Short Project Description

Background: Forests, and especially the trees comprising the majority of the forest, provide many essential ecosystem functions and services, such as carbon cycling, water management, biodiversity support and pollution control. This is particularly relevant for urban forests close to urban areas such as cities, as these ecosystem functions have been mostly replaced by urban infrastructure and are thus in short demand. However, very little is known about how much services and functions urban forest in Norway provide, and how much they vary depending on tree size, height, species composition and more. The software suite iTree was developed by the United States Department of Agriculture (USDA) Forest Service for urban and rural tree forest analysis of ecosystem benefits (Nowak et al. 2018), as such it is optimally suited to quantify urban forest benefits. While not initially adapted for Scandinavian conditions, the software has been continuously developed to fit multiple continents, countries and ecological systems. This has allowed it to be used to calculate tree ecosystem functions in many different countries, e.g., Sweden, China and Ireland (Deak Sjöman and Östberg 2020; Song et al. 2020; Riondato et al. 2020). Access to quantified ecosystem functions from trees have also allowed for economical calculation of forest values, which can significantly help in encouraging policy makers while creating conservation policy and biodiversity support efforts.

Aims: We wish to use tree inventories and the iTree software suite to identify ecosystem functions of urban forests in the larger Stavanger area.

Objectives: I. Prepare remote-sensed source maps of urban forests and select sampling sites. **II.** Conduct tree inventories and collect biometric data according to iTree recommendations. **III.** Analyse ecosystem functions and services using iTree Eco. **IV.** Assist in the manuscript creation and writing process.

Material and Methods: We would select suitable urban forest areas for tree inventory observations. Sampling points in the forests would be selected based on minimum survey area and all trees within these circles would be surveyed according to iTree recommendations. Variables surveyed include species, tree height, diameter at breast height, crown metrics and health etc. Data will be either manually or automatically entered into iTree and automatic analyses would be run by iTree servers. Output results in the form of ecosystem functions and services (e.g., carbon sequestration, pollution removal, storm water retention etc.) would then be summarized and analysed.

Expected Output: We expect the output to be a peer-reviewed scientific journal article in an international urban landscaping journal of good impact and high readership (e.g., Urban Forestry and Urban Greening or Landscape and Urban Planning).

References:

Deak Sjöman J, Östberg J (2020) i-Tree Sweden – Strategic work with ecosystem services provided by urban trees

Nowak DJ, Maco S, Binkley M (2018) i-Tree : Global Tools to Assess Tree Benefits and Risks to Improve Forest Management. Arboric Consult 51:10–13

Riondato E, Pilla F, Sarkar Basu A, Basu B (2020) Investigating the effect of trees on urban quality in Dublin by combining air monitoring with i-Tree Eco model. Sustain Cities Soc 61:102356. https://doi.org/10.1016/j.scs.2020.102356

Song P, Kim G, Mayer A, et al (2020) Assessing the Ecosystem Services of Various Types of Urban Green Spaces Based on i-Tree Eco. Sustainability 12:1630. https://doi.org/10.3390/su12041630