

Data-intensive tools for effective carbon mitigation in forestry

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1. Problem definition and value

Sustainable forestry can be a key solution contributing to climate change mitigation (IPCC: Rogelj et al, 2018). But the carbon balance (carbon sequestered minus carbon emissions) can vary depending on many factors, including how the forest is managed by the owners and how and when it is harvested (Lundmark, Bergh et al. 2014; Canadell & Raupach, 2008). Besides that forest store large amounts of carbon in biomass and soils wood products can replace fossil fuels and greenhouse gas-intensive materials (Sathre & O'Connor 2010, Sathre et al. 2010). Calculating a carbon balance model and simulating the impact of different decisions is a data-intensive task which can use the increasing digitalization of forestry data. Optimizing the carbon balance of forestry through better data-intensive management (See Zou et al 2019 for data-intensive approaches in forestry) could help optimizing the climate mitigation impact of forestry in Sweden, and helping forest owners and industry in their work towards sustainable forestry.

2. Objectives

This projects wants to explore the use of data-intensive approaches and visualization for helping forest owners to understand the carbon balance of their forest, and help them in making informed management decisions to improve the carbon capture potential of their forestry.

For achieving this, the seed project will bring together an interdisciplinary team from academia and industry, with knowledge in sustainable forestry, computer science, visualization and sustainable human-computer interaction. During the seed project, the team will explore:

- (a) The affordances of existing forestry data.
- (b) The existing carbon balance models for forestry.
- (c) The needs, drivers, and barriers for forest owners in their work affecting the carbon balance.

Based on these, a mockup prototype will be created during the seed project to show possible solutions and kick-start the discussion between the partners.

3. Expected Results

The expected results from the seed project are:

1. An interdisciplinary understanding of the possibilities of data-intensive approaches for climate mitigation in forestry based on the existing data affordances, the existing carbon balance models and the forest owners and industry needs.
2. A mockup prototype of how a tool using data-intensive visualizations and simulations for supporting carbon mitigation in forestry can look like (deliverable A).
3. An external funding proposal with the aim of developing the technology and testing it with forest owners (deliverable B).

4. Consortium

This seed project is a collaboration between the Faculty of Technology at LNU and Sydved:

- Jorge L. Zapico (LNU), from the Department of Computer Science and Media Technology, will be responsible for leading the seed project and coordinating the data gathering efforts and co-creation of the mockup. jorgeluis.zapico@lnu.se
- Rafael M. Martins (LNU), from the Department of Computer Science and Media Technology, will contribute in the co-creation of the mockup and the visualization of data. rafael.martins@lnu.se
- Johan Bergh (LNU), from the Department of Forestry and Wood Technology, will provide the expertise in wood management and the carbon balance of forests and participate in the co-creation processes. johan.bergh@lnu.se
- Örjan Vorrei (Sydved), IT manager at Sydved, will provide expertise in forestry data and users needs and work as a liaison with other key actors at Sydved and with forest owners for the data gathering. Orjan.Vorrei@sydved.se

5. Activities & Time plan

- Workshops: organization of workshops together with the participant researchers and Sydved to gather existing data and models, and needs from the industry. (May-June 2019)
- Short interviews and/or questionnaires: preliminary data gathering of needs, drivers and barriers of forest owners regarding activities relevant for climate mitigation. (June-August 2019)
- Co-creation activities: organization of design activities together with the participant researchers and Sydved to create iteratively the mockups of possible solutions. (First round: May 2019, Second round: June 2019, Third round September/October 2019).
- Proposal writing for external funding. (Fall/winter 2019 depending on available calls)

6. Budget

The budget of the seed project is 99000 kr which will be distributed as following:

- Travel and organization costs for workshops and co-creation activities: 15 tkr (5*3000kr).
- Jorge L. Zapico, 81h, 51 tkr (Ink OH)
- Rafael M. Martins, 46h, 33tkr (Ink OH)
- Johan Bergh 30h, 30 tkr in-kind (Ink OH)

Sydved will add resources to the project in form of in-kind time from Örjan Vorrei and other possible participants, adding to a minimum of 36 tkr (36h à 1000kr).

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