Mitigation and adaptation of carbon sequestration in multi objective forest management through co-creation with stakeholders (CARBONPATH)

Ukonmaanaho, Liisa[1], Soini, Katriina[1], Tuomenvirta, Heikki[2], Artell, Janne[1], Häyrinen; Liina[1], Haikarainen, Soili[1], Huhta, Esa[1], Hynynen, Jari[1], Juvonen, Jaakko[2], Pirinen Pentti[2], Salmivaara, Aura[1], Stenberg, Leena[1], Vanninen, Petteri[1], Pouta, Eija[1]

[1] Natural Resources Institute Finland, liisa.ukonmaanaho@luke.fi, 0000-0002-2268-6862, katriina.soini@luke.fi, janne.artell@luke.fi, liina.hayrinen@luke.fi, soili.haikarainen@luke.fi, esa.huhta@luke.fi, jari.hynynen@luke.fi, aura.salmivaara@luke.fi, leena.stenberg@luke.fi, petteri.vanninen@luke.fi, eija.pouta@luke.fi
[2] Finnish Meteorological Institute, heikki.tuomenvirta@fmi.fi, jaakko.juvonen@fmi.fi, pertti.pirinen@fmi.fi

Forest management has important role in storing carbon in forest biomass and forest soil. To Increase the understanding of optimal forest management practices considering carbon sequestration as well as water and biodiversity protection is crucial for reaching e.g., the set carbon neutrality goals. However, reaching them requires practice-validated strategies for the implementation of best-suited methods in multi objective forest management.

In the CARBONPATH project (www.luke.fi/en/projects/hiilipolku) our aim is co-create practices in partnership with local forestry actors (e.g., landowners, forest service entrepreneurs, NGOs) that nudge carbon sequestration in forests and which simultaneously support water and biodiversity protection. Practices are based on state-of-the-art modelling while striving for socially just and rewarding implementation.

CARBONPATH is carried out in the Puruvesi catchment area, in South-East Finland. The size of the catchment area is about 1017 km^2, including lake and land areas, the 92% of catchment land area is boreal forest which grows either on mineral or organic soils (peatlands). Main land use is forestry with minor areas of agriculture and urban land use. We are focusing on three subcatchments of the area, which size varies from 11 km^2 to 55 km^2 (total c. 16% of land area). The project has four workpackages, where 1) we study perceptions of forest stakeholders regarding sustainable forest use and management (i.e. carbon sequestration, biodiversity, water protection), 2) we run three scenarios with and without water protection emphasis were built from various forest management regimes (including e.g., longer rotation periods, continuous cover forestry, fertilization, increase of deciduous tree percentage) per each stand in the target area. The scenarios are estimated with Motti (doi.org/10.1007/s10342-014-0860-0) and SUSI-models (doi.org/10.14214/ma.10575) with simulations in current and future climate conditions, 3) we have carbon, water protective and biodiversity related counselling of forest owners, and finally 4) the local, voluntary-based model of carbon sequestration, water protection and biodiversity by individual forest owners produced in the study is conceptualized and its applicability nationally in forest counseling will be evaluated.

Preliminary results show:

- Local stakeholder participatory process shows the importance of balancing different objectives of forest management and shares information and practical knowledge.

- The simulations results show how different management options support various objectives, e.g., carbon sequestration is supported with longer rotation period and biodiversity benefits of the increased share of broadleaves trees.
- Forest owners' survey show that beyond economic objectives they emphasize particularly water conservation objectives.