PhD fellowship in forest carbon fluxes in a climate change and management context

Boreal forest ecosystems hold the largest terrestrial carbon stocks globally and also in Norway. The carbon stocks of forest soils and dead wood are vulnerable because of the susceptibility of the organic matter decomposition process to temperature and moisture changes, and management. We are recruiting a PhD fellow to study climate change and management effects on carbon fluxes and the forest ecosystem carbon budget experimentally in real forest ecosystems in Norway, in the project 'ForBioFunCtioN: Functional responses of forest soil biota to climate change and biochar: ecosystem carbon budget, soil condition and management implications'.

The ForBioFunCtioN project

Understanding the effects of climate change on biodiversity and processes in our ecosystems is a first necessary step for optimal societal mitigation and adaptation to climate change. The project ForBioFunCtioN will investigate how climate change, biochar and fertiliser application influence natural communities of fungi, bacteria, soil fauna and ground vegetation in boreal spruce forests in terms of species richness, functional diversity and functions that are connected to critical ecosystem processes such as the carbon and nitrogen cycles. By establishing climate manipulation experiment in different forests, we will quantify the climate-induced changes in greenhouse gas emissions from soils and dead wood, and establish the relevance of these changes for the forest carbon budget, utilising eddy-covariate measurements from ICOS Norway. The project aims to predict future forest carbon budgets that include both the future changes caused by climate and the testing of a novel climate-change mitigation tool, i.e. application of biochar to forest soils. The effects of biochar addition on soil biota, soil properties and soil processes will be studied both in current climate and in conditions corresponding to future climate. The effect of biochar application will be compared with the effects of fertiliser application, as biochar is expected to improve soil nutrient status so that the need for forest fertilisation becomes reduced. Based on our results and literature review, we will evaluate which soil properties are suitable as indicators of soil condition. Our project may reveal trends of global importance that can be difficult to overturn after the changes have taken place, such as loss of soil carbon to the atmosphere in a warming climate. Early detection enables targeted and efficient actions to safeguard the species or properties with the greatest impact on ecosystem processes. We will produce knowledge necessary for the design of evidence-based conservation and management schemes as well as policy development.

About the Norwegian Institute for Nature Research (NINA; the host institute)

NINA is among Norway's largest applied ecology research institutes with more than 280 employees. NINA conducts research within the natural and social sciences that are related to the interactions between humans and nature. NINA seeks to conduct both basic and applied research of very high quality and of high relevance for real world application. The main office of NINA is in Trondheim, and

there are research units also in Oslo, Lillehammer, Bergen and Tromsø. This position will be based in NINA's Oslo research unit.

NINA's research unit in Oslo has over 40 researchers from a diversity of disciplinary backgrounds including ecology, geography, economics and social sciences, and from a diversity of nationalities. The unit NINA Oslo will from the beginning of June be situated in Ullevålsveien 68, close to the University of Oslo and Oslo Science Park. The PhD fellow will be connected to a large research project, ForBioFunCtioN, based at NINA and funded by the Research Council of Norway. The interdisciplinary project team includes 12 researchers, two PhD students and a forestry expert. Six team members are based in Oslo or its vicinity.

About the Department of Geosciences and Natural Resources Management, University of Copenhagen (the university affiliation)

The Dept. of Geosciences and Natural Resource Management (IGN) has > 400 employees and 25 full professors. It has a broad basis in ecology, nature management, geology and geography, and a strong research focus on climate and environment. University of Copenhagen has a strong commitment to its doctoral programme and IGN recruits over 35 new PhDs annually, about half being foreign students, which ensures a multicultural, international environment. IGN has a number of highly instrumented large-scale field experiments and monitoring stations that will be used for local PhD training. Klaus Steenberg Larsen, one of the two supervisors of the PhD, is an expert in ecosystem carbon dynamics, flux measurements and instrumentation.

Job description

The PhD fellow will be employed at NINA Oslo but enrolled at the University of Copenhagen where he/she will be affiliated to the Department of Geosciences and Natural Resource Management, University of Copenhagen, Denmark. The PhD fellow will write a PhD thesis on the ecosystem-climate interactions in the forest carbon cycle, supervised by Jenni Nordén (NINA) and Klaus Steenberg Larsen (University of Copenhagen). The PhD fellow is expected to lead the monitoring of carbon fluxes from soil and dead wood in a climate manipulation experiment, involving also management treatments (forestry, nitrogen fertiliser application, biochar), in real forest ecosystems in Norway. Treatment effects on CO_2 and CH_4 emissions from soil and dead wood will be revealed, and the effects of these emission changes on the forest ecosystem carbon budget will be quantified and related to changes in soil and dead wood communities (another PhD project). One of the four study sites has an eddy covariance measurement tower belonging to ICOS (Integrated Carbon Observation System) Norway. Seventy-five per cent of the work time is connected to ForBioFunCtioN. The remaining 25% will be covered by work in other NINA projects. The PhD fellow will be staying for shorter periods 1-2 times per year in Copenhagen for training, courses and thesis writing as needed.

Required qualifications:

- Master degree in environmental sciences, biology, geography or a related discipline, preferably with a special interest in environmental issues.
- Experience with measurements of greenhouse gas fluxes between ecosystem and atmosphere will be considered an advantage.
- Experience with statistics and programming (R).
- We expect that the candidate acquires sufficient language skills in one Scandinavian language (preferably Norwegian).

- Fluent English language skills.

Characteristics
You are dedicated, ambitious, enthusiastic and have good analytical and communication skills and cooperative qualities. You are genuinely interested in the research topic and aim at doing high-quality research and writing high-impact publications. You are flexible in terms of varied tasks. You like both working in teams, including leading them, and doing more independent work. You have a high working capacity.

Terms of employment
We offer:

- Full time research employment for four years (August/September 2020 – July/August 2024).
- Salary NOK 479 600-504 700 (lønnstrinn 54-57).
- Flexible working hours.
- Good pension and insurance schemes.
- A welcoming and inspiring working environment.
- Good opportunities for professional development.

NINA has a personnel policy objective that the staff must reflect the composition of the population to the greatest possible extent. NINA would like to increase the percentage of female scientists within the institute. Women are encouraged to apply for this position. When two applicants are considered equally strong, preference will be given to the female candidate.

For further information, please contact Researcher Jenni Nordén (jenni.norden@nina.no) or Research Director in NINA Oslo Kristin Thorsrud Teien (phone: +47 93006805; e-mail: kristin.teien@nina.no).

The application should contain:

- A one-page letter where the candidate explains their motivation for applying for this PhD fellow position and a brief description of the scientific relevance of the candidate's education, work and research experience.
- A CV including a list of publications (if relevant) with bibliographical references and contact details (telephone and e-mail) for three references.

The application must be submitted in English or Norwegian. The application should be submitted by e-mail to siri.svendsen@nina.no. A selection of the candidates will be interviewed via Skype or equivalent.

Dead line for application: 14th of April 2020.