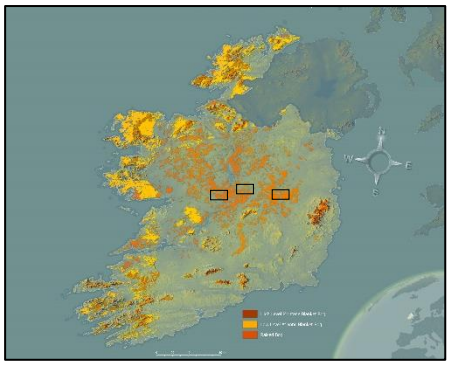
Best Oral Presentation at Environ 2022
Winner Wahaj Habib, Trinity College Dublin

Mapping vegetation communities on Irish raised bogs using PlanetScope imagery and Google Earth Engine

In Ireland, peatlands cover about 20 % of the total land area and store approximately 1085 Mega tonnes (Mt) of carbon. They have been severely impacted (~ 90 %) by human intervention predominantly by drainage and subsequent conversion to forestry, agriculture, and extraction. Vegetation communities, artificial drains and open water bodies play a crucial role in C/GHG (Carbon/Green House Gas) dynamics, and their detailed mapping is essential for precise estimation of C/GHG fluxes. These maps could also prove helpful in developing a better understanding and long-term monitoring of terrestrial C/GHG dynamics of these ecosystems.

This research is part of the EPA-funded SmartBog (Smart Observation of Management Impacts on Peatland Function). The primary objective of the project is to develop an interdisciplinary approach to assess the impact of anthropogenic management on peatlands. A robust system based on Earth Observation technologies (Satellite, Aerial, and In-situ sensors) to identify anthropogenic stressors on peatlands and assess its implications on the C/GHG storage and release status from peatlands in Ireland.



In Ireland, persistent cloud cover causes an impediment to optical satellite remote sensing. Here we used high-spatial (3m) and temporal resolution multispectral imagery to overcome this issue and generate cloud-free mosaics. The images were acquired by PlanetScope between January 2020 and December 2021. It was used to map vegetation communities across a drainage

gradient on three raised bogs in the Midlands of Ireland. These sites represent an industrial peat extraction, a near-natural site, and a site under rehabilitation.

Study sites:

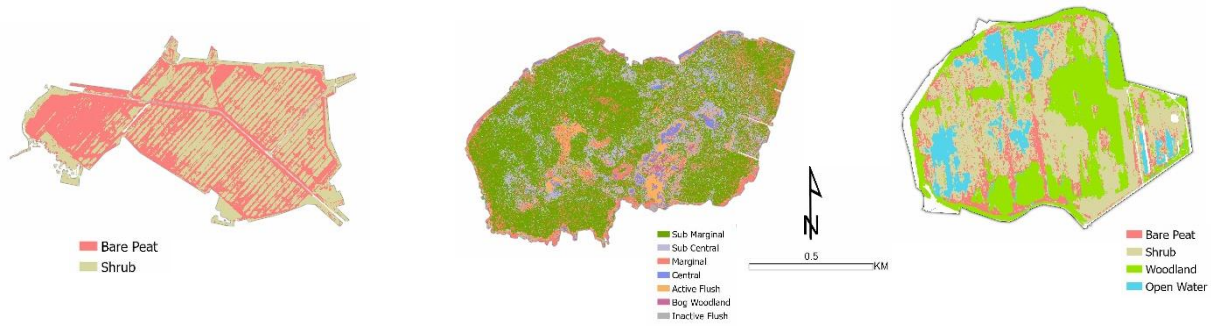
Garryduff (Industrial Peat Extraction site) (Under Rehabilitation)

ClaraBog (Near Natural)

Lullymore

Cloud-free imagery was collected for all the three sites and annual mosaics were calculated using a mean filter to derive a single image for each year (2020, 2021) and each site. The SMILE (Statistical Machine Intelligence and Learning Engine) Random Forest algorithm, a machine learning-based image classification technique was used in Google Earth Engine (GEE) platform. Data acquired through detailed field surveys (from various sources for each site) depicting vegetation communities across the study sites were used to derive the training and validation sample data for the image classification. The classification results revealed an average of 90% accuracy for all the maps. The results from this study illustrate the potential of these data and methods for long-term monitoring of raised bogs. Additionally, this will aid in the understanding of C/GHG dynamics by upscaling the fluxes from in-situ estimates to local and national scales.

Results:



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