Restore bogs with drone-derived data

How are peat moss patches organized in shape and size in rewetted bogs

Department: Copernicus Institute of Sustainable Development
Research group: Environmental Sciences
Supervisor: Dr. Ralph J.M. Temmink
Email address: r.j.m.temmink@uu.nl

Project description

Peatlands play a key role in the mitigation of climate change and sustain a unique biodiversity. Degradation of peatlands worldwide makes their restoration urgent. Restoration traditionally focused on rewetting areas and using peat moss transplants in an often unsuccessful and trial-and-error manner. Essentially, mechanisms through which peat mosses modify habitats and activate self-reinforcing feedbacks are poorly understood, and overlooked. For example, larger peat moss patches increase water holding capacity, which result in wetter environments that facilitate peat moss growth. These feedbacks are patch-size dependent and result from emergent traits: traits that are not expressed by individuals organisms, but emerge spontaneously if individuals are spatially aggregated. This aspect is essential for peatland functioning and optimal-sized transplants and spatial-configurations of these transplants should be used for peatland restoration. The Bright Minds project is related to my Veni project, which aims to unravel the importance of optimal patch size and configuration of peat moss aggregates and apply the concept of self-reinforcing feedbacks to innovate peatland restoration.

You will focus on how peat mosses are spatially organized in restored bogs. You will measure patch-size and spatial-patch-organization in rewetted bogs with high-resolution drone-collected data. Patch-size dimensions of successfully established peat mosses can inform the optimal patch-size required for restoration. To capture dimensions of established peat moss patches, including topographic height and patch-size in an area of 10 ha, you will use cm-spatial-precision of pixels in imagery with remote sensing collected by a multispectral drone (DJI-Phantom 4 Multispectral). You can explore peat moss spatial organization with the use of multispectral orthophoto's, digital surface models (DSM), and spectral vegetation indices like Normalized Difference Vegetation Index (NDVI; proxy for biomass) and others. We already mapped a 50 ha area in the Fochteloerveen in the Netherlands early in 2024 with the option of additional mapping early in 2025. This gives you the opportunity to aid in drone-date collection and to collect ground-truthing data in the field. In this project, you will apply your GIS skills to advance peatland restoration, which can aid to mitigate climate change and help to achieve biodiversity restoration targets.

Job requirements

- I am looking for a motivated and enthusiastic students with good communication skills.
- Good knowledge of GIS analyses (either ArcGIS, QGIS or R statistics).
- There is an option to collect additional drone or ground-truthing data in the field.