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Carbon Farming – MRV examples from Ireland

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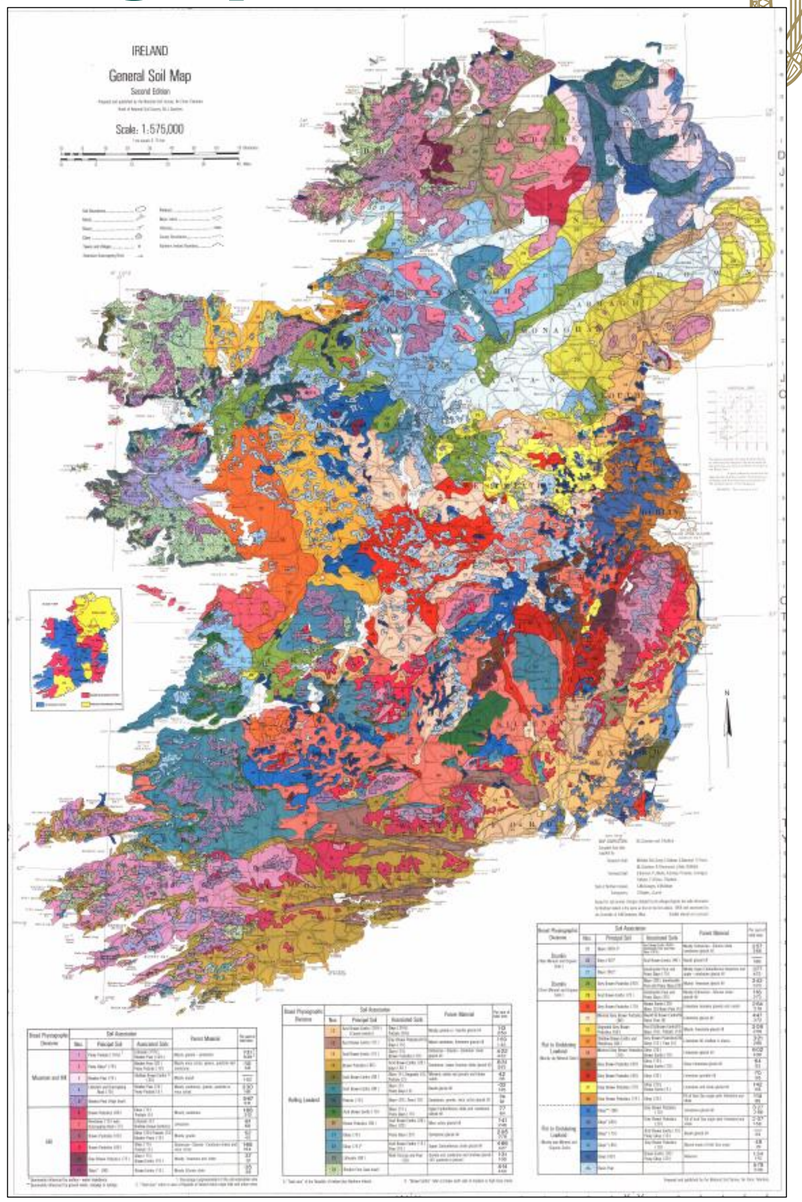
Overview of Irish Agriculture:

- Total land area of 6.9 million ha, of which 4.5 million ha is used for agriculture
- 92% of land is devoted to grazing and forage production with the remaining 8% attributable to crops, fruit and horticultural
- The agri-food sector is Ireland’s largest indigenous manufacturing industry, accounting for over 173,000 jobs
- The sector is dominated by medium-sized farms and a maritime climate favours a grass-based system of agricultural production.
- High level of on-farm technical efficiencies make further GHG emission reductions challenging
- Carbon Farming represents one pathway to reward farmers for enhanced sequestration and carbon pool protection activities

How do we address knowledge gaps for land-based emissions?

- Higher resolution soil/landcover/drainage maps
- Improved activity data at field level
- Country specific GHG emission/removal factors for all soils types and agricultural management



RePeat Mapping Project

- Circa 300,000ha of drained organic soils under agricultural management
  - ➢ represents a significant source of national GHG emissions to which accurate maps are required

- Objectives of the RePeat Project:
  - ➢ The increased accuracy of peatland maps at a field scale level
  - ➢ The precise identification of agricultural land-use and intensity on former peatlands
  - ➢ Provide detailed information to policy makers to provide better management options to farmers to help reduce GHG emissions

National Soil Survey Pilot Programme

- The purpose of this programme is to develop a baseline national data set at farm level for :
  - *Macro- and micronutrients for agronomic advice and water quality risk assessment.*
  - *Soil carbon(C) relating primarily improving climate objectives and soil health.*
  - *Soil pathogen assessment as a biosecurity measure for policy guidance*

- Programme to help refine our soil maps and inform us on long term changes in Soil Organic Matter and therefore stock of carbon at a farm level.

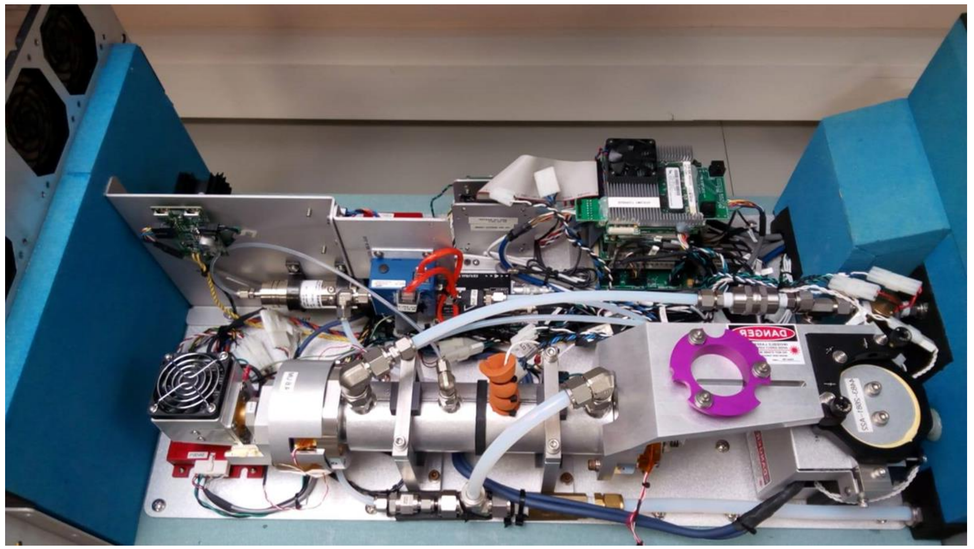
- Farm Advisors will be up-skilled to assist farmers in implementing on-farm nutrient management practice ensuring that farmers know the right nutrient type, the right application rate, and when and where to apply fertiliser an organic manure.

- In driving soil health will improve the economic and environmental sustainability of farms and the ability to store and sequester carbon.

NASCO- National Agricultural and Soil Carbon Observatory

The establishment of this infrastructure will allow:

- Better quantification of soil GHG fluxes from agricultural land
- The inclusion of mitigation measures to increase carbon sequestration to be reflected in our national inventory
- Participation in the EU Integrated Carbon Observation System (ICOS)



NASCO- National Agricultural and Soil Carbon Observatory

- A network of Eddy Covariance Flux Towers funded by DAFM and industry and managed by Teagasc as part of their SignPost Farms
- A variety of sites including agricultural grasslands, mineral soils and peatlands
- Ability to determine actual emissions (CO2 CH4, N2O) and sequestration in Irish specific conditions
- As a result, Ireland will have the highest density of agricultural flux tower installations per hectare in Europe

Farmed Peat EIPs

- A call for a new locally-led European Innovation Partnership (EIP) project/s on reduced management of farmed peatlands was announced in August 2020.

- Aim to provide lessons learned to scale up the actions and measures into a larger agri-environment programme for the next CAP.

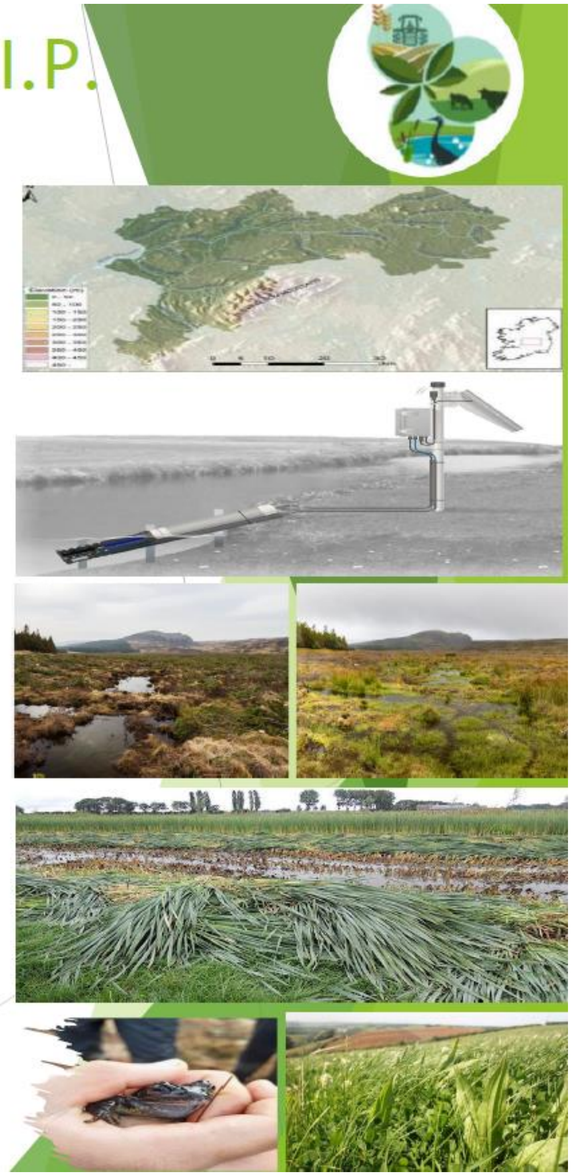
- Local Groups to put forward projects outlining concrete actions that will;
  - Protect the carbon stock and restore sequestration associated with drained peatlands under agricultural management.
  - Maximise other ecosystem service co-benefits such as protection of biodiversity, water quality and water regulation.
  - Build resilience to the impacts of climate change at catchment/landscape level.

- Two groups, Nature Based Agri Solutions Limited (FarmPeat project) and Green Restoration Ireland were successful and will receive over €2 million to complete their projects.

Farm Carbon E.I.P

Green Restoration Ireland : Farm Carbon E.I.P.

- Creation of an **Irish Peatland Code** to provide assurances to voluntary carbon market buyers that the climate benefits being sold are real, quantifiable, additional and permanent.
- LANDSCALE assessment of Co. Offaly (Verra)
- A **Water Quality Monitoring Programme** employing Sonde devices and Autosamplers to monitor a peatland catchment (1st of its kind in Ireland on the Silver River in Co. Offaly)
- Trialing of Landowner-led **Peatland Restoration & 'Rewetting' Programme** by various 'rewetting' approaches i.e.,
  - Rewetting & Rewilding (e.g., Fen, Wet grassland etc.)
  - Partial Rewetting and
  - Paludiculture Trials (cattail)
- A Whole farm Plan approach i.e. a **Peatland Management & Sustainability Programme** including native woodland restoration, hedge repair, species action plans etc. multi-species Grass Swards cultivation employing mob grazing for adjacent lands



Terrain AI

1. Benchmark Sites
Establishment of representative benchmark sites across Grass, Peat, Crop, Forest, and Urban environments with in-situ sensors for intensive monitoring and measurement
2. Mapping
Ecosystem mapping & monitoring using spaceborne, airborne, drone, in-situ data, and GIS along with targeted site-survey to measure greenhouse gases (GHG) at benchmark sites
3. Analysis Ready Data
Petabyte-scale cloud-platform, using multi-thematic earth observation indexing and ingestion engine for analysis ready data
4. Artificial Intelligence Profiling
Computational workflows, machine learning processors, statistical analysis, & geospatial modelling to produce digital profiles of terrestrial environments types
5. Dynamic Activity Insight
Incorporation of dynamic land management practices, human activity across our rural and urban landscapes
6. GHG Modelling
Integrated earth system modelling, synthesizing terrestrial profiles, natural processes and uncertainty parameters to compute energy, carbon and water fluxes across the landscape
7. Sustainable Planet
Spatially refined mitigation policy, informed land management practices & adaptable nature based solutions to address UN Sustainable Development Goals, nationally and internationally
Outputs & Benefits
Improved Standards in measurement & monitoring of GHG exchange
Scenario modelling tool for GHG Emission mitigation focused on nature based solutions
Natural & urban profiling tools highlighting environmental processes & human interactions
GHG Management Strategies Sustainable & Healthier Living

Conclusions

- Good baseline data on soil carbon and field level activity is essential
- Long term emission flux data has widespread benefits and is now a prerequisite for future agricultural policy formation.
- Farmers need to understand why policy objectives are moving in a certain way- accurate data will aid this process
- There are opportunities for farmers, such as carbon farming, to financially benefit from this increased data collection
- We must continue to prove the sustainability of our production systems to ensure a vibrant agricultural sector for future generations.