The $$ cost of losing soil fertility

Soil test reports as a regular feature of farm sales? Research suggests it might be a good idea, giving new owners a truer idea of the financial viability of their purchase.

In a landmark pilot study, scientists from CSIRO Land and Water together with NSW Land and Water Conservation investigated how soil degradation affects the value of agricultural land.

The project was supported by growers through the GRDC, the Land and Water Resources Research and Development Corporation and the National Australia Bank.

It arose from concerns that the state of the soil on agricultural land was not

being factored into land prices. "This could mean that a farmer finds the land's productivity is not sufficient to provide a reasonable income and repay the loan used to buy the property," said project leader Anthony Ringrose- Voase.

The scientists looked for relationships between paddock productivity and soil

properties. Some 80 paddocks were selected near Wagga Wagga, representing the

major agricultural soil- landscape types in that region.

They collected samples of topsoil and subsoil and sent them for commercial testing. Farmers' records were used to estimate paddock gross margin over the four years prior to sampling, which was used as a measure of productivity. They statistically compared the productivity of each paddock to the soil test results, making allowance for differences in growing season rainfall. /B>

Productivity indicators differ

This work showed the best soil indicators of productivity were different in different parts of the landscape.

The hillslope soil- landscape type is representative of the slopes of the hills to the south of Wagga Wagga. The soils are shallow and used mainly for pasture. In this area the best soil indicators are topsoil exchangeable aluminium per cent (EAP), which increases with soil acidity, and organic carbon.

"In general, one can expect productivity to decrease by roughly $11.90/ha/year for every 1 per cent increase in EAP. Similarly, productivity decreases by about $11.60/ha/year for each 0.1 per cent decrease in organic carbon," said Dr Ringrose- Voase. He added that the figures are indicative rather than precise because of the small number of samples used in the pilot project. /B>

What does it mean for land value?

"The crux of the matter was adjusting the capital value of land to allow for the condition of the soil indicators. We did this by estimating the value of lost (or gained) production over the term of the loan. We assumed an interest rate of 12 per cent over 15 years.

"The $11.90/ha/year for EAP mentioned earlier translates to a decrease in land value of about $81/ha. A prudent buyer might consider deducting this amount from the market price for average land of this type. Similarly, the decrease in capital value for a 0.1 per cent decrease in organic carbon is $79/ha. (See table this page; 0.1 per cent is a sizable loss of organic carbon, the total of which is rarely higher than about 2 per cent in Australian soils - Ed.)

Dr Ringrose- Voase said the good news is that if a soil indicator is better than average, productivity and capital value will increase. /B>

Other soil landscape types

Footslopes are typically found downslope of the areas described earlier. They have deeper soils and lower slopes than the hillslopes and have slightly more cropping. Here the scientists found the only workable soil indicator was topsoil-available phosphorus. Each 1 part per million (ppm) decrease in phosphorus decreases productivity by $2.80/ha/year, which translates into a decrease in capital value of $19/ha.

The plateau soil- landscape type has red and red-brown earths and includes some of the most productive cropping land around Wagga Wagga. The soil indicators here are topsoil organic carbon and subsoil-available phosphorus. A 0.1 per cent decrease in organic carbon decreases productivity by $23/ha/year and decreases capital value by $150/ha. Corresponding decreases for each 1 ppm decrease in subsoil phosphorus are $25/ha/year and $170/ha.

The alluvial soil- landscape type is divided into two. In the heavy clay plains along the Murrumbidgee and west of The Rock, the scientists could find no useful soil indicators. In the alluvial soils along narrower valleys, the effective cation exchange capacity (eCEC) of the subsoil was the best soil indicator.

The eCEC indicator is closely related to clay content and in this situation probably indicates where clay subsoil occurs nearer the surface, leading to greater incidence of waterlogging. Productivity decreases by $29/ha/year and capital value by $200/ha for each 1 meq/100 g increase in eCEC. (meq is the abbreviation for milliequivalent. Growers may have seen this on their soil test results.)

Effects of indicator soil attributes for each soil-landscape type on annual productivity and capital value

Soil-landscape type Soil indicator (& depth measured) Average value (& range of values) Change in productivity for each unit change in indicator ($ per hectare per year) Corresponding change in capital value ($ per hectare)
Hillslopes
Exchangeable aluminium % (0-10 cm)
5.2% (1-32)
$12 decrease
$81 decrease
Organic carbon (0-10 cm)
1.3% (0.9-2.6)
$120 increase
$790 increase
Footslopes
Available phosphorus (0-10 cm)
26 ppm (11-54)
$2.90 increase

$19 increase

Plateau

Organic carbon (0-10 cm)

1.2% (0.9-1.9)

$230 increase

$1500 increase

Available phosphorus (20-30 cm)

6.6 ppm (2.5-13)

$25 increase

$170 increase

Alluvial- clay plains

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Alluvial - narrow valleys

Effective cation exchange capacity (20-30 cm)

4.2 meq/100g (2.4-12)

$29 decrease

$200 decrease

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Contact: Dr Anthony
Ringrose- Voase 02 6246 5956
Email: **anthony.ringrosevoase@cbr.clw.csiro.au**

http://www.grdc.com.au/growers/gc/gc21/p1b.html