



Protecting the Nation's Soils

Detecting changes in Scotland's soils

Allan Lilly, John S. Bell, Gordon Hudson, Andrew J. Nolan and Willie Towers
email: a.lilly@macaulay.ac.uk The Macaulay Institute, Aberdeen

Are Scotland's soils changing?

Between 1978 and 1988, The Soil Survey of Scotland sampled 721 soils on a 10 km grid throughout Scotland (Figure 1a) as an inventory of our soil resource. The soils were analysed for a range of key properties including soil nutrient status and organic carbon content. The results of this National Soils Inventory of Scotland (NSIS) allow us to determine changes in key soil properties.

We have a programme to resample a subset of the original NSIS during 2007 – 09. There are three main objectives:

- Detect changes in key Scottish soil properties
- Test the suitability of soil quality indicators in a wide range of soils and land uses
- Test different methods for monitoring soils at a national scale

We are re-sampling 25% of the original locations on a 20km grid (Figure 1b). This is similar in scale to EU soil monitoring schemes and has no inherent bias in sampling (Figure 2).



Design of field sampling

Sites are relocated using aerial photographs; a pit is dug to 80 cm deep (Figure 3); soil layers identified and characterised (Figure 3); 1.5 kg soil sample taken from each and analysed for chemical, physical and biological attributes; additional pits are sampled to determine soil variability; sampling approaches used in other UK schemes are replicated to inform on future soil monitoring methods.

Figure 1a
Original NSIS_1 Sampling design

Figure 1b
2007–2009 NSIS_2 Sampling design

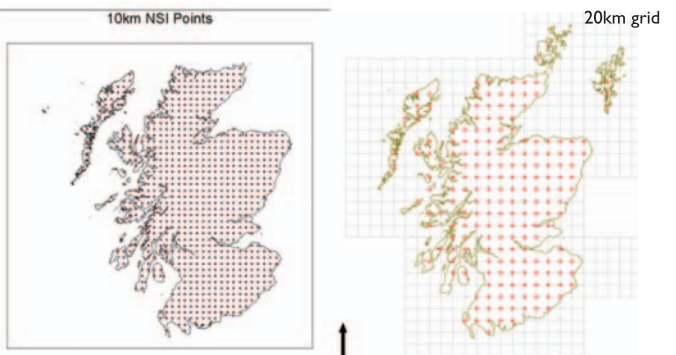
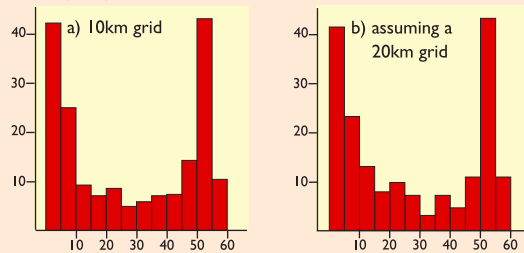


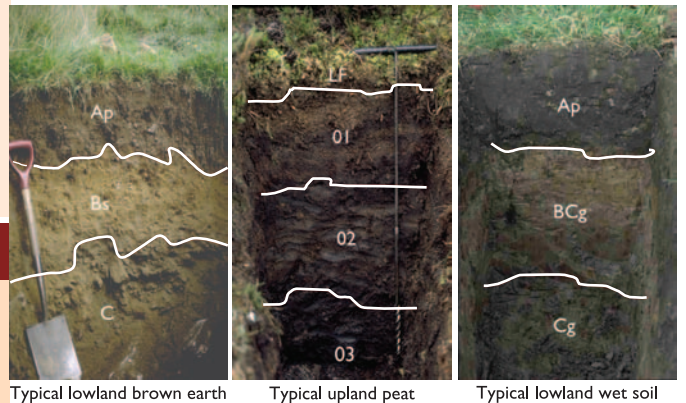
Figure 3

Figure 2 Frequency distribution of carbon contents



Progress and future plans

- ~ 60 locations visited in 2007 with 700 samples taken from lowland agricultural soils and upland peats (Figure 3)
- Samples are being analysed for a range of key soil properties done during the original survey and for new properties to aid interpretation of change
- Applying state of the art techniques like analysis of DNA in soils (Figure 4) and testing methods to speed up analysis of soil monitoring schemes



Typical lowland brown earth Typical upland peat Typical lowland wet soil

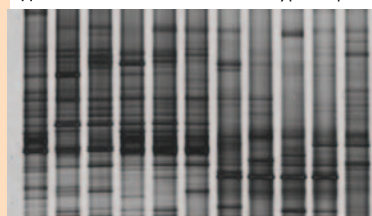


Figure 4 DNA profiles

