Priorities for the Environmental Protection of Soil

R&D Technical Summary P5-055/TS

Knowledge about soils, their properties, processes and functional capabilities is, in many cases, limited. This has made the process of making rational decisions about the targeting of resources in soil protection very difficult, since it has required a great deal of subjective judgement. This project has developed a basic framework methodology that will provide the Environment Agency with a flexible, risk based tool for prioritising the environmental issues relating to soils. The eventual aim is to use the tool to assist in the targeting of resources and research to identify soil scenarios at greatest risk of damage.

The project started with an initial literature review to reveal the type and quantity of knowledge available on soils and their associated environmental issues. The main purpose of this was to identify the type and scope of knowledge that would need to be captured in order to design the knowledge base in a flexible manner such that it would be capable of handling the diversity of available information. Once the basic framework had been developed, two workshops attended by soil experts, project staff and staff from the Environment Agency, were held at the University of Hertfordshire. These workshops provided a forum to discuss, develop and test the method using external soil expertise.

The developed method employs a process of building soil change scenarios to structure expert knowledge and to populate a knowledge base. This knowledge base captures current understanding of the links between external influences (activities and environmental parameters), soil properties and the ability of a soil to perform a number of different functions. Changes within scenarios are characterised using risk criteria and levels of confidence are recorded to capture the degree of uncertainty. The scenarios within this knowledge base are grouped based on common soil properties and then the knowledge base can be interrogated to help answer questions about the environmental protection of soil. For example, it can help find out:

- What soil properties and functions might be influenced by a given activity or environmental parameter, and what are the relative risks posed by those activities?
- If a given property changes what effect does this have on soil functions?
- What is likely to cause an increase/decrease in the ability of a soil to perform a given function and on what sort of soil?

To facilitate this process a software tool was developed, the Soil Protection Risk Assessment System (SPRAS). This provides structure to the scenario building process and ensures that any expert contributing to the database does so in a way that allows easy integration into the overall system. It also facilitates the process of interrogating the knowledge base to answer questions. For the purposes of this project, an initial population of scenarios intended to cover a range of soil issues was obtained from a panel of three soil experts using SPRAS with additional input from Environment Agency staff.

Overall this project has established a methodology for decision making in the management of environmental risks pertinent to soils. This project did not attempt to fully populate the system with the complex range of scenarios that could be possible. The methodology was designed to be flexible so as to allow further

information to be added later. The task of database population must now be undertaken carefully so as to distil the expert knowledge present in a number of fields into a succinct data resource to support soil protection decisions.

This R&D Technical Summary relates to information from R&D Project P5-055 reported in detail in the following outputs:

R&D Project Record P5-055/PR
Priorities for the Environmental Protection of Soil

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