Using monoliths to communicate soil information

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Abstract
Soil monoliths, often used as teaching aids in universities, are of interest to a wider audience if accompanied by a suitable explanatory display. Monoliths can be prepared with space for the display adjoining the profile. Site and land use information, and the significance of the profile or particular features in it are important when displayed in a museum to the general public. Monoliths have been a valuable component of extension programs and training courses for landholders and natural resource management authorities. Compared to soil pits, monoliths cannot display some physical properties, but when grouped together, important differences and similarities in profile features are more easily recognised.

Key Words
Monolith, extension, education, soil profile, display.

Introduction
Mounted soil profiles or monoliths have been made for over 100 years (Vanderford 1897). In Australia monoliths have generally been used as teaching aids for soil courses at universities. In rural areas extension workers with farmer groups often use freshly excavated pits. In New South Wales (NSW) the state agricultural department has also used large undisturbed soil cores to minimize the area disturbed by excavation. These cores are especially useful when several profiles are needed (Figure 1). The cores can then be transported to a central location once securely wrapped.

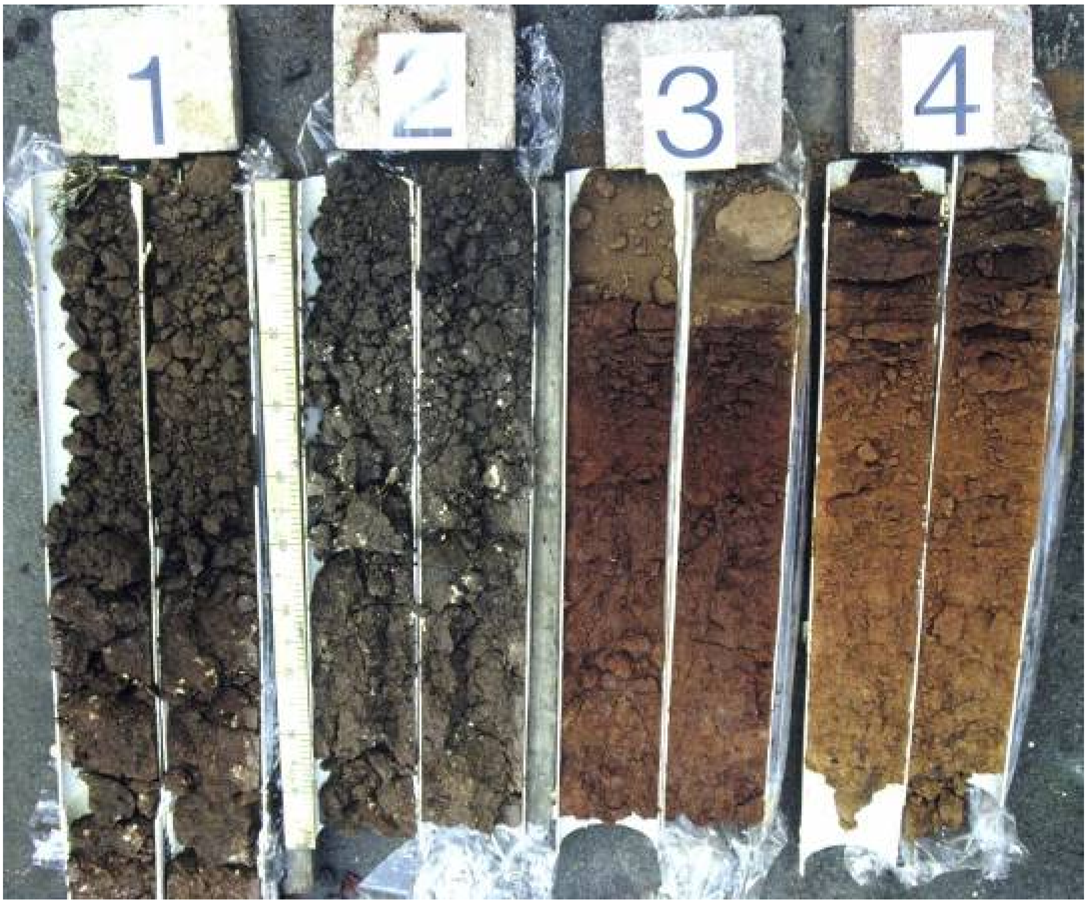

Figure 1. Freshly split soil cores (150mm diameter) from different areas around a large feedlot in central west NSW. This photograph was used as evidence in a case before the NSW Land and Environment Court. (Photo: L Turton).

Like most soil pits, the large cores can seldom be used more than once. To meet the demand from soil extension programs for repeated use of representative profiles from across regions, a technique for making monoliths from large cores was developed (Haddad *el al*., 2009). Over a hundred monoliths from across NSW have been prepared over the last ten years using a wide range of soils, from structureless loose sandy soils to dense cracking clays. The cores used are generally 90-100cm long. In challenging sites where there is rock at shallow depth for example, the top of the weathered bedrock is normally retrieved intact because it usually contains plant roots.

The monoliths have been prepared in order to
- display soils from experimental sites, agricultural colleges and research stations
- raise awareness of soil features that are critically important for management
- represent the range of soils present in a particular district or region
- display soil properties that are likely to affect water quality
- form part of a training course, for example for local government employees

Figure 2. An example of a freshly prepared monolith lacking accompanying soil information. This monolith which has a buried A horizon (due to erosion upslope) needs the accompanying information and interpretation to draw attention to this critical detail and explain its significance (photo: L. Turton).

Method:
Each completed monolith weighs around 10kg and is mounted onto a board 1.3m long, allowing it to be transported on the back seat or in the boot of most cars. The 150mm wide profile is positioned to one side of the board (300mm wide) towards the bottom (Figure 2). This leaves space at the top of the board for a title and site photo, and at the side for a description of the major profile features. There is also room for information on site features and land use. A sub-heading outlining the significance of the profile is often added below the title. This is the place where the viewer finds information on why the soil is important enough to be made into a monolith. The main title can be a taxonomic or local name depending on the intended audience for the monolith and the objectives of the project.

Some monoliths, especially those made earlier, carried a full taxonomic title, with a detailed technical description and major chemical properties in the side text. This is important for a scientific audience, who expect to see information presented as for example in a conference poster paper. Later, batches of monoliths were accompanied by non-technical text, generally after consultation with potential users who were often experienced extension workers. Technical information could be made available either in an accompanying leaflet or sometimes printed on removable labels that could be swapped with the simpler ones, depending on the audience. The accompanying leaflets can also form part of the information package for an extension program or training course (Figure 3). When displayed the monoliths are often mounted in pairs using small folding portable stands (Figure 4) similar to artists easels. Occasionally a special display board, the same size and shape of a monolith, is used for additional explanatory information (Figure 5).

Results
The level of public interest in environmental and natural resource issues in Australia has increased substantially during the last decade or so. From the outset soil monoliths have proved very popular as an extension tool. On public display, even when viewed through a transparent perspex cover, they attract considerable attention. For example in 2002 a monolith of an acid sulfate soil was loaned to Sydney's Powerhouse Museum initially for a period of three years. This loan agreement has subsequently been renewed twice. Monoliths have also been on temporary display to large audiences at major agricultural shows and field days.

Figure 3. An example of two accompanying leaflets prepared using non technical text. The profile on the right is the same as in Figure 2. The profile on the left is 200m upslope on the same grazing property near Taree in Eastern NSW. These leaflets were made for an extension program for landholders in the district.

Figure 4. Monoliths with transparent covers displayed on portable folding stands.

Figure 5 (right). A monolith paired with a special display board (photos by L. Turton).

A permanent monolith display has been commissioned by some clients, including two local government authorities from the NSW coast (i.e. acid sulfate soils), a university (soils used for fly ash research), a winery (the main soil from the vineyard) and a major environmental consultancy (typical soils of eastern Australia). Other clients who have commissioned them to use as an extension tool or for training purposes have been a catchment management authority, an agricultural college, two universities and a large organic waste recycling site. Most of the monoliths collected for the state agricultural authority in NSW are used for these purposes. For smaller audiences (i.e. with twenty people or less) the perspex cover is generally removed and the users can inspect the profile features up close. Under supervision viewers can see biological features like fine plant roots, and abandoned insect burrows and worm channels. Where present other features such as small pieces of charcoal, fine lime and sesquioxide concretions can also be pointed out by the presenter. Occasionally monoliths have been exhibited at the opening of new buildings, at the launch of new research and extension projects, and even as part of the selection process when interviewing prospective new soil scientists. The accompanying leaflets have been aggregated into a useful resource; particularly by the agricultural college (see Tocal web reference). This is adding to the growing amount of pictorial, publicly available web based soils information (e.g. Imhof *et al*. 2008).

Conclusion

Monoliths made from large undisturbed cores are more versatile than pits, but there are some disadvantages that need to be recognised, along with the benefits (see table 1)

Table 1. Some advantages and disadvantages of soil monolith displays

Advantages	Disadvantages
• portable • can be used many times • comparisons between profiles are simple • can be grouped or arranged around a particular theme • can be viewed indoors • suitable for large groups • can be on display over long periods	• do not provide a 'hands on' experience • cannot be manipulated or examined in detail • soil physical properties such as variation in soil moisture content, shear strength, consistence or presence of hardpans can not be demonstrated • extent of biological activity can be difficult to assess • large soil structural features apparent in pits may not be displayed. • the profile displayed in the monolith is usually separated from its natural setting.

The value of the monolith in communicating soil information increases when the text and display accompanying the profile suit the intended audience. The accompanying text can be used, and amplified, to meet the need of extension programs that aim to improve soil management.

References

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