

INSTITUTE OF TERRESTRIAL ECOLOGY

**MASQ: MONITORING AND ASSESSING SOIL QUALITY**

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Module 6: Soils and Pollution

Progress Report 2 to The Environment Agency

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## **1. Work Programme 1/4/99 to 1/7/2000**

- ◆ Development and population of the database for soil acidity and loss-on-ignition, and associated supporting data.
- ◆ Laboratory examination of soil fauna and microbiology
- ◆ Analysis of heavy metals and organic compounds
- ◆ Short scoping study for metals/metalloids and organics

## **2. Progress**

### **2.1 Development and population of the databases**

***Soil acidity and loss-on-ignition, and associated supporting data:*** The Microsoft ACCESS database, containing all the 1998 soil pH and LOI data, has now been transferred into the Countryside Information Database (CID). Soil pH and LOI data from the remaining X-plots (ca. 125) are being added as samples are processed from the 1999 fieldwork which started in May.

***Other MASQ databases:*** MASQ databases have been established for Microsoft ACCESS for the soil microbial and soil faunal assessments with the assistance of John Watkins, the CS2000 data manager. All data will be stored in a restricted access folder on the Merlewood shared drive. Excel databases have been set up from the 1998 field data of a complete list of the samples received by ITE Merlewood from the CS2000 survey for the soil faunal and microbial samples.

### **2.2 Laboratory evaluation of soil faunal diversity and microbiological status**

***Soil faunal diversity:*** Two project staff have been assigned to identify the invertebrate fauna. In April, these two visited Dr Steve Hopkins at Reading University for a short course in collembola species identification and to discuss QA and taxonomic issues. A two day training session has been organised for Dr Malcolm Luxton to cover mite identification at ITE Merlewood in June 1999. A list of taxonomic experts for individual invertebrate groups has been compiled in liaison with the Biological Records Centre. These experts are being contacted to determine who would be available to QA samples and to resolve taxonomic difficulties.

**Soil Microbial Diversity:** A full-time ASO started work on 16<sup>th</sup> Feb. 1999 to process frozen CS2000 soil cores for microbiological analyses. She has done preliminary tests to determine an inoculation strategy and has started to prepare solutions for BIOLOG analysis and to thaw, sieve and determine moisture contents of one batch of CS2000 soil samples. A total of 998 soil samples were returned to Merlewood from the 1998 CS200 survey, ten of these were not frozen due to there being insufficient material to do all of the analyses. Of the remaining 996 samples, the number of samples processed (thawed, sieved and moisture content determination), analysed for microbial activity and functional diversity (BIOLOG) and re-frozen for analysis of organic chemicals to date are detailed in the table below. Samples were not analysed with the BIOLOG system if there was less than 5 g dry weight equivalent of soil left after sieving (e.g. for peaty soils and forest litter samples), these samples were re-frozen as a whole for analysis of organic chemicals. In certain cases, the whole of a sample was needed for the BIOLOG analyses and there was no remaining soil for analysis of organic chemicals.

**Table 1: Summary of BIOLOG processing to May 1999**

Number of samples	Processed	Analysed	Re-frozen
Batch A (March-April 1999)	113	108	109
Batch B (April-May 1999)	35	33	34
Total	148 (15%)	141	143

### 2.3 Analysis of heavy metals and organic compounds

**Heavy Metals:** The analyses of these are awaiting the finalised list which will be prepared by the end of June 1999 after resolution of analytical technique and protocols.

**Organic Pollutants:** An outline protocol for the validation exercise has been developed and will use of soil samples drawn from another study in the first instance to test procedures. The initial standard reference material for the work will be an LGC coal-gas site material. The suitability of such a highly contaminated sample for MASQ will be considered during the validation study. Information on the soil sample plots in CS2000 has been considered. Results of preliminary studies of the vegetation types show that there are various numbers of squares from the main vegetation types (see Table 2). There are larger numbers of squares for various mixed vegetation types. It may be wise to consider concentrating effort on grassland samples and combine this with selective studies on other vegetation types. If all grass types are

considered then there are ca. 500 soil samples which are distributed throughout the whole of GB (unlike a number of the other vegetation types). The next step is to examine soil types under each of these vegetation types. Once this information has been collated samples can be selected for analysis.

**Table 2: Summary of the dominant vegetation types of the X-plots sampled for MASQ soil samples during CS2000**

No. of samples	Vegetation Type
90	Weedy sward
90	Heathland
100	Rye grass
120	Well-managed grass
110	Weedy sward + unmanaged grass
90	Conifer woodland
40	Broadleaved woodland
c. 500	All grassland types

#### 2.4 Scoping study for metals/metalloids and organics

A draft version Scoping Study of heavy metals and organic pollutants has been completed. The recommendations and various issues over validation, analytical techniques and protocols were discussed at a meeting with The EA on the 31<sup>st</sup> May in Bristol. A final copy of the Scoping Study is being prepared and will be submitted to the EA by the end of June 1999.

#### 2.5 Meetings timetable

Date	Location	Main Topic
30 <sup>th</sup> April 1999	EA Bristol	Chemical analyses