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Patterns of agricultural land use have traditionally taken on special significance for public programs which deal with water quality, soil and water conservation, real property taxation, and institutional arrangements for enhancing farm viability and maintaining farmland in its current use. The effectiveness of such programs is conditioned, to an important degree, by the availability of research-quality data on agricultural uses of land. Recent technological developments for measuring and storing land-based information provide new avenues for accurate and cost-effective analysis of land utilization on farms.

The purpose of this paper is to discuss our efforts to develop a computer-resident land information database for a sample of commercial farms in New York. Our study grew out of a 1987 survey of electric energy use by Upstate New York agriculture. A subset of the survey respondents identified their farm boundaries on photo-based soils maps. A microcomputer-based coordinate digitizer was used to analyze these maps and develop spatially referenced acreage estimates for each farm. The estimates control for soil mapping unit, tenure, and land cover. These results were linked to survey information on energy use, production of agricultural commodities, farm structure, and recent capital outlays for the farm

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business. As our study progresses, computer-resident secondary data from published soil surveys, the 1982 National Resources Inventory, weather stations, and property tax rolls will also be merged to create an integrated information system for land use research.

The paper is organized into three sections. The first section outlines the techniques devised to assemble the information system. The second highlights our results and provides an illustration of the system's application. The final section describes planned economic analysis using the database. Discussion of these topics is prefaced by a section which highlights earlier efforts to incorporate land use information into policy analysis in New York.

BACKGROUND

The information system discussed in this paper is an extension of work conducted in the Department of Agricultural Economics since the 1920s. As a guide for policymakers during the Great Depression, Cornell researchers devised procedures for arranging actively farmed land into classes which were thought to discriminate according to suitability for long-term agricultural use. Using counties as units of study, evaluations of soil quality, prevailing patterns of land use, topography, elevation, and size and condition of farm buildings were utilized in the classification work (see, for example, Keepper). Empirical results from studies of this kind were used to guide both public and private decisions on land use in rural New York during the years when the farm sector was plagued by low incomes, property tax delinquency and rapid technological change (Salter).

Such land classification efforts continued and even intensified after World War II. Rural land was released from agricultural use on a wide scale during the 1950s and 1960s and, as before, policymakers needed information on relationships between land resources and the viability of New York agriculture. The classification work evolved into an appraisal of "income expectancy" and culminated with the publication of a map showing the "economic viability of farming areas" (State of New York, Office of Planning Coordination). This map arranged the State's land base into classes based on its prospects for continued agricultural use, assuming farming is not precluded by future urban expansion.

Nearly 20 years have elapsed since this classification work was completed, but virtually all of the forces which made the effort relevant to public policy remain. These include urban expansion into farming areas, structural adjustments due to changing demand/supply relationships in national (and international) commodity markets, and abrupt rates of technological development in the production of food and fiber commodities. As in years past, information which links commercial agriculture to the State's land base is a prerequisite for definitive analysis of rural policy issues.

APPROACH

Our current efforts to develop land-based information systems can be divided into four components: (1) designing and selecting a farm sample, (2) identifying the geographic location of farm boundaries, (3) transforming farm maps into computer-ready data files, and (4) merging with farm survey information and background data. Each of these components is discussed below.

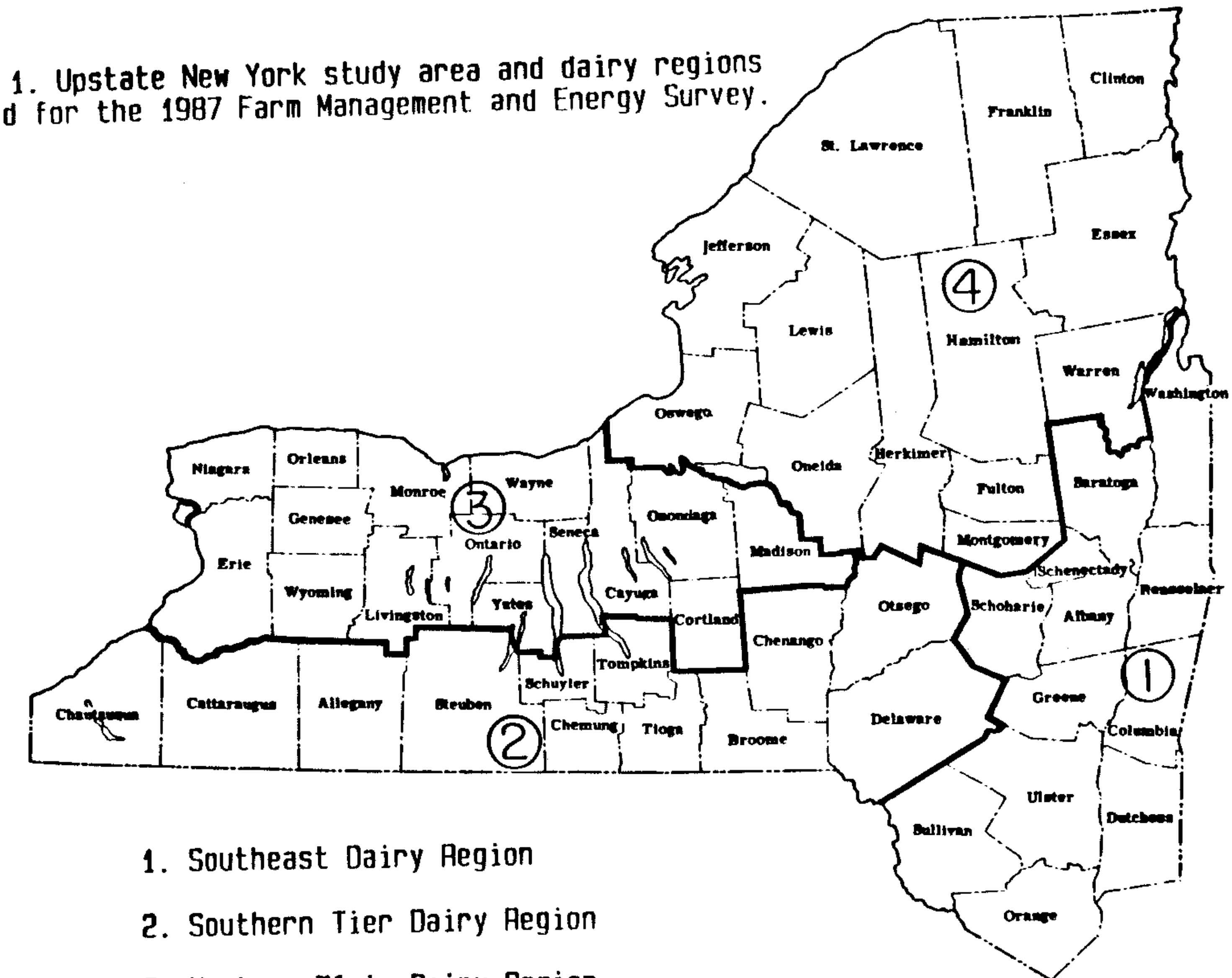
Design and Selection of the Farm Sample

Cornell University and the New York Agricultural Statistics Service (NYASS) conducted the 1987 Farm Management and Energy Survey to assemble new data on agricultural production, farm structure, and electrical energy use. The survey is part of the research project "Future Directions for the Upstate New York Agricultural Economy with Special Reference to the Potential for Electrical Energy Conservation", conducted by the Departments of Agricultural Economics and Agricultural Engineering. The project is funded by the Niagara Mohawk Power Corporation.

The survey was focused on Upstate New York farms with $10,000 or more of gross agricultural receipts during the 1986 calendar year (Kelleher and Bills). This farm universe excludes many small, part-time farms and farms located on Long Island and suburban New York City (figure 1). A disproportionate stratified random sample was designed with strata based on type of farm enterprise, gross receipts, and geographic regions for dairy producers. A sample of 1800 farm operations were selected from a list frame maintained by NYASS (table 1).

Due to time and resource limitations, a subsample of 602 farm operations were chosen for the farm boundary mapping exercise. Criteria for selecting the subsample were based on type of farm, availability of modern or photo-based soil survey information, and proximity to one of New York's larger core cities. Horticultural and vegetable producers were eliminated from the subsample because land used for these products is often influenced by special physical circumstances, e.g., availability of organic muck soils for vegetables. Also, product mix on these specialty farms is extremely variable, which compounds the difficulties associated with making generalizations about farm profitability and investment. Fortunately, these types of farms are relatively rare occurrences and account for less than 5 percent of the land in farms with $10,000 or more in gross receipts (U.S. Department of Commerce).

Figure 1. Upstate New York study area and dairy regions selected for the 1987 Farm Management and Energy Survey.



1. Southeast Dairy Region
2. Southern Tier Dairy Region
3. Western Plain Dairy Region
4. Northern Dairy Region

Table 1. Stratified random sample design for the 1987 farm management and energy survey

				Number of farms sampled
1.	Poultry	a.	$10,000-$99,999	21
		b.	$100,000-$249,999	18
		c.	$250,000+	26
2.	Vegetable	a.	$10,000-$99,999	25
		b.	$100,000-$249,999	40
		c.	$250,000+	105
3.	Grapes	a.	$10,000-$99,999	37
		b.	$100,000+	23
4.	Tree fruit	a.	$10,000-$99,999	25
		b.	$100,000+	35
5.	Horticulture	a.	$10,000-$99,999	25
		b.	$100,000+	30
6.	Dairy	a.	$10,000-$99,999	
			i. Eastern	45
			ii. Southern Tier	75
			iii. Western Plains	55
			iv. Northern	72
		b.	$100,000-$249,999	
			i. Eastern	85
			ii. Southern Tier	160
			iii. Western Plains	140
			iv. Northern	200
		c.	$250,000-$499,999	
			i. Eastern	48
			ii. Southern Tier	50
			iii. Western Plains	80
			iv. Northern	55
		d.	$500,000+	95
7.	Other livestock	a.	$10,000-$99,999	50
		b.	$100,000-$249,999	32
		c.	$250,000+	8
8.	Other crops	a.	$10,000-$99,999	45
		b.	$100,000-$249,999	33
		c.	$250,000+	12
9.	Miscellaneous	a.	$10,000-$99,999	45
		b.	$100,000+	5
Total				1,800

The sample design was further constrained by the absence of modern soil survey information. To date, modern soil surveys containing photo-based soils maps have been published in only 30 of the 54 Upstate New York counties. Obtaining aerial photographs for those areas not covered by modern photo-based soil surveys was considered. However, difficulties with photo availability, matching outdated soils information to aerial photographs, and photo expense required us to limit the scope of the study to the 30 counties with published modern soil surveys. The most notable limitation of this approach was the exclusion of most counties in the Northern New York dairy region (see figure 1).

The final consideration in subsample selection was proximity to a core city with a population of 50,000 or more. Definitions of Standard Metropolitan Statistical Areas (SMSAs) were used to classify farm operations according to their location in urban, urban fringe, or rural counties (table 2). Urban counties are SMSA counties which contain a core city with a population of 50,000 or more; fringe counties are adjacent SMSA counties; rural counties are non-SMSA counties. An attempt was made to select 200 farms from each of the three SMSA categories. However, the number of farms in the larger sample which were located in urban or urban fringe counties was limited. The final composition of the subsample was 149 urban, 207 urban fringe, and 246 rural farm operations.

Identifying Farm Boundaries

NYASS enumerators worked with farm operators to identify and draw the farm boundaries on a photo-based soil map sheet. The farm's location on a map sheet was determined by referring to the map sheet index. Then, the boundaries for all parcels of land owned and/or rented by the survey

Table 2. Upstate New York counties with modern photo-based soil surveys, by SMSA proximity to a large core city

Urban	Urban fringe	Rural
Broome	Herkimer	Cayuga
Chemung	Madison	Chenango
Erie	Montgomery	Franklin
Monroe	Orleans	Genesee
Niagara	Oswego	Lewis
Onondaga	Wayne	Ontario
Schenectady		Orange
		Schoharie
		Schuyler
		Steuben
		Tompkins
		Ulster
		Washington
		Wyoming
		Yates

respondent were drawn on the map and assigned the farm's survey number. Colored pencils were used to differentiate land parcels according to tenure. Tenure categories were land owned and operated, land owned and rented to others, and land rented from others.

Transformation of Farm Maps into Computer-Ready Data Files

Areas of maps have historically been measured using dot grids, weight proportion, transects, or planimeters. Recent technological developments have made available microcomputer-based coordinate digitizers for more precise measurement of land areas. The computer-based system eliminates the need for manual entry of the land areas into data files and allows each sample unit to be spatially referenced to a standard coordinate system.

The Cornell Laboratory of Environmental Applications of Remote Sensing (CLEARS) used the farm maps to provide area estimates of farm acreage, controlling for soil mapping unit, tenure, and land cover for the farm. ERDAS software/hardware, supported at CLEARS for work on geographic information systems and image processing, was used to process the farm data. The ERDAS system incorporates a number of software/hardware packages to input, manipulate, store, and analyze map or image data. Map data are represented using grid cells, or pixels, having a value which corresponds to a map class. The map class, e.g., soil mapping unit or land class, is spatially referenced to a specified coordinate system.

A standard procedure was developed and used in this study: (1) catalog each map parcel by survey identification number; (2) photocopy and mosaic each soil map sheet so all parcels of a farm appear on one sheet; (3) delineate on the map sheet the land use classes (cropland, orchard/vineyard, and other); (4) register the map sheet on the coordinate digitizer and establish arbitrary reference grid based on published map scale;[1] (5) digitize land parcels falling in each tenure category; (6) create GIS files by gridding polygon files; (7) produce summary files; and (8) output ASCII data files of land area estimates.

Merges with Survey Information and Soils Data

Two different types of data files were developed to allow a merge of the mapped land area estimates with the enumerative survey results. The first was a DBaseIII file structure for microcomputer analysis. This data file was used to compare mapped area estimates with estimates provided by the survey respondent. Any deviations between the two estimates were identified, and any problems from data input or processing were corrected.

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[1] Photo-based soil surveys for New York counties have been published intermittently since 1956. The standard latitude/longitude reference system is not precise on most of the soil surveys. Further, even fewer of the soil surveys have been rectified for curvature of the earth. The decision was made, due to time and resource limitations, to use an arbitrary coordinate system at present. Three to five control points were digitized for each farm to allow for rectification and spatial referencing to a standard coordinate system at a later date.

After these checks for data consistency were completed, the microcomputer data files were uploaded to an IBM4381 mainframe computer. This allowed us to overcome size limits imposed by the microcomputer and interface with data files which contain the farm survey results. The two data sets were quickly merged using the farm identification number common to both.

Manipulating the information system in a mainframe environment also sets the stage for merging existing computer-ready data. This task is just beginning at this writing. To help complete the illustration in the next section, land areas of each soil mapping unit were grouped according to the Land Capability Classes, as defined by the USDA's Soil Conservation Service. This classification discriminates among soils based on the severity of hazards encountered in crop production. Production hazards considered include erosion, wetness, and stoniness. These classes are used, for the purposes of this paper, as a rough indicator of the productivity of a farm's soil resource in field crop production. We intend to refine these relationships as our research progresses by incorporating agronomic data on expected crop yield into the information system.

EMPIRICAL RESULTS

During April and May 1987, NYASS enumerators contacted 1800 farm operators. As part of the survey, 602 farm operators were asked to identify their farm boundaries on photo-based soils maps. Approximately 275 farm operators provided both survey data and mapped information to the enumerator. Upon further review, 13 of these records were not usable due to operational problems with the farm maps, leaving data for 262 farms available for analysis.

Farms with Mapped Boundaries

The principal thrust of our research is to relate the structure of commercial agricultural production to New York's land base. As expected, the subsample of mapped farms is not completely representative of the larger farm population. On average, the farms we mapped were somewhat larger and more profitable than the typical Upstate New York farm (table 3). Farms in the subsample operated an average of 501 acres of farmland, and reported a net cash farm income of $24,700, compared to an Upstate average of 388 acres and $19,800 net cash farm income. Investments made in 1985 and 1986, total assets, and total debts are larger on average for the sample of mapped farms.

Table 3. Size characteristics of Upstate New York farms and mapped farms, 1986

Item	Mapped farms	Upstate New York farms
	- - - Acres - - -	
Farmland operated	501	388
Cropland operated	356	246
	- - - Dollars - - -	
Net cash farm income	24,700	19,800
Farm investment, 1985	17,300	9,800
Farm investment, 1986	19,800	11,600
Total assets	566,000	449,000
Total debt	157,000	86,000

Source: 1987 Farm Management and Energy Survey.

The size discrepancy may at first appear to reflect some bias in the mapped farm data. However, the differences are primarily the result of using unweighted mapped farm data. Weights based on the probability of a farm being sampled were incorporated into the 1987 Farm Management and Energy Survey to make population estimates because the sample was designed to select a disproportionately large number of rare occurrence farms (e.g., large farms). Acreages reported on mapped farms with unweighted data are reasonably comparable. However, applying sample weights to the mapped farms is inappropriate unless one intends to provide soil mapping unit acreage estimates for the target population. This objective could not be achieved in this study due to the operational problems encountered in acquiring photo-based soils maps for all Upstate counties.

Farm operators' estimates of farmland and cropland acreage were compared to the digitized estimates from the mapped areas (table 4). On average, the farmland and cropland estimates from each source were reasonably close, with differences ranging from 1 percent for operated cropland to 12 percent for owned cropland. However, there were large, but often offsetting, discrepancies in acreage estimates on individual farms. Discrepancies of this sort probably are due to a number of reporting and recording errors. Farm operators may have left out parcels, or may have misplaced boundaries on the soil maps. Another source of error for the digitized cropland estimates was that most photos were dated -- vintages ranged from 1955 to 1978 -- and land use has changed in many areas during that time.

Table 4. Operator and mapped area estimates of farm acreage

Item	Survey response	Mapped area
	- - - Acres - - -	
Farmland owned	322	314
Farmland operated	501	462
Cropland owned	201	226
Cropland operated	356	353

Source: 1987 Farm Management and Energy Survey.

When operational, our system will permit new analysis of the interplay between New York's commercial agriculture and the land resource base. To illustrate, 91 farms from six counties were examined to determine the configuration of land operated in relation to soil quality, as reflected by USDA-defined Land Capability Classes. Soil mapping units for each farm were allocated to Land Capability Classes (table 5). Differences in the distributions of Land Capability Classes discriminate among soils based on the severity of hazards encountered in crop use (Klingebiel and Montgomery). Differences in soil quality, in turn, are thought to affect farm productivity and investment decisions. Under the USDA classification, class I soils are rated as the best for agriculture, with few restrictions for crop use. Class II, III, and IV soils have increasingly severe limitations for crop use; classes V and VI have severe limitations which usually restrict their use to pasture or woodland; classes VII and VIII have extreme limitations, restricting their use largely to woodland and wildlife use (U.S. Department of Agriculture, 1971).

Table 5. Percentage distribution of land in 91 farms by county and Land Capability Class

County	Land Capability Class						
	I	II	III	IV	V	VI	VII-VIII
			- - - Percent - - -				
Broome	5	13	46	28	2	6	1
Cayuga	0	57	18	17	1	6	1
Chenango	2	29	34	12	3	9	11
Erie	1	36	52	7	2	1	1
Genesee	3	28	29	34	0	5	1
Madison	3	21	10	8	21	19	18
All	2	29	30	13	8	10	8

Source: 1987 Farm Management and Energy Survey.

A soil quality index was devised using a weighted average of the acreage falling in each Land Capability Class. An index value of 1 is calculated for a farm with 100 percent Class I soil, and an index value of 7 is calculated for a farm with all soils in Classes VII-VIII. Then, the 91 farms were arranged according to this index to allow comparisons of average farm size, net cash farm income, investment expenditures, and debt/asset ratios (table 6).

Table 6. Selected characteristics of 91 farms by soil quality index

Item	Soil Quality Index[a] 1-2.75	2.75-3.75	3.75+
Farmland operated (acres)	461	481	419
Cropland operated (acres)	381	312	258
Net cash farm income ($)	30,500	21,700	29,300
Farm investment, 1985 ($)	14,100	20,700	10,200
Farm investment, 1986 ($)	14,500	15,100	9,400
Total assets ($)	626,000	487,000	461,000
Total debt ($)	101,000	124,000	127,000
Debt/asset ratio	.16	.25	.27

[a] The Soil Quality Index is defined as the weighted average of acres of each Land Capability Class.

$$\text{Soil Quality Index} = \frac{(\text{Class I}*1) + (\text{Class II}*2\ ) + \ldots + (\text{Class VII}*7)}{\text{Class I} + \text{Class II} + \ \ldots + \text{Class VII}}$$

where Class I refers to the acres of land operated in Land Capability Class I, and similarly for Classes II-VI. Class VII refers to the acres of land operated in Land Capability Classes VII and VIII. A value of 1 would indicate a farm with all operated land of Class I soils, or an index of 7 would indicate a farm with all operated land of Class VII or VIII soils.

Source: 1987 Farm Management and Energy Survey.

Interestingly, these preliminary calculations seem to contradict the conventional wisdom, and show that average net cash farm income is approximately the same on farms with the poorest soil resources as those with the best soil resources ($29,300 and $30,500, respectively). Further, farms with the poorest soils generate that income from fewer acres, 419 acres compared to a 461 acre average for farms with the best soils. Farms in the middle index group (index 2.75-3.75), have the lowest net cash farm income at $21,700, but are the largest farms on average. Farms with the lowest quality index have the highest debt/asset ratio with debts at 27 percent of total assets. Investment made by the middle soil quality group were the largest for both 1985 and 1986. The poor-soil farms invested the least with $10,200 in 1985 and $9,400 in 1986.

The soil quality index does discriminate among farms based upon crop selection and crop yield. For example, corn grain was grown by approximately 60 percent of the farms but average acreage and yields of corn grain decreased across the soil quality index (table 7). Farms with higher quality soils averaged 181 acres and 93 bushels per acre of corn grain. In contrast, farms with the poorest soils reported 61 acres and 65 bushels of corn grain. The pattern of corn silage production was different from corn grain. Average acres reported were similar for all soil quality index groups. Average yields decreased from 18 tons per acre on high quality soils to 13 tons per acre for the poorest soils group. As soil quality decreased, there was an increase (60 to 97 percent) in the frequency of farms harvesting corn silage.

Value of owned real estate and price paid for land rented were also examined by soil quality index. The value of real estate followed an expected pattern; the highest quality group reported an average of $958 per acre of owned real estate (table 8). The mid quality group averaged $921 per acre, and the farms with the poorest soil resources reported average real estate values of $739 per acre. Eighty-six percent of the farms with the poorest quality soils rented land; they rented an average of 105 acres. In contrast, only 70 percent of the farms in the high quality group rent land, but they rent 318 acres on average. The price paid for rented land was highest for the farms with the best soil quality.

Table 7. Corn grain and corn silage acreage and yields by soil quality index

	Soil quality index		
	1-2.75	2.75-3.75	3.75+
Corn grain			
Percent of farms	65	57	60
Cropland (acres)	181	115	61
Yield (bushels)	93	93	65
Corn silage			
Percent of farms	60	80	97
Cropland (acres)	57	66	56
Yield (tons)	18	15	13

Source: 1987 Farm Management and Energy Survey.

Table 8. Value of real estate and rent paid by soil quality index

	Soil quality index		
	1-2.75	2.75-3.75	3.75+
Owned land			
Value of real estate ($/acre)	$958	$921	$739
Rented land			
Percent of farms	70	79	86
Farmland (acres)	318	209	105
Rent paid ($/acre)	$26	$16	$19

Source: 1987 Farm Management and Energy Survey.

Relationships between soil quality and production variables can also be illustrated with correlation analysis. Corn grain yield and acreage, total asset value per acre, real estate assets per acre, rented acreage, cropland operated, total farm expenses, and corn silage yield were all found to be correlated with the soil quality index, with a 90 percent confidence level (table 9). The acreage of farmland owned and net cash farm income were found not to be significantly correlated with the soil quality index.

The 91 farms were also disaggregated according to their status as Standard Metropolitan Statistical Areas (SMSAs). SMSA counties containing a city with a population of 50,000 or more are designated as urban, while adjacent SMSA counties are designated urban fringe; non-SMSA counties are rural counties for the purpose of this illustration. Based on this categorization of urban status, farms situated in rural counties operated the largest acreage, were less profitable, but have recently made relatively large investments in the farm business when compared to farms in urban or urban fringe counties (table 10). Farms in urban counties had the highest net cash farm income ($33,700), followed by those in urban fringe and rural counties (with $27,000 and $14,700, respectively). This result does not contradict the widely held view that agricultural land is used more intensively in more urban settings. This relationship is also reflected in the per acre value of total assets.[2] Farms in urban and urban fringe counties have similar values at $1,170 and $1,160 per acre operated. This contrasts with the farms in rural counties with an average value of $970 per acre operated. The value of total assets per acre of farmland owned is slightly

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[2] The value of land rented in is not included in the calculation of total assets per acre.

Table 9. Correlation coefficients of selected characteristics and soil quality index

	Correlation coefficient	P value
Corn grain yield	-.354[a]	.01
Total assets per acre	-.315	.004
Corn grain acreage	-.285	.04
Real estate assets per acre	-.273	.01
Rented acreage	-.271	.02
Corn silage yield	-.226	.06
Cropland operated	-.207	.05
Gross receipts	-.137	.19
Total expenses	-.195	.08
Corn silage acreage	-.089	.45
Farmland owned	.079	.45
Net cash farm income	.000	.99

[a] Because the soil quality variable was defined as high quality soils having a low number, a negative sign on the correlation coefficient indicates that as soil quality increases, corn grain yield, or any other variable, increases.

Source: 1987 Farm Management and Energy Survey.

Table 10. Selected characteristics of 91 farms in metropolitan and non-metropolitan counties

	SMSA		Non-SMSA
	Urban	Urban fringe	Rural
Farmland operated (acres)	436	417	528
Cropland operated (acres)	271	271	394
Gross receipts ($)	206,000	130,000	162,000
Net cash farm income ($)	33,700	27,000	14,700
Farm investment, 1985 ($)	14,500	11,000	23,400
Farm investment, 1986 ($)	13,700	13,600	11,800
Total assets ($)	509,000	483,000	514,000
Total debt ($)	84,000	138,000	149,000
Total assets per acre ($)	1,170	1,160	970
Soil index (1-7)	3.0	4.6	3.2
Milk cows (number)	80	73	59

Source: 1987 Farm Management and Energy Survey.

different. Farms in urban counties were valued at $1,770 per acre, as compared to $1,560 per acre for farms in urban fringe and rural counties.

The soil quality index, based on Land Capability Classes, produced some interesting results. Differences in the index seem uncorrelated with other reported profitability and farm size, but are correlated with productivity measures. Urban fringe farms with relatively poor soils compare favorably with urban farms in terms of acreage, net cash farm income, milk cows, farm investment, and total assets. These results will be refined as our research progresses, but may well point out the need to investigate whether the management practices or other economic factors often override or offset the effects of soil quality on farm profitability and productivity.

DISCUSSION

This paper deals with a continuing effort to develop a computer-resident land information system for commercial farms in New York. The system will be used for a variety of educational purposes, including applied research on relationships between land resources and the structure of the State's farm sector. To date, we have focused on techniques for integrating data from a probability-based sample survey, digitized soil maps, soil productivity indices, and published soil surveys.

The system described in this paper is flexible, however, and can be adopted to more expansive analyses of public policy issues related to agricultural uses of rural land. To extend this research, we are developing data systems which can be used to study the effects of livestock concentrations and cropping systems on surface water and groundwater quality. In addition, we are assembling the map overlays required to investigate property tax liabilities and enrollment in agricultural districts.

To facilitate water quality analyses, the digitized data on soil mapping units will be merged with on-line information compiled from published soil surveys. These data bases can be cross-referenced by soil mapping unit. Then, management practices on the sample farms can be associated with soil parameters which influence erosion potential and nutrient movement to waterbodies. Contrasts can be made between farms of varying size and type; calculations of nutrient loads attributable to applications of commercial fertilizers and disposal of livestock wastes can be made to capture interfarm variability in cropping systems, crop yields, livestock concentrations, and methods used to handle livestock manure.

Identifying farm boundaries on local tax and agricultural district maps opens up new research on relations between farm structure and institutional arrangements for maintaining farmland in its current use. Ongoing work deals with the New York Agricultural District Law and its provisions for property tax preferences to owners of agricultural land. Map overlays show farms that are located within or outside the boundaries of an agricultural district. Econometric models will be used to examine the social, economic and institutional factors which influence voluntary decisions to enroll agricultural land in the district program. Another study deals with comparisons of alternate techniques to grant farmland owners a property tax preference. Preferences currently granted via use-value exemptions on farmland under New York law are being compared with simulations of a Michigan program which would link total property tax bills to a landowner's total annual income.

Preliminary results from our experiment with a computerized land information system appear to be promising. However, further efforts to design and implement such work on a more comprehensive scale depend almost entirely upon factors which are outside the control of the research analyst. Efforts of this sort are severely hampered by the availability of modern, photo-based soils information. Modern surveys have been published for only a fraction of all New York counties. It is also important for soils information to be digitized and rectified to facilitate comprehensive and cost-effective analysis.

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