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## Background

Irish soils stored an estimated 2021 Mt of soil organic carbon (SOC) in 2000 (Tomlinson, 2005). Peat accounted for 53% of this with mineral soils storing the remainder. Recent work (Fay, 2002; McGrath & Fay, 2004) has seen SOC measured in the 0 to 10 cm layer at 10 km resolution for the entire country. Understanding the magnitude and flows of SOC stocks helps not only to constrain the terrestrial C budget but also to predict the C sequestration potential of soils under different land uses, management systems and climatic conditions.

## SoilC Project Description

A recently-commenced project, **SoilC** (Kiely, 2005), has the following objectives:

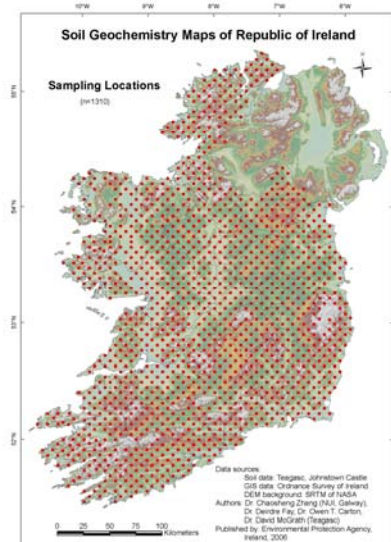
- To review past and current Irish (and international) research in relation to SOC turnover.
- To measure soil carbon stocks to a depth of 50 cm at 60 sites throughout Ireland and to use these data to develop a quantitative assessment of SOC stocks in Irish soils (by extrapolating from these 60 sites to the 1300 sites of the National Soils Database, **NSD**). In addition a further 10 peatland sites will similarly be assessed.
- To measure a range of key soil properties at 10 sites to a depth of 0.5m (bulk density, sand/silt/clay fractions, total SOC and slow, active and passive SOC fractions).
- To carry out an intensive soil sampling campaign at one site in order to test the detectability of soil carbon stock changes using conventional soil sampling techniques.
- To integrate SOC and other soils data into SOM models (e.g. CENTURY, RothC, PaSim, DNDC). To determine the most suitable of these models for further development at the local, regional and national scale.
- To analyse the findings in the context of UNFCCC and Kyoto Protocol.

## The National Soils Database

The EPA-funded project conducted by McGrath and Fay (2004) on a National Soils Database for Ireland is almost complete (Fig. 1).

**SoilC** will add value to the NSD through the addition of soil carbon profile, soil texture and bulk density measurements at 60 of the 1310 NSD locations.

Figure 1: Map showing National Soils Database sampling locations (Zhang et al., 2006).



## Site Selection

A subset of 60 of the NSD sampling locations has been selected for resampling under **SoilC**. The chosen locations are representative of (a) soil types and (b) land uses prevalent in Ireland.

The sites were selected as follows:

**Step 1:** The 1310 sites were classified in terms of soil types and land use types (Table 1).

**Step 2:** 60 sites covering the most prevalent land use/soil type combinations were selected (Table 2), subject to a minimum of three sites in any selected soil type/land use class.

Table 1: Soil classifications and land use of the 1310 NSD sites.

Soil Type	Land Use						Total
	Arable	Forest	Pasture	Others	*Peat	Urban	
Acid Brown Earth	13	5	106	0	0	0	124
Brown Podzolic	19	8	122	2	0	0	151
Gleys	12	14	245	2	0	0	273
Grey Brown Podzolic	26	8	261	0	0	0	295
Lithosols	1	0	14	4	0	0	19
Podzol	0	4	67	6	0	0	77
Shallow Brown Earth	0	1	39	0	0	0	40
Rendzina	0	1	5	2	0	0	8
*Peat	0	0	0	0	308	0	308
Urban	0	0	0	0	0	15	15
Total	71	41	859	16	308	15	1310

\*Note: peat is both a soil type and a land use as sites where the soil type was classified as peat were not assigned to a land use.

Table 2: Soil classifications and land use of the 60 SoilC sites.

Soil Type	Land Use						Total
	Arable	Forest	Pasture	Others	Peat	Urban	
Acid Brown Earth	3		3				6
Brown Podzolic	3	3	3				9
Gleys	3	3	5				11
Grey Brown Podzolic	3	3	5				11
Lithosols			3				3
Podzol			3				3
Shallow Brown Earth			3				3
Rendzina							0
Peat					14		14
Urban							0
	12	9	25		14		60

## Expected deliverables

- An updated estimate of the national soil C stock (to 50 cm depth)
- An estimate of the uncertainty in the national soil C stock
- Farm level model simulations of soil C dynamics
- An assessment of the detectability of soil C changes on the farm scale using current sampling methods
- Assessment of the possibility of upscaling model results to report national changes in soil C stocks under the Kyoto Protocol

## Acknowledgement

This project relies on the results of the NSD project managed by Deirdre Fay of Teagasc.

## References

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