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# Using Land Evaluation and Site Assessment (LESA) for Farmland Protection Planning: A Case Study

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# Using Land Evaluation and Site Assessment (LESA) for Farmland Protection Planning: A Case Study

**Abstract**
The Land Evaluation and Site Assessment (LESA) system was used in developing a farmland protection plan that identified and described land use variables and agricultural operations associated with development. Using automated property tax data, a baseline model was established that identified field crops, vacant lands, truck cropland, and population as variables positively associated with development, whereas fruit crops had a negative association. Variables associated with development were lowest in profit per acre, whereas fruit crops were higher in profit. LESA and the model provided an objective and innovative approach to identify and recommend agricultural lands for farmland protection planning and implementation efforts.

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## Introduction

As in many of the urban areas of the nation, New York State agricultural land is under pressure from expanding urban development (Stashenko, 1993). Most of this development results in farms being converted to non-agricultural uses or being prematurely retired from production. While population growth has slowed in western New York, a projected modest increase in the rural communities will continue to put farmland under development pressure (Genesee/Finger Lakes Regional Planning Council, 1997).

New York State provides protection of agricultural lands by authorizing the preparation of agricultural and farmland protection plans and providing a grant program for their development at the county level (New York State Department of Agriculture and Markets, 1992, 1997). Generally, the goal is to identify and protect agricultural lands and assist municipal governments in implementing protection policies and programs.

To assist in such efforts, the Land Evaluation and Site Assessment (LESA) system was developed by the U.S. Department of Agriculture: Natural Resource and Conservation Service (USDA:NRCS). The Farmland Protection Policy Act of 1981 requires federal agencies to use LESA to minimize federal program contribution to unnecessary and irreversible farmland conversion as well as encourage compatibility with state, local, and private farmland protection efforts.

Federal farmland protection programs are required to use LESA when considering agricultural lands that have been recommended by municipalities (village, town, county, state) for funding purposes (USDA, 2001). However, New York State municipalities are not required to use LESA when identifying and recommending agricultural lands. Consequently, the use of LESA by municipalities may be desirable to ensure an objective approach when funding protection efforts.

LESA evaluates and assesses agricultural land and its viability for farming. Land evaluation (LE) involves rating and grouping soils for an agricultural use, while site assessment (SA) variables measure agricultural productivity, development pressure and compatible land uses. Both LE and SA variables are usually represented by numeric ratings and added together to derive an overall

score (Pease & Coughlin, 1996).

Many of the variables in this study are identified in the LESA Guidebook (Pease & Coughlin, 1996). Other variables may be used depending on the local availability of data or data that better represents local conditions. Hence, population and income were considered because these are well-documented economic variables that influence the demand for agricultural land (Samuelson, 1980; Tomek & Robinson, 1990).

## Purpose

The purpose of the study reported here was to develop a countywide farmland protection plan to:

1. Identify and describe land use variables associated with development,
2. Identify agricultural operations associated with development, and
3. Establish a baseline model describing agricultural lands associated with development.

## Methodology

The Monroe County Real Property Services Department provided automated data from 19 towns (municipalities) that had agricultural land. Data was organized and stored using a Geographic Information System. Only data that was readily available and updated was used in order to establish a baseline for trend analysis. Consequently, only site assessment data was available and collected by town (municipality) which included variables associated with agricultural productivity, such as assessed value and the type of agricultural commodity (field crop, truck crop, vegetable, orchard and small fruit, livestock, vacant). Site assessment factors measuring development pressure included the frequency and location of shopping centers and industrial operations, number of parcels served by sewer, the number of roads and interchanges, and single family building permits.

The variable "property class code changes" was identified as a dependent variable in order to assess the level of development pressure on agricultural parcels within a town. This dependent variable was measured as a frequency by town and indicated a land use change within a given year (1997). A change in a parcel's primary use prompts a town assessor to report "a class code change." Only class code changes involving a developed use (residential, commercial, industrial) were considered.

Data was organized, verified and analyzed using basic descriptive statistics and econometrics ($p \leq .05$ level). The computer software EViews was used in analysis.

## Discussion and Results

Table 1 indicates an ordinal ranking of 19 towns by agricultural acreage and type of agriculture (vacant, fruit, truck, etc.). The municipality with the largest acreage is Hamlin, with 14,925 acres. The towns of Riga, Wheatland, and Parma range from approximately 13,600 acres to 10,600 acres, respectively. The towns of Rush, Ogden, Chili, Mendon, Clarkson, and Penfield range from 3,100 to 1,500 acres. The town of Brighton has 384 acres, while Gates has 29 acres, and Irondequoit has approximately 8 acres.

Table 1 indicates that most of the agricultural vacant land is in the towns of Riga, Hamlin, Ogden, and Mendon (from 8,500 to 5,200), while Rush, Chili, Wheatland, Perinton, Penfield, and Parma range from 4,700 to 1,400 acres. Orchard and fruit crops are located in the northernmost region of the county and run west to east. The towns of Hamlin, Parma, Greece, Penfield, Clarkson, Ogden, and Sweden range from about 1,200 acres to 160 acres. Truck crops are in the towns of Clarkson, Parma, Greece, and Sweden, and range from 1,400 acres to 540 acres, respectively.

**Table 1**
Municipalities Ranked by Agricultural Parcel Acreage

| Municipality | No. of Ag. Parcels | Ag. Parcel Acreage | Orchard (Acres) | Field Crops (Acres) | Ag. Vacant Land (Acres) | Truck Crops (Acres) |
|---|---|---|---|---|---|---|
| Hamlin | 207 | 14,925.09 | 1,211.89 | 6,567.9 | 5,415.08 | 0 |
| Riga | 218 | 13,629.01 | 0 | 3,232.92 | 8,534.30 | 0 |
| Wheatland | 157 | 11,942.08 | 0 | 8,503.29 | 3,059.29 | 0 |
| Parma | 189 | 10,577.94 | 918.77 | 4,753.75 | 1,391.41 | 650.31 |
| Rush | 116 | 9,166.73 | 0 | 3,801.34 | 4,781.29 | 121.50 |
| Ogden | 176 | 8,388.38 | 271.95 | 2,405.31 | 5,312.97 | 0 |
| Chili | 134 | 8,380.93 | 0 | 3,661.48 | 3,781.99 | 28.13 |
| Mendon | 144 | 8,257.69 | 0 | 2,380.88 | 5,221.51 | 0 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Clarkson | 68 | 5,342.71 | 279.92 | 2,261.76 | 354.25 | 1,406.54 |
| Penfield | 117 | 5,134.93 | 315.77 | 2,583.10 | 1,728.62 | 177.71 |
| Sweden | 53 | 3,671.16 | 161.70 | 2,086.21 | 785.91 | 540.54 |
| Pittsford | 56 | 2,627.41 | 0 | 1,992.37 | 168.51 | 71.4 |
| Henrietta | 49 | 2,607.45 | 0 | 2,344.33 | 112.34 | 0 |
| Greece | 74 | 2,591.36 | 652.35 | 784.26 | 269.61 | 600.14 |
| Perinton | 52 | 2,452.18 | 23.21 | 96.93 | 1,959.25 | 0 |
| Webster | 30 | 1,537.88 | 0 | 870.85 | 507.91 | 0 |
| Brighton | 17 | 384.02 | 0 | 0 | 169.06 | 0 |
| Gates | 5 | 28.98 | 0 | 0 | 0 | 0 |
| Irondequoit | 2 | 7.60 | 0 | 0 | 0 | 0 |
| Rochester | 0 | 0 | 0 | 0 | 0 | 0 |
| East Rochester | 0 | 0 | 0 | 0 | 0 | 0 |
| Total | 1,864 | 111,653.54 | 3,835.56 | 48,326.57 | 43,553.30 | 3,596.27 |

Table 2 indicates acreage in industrial, shopping centers, and sewered areas. Industrial parcels occupy 8,909 acres and are located in 10 towns. Industrial acreage is primarily located with the majority of the county's population. Shopping center parcels occupy 706.23 acres in the county and reside within eight towns. Seven of these towns are in the central part of the county and account for most of the county's population. Areas served by public sanitary sewer are primarily located in the central and eastern portion of the county, with scattered service areas in the southern and western parts of the county. All but one town has public sanitary sewers.

**Table 2**

Acreage by Municipality of Selected Site Assessment Factors Measuring Development Pressure

| Municipality | Regional Shopping Centers | Area/Neighborhood Shopping Centers | Industrial Operations | Sanitary Sewers |
|---|---|---|---|---|
| Brighton | 0 | 53.81 | 45.43 | 7,136.74 |
| Chili | 0 | 33.83 | 404.04 | 7,042.52 |
| Clarkson | 0 | 0 | 5.17 | 2,270.61 |
| East Rochester | 0 | 24.46 | 78.12 | 649.46 |
| Gates | 58.88 | 96.48 | 851.11 | 8,376.53 |
| Greece | 298.55 | 170.68 | 860.41 | 15,845.00 |
| Hamlin | 0 | 5.45 | 45.02 | 1,792.18 |
| Henrietta | 175.74 | 88.08 | 391.19 | 12,855.58 |
| Irondequoit | 99.72 | 89.60 | 5.22 | 8,009.01 |
| Mendon | 0 | 15.90 | 375.45 | 1,656.03 |
| Ogden | 0 | 15.55 | 443.15 | 1,660.94 |
| Parma | 0 | 2.10 | 441.81 | 1,965.70 |
| Penfield | 0 | 102.67 | 350.77 | 5,479.10 |
| Perinton | 23.4 | 31.14 | 441.95 | 10,031.49 |
| Pittsford | 39.5 | 29.26 | 153.89 | 6,546.65 |
| Riga | 0 | 0.50 | 18.30 | 667.56 |
| Rochester | 10.44 | 72.42 | 1,726.31 | 15,650.43 |
| Rush | 0 | 0 | 216.30 | 0 |
| Sweden | 0 | 94.84 | 374.07 | 2,533.19 |
| Webster | 0 | 11.06 | 1,268.58 | 12,794.72 |
| Wheatland | 0 | 20.45 | 413.10 | 551.36 |
| County Total | 706.23 | 958.28 | 8,909.40 | 123,514.80 |

Table 3 provides detail as to the 4,383 property class code changes that occurred throughout the county, as well as population, population change, and average median income statistics. Of the total number of class code changes countywide, approximately 46% were to vacant land, 42% were to residential, 5.7% were to commercial, 3.5% were to agricultural, and the rest of the changes were either to recreation and entertainment, industrial, community services, public

services wild forested conservation lands, and public parks.

Although the greatest number of class code changes countywide occurred in the vacant land class, in 11 out of the 21 towns, there were more class code changes in the residential class. In these 11 towns, changes to vacant land were second. The reverse was true for nine towns.

The 1990 population of Monroe County was 713,968 and primarily resided in the central part of the county. Average median incomes ranged from $71,600 in Pittsford to $36,800 in East Rochester.

**Table 3**
Municipalities Ranked by Number of Parcels Experiencing a Property Class Code Change

| Municipality | Freq. of Property Class Code Changes | Population | % Population Change 1980-1990 | Average Median Income |
|---|---|---|---|---|
| Perinton | 738 | 43,105 | 12.2% | $55,598 |
| Rochester | 653 | 231,636 | -4.2 | 25,166 |
| Greece | 387 | 90,106 | 10.7 | 43,906 |
| Henrietta | 341 | 36,376 | .7 | 44,050 |
| Penfield | 329 | 30,219 | 11.1 | 49,978 |
| Webster | 255 | 31,639 | 9.4 | 49,360 |
| Parma | 225 | 13,873 | 10.2 | 46,127 |
| Pittsford | 214 | 24,497 | 8.2 | 71,587 |
| Ogden | 214 | 16,912 | 15.1 | 49,066 |
| Chili | 201 | 25,178 | 6.3 | 48,141 |
| Mendon | 133 | 6,845 | 25.9 | 59,091 |
| Gates | 113 | 28,583 | -3.9 | 41,685 |
| Clarkson | 109 | 4,517 | 9.9 | 44,899 |
| Riga | 106 | 5,114 | 18.6 | 48,674 |
| Rush | 71 | 3,217 | 7.2 | 56,838 |
| Sweden | 69 | 14,181 | -4.6 | 38,113 |
| Brighton | 62 | 34,455 | -3.7 | 50,338 |
| Hamlin | 57 | 9,203 | 19.9 | 41,075 |
| Irondequoit | 57 | 52,377 | -9.1 | 44,296 |
| Wheatland | 46 | 5,093 | 4.0 | 45,917 |
| East Rochester | 3 | 6,932 | -8.7 | 36,832 |
| County Total | 4,383 | 661,733 | | |

**Regression Analysis**

Table 4 is a stepwise regression that indicates field crops, agricultural vacant land, truck crops, orchards and fruit, total vacant land, and population produced a significant overall model ($p \leq .05$ level) with a large amount of explained variance. Types of crops were divided by total agricultural acreage to get weighted factors for analysis.

**Table 4**
Regression Model
Dependent Variable Is Property Class Code Changes
(Included observations: 19 after adjusting endpoints*)

| | Coefficient | Standard Error | T-Statistic | Prob. |
|---|---|---|---|---|
| Intercept | -.224.5846 | 78.89472 | -2.846180 | 0.0147 |
| Field Crops | 118.6354 | 84.81119 | 1.398818 | 0.1872 |
| Agricultural Vacant | 310.4261 | 93.31513 | 3.326643 | 0.0060 |
| Truck Crops | 722.3499 | 315.6302 | 2.288596 | 0.0410 |
| Orchards | -955855.9 | 346799.6 | -2.756307 | 0.0174 |
| Total Vacant | 0.020807 | 0.009959 | 2.089277 | 0.0587 |
| Population | 0.007502 | 0.001510 | 4.969152 | 0.0003 |

| | | | | |
|---|---|---|---|---|
| R-squared | 0.801368 | | Mean dependent var | 188.0000 |
| Adjusted R-squared | 0.702051 | | S.D. dependent var | 157.5697 |
| S.E. of regression | 86.00894 | | F-statistic | 8.06887 |
| Sum squared resid | 88770.44 | | Prob (F-statistic) | 0.001185 |
| Log likelihood | -107.2288 | | | |
| * City of Rochester and town/village of East Rochester were excluded from the analysis because they do not contain any land coded as agricultural. | | | | |

Although the variable field crops was not a statistically significant factor (p = .1872), it contributed to the overall significance and explanatory power of the model. Towns possessing such acreage are likely to have conversions due to its positive association and relatively large weight. This may be due to the possibility that land producing field crops tends to have lower output values. Therefore, the opportunity cost (the value of what has been foregone) in development is much higher than in other types of crops.

Agricultural vacant acreage was independently significant and had a positive and large weight on the overall model. This may suggest that these lands also have low output values and may be marginal lands that are influenced by commodity prices. As with field crops, the opportunity cost for development is much higher than keeping such land in an agricultural use.

The variable "truck crop" was independently significant and had a positive and large weight on the overall model. Typically, in highly developed areas, truck crop acreage (vegetables) is the last to be converted to development. This may be because such land has medium to high value crops produced on such land and because these crops are in high demand by the nearby urban population.

The variable "orchard and small fruit" was independently significant and had a negative and a very large weight on the overall model. This suggests that any minor impact on orchard and fruit acreage will have a major negative impact on property class code conversions and may thwart development, because these lands tend to produce high value crops and thus have low opportunity cost for putting such land into development.

Total vacant land was not independently significant at the .05 level, but was significant at the .10 level and had a positive and small weight on the overall model. This may suggest that vacant lands, as well as agricultural vacant lands, have large opportunity costs associated with development, because they have very little alternative use in terms of output value.

Population was independently significant and had a positive and small weight on the overall model. As described in microeconomic theory, increases in population will often create increases in the demand for a good. Hence, municipalities with larger populations have larger frequency of parcels being converted for a developed use.

Public sanitary sewer acreage was not associated with property class code conversions. Usually, sewers follow development, and most development is not limited by the availability of sewer (septic systems). However, a sewer may heavily influence the nature of development (e.g., low versus high-density housing).

## Conclusions and Implications

Much of agriculture in a county is associated with a large land base. Field crops, agricultural vacant land, and truck cropland are highly associated with development and tend to be the lowest in terms of production value when measured on a profit per acre basis. Higher value crops, such as fruit and fresh market vegetables, tend to be more profitable with less opportunity cost associated with development (Blank, 1997; Eatwell, Milgate, & Newman; 1989). This suggests a rational economic response by farmers in pursuit of higher returns on low value lands. When faced with development, developing low value cropland may be preferable than developing high value cropland.

Because many municipalities emphasize social and environmental goals, polices such as zoning, property tax, and comprehensive plans incorporate open space and preference for a given land use. Because farmland protection efforts usually involve purchasing development rights and/or providing property tax, policies encouraging farmers to change over from low value crops (field crops, truck crops) to higher value crops (fruit, fresh-market) would be complementary. In this study, most of the low value cropland was conducive for growing high value crops (USDA, 1973)

and was in close proximity to highly populated urban areas (Monroe County Department of Planning, 1999).

Population is positively associated with property class code conversions, and, as with many economic goods, increases in population size tend to increase the demand for development. Further analysis of population and its impact on agricultural lands may provide insight as to the likelihood, magnitude, direction, and location of development.

The statistical model provides an objective approach in a predominantly subjective process that municipalities tend to rely on when recommending agricultural lands for protection. By using both LESA and the statistical model, municipalities can apply information from existing databases in an innovative manner when making decisions regarding farmland protection. Ultimately, a baseline is established and helps develop temporal models that could further explore the cause and effect of development as well as the efficacy of a municipality's protection efforts.

## References


Blank. S. C. (1998). The end of agriculture in the American portfolio. Westport, CT: Quorom books.

Eatwell, J., Milgate, M., & Newman, P. (Eds.). (1989) The new palgrave: Economic development. New York: Macmillan Press.

Genesee/Finger Lakes Regional Planning Council (1997). Population projections, counties, cities, towns, and villages of the Genesee/Finger Lakes Region out to 2030. Rochester, NY.

Monroe County Department of Planning. (1999). Monroe County agriculture and farmland protection plan. Rochester, NY.

New York State Department of Agriculture and Markets. (1992). Article 25AAA-Agricultural and farmland protection plans (Circular 1500). Albany, NY.

New York State Department of Agriculture and Markets. (1997). Article 25AA-Agricultural districts (Circular 1150). Albany, NY.

Pease, J. R., & Coughlin, R. E. (1996). Land evaluation and site assessment: A guidebook for rating agricultural lands (2nd ed.). Soil and Water Conservation Society. Ankeny, IA.

Samuelson, P.A. (1980). Economics. (IIth ed.). New York: McGraw Hill.

Tomek, W. G. & Robinson, K. L. (1990). Agricultural product prices (3rd ed.). Ithaca, NY: Cornell University Press.

United States Department of Agriculture. (1973). Soil survey Monroe County, New York. Washington, D.C.: U.S. Government Printing Office.

United States Department of Agriculture. (2001). Notice of request for proposals, farmland protection program (Federal Register Publication No. 66 FR 6566).