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Soil Quality and Health – can it be quantified?

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Soil quality and health (SQH) are terms used extensively to characterise soils. However, the exact definitions of quality and health are often qualitative with differing meanings to different stakeholders. Collecting and combining these differing viewpoints is a non-trivial task. In this work, we will discuss how we have used the Bayes Net framework to define a hierarchical structure that enables a subjective concept such as soil quality and health to be quantified from multiple sources of information including diverse sources of expert knowledge and linking this through to national databases.

Information within a Bayes Net is encapsulated through a set of conditional probability tables that describe the conditional dependencies of all variables of interest. It is well known that humans are particularly poor at estimating such probabilities which, when a Bayes Net relies upon experts from differing disciplines and stakeholders from disparate application areas to quantify their beliefs through these conditional probability tables, is often a major limitation to these techniques. Here, we demonstrate an elicitation web app that mitigates some of the difficulties associated with quantifying subjective opinion. Moreover, we show how an inference network of known associations aids in the extraction of information from increasingly subjective sources within the hierarchical framework.