

# Science for Environment Policy

## Fewer indicators may be sufficient to assess soil quality

**Although soil quality** is best assessed using a wide range of indicators, a smaller set may be more practical and still provide the necessary information needed to choose between land management systems. This is the conclusion of a new study in Brazil that evaluated three different indexes of soil quality based on three sets of indicators.

**In order to ensure [farming](#) is sustainable**, there is a growing need to measure the impacts of [land use](#) and management practices on [soil](#) quality. A wide range of indicators exist to assess soil quality, but there is no universal set to inform effective management decisions.

A soil quality index combines indicators into one value by prioritising (or weighting) them according to their importance in the context, for example, the type of crop or environmental factors will influence the weighting.

The study evaluated three indexes of soil quality in terms of their ability to discriminate between three regional rice management systems in the Camaquã Rio Grande do Sul state of Brazil. This is an area where rice farmers are concerned about the decrease in soil quality as a result of changes in land management.

The three management systems were: 1.) Conventional: tillage takes place just before sowing, when the soil is not flooded; 2.) Pre-germinated: fields are flooded before the conventional tillage operations start. Tillage takes place and pre-germinated seeds are used; 3.) No tillage: the soil preparation is done around two months before sowing, when the soil is not flooded. Conventional management (1) is the system used most in the area.

The researchers took samples of soil from 21 rice fields that varied with management practice and soil texture, i.e. the percentage of clay in the soil. The physical, chemical and biological properties were measured to give values for the indicators which were then used to calculate the three soil quality indexes. The researchers evaluated three indexes, based on 29, 8 and 4 indicators.

Statistically, none of the indexes could differentiate between the three management systems. However, all three indexes did show similar trends in their ratings soil quality. All three indexes indicated that the highest soil quality was present in the management system where soil preparation was done around two months before sowing (3). The indexes also identified similar trends when analyzing soil texture. For example, all three indexes identified the most visible differences between management systems for the soil texture that contained 40 to 60% clay, suggesting that the quality of this type of soil is more susceptible to influences from the chosen management system.

The study shows that, although they can not statistically differentiate between the management systems, the indexes can provide useful information on the different levels of soil quality. Importantly, this information can be provided by any of the three indexes. As such, the researchers suggest that indexes based on fewer indicators (and those most meaningful to farmers) can discriminate soil quality between management systems just as well as those based on a large number of indicators. Although a larger number of indicators may sometimes provide a more accurate picture of soil quality, a smaller indicator set may be just as useful and more feasible for informing management decisions.



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