Peatlands are an important ecosystem due to their role in carbon sequestration as well as other ecosystem services including climate regulation and water regulation. Peatlands cover a small fraction (~3%) of the terrestrial surface (Misseny et al., 2019). Nevertheless, they account for approximately one-third of global Soil Organic Carbon (SOC) stock. In Ireland, peatlands cover ~21% of the land area (Fig. 1) and account for between 50-75% of the total SOC stock (Renou-Wilson et al., 2011). However, much of this area has been degraded through anthropogenic activities such as drainage and peat extraction. SmartBog will take an interdisciplinary approach to address these issues using GIS, Earth Observation and Machine Learning (ML). This will directly support rehabilitation and conservation activities, aiding identification of candidate sites for rewetting and restoration.

**Methodology**

**Multi-Scale (Spatio-Temporal) NDVI Maps:**
Multi-Scale (Spatio-Temporal) NDVI mapping will be conducted using data acquired with sensors at three different levels (Ground, Air, and Space). Starting from the ground level, NDVI maps and C/GHG emission status will be acquired using IoT (Internet of Things) sensors/ Flux towers (Fig. 3 (a)). This will provide highly accurate in-situ observation. On the next level, data from very high resolution aerial imagery (~25 cm) (Fig. 3 (b)) will aid in providing cloud free observation at National scale. The RGBI images will be used to create NDVI maps. While the aerial imagery will provide very high spatial resolution maps, due to the cost the images will be acquired one time only. This gap in temporal resolution will be hence filled by Copernicus Sentinel – 2 sensors in the Space (Fig. 3(c)). Cloud free Spatio-temporal (yearly) NDVI maps will be generated using Google earth Engine (GEE) platform. The result from the preliminary analysis performed using GEE can be seen in the NDVI maps below (Fig. 2).

**Intended Outcomes**

- SmartBog is in its initial start-up phase.
- Next steps include acquisition of very high resolution aerial photographs.
- Initial assessment at raised bogs in the midlands of Ireland.
- Updated peatland land use map of Ireland will be created.
- Very high resolution peatland drainage maps, representing peatland spatial extent and habitat condition.
- Multi scale NDVI maps of peatland will be generated to determine C/GHG emission status.

**References**


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