At the second workshop held on July 18-19 participants from State and Commonwealth agencies agreed that the project would focus on developing a 1990 regional scale baseline of woody vegetation in Australia's agricultural areas and quantifying the changes that had taken place in the period 1990-1995. These changes would include:

- areal extent and location of change in woody vegetation due to clearing or on farm tree planting
- the type of vegetation cleared
- the replacement vegetation

This information, together with soil carbon data and above ground biomass estimates for the continent being compiled by the Bureau of Resource Sciences and other ancillary data sets will be used to establish the contribution that agricultural land cover change makes to greenhouse gas emissions over the period 1990-1995.

The 1990 and 1995 digital data sets and associated land cover database for the agricultural regions of the continent, plus the change statements will be published on a CD-ROM. A series of journal papers will be prepared for publication, describing the project's methodology and results, and the implications of the extent of land cover change detected for Australia's greenhouse gas emissions.

Other issues discussed at the July workshop included data ownership, custodianship and exchange arrangements, data purchasing and licensing arrangements, change detection methods and interagency coordination arrangements. Workshop participants noted that a number of agencies within their States were likely to hold remote sensing or ancillary data of great value to the project, or be interested in accessing the TM data being purchased or contributing to the project in some way. It was agreed that where more than one agency could be expected to have an interest in the project, the State would establish a coordinating committee to ensure that all these interests were taken into account.

A Working Group has been established to advise on detailed project specifications. These will build on the output specifications developed as part of the Murray-Darling Basin Commission's Basincare project, and will be tested in a series of pilot projects to be undertaken by State agencies. The Working Group will meet in early September. They would like to hear from people working on land cover change detection not previously contacted.

For further information about the project, contact Michele Barson.

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Field description and classification of hardsetting soil horizons

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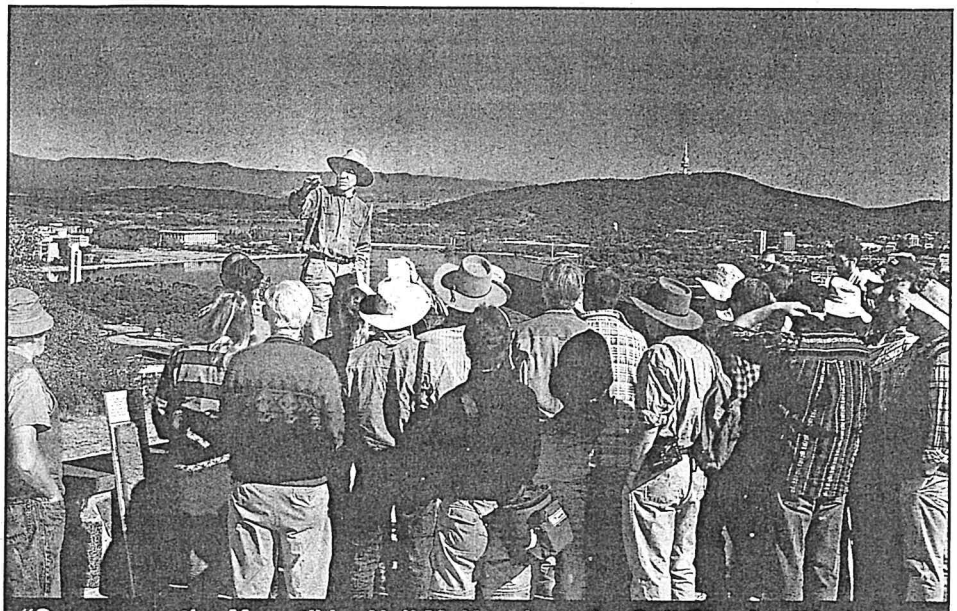
We suggest the criteria for the field description of hardsetting soil horizons be modified in the next edition of the Australian Soil and Land Survey Handbook - Field Handbook (McDonald et al. 1990).

The condition of dry surface soil is often described in soil surveys, as this is considered relevant to soil management. Such a surface condition is hardsetting, which may be related to a host of factors such as seedling emergence, tilth (Mullins et al. 1990) and wind erodibility (Harper and Gilkes 1994). The current definition of hardsetting is in part a "compact, hard, apparently apedal condition which forms on drying, but softens on wetting. When dry, the



"Sermon on the Mount" by Neil McKenzie at the Soil Physics Workshop.

material is hard ... and is not disturbed or indented by pressure of the forefinger".(McDonald and Isbell 1990).

The field expression of hardsetting is continuous, presumably as a consequence of the interaction of a number of continuous soil properties. We have recently reported such relationships between hardsetting and soil texture and organic carbon contents (Harper and Gilkes 1994). The hardsetting definition of McDonald and Isbell (1990), and those of Northcote (1979) and Chartres and Mullins (1994), however, essentially treats hardsetting as a discrete state. Northcote (1979), for example, related hardsetting to a critical penetrometer resistance, although this approach was not continued in subsequent Australian field manuals (McDonald and Isbell 1990). A recent definition of hardsetting (Chartres and Mullins 1994), also suggests a critical tensile strength value (90 kN m^{-2}). In an earlier plea for consistency in description, Aylmore and Sills (1982), note that the term "hardsetting" has been applied to soils with strength values which differ by orders of magnitude.

Hardsetting is a prominent attribute in the classification of duplex soils (Northcote 1979). As hardsetting is absent in moist soils, such soils cannot be classified in the field according to such systems. Consequently, the moisture content of all soils classified as hardsetting in the Western Australian soil profile database (Peluso et al. 1993) were examined. Of 816 soils, 69% were dry when examined, 11% moderately moist, 18% moist and 2% were wet (definitions of McDonald and Isbell 1990). As soil surveys occur in all seasons, and an aim of field classification schemes is to classify on the basis of observations rather than inference (Butler 1980), the practicality of using hardsetting in soil classification schemes must be questioned (Harper and Gilkes 1994). Indeed, hardsetting is not used in the proposed new Australian soil classification system[1].

The importance of hardsetting for soil management will vary with the magnitude of its expression. Thus if hardsetting is to be described in the field, and used as an indicator for modified soil management, better definition of its field expression is required. We do not, however, advocate the implementation of laboratory analysis to measure hardsetting, but rather the use of objective field assessment. Such an approach is consistent with both the traditional reliance on field observations by Australian soil surveyors, and the ability of land-users to make their own observations and base their management decisions on these (Hunt and Gilkes 1992). To do this, objective class boundaries have to be defined, and we suggest that these already exist with the discrete intervals in soil strength used in the description of dry consistence (Butler 1955; McDonald and Isbell 1990). The field description of hardsetting, using these strength classes, may therefore provide an adequate compromise. These would be accompanied by a notation that hardsetting only occurs in dry soils.

References

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australian collaborative
aclep
land evaluation program

newsletter

Volume Number 4/3

September 1995

From the Editor...

This issue provides a summary of ACLEP's activities and achievements. We are pleased with the progress that has been made over the past two and half years. We gratefully acknowledge our project collaborators and their agencies who give freely of their time and resources to help make it all happen. We also gratefully acknowledge funding from the National Landcare Program (DPIE) and CSIRO Division of Soils.

Included in this issue is a "P.S. to the forested land evaluation" issue by Trevor Booth demonstrating that broad scale environment information is being used to provide synoptic predictions. Michele Barson outlines a Commonwealth-State project which aims to estimate land cover change across Australia. Richard Harper contributes to of revision of the Australian Soil and Land Survey Field Handbook by suggesting modifications to the criteria used to define hardsetting.

In the next newsletter we will consider the role of land resource assessment in salinity management. There has been a great deal of activity in salinity mapping and management over the past decade. LWRRDC is funding research in five focus-catchments to facilitate a coordinated development of salinity assessment and management. A major issue will be extension of findings from these catchment to other areas - good quality land resource survey will have to form an essential part of this process.

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