3-1-1979

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Use of Soil Maps in Indiana’s Farmland Reassessment

Joseph E. Yahner, Agronomy Department, Purdue University

Soil maps are playing an important role in Indiana’s agricultural land reassessment program now underway. Both modern detailed county soil surveys and county general soil maps are being used. By an act of the Indiana General Assembly (House Enrolled Act No. 1174, 1973), these maps are to serve as a guide “in establishing the true cash value of agricultural land.”

This publication deals with how soil maps are being used in reassessment activities. Discussed are: the past difficulties in arriving at equitable land assessment figures; the value of soil maps in standardizing assessments; the soil rating system that permits use of soil maps; Indiana’s statewide assessment procedure and examples of how it works; and the types of valuation adjustments that are possible.

EQUALIZATION—AN OLD ASSESSMENT PROBLEM

Farmland assessment and property tax equalization have been ‘hot’ issues in Indiana and other midwestern states in recent years. Landowners want to be treated equally. Therefore, dissatisfaction arises when one land parcel is not assessed on the same basis as a neighboring parcel. Further complaints are heard when farmers owning land in more than one township or county discover large variations in the valuation given similar land because different assessment methods were used.

Equalization is the process that attempts to assure all individual landowners of being treated equitably. This is a basic aim of any assessment.

Tax assessments are equalized at two levels—(1) between land parcels within a county, and (2) between counties. Detailed soil surveys, because they are prepared using a uniform classification system, serve as a basis for equalization of agricultural land at the first level. Once assessment of within-county farm parcels are equalized, it is much easier to equalize at the second level (across county lines). County general soil maps are also suited to this process.

VALUE OF USING SOIL MAPS IN LAND ASSESSMENT

A prime reason for differences in farmland values is soil productivity, or the ability of land to produce crops. Too often in the past, assessment of land value has been done by the ‘eye-ball’ method. That is, land value was established by simply observing the quality or appearance of the crop growing on it.

Following this method, two farmers with the same soil might well have their lands rated differently. If one farmer planted earlier and used more fertilizer, his land would likely be given a higher value than his neighbor’s, which had a shorter, less green-looking crop—even though a soil map showed the same soils.

Since their basic productive potential was similar, these lands should be given the same value. Assessment by soil map removes from the valuation process differences caused by management choices and, thus, does not penalize a farmer (through his property tax) for employing good management practices.

Soil maps also permit more equitable assessment because the soil classification system used in mapping soils is applied uniformly across the state. For example, Miami silt loam has the same physical properties and profile (surface soil, subsoil and parent material) no matter where it is mapped. Therefore, Miami silt loam of the same slope and erosion class should have the same potential productivity wherever it occurs. This means that farms in different areas can be rated on the same basis.
SOIL 'YIELD RATINGS'—
THE BASIS FOR VALUATION

In order to use soil maps for reassessment, each soil unit mapped in Indiana must be given a productivity rating. This rating is based on the soil's physical properties, such as slope, parent material, moisture-holding capacity, amount of surface soil remaining, rooting depth, natural drainage class and other properties.

From research plot data, farmers' records and accumulated knowledge of Indiana's soils, scientists from the USDA Soil Conservation Service and Purdue University's Agronomy Department have developed a number of rating systems. Some are based on corn yield; others on all crops, including pasture and forest.

The rating system selected by the Indiana Land Advisory Committee and the State Board of Tax Commissioners for agricultural land reassessment is estimated corn yields. These yield estimates are for an 'average management level' and are meant to reflect corn yields obtained over a number of years, in order to even out the effect of varying weather and other seasonal influences.1

It is important to remember that, for equitable rating of farmland, the absolute yield value used is not as important as ensuring that Indiana's soils are rated correctly relative to one another. If the relative yield ratings are correct, then the relative ratings of farmland parcels will be the same, regardless of the absolute yield values used.

ASSESSMENT PROCEDURE BEING USED

Here is a brief explanation of the process being used in Indiana's agricultural land reassessment program:

1. Two features of a parcel of land must first be identified—(a) the kind of soil in the parcel (from either a detailed soil survey or a soil association map), and (b) the parcel's land-type class.

2. Each detailed soil map unit or soil association has been assigned an estimated per-acre corn yield value. (A list of these yields is available from your county assessor.) The estimated yield translates into a yield factor (estimated yield ÷ 100) and is applied to a base rate of $450, which is the prescribed true cash value of an acre of land capable of producing 100 bushels of corn.2 This base rate multiplied by the yield factor gives an adjusted rate, which is a per-acre value based on the productive potential of the soil.

For instance, for a soil map unit or soil association rated at 125 bushels per acre, the value would be $450 (base rate) x 1.25 (yield factor) = $562.50 per acre. For a map unit or association rated at 60 bushels, the value would be $450 x 0.6 = $270 per acre. The lowest estimated corn yield applied to any soil is 47 bushels per acre.

3. The adjusted rate is next multiplied by the number of acres in the parcel of land to give what is termed the extended value.

4. The parcel's value is then further modified according to a land-type classification. The particular classes being used for farmland assessment and their modifiers (called influence factors) are as follows:
   • Open, tillable land—less than 18 percent slope and capable of annual row-cropping or small grain production (100% of the extended value).
   • Open, non-tillage land—exceeds 18 percent slope or not usually row-cropped continuously (60% less than the extended value).
   • Wood or wasteland—not cleared of trees or brush and, thus, not suitable for cultivation, or a portion of land not being used and not capable of being used economically (80% less than extended value).

5. Multiplying the land's extended value by the appropriate land-type or influence factor provides the true cash value. Assessed valuation is one-third of that cash value figure.

ESTIMATING YOUR LAND'S
ASSESSED VALUE

A farmer who wishes to estimate the land portion of his farm assessment has the tools at hand to do so—his county's published detailed soil survey or general soil map (AY-50 series), available at local Cooperative Extension Service or Soil Conservation Service offices. Which map to use, if there is a choice, is explained in the following paragraphs. As mentioned earlier, a list of yield factors for soil map units or soil associations can be obtained from the county assessor.

1 The estimated corn yield ratings being used for reassessment are about 15 percent lower than the estimates shown in the interpretive tables of the county general soil maps. The general map yields were intended to represent those achieved by the upper 20 percent of corn producers; whereas the yields used in reassessment are meant to represent those resulting from average management and prevailing average fertilizer rates. Comparative studies show that these yields approach the 10-year average of corn yields reported by the USDA Statistical Reporting Service.

2 These figures and some of the examples given in this publication are from the Indiana Appraisal Manual, State Board of Tax Commissioners, 1976.
Example for Counties Using Detailed Soil Surveys

Counties having detailed soil surveys published between 1958 and September 1976 are using them for soil identification. These maps were produced at a scale which shows the individual soils of an area of land. A 160-acre tract might have from two to six or more such soil map units.

Therefore, to find the total cash value of the entire tract: (1) the number of acres of each map unit must be identified and multiplied by its yield factor, base rate and influence factor; then (2) the products of each unit added together. Variations from one parcel to another will be reflected in the values obtained.

Figure 1 shows the land value calculations on a property record card for a sample 160-acre tract. One of the map units is 2 acres of Crosby soil (CrA) (yield factor, .89) presently in woods (influence factor, -80%). Its cash value is determined as follows:

<table>
<thead>
<tr>
<th>Base rate</th>
<th>Yield</th>
<th>Adj rate</th>
<th>No. acres</th>
<th>Extended value</th>
<th>Influence factor</th>
<th>True cash value</th>
</tr>
</thead>
<tbody>
<tr>
<td>$450 x</td>
<td>.89</td>
<td>$401</td>
<td>2</td>
<td>$802</td>
<td>.2(-80%)</td>
<td>$160</td>
</tr>
</tbody>
</table>

Each soil-land type combination is calculated in like fashion and their cash values summed. The assessed valuation is then one-third of that total ($76,900 in Figure 1 + 3 = $25,633).

Example for Counties Using General Soil Maps

General soil association maps are being used for reassessment in counties not having modern detailed soil surveys published before September 1976. The reason is to allow for consistent use of soil ratings across the state, which further assists in the statewide equalization process.

The general soil map’s small scale (a county is printed on one side of a 17” x 11” sheet of paper) does not allow for locating individual detailed soil map units. A parcel of land is, therefore, rated according to the estimated corn yield for the soil association in the area where the parcel falls. Estimated corn yield for each soil association is based on the average of the yield estimates for each different soil type in that association.

Admittedly, use of a county general soil map presents difficulties in terms of individual farm valuation. For instance, a soil association composed of both level soils (higher estimated yields) and sloping soils (lower estimated yields) was ascribed a corn yield rating according to the proportions of these soils averaged over the entire area occupied by the association.

But chances are, an individual farm has higher or lower proportions of different soils compared with the association average—a discrepancy not accounted for using general soil maps. Therefore, counties using these maps have some possibilities for adjustments to valuation resulting from greater-than-average areas of sloping soils (see next section).

Although problems do exist in the use of general soil maps, their valuation figures should compare reasonably well with those from detailed soil surveys. And certainly, they provide for more equitable assessment than the ‘eye-ball’ method.

The procedure for valuing a farm tract using a county general soil map is similar to that using the detailed soil survey. Figure 2 shows the record card calculations for the same 160-acre tract as in Figure 1. One specific parcel is 6 acres of open, non-tillable land (influence factor, -60%), which the general map shows to be in an area identified as Soil Association No. 66, Fincastle-Ragsdale association (yield factor, 1.12). Just as for detailed soil map units, the true value is calculated as follows:

<table>
<thead>
<tr>
<th>Base rate</th>
<th>Yield</th>
<th>Adj rate</th>
<th>No. acres</th>
<th>Extended value</th>
<th>Influence factor</th>
<th>True cash value</th>
</tr>
</thead>
<tbody>
<tr>
<td>$450 x</td>
<td>1.12</td>
<td>$504</td>
<td>6</td>
<td>$3024</td>
<td>.4(-60%)</td>
<td>$1210</td>
</tr>
</tbody>
</table>

Again, total value of the 160-acre tract is the sum of each parcel that differs in soil association and/or land-type class. Assessed valuation of the Figure 2 example is $24,983 ($74,950 ÷ 3). Notice how close these valuation figures are to those derived using the detailed soil survey. This will often be the case, with the actual tax difference insignificant.

POTENTIAL ADJUSTMENTS TO VALUATION

The question of adjustments should be taken up individually with county assessors. Adjustments for excessive slopes are possible for counties using general soil maps. Adjustments can also be made for open, tillable land having permanent or uncontrollable hazards—e.g., (1) a bottomland soil, normally high-yield rated, that floods often enough to prevent agricultural operations; or (2) a depressional soil, again normally given a high-yield rating, that is undrainable due to lack of an outlet.
<table>
<thead>
<tr>
<th>LAND TYPE</th>
<th>ACTUAL FRONTAGE</th>
<th>EFFECTIVE FRONTAGE</th>
<th>EFFECTIVE DEPTH</th>
<th>DEPTH FACTOR</th>
<th>BASE RATE</th>
<th>ADJUSTED RATE</th>
<th>EXTENDED VALUE</th>
<th>INFLUENCE FACTOR</th>
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SOIL ID ACREAGE FACTOR
4 Ba 90 1.23 450 554 498.60 74900
4 CrA 60 .89 450 401 210.60
5 Ba 40 1.23 450 554 221.6
5 CrA 20 .89 450 401 802
6 Ba 10 1.23 450 554 554
6 CrA 20 .89 450 401 802

TOTAL ACREAGE 140
TOTAL TRUE CASH LAND VALUE 74900

Figure 1. Example of land value calculations using detailed soil survey map data.

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SOIL ID ACREAGE FACTOR
4 60 80 1.12 450 604 14352
4 60 60 .99 450 494 16760
5 60 60 1.12 450 504 1024
6 60 40 .99 450 494 1339
4 60 40 1.12 450 504 1008

TOTAL ACREAGE 140
TOTAL TRUE CASH LAND VALUE 74950

Figure 2. Example of land value calculations using general soil map data.

One particular advantage for those in counties using the detailed soil survey is that problems like the above can be noted at the time a farm is visited by the assessor. This would reduce trips to the assessor's office or requests for appeals.

Land valuation data, like that shown in Figures 1 and 2, now appear on your property records, which you may inspect. Since recording and calculating errors are possible, don't hesitate to check the data on your property cards. Also know that, while you may seek a downward adjustment in land valuation, there is no requirement for an upward adjustment of land 'better' than the soil association average.

SUMMARY
Indiana is following an innovative path in using soil maps for agricultural land reassessment. Any assessment system is subject to some criticism, especially where a single parcel is concerned. However, the use of soil maps provides numerous advantages over the earlier, more subjective methods. In addition, a farmer can easily check his reassessment since soil maps are readily available.

Completion of modern detailed soil surveys for all of Indiana's 92 counties will one day eliminate the necessity of using general soil maps for individual parcel valuation. Fuller assurance of equitable reassessment is the greatest advantage that the soil survey can provide.

Detailed soil surveys, county general soil maps and other useful information on the characteristics of soils may be obtained through your local Cooperative Extension Service or Soil Conservation Service offices.