The use of pedometric measurements to enhance and improve the presentation of soil information from soil maps

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Abstract
Several simple pedometric measures are used to compare the effectiveness of different map legends. These were the normalized soil properties and the pedological distance between different map units and the colour distance between different map units from published maps. The conclusions from the pedometric measurements were checked against a questionnaire of users of soil information. The measures do indicate which legends are more effective in presenting soil information but as always much depends on the requirements of the end user. The normalized soil values were also shown to be a potentially useful tool for presenting soil information in reports.

Key Words
Soil map legends, pedometric distance, soil information.

Introduction

The presentation of soil maps requires the development of map legends, the choice of soil colours for soil mapping units and the presentation of complex information and data. The presentation of soils information in soil maps and reports is often the interface between soil scientists and the clients or audience to which the soil information is directed. The success of communicating the soil information can depend on the types of legends, colour scheme and style of reports developed. There is scope to use the measurement and methodologies developed within pedometrics to provide some objectives measures of the efficiency and effectiveness of the legends, colour schemes and data and information presentation styles used in soil mapping. There is also scope to apply pedometrics to the traditional soil mapping methodologies. This paper explores briefly some of these possibilities.

Some pedometric measures of different legend and colour schemes for soil maps

The Nyngan and Forbes 1:250 000 Soil Landscape Maps from Central West New South Wales are depicted using two legend - colour schemes. Both these systems have been used to present soil map information to the community. These are:

a. The soil mapping units are coloured according to their recent and current landforming processes or conditions (eg residual, erosional, transferral, colluvial, alluvial, stagnant alluvial, estuarine). This is essentially a one dimensional system in which the geomorphological processes influencing the soil parent material are considered. These range from in-situ, through colluvial to alluvial and then any special geomophological proceses such as aeolian, estuarine or swamp processes are included. This was termed the Processes System
b. The major soil types based on parent material (geological structure, granites, basalts, riverine – alluvium, metasediments etc). This is a two dimensional system in which the geomorphological processes above are considered, but also the nature of the parent material is also taken into account. Essentially the key factor considered for the nature of the parent material is the silicon and ferromagnesium mineral content (basic – siliceous spectrum). This is not explicitly identified, but is inherently taken into account in the use of the geological structure and geological formations associated with the soil map units. This was termed the GeoGroup System.

The following steps were then taken.

1. The mathematical distance between the colours depicting the soil map units on the map sheet were then calculated using the Colosol Program (Viscarra Rossel 2006).
2. The similarity distance between the map units based on the pedological distance as calculated using the methodology outlined in (Carre and Jacobson 2008). This calculates the distance based on the normalised soil properties of the soils in the map units.
3. These were then plotted on a graph using the values for the above parameters. For convenience this was termed the map colour space (MCS).
4. An independent evaluation was undertaken of the usability and value of the two maps was made by soils

and land management advisory officers of the two sets of coloured maps.
The results for this study were reported in Murphy *et al.* (2009)

Conclusion

The use of pedometric measures has enabled some objective assessments of the types of legends and colour schemes soil mapping. This is a very important aspect of presenting soil information as this is often the entry point for many users of soil information. The form of the legend and the colours of the mapping units on soil maps have a large influence on the potential utility and the capacity of targeted users to gain useful information. An important conclusion may be that a series of soil maps should be made available in PDF format to cater for different levels of experience, knowledge and very importantly the problem of those who are colour blind.

Presenting summaries of soil data

One option to enhance the presentation of data is to use normalized soil values across arrange of soil landscapes. This enables soil data from a range of soil properties to be presented on the one graph. As can be seen in Figure 1, whether soil landscapes have high or low values for particular soil properties becomes immediately obvious. This is often lost in the more complex presentation of large quantities of soil data that accompanies the presentation of soil data in general reports. For example, in this case the low pH values of the surface soils of the sand dunes (KKdun), the high lime content and pH of the gilgai unit (BBgpu) and the high sodicity of the of the Bulbodney flow line unit (BBflo) are clearly evident. Such analyses and graphic can be used at the broader scale.

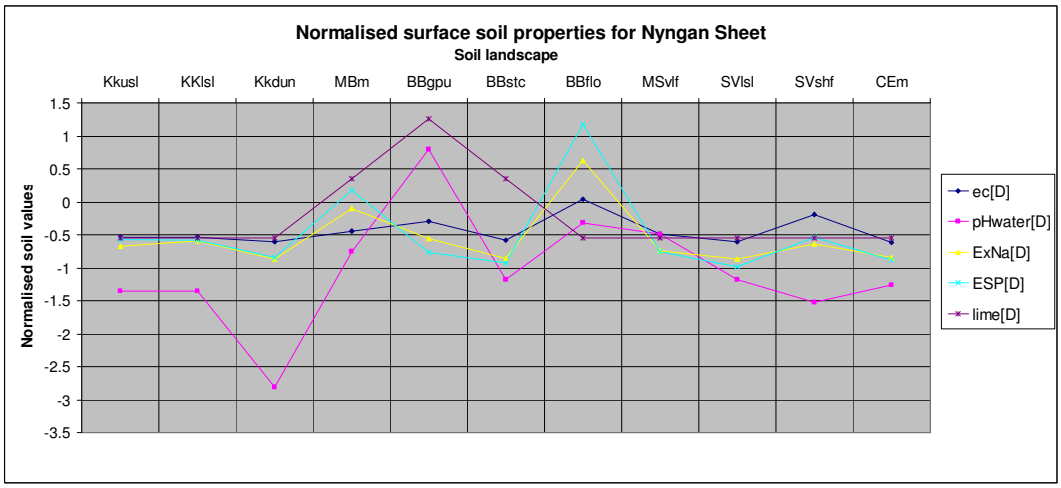

Figure 1. Normalised values for some soil properties in the Nyngan Soil Landscape Map.

Conclusion

The use of pedometric methods and measures can be used to enhance the presentation of soil information in maps and reports. Critically it can be used to make objective measurements of the effectiveness of different legends and mapping systems. It can also be used to develop improved and better methods for presenting complex soil data to make it more easily interpreted by users of soil information. However, there is a danger that pedometric methods can also make presentation of data more complex and difficult to understand.

References

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