research groups working with wood ash, forest ecology, and key forest processes and soil organisms. The network bridged university-based research groups in Nordic and Baltic countries and link current and recent wood ash research projects.

Our specific aims was to 1) exchange knowledge and identify the most important knowledge gaps for each country as well as for the Nordic/Baltic region in general 2) compile a report listing the current available research sites in each participating country 3) outline possible future integrated sampling and survey programs 4) Based on the list of knowledge gaps and common research themes across the Nordic/Baltic encourage to publish joint articles in peer-reviewed journals 5) compile a list of nonprofessional/popular, energy and forestry journals and newsletters which may be targeted for broadcasting results concerning wood ash in forestry 6) initiate future research applications

b) A description of the main activities of the network

The following things was addressed at the meeting in Nøddebo:

1. Presentations of current research in the area

We had 10 talks presenting recent research from Norway, Finland, Estonia, Latvia, Lithuania and Denmark within the field. An interesting thing that was clear from several of the presentations was the large potential growth stimulation that sometimes are observed either when supplying ash together with a N source or when added to a nutrient rich forest floor. Also, negative side effects by amending ash either to regular forests or during afforestation seems negligible.

2. Excursion into Gribskov

We visited different forest stands in nearby Gribskov and discussed how Danish state forests tackles the challenges of both maintaining productive valuable stands, increasingly planting/renewing only indigenous Danish species and

stimulating biodiversity. Statistics about Danish forest was passed around and discussed.

3. Group work on the survey-based position paper

Before the meeting the network coordinator had asked participants to phrase their 10 most burning questions and concerns within the field. This added up to 150 questions on the use of wood ash in forests and these were divided between three groups of participants who each sorted these into different subjects. Each groups handed in a report to the network coordinator who is responsible for merging into one common list which will become an outline of the paper. Next, participants will be asked to write short sections corresponding to each section of the paper.

4. Wood ash use and legislation in the Nordic/Baltic countries

Morten Ingerslev led this session and collected, on-side, the relevant available information from each country. After the meeting, he has been in contact with key persons from each country to supply remaining data. The resulting spreadsheet may then be used for future grant proposals but also for reporting to SNS. Morten are in charge of the future process.

5. Available long-term field sites in the Nordic/Baltic countries

Again, Morten tabulated data about still existing field trials in the Nordic/Baltic region into a common spreadsheet on-side. Then Morten will send out template for more details to be filled in. Again, the resulting spreadsheet are valuable for future grant proposals but may also be a resource for current researchers within the area as well as for reporting to SNS.

6. Funding opportunities in the near future

Pasi Rautio presented various funding opportunities and gave some insights from recent applications he had been involved in. The focus were on relevant EU H2020 calls and Norforsk opportunities.

7. Upcoming meeting in Latvia

The Latvian delegation presented the opportunity for an upcoming meeting next winter/spring in Latvia. Tentative dates early March.

Detailed time table Nøddebo ash meeting 2019

Wednesday 13 November

<i>Morning</i>	<i>Arrival</i>
12.00 - 13.00	Lunch (put presentations on computer)
13.00 - 13.20	Welcome, meeting agenda (Rasmus & Morten)
<i>Current research in our region, 10-15 min talks + 5 min questions and discussion</i>	
13.20 - 13.40	Kjersti Holt Hanssen, Norway: The effect of ash and N fertilization on growth and chemical defence of Norway spruce
13.40 - 14.00	Iveta Varnagiryte-Kabasinskiene & Jurate Aleinikoviene , Lithuania: Effects of wood ash fertilisation on soil chemical properties, vegetation and microorganisms in Scots pine stands
14.00 - 14.20	Arta Bardule, Latvia: Turn over of elements in afforestation and agroforestry system fertilized by wood ash
14.30 - 14.50	<i>Short Break</i>
14.50 - 15.10	Ilze Karklina, Latvia: Evaluation of environmental impact of forest soil fertilization with wood ash and nitrogen fertilizer
15.10 - 15.30	Santa Neimane, Latvia: wood ash use for former peat mining areas afforestation as re-cultivation method
15.30 - 16.00	<i>Break</i>
16.00 - 16.20	Louise Hindborg Mortensen, Denmark: pH, bacteria and N mobilization after wood ash applications
16.20 - 16.40	Jesper Liengaard, Denmark: Availability of Cd in the soil environment
16.40 - 17.00	Flemming Ekenlund, Denmark: Effect of wood ash on moss cover and composition
17.00 - 17.20	Introduction to next days program

18.00 Dinner
 Evening *Networking and socializing, drinks and snacks*

Thursday 14 November

08.00-09.00 *Breakfast*
 09.00 - 12.00 Excursion into Gripskov/presentation about Skovskolen
 12.00 - 13.00 Lunch
 13.00 - 13.20 Mari Tilk , Estonia: Effect of different biofuel ashes (wood ash and oil shale ash) on the growth of trees, nutrient recycling and microbiology on peatland in NE Estonia
 13.20-13.40 Pasi Rautio/Hannu Ilvesniemi, Finland: Combined ash and nitrogen fertilizations
 13.40 - 15.00 A survey based position paper - introduction and discussion in groups (Rasmus)
 15.00 - 15.30 *Break*
 15.30 - 16.30 Survey based position paper - reports from groups (Rasmus)
 16.30 - 17.30 Current use and legislation of wood ash in regional forestry - roundtable (Morten)

 16.45 - 17.45 Available field sites in region - compilation of list (Morten)
 18.00 *Dinner*
 Evening *Networking and socializing, drinks and snacks*

Friday 15 November

08.00-09.00 *Breakfast*
 09.00 - 10.30 Future directions, meeting in Latvia March 2020, funding possibilities (Pasi)
 10.30 - 11.00 *Break*
 11.00 - 12.00 Follow up from previous days, loose ends, SNS communications (Rasmus and Morten)
 12.00 - 13.00 *Lunch*
 Afternoon *Departure*

Outcome

6. Published outputs achieved as a consequence of the network (peer-reviewed articles, other publications)

The group is working on an inquiry-based position paper as outlined above. This is still in the analysis/writing phase

7. Other practical outputs of the project (workshops, conferences, scientific meetings, policy recommendations, conferences, large-scale project applications, databases or websites etc.)

As also mentioned above, two databases, one on available research sites and one on legislation within the area was gathered at on-side at the meeting. The databases will be finished when Morten Ingerslev (UCPH) returns from sabbatical later this year.

8. How and within which areas was the network beneficial for the Nordic region?

The network successfully bridged leading Nordic research groups working with wood ash, forest ecology, and key forest processes and soil organisms. Additionally, university-based research groups at University of Copenhagen, Lund University, Swedish University of Agricultural Sciences (SLU), University of Helsinki, The Agricultural University of Iceland and Estonian University of Life Sciences were linked with their sector-based counterparts represented by NIBIO (Norway), Skogforsk (Sweden), LUKE (Finland), SILAVA (Latvia) and LAMMC (Lithuania). The network also joined forces between current and recent wood ash research projects such as ASHBACK (Denmark), AskeVerdi (Norway), WOOD-EN-MAN (EU), "Wood ash valorisation as functional fertilizers in agri- and horticulture" (Estonia), "Developing technological and engineering aspects for the utilization of wood ashes as fertilizer in forest cultivation" (Latvia), MAGIC (Horizon 2020) and GURINIMAS (Estonia & Latvia).

The knowledge gained, will on the longer term secure a safe and knowledge-based use of biomass harvesting and wood ash recycling in Nordic and Baltic forests and plantations.

* Nordic is defined here as Denmark, Finland, Iceland, Norway, Sweden and the autonomous areas of the Faroe Islands, Greenland and Åland Islands.

9. Provide a popular science piece for dissemination in SNS' various channels (maximum 700 words) with emphasis on application of results and benefits for the Nordic society.

Provide pictures (size at least 500x500 pixels and resolution at least 72 pixels) as separate files (.jpg). Include caption to each picture, including the name of photographer.

Globally, measures are taken to limit CO₂ emissions as a result of burning fossil fuels for energy production. One way is to replace fossil fuels with CO₂-neutral biomass e.g. forest products and the use is in sharp increase in many countries especially the Nordic. Incineration of biomass leaves a solid phase, ash, rich in elements and metals and recycling wood ash from power plants to forests therefore also receives attention in the region. Wood ash may also be a way of mitigating nutrient depletion in production forests and thus overall contributes to a circular bioeconomy.

The long-term goal of the Nordic-Baltic network, NORDASH, was to initiate a dynamic network for knowledge sharing between leading Nordic research groups working with wood ash, forest ecology, and key forest processes and soil organisms. The network bridged university-based research groups in Nordic and Baltic countries and link current and recent wood ash research projects. The network met over three intensive days at the beautiful Danish Forest and Landscape College in Nøddebo late 2019.

The meeting resulted in fruitful exchange of knowledge between participants and identified the most important knowledge gaps for each country as well as for the Nordic/Baltic region in general. It was clear from several presentations that supplying wood ash together with an N source or when added to a nutrient rich forest floor results in large growth increases. Also, negative side effects by amending ash either to regular forests or during afforestation seems negligible.

As an innovative way of addressing knowledge gaps, participants had been asked before the meeting to phrase the 10 top-most questions and concerns that need to be answered before wood ash can be used wide scale in the Nordic region. This added up to more than 150 questions (see figure) and during the meeting, groups sorted these into different topics. The resulting set of questions will form the backbone and structure for a forthcoming scientific position paper.

In addition, the group compiled a database of current available research sites in each participating country and discussed possible future integrated sampling and survey programs. Also, we compiled a list of the current use and legislation of wood ash in the Nordic countries. Both will become available for interested stakeholders and could be of used in future research applications.

Overall, the knowledge gained, will on the longer term secure a safe and knowledge-based use of biomass harvested and wood ash recycling in Nordic and Baltic forests including afforestation.

Participation and inclusion in the network activities

10. Participants								
Country	PhD students & Post-docs	Senior researchers	Stakeholders	Communication officers	Gender			Total
					Women	Men	Other	
Denmark	2	4			1	5		6
Finland		3			1	2		3
Norway		2			1	1		2
Estonia	1	1			2			2

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Latvia	3				3			3
Lithuania		2			2			2
Total	6	12						18

Economic report

11. Received grant from SNS (SEK):
178 706 SEK

12. Costs	SNS funding	Co-financing	Total
Travel	48.149	0	48.149
Meeting costs and accomodation	75.136	0	75.136
Salary (participants time)	0	180.648	0
Total SUM (SEK)	123.285	180.648	303.933

13. Allocation of SNS funding		
Country	Partner organization	% of total
Denmark	UCPH	20
Finland	LUKE	25
Norway	NIBIO	22
Estonia	Estonian University of Life Sciences	10
Latvia	SILAVA	14
Lithuania	LAMMC	9
Total SUM		100

14. Economic result (deficit or surplus)
+55.421 SEK

Optional: Comments to the economic reporting
Participant's time/co-financing is calculated based on inputs from participants.

Report for annual networks

I hereby declare that the above statements are true to the best of my knowledge

Signature of the main applicant		
	University of Copenhagen	03-03-2020
Signature	Institution	Date
Rasmus Kjøller		

Signature of the department head at the department of the main applicant		
-----	University of Copenhagen	03-03-2020
Signature	Institution	Date
Niels Kroer		

Second applicant's signature, place and date		
	LUKE	03-03-2020
Signature	Institution	Date
Pasi Rautio		

Third applicant's signature, place and date		
-----	Estonian University of Life Sciences	03-03-2020
Signature	Institution	Date
Katri Ots		

From: [Katri Ots](#)
To: [Rasmus Kjøller](#); [Rautio Pasi \(Luke\)](#)
Cc: [Morten Ingerslev](#)
Subject: Vs: Nordash reporting
Date: 3. marts 2020 15:00:52
Attachments: [Report-annual-networks_NORDASH.asice](#)

Dear Rasmus, Morten and Pasi,

Report is good and I attached file with my digisignature.

With best regards from Estonia,

Katri

Saatja: Rasmus Kjøller <rasmusk@bio.ku.dk>

Saadetud: 3. märts 2020 15:37

Adressaat: Rautio Pasi (Luke); Katri Ots

Koopia: Morten Ingerslev

Teema: Nordash reporting

Dear Pasi and Katri

I have to report the SNS meeting in Nøddebo.

Please see my report attached and if you are good with this, return this to me with your signatures.

BW

Rasmus

[Rasmus Kjøller](#), Associate Professor, Head of Studies
[Sect. Terrestrial Ecology, Dept. Biology,](#)
[University of Copenhagen,](#)
[Universitetsparken 15](#), building 1, 2nd floor
DK-2100 Copenhagen Ø, Denmark
Phone/Skype: +45 41432331/rasmuskjoller1
[DNAMARK](#) - eDNA in conservation
[NORDASH](#) - sustainable use of wood ash in Nordic forests
[SoilTracker](#) - Use of DNA in Forensics



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I hereby declare that the above statements are true to the best of my knowledge

Signature of the main applicant



Signature

University of Copenhagen

Institution

03-03-2020

Date

Rasmus Kjeller

Signature of the department head at the department of the main applicant



Signature

University of Copenhagen

Institution

03-03-2020

Date

Niels Kroer

Second applicant's signature, place and date

.....

Signature

LUKE

Institution

03-03-2020

Date

Pasi Rautio

Third applicant's signature, place and date

.....

Signature

Estonian University of Life Sciences

Institution

03-03-2020

Date

Katri Ots