

"Farming on the Edge":
A New Look at the Importance and Vulnerability
of Agriculture Near American Cities



American Farmland Trust

June 1994

American Farmland Trust is a private nonprofit organization that works cooperatively with farmers, public officials and other interest groups to protect the nation's best farmland and promote farming practices that lead to a healthy environment.

This report was authored by Edward Thompson Jr., AFT's director of public policy, with assistance from A. Ann Sorensen, director of AFT's Center for Agriculture in the Environment, and Professors John Harlan and Richard Greene of the Geography Department, Northern Illinois University.

This report was made possible by the generous support of Philip Morris Companies/Kraft General Foods, The Ford Foundation and the members of American Farmland Trust.

For more information, please write or call:

American Farmland Trust
1920 N Street, NW
Suite 400
Washington, D.C. 20036
202/659-5170

**"Farming on the Edge":
A New Look at the Importance and Vulnerability
of Agriculture Near American Cities**

I. Summary

American Farmland Trust took a fresh look at the relationship between urban growth and agricultural production that resulted in some surprising findings. Analyzing the most recently published, agricultural (1987) and population (1980-90) census data, AFT found that more than half of the value of U.S. farm production, including more than 85 percent of domestic fruit and vegetables, is grown in "urban-influenced" counties, and that population growth in counties with the highest agricultural productivity is more than twice the national average. Together, these findings suggest that a strategic sector of U.S. agriculture is economically vulnerable to the documented impacts of growth on farming: farmland conversion and conflict between urban and agricultural land uses. AFT therefore recommends that the local, state and federal governments increase their efforts to protect strategic farmland from haphazard urban growth. It also recommends further study of land use trends, which remain poorly documented, to help focus government and private protection efforts on the most important and vulnerable agricultural areas.¹

II. Methodology

The objective of AFT's study was to determine the geographic relationship between agricultural production and population growth in the United States. It was believed that this would shed light on the vulnerability of U.S. agriculture to the well-documented effects of urban growth and development.

¹ Food security is only one of many reasons for concern about the impacts of urban growth on farmland. Among the multiple benefits of protecting strategic farmland from urbanization are:

Ecosystem maintenance, restoration and enhancement. Protection of the most productive farmland reduces pressure for more intensive agricultural use of marginal lands that has many negative environmental impacts, including rapid soil erosion, nonpoint source water pollution, wetlands drainage and over-use of fertilizer and pesticides.

Protection of historic landscapes, scenic beauty and open space. Farmland improves the quality of life by providing relief from urban congestion and is a foundation of recreation and tourism in many areas.

Economic stability of communities. Protection of farmland helps prevent urban sprawl that is more costly to service than compact growth. Farmland is also the least expensive land use when the property taxes it contributes are compared to the public services it demands. For both reasons, it helps contain the property tax burden on communities.

Sustainable rural economic development. Programs that compensate farmers for protecting farmland (e.g., purchase of agricultural conservation easements) typically result in the re-investment of funds in the community. Protecting farmland to secure its many benefits is among the most sustainable kinds of rural economic development.

In brief, those effects include:

- Conversion of farmland, a disproportionate amount of it prime and unique land, to non-farm use. This could reduce the nation's agricultural production capacity, particularly that of specialty crops with unique soil and climatic requirements.
- Conflicts between commercial agricultural production and urban and suburban land uses resulting from their juxtaposition in "sprawl" development patterns that fragment the agricultural landscape. This makes farming riskier and more costly because of the need to modify normal farming practices to avoid liability and direct damage to farm equipment, crops and livestock.

It was not an objective of this study to document actual farmland conversion trends or the severity of land use conflicts. Existing data are limited in their availability and suitability for this purpose. Nor, in looking at the vulnerability of agriculture to urban growth, did the study take into consideration the existence and efficacy of current programs to protect agriculture and the land on which it depends. (Though these analyses should be performed to identify problem areas with greater precision.) Rather, it was a straightforward attempt to measure the *potential* for urban growth to diminish agricultural capacity -- and the many other public benefits of open countryside -- if adequate measures are not taken to guide that growth in appropriate patterns that avoid strategic agricultural resources.

Analysis was performed cooperatively by AFT's Policy Division and its Center for Agriculture in the Environment, a joint venture with Northern Illinois University, using GIS technology developed by the NIU Geography Department.

"Urban-Influenced" Agricultural Counties

To examine the geographic relationship between agricultural production and population growth, AFT introduced the concept of "urban-influenced" agricultural counties. As defined for purposes of the study, these include counties within Metropolitan Statistical Areas defined by the U.S. Office of Management and Budget, and those counties adjacent to MSA counties with a population density of at least 25 persons per square mile. This density is the lowest that a county can have and still be considered metropolitan in character by OMB standards, though other factors must be present for such counties to be so characterized.

We chose to include these adjacent counties for a couple of reasons. First, the purpose of OMB metropolitan county designation is not expressly to distinguish their land use from that of predominantly rural counties, so that it is quite likely that some urban influence extends to adjacent counties. Second, because local government efforts to address the impacts of growth on agriculture tend to lag well behind the impacts themselves, adjacent counties were included to ensure that our study did not lull them into a false sense of complacency by assuming a lack of urban influence. Inclusion of any particular county as an "urban-influenced" county was not intended to suggest that the degree of urban influence is the same, or that the need to address the impacts of urban growth on agriculture is equally urgent in all of these counties. Indeed, in

recognition that urban influence is less likely in adjacent counties, the study expressly differentiated between MSA and adjacent counties in analyzing and presenting census data. (Table 1)

Using this definition of urban-influenced counties, the study analyzed 1987 Census of Agriculture and 1980-90 Population Census data to determine the extent of agricultural production and population growth in such counties as compared with other counties and the nation as a whole.

Highly Vulnerable Counties: Agricultural Productivity & Population Growth Assumptions

The study also attempted to identify those urban-influenced counties where intensive agricultural activity coupled with high population growth suggests an especially significant degree of vulnerability of agriculture to urban land use expansion. To do this, a number of ways to measure high agricultural productivity and high population growth were examined before the definitions used in the study were chosen.

A 1986 study by AFT similar to this one defined "high market value farming counties" in terms of *gross market value of agricultural products sold*, as documented in the Census of Agriculture. However, this definition tends to inflate the importance of counties that are merely large in geographic area and that tend to have average- to low-intensity agriculture. It was the intention of our study, however, to highlight those counties where the intensity and special quality of agricultural production are at least as important as quantity, where the nature of agriculture suggests that it has special significance to the nation or to individual states.

To introduce this concept into the analysis, *market value of farm products sold per acre of land in farms* was considered as a measure of higher agricultural productivity. It was believed that production per acre reflects two characteristics of agriculture in a county that would distinguish it from the "average" and are, thus, particularly desirable to safeguard: (i) especially productive soils, climate and other growing conditions; and (ii) relatively high capital investment in agricultural production systems. Because production per acre cannot distinguish between these two conditions, however, it tends to inflate the importance of counties where agriculture is less dependent on quality resources than on capital, whereas it was AFT's intention to highlight the resource-dependency of agriculture.

To correct for this tendency, we decided to use *both* gross production and production per acre as the measure of high agricultural productivity, i.e., a county must exceed a threshold in both of the above categories to qualify. Our assumption was that the former, as a measure of extensive agricultural production, would tend to exclude small urban edge counties where agriculture has become extremely intensified because capital investment has been substituted for

large areas of productive farmland, for example, where horticultural specialties predominate.² Thus, only counties where intensive farming is also extensive will meet the test of high productivity.

Based on these definitions, we conducted a "high-low" analysis of agricultural productivity and population growth. The threshold of high agricultural productivity was the mean average of all U.S. counties' market value of production and production per acre. The mean production was approximately \$44,000 per county and mean county production per acre of land in farms was \$144 per acre. For consistency, the same mean average was used to differentiate higher and lower growth counties based on percentage increase in population from 1980 to 1990 according to the Census Bureau's population census. The mean percentage county population increase was 4.1 percent.

Those parameters are explained on the "Farming on the Edge" map accompanying this report. (Appendix) On the map, counties colored red are higher than the national mean in farm production, production per acre and population increase. Orange counties are higher than their *statewide* mean for the agricultural productivity indices and higher than the national mean for population increase. Green counties are in MSAs or adjacent counties with a population density of at least 25 persons per square mile in 1990.

III. Major Findings

Agricultural Production

A significant amount of the nation's agricultural production occurs in the nation's 1,549 urban-influenced counties as defined by this study, including:

- 56 percent of total market value of agricultural products sold (30 percent from counties inside MSAs, 26 percent in adjacent urban-influenced counties)
- 87 percent of domestic fruit and nut production
- 86 percent of vegetable production
- 79 percent of dairy production
- 47 percent of grain production
- 45 percent of livestock and poultry production.

(All figures are based on 1987 Census of Agriculture)

Aggregate production per acre of land in farms for these counties was \$243 or 2.7 times that of other U.S. counties (\$90).

² We considered but rejected the idea of deducting the value of horticulture crops as well as poultry production from total market value. Production of neither of these is dependent on the availability of extensive amounts of agricultural land, the principal concern of this study. Ultimately, however, we concluded that discriminating against specific crops would skew the analysis in favor of certain regions of the country.

(A more detailed breakdown is contained in the appendix.)

Approximately 45 percent of Commodity Credit Corp. payments to agricultural producers was paid to those in urban-influenced counties (1987). Fifteen percent went to MSA counties and another 30 percent to adjacent counties.

Population

Urban-influenced counties contained approximately 90 percent of the U.S. population in 1990.

Between 1980 and 1990, the population of these counties grew at an aggregate rate of 11 percent or 6.6 times that of other U.S. counties. Highly-vulnerable, red counties grew at an aggregate rate of 23 percent during this period, accounting for 49 percent of total U.S. population growth.

Land Use

Urban-influenced counties contained about 33 percent of U.S. land in farms (1987). Land in farms in urban-influenced counties declined 26.8 million acres (7.8 percent) from 1978 to 1987, as compared with 22.4 million (3.4 percent) for other U.S. counties.³

IV. Observations

Urban-influenced counties encompass a distinctive and important part of American agriculture. The importance of this agriculture rests upon its exceptional production, particularly of fruits, vegetables and other specialty crops. Its distinction is that it is, indeed, influenced by urban land uses. Urban expansion removes land from agricultural production -- some of it unique farmland that cannot be replaced -- and, if not properly guided, creates conflicts between agriculture and urban sensibilities that tend to make farming riskier and more costly.

Farmers on the edge of cities face all the challenges of agriculture everywhere else -- the weather, commodity prices, government programs, environmental regulation -- plus those associated uniquely with urban sprawl. They also have unique opportunities, primarily in direct marketing of produce. And they are the "ambassadors" of American agriculture -- the closest link between agriculture and the majority of voters who, increasingly, determine the fate of agricultural policy.

Some urban-influenced counties are more vulnerable to the effects of urbanization than others. This study attempted to measure the degree of vulnerability by correlating agricultural productivity and population growth. Though additional study is needed to refine this analysis,

³ Because the cause of decline in land in farms cannot be determined from Census of Agriculture data, no conclusion can be formed as to the relative contributions of urbanization and abandonment. It is likely, however, that declines in urban-influenced counties are much more likely to be caused by urbanization than abandonment.

delay in taking measures to address the potential influence of urban growth on agriculture will inevitably compromise the ability of such measures to protect agriculture.

V. Policy Recommendations

To protect the significant segment of the U.S. agriculture industry that is urban-influenced, the issue of land use must be addressed. First, stabilize the agricultural use of land in urban-influenced areas by managing growth to prevent further urban sprawl. This will protect farming from land use conflicts, taking the uncertainty out of farming on the edge and making it possible for farmers to make a commitment to the future.

Second, permanently protect strategic farmland by giving farmers an adequate incentive to voluntarily dedicate urban edge farmland to agricultural production under conservation easements limiting use of the land to farming. This will provide even more security for agriculture by progressively inhibiting changes in land use policy that could undermine sound growth management.

Among the high-priority policy initiatives that are needed to achieve these objectives are:

Local governments, which have traditionally been responsible for land use matters, should --

- Adopt growth management plans to divert development away from strategic agricultural lands and concentrate it near existing settlements where it is less expensive to service.
- Keep annexations of farmland to a minimum.
- Make decisions on zoning and public investments on roads, sewers and other growth infrastructure to reinforce desirable patterns of development.

State governments should --

- Review their own infrastructure spending priorities, again to guide development away from agricultural reserves. (This could also help revitalize core cities.)
- Strengthen their right-to-farm laws to offer greater protection to well-practiced agriculture.
- Continue to take the lead in permanent farmland protection through PACE programs, or Purchase of Agriculture Conservation Easements, voluntary covenants limiting development of the land. These programs need to be better targeted at strategic lands and to be adequately funded. The idea is to give farmers in designated reserves an alternative to selling for development when they need it.

The *federal government* should --

- Provide technical and financial assistance to states and localities to encourage them to pursue the foregoing policy strategies.
- Cooperate with states to develop a consistent system for accurately tracking farmland conversion and its impacts on agricultural capacity.
- Enforce the Farmland Protection Policy Act, which requires that federal spending on development infrastructure avoid needless farmland conversion and be consistent with state and local farmland protection plans and programs.
- Adequately fund the Farms for the Future Act, passed in 1990 to authorize federal cost-sharing for state and local PACE programs. This could be a tremendous catalyst to state and local initiatives.
- Offer additional green incentive payments to help farmers on the edge improve their land stewardship and comply with environmental regulations. Otherwise, the cost of compliance may drive them over the edge, with negative consequences for agriculture and the environment.

Addendum

The "Top 12" On the Edge

AFT analyzed data from its "Farming on the Edge" study to identify areas of the United States where concentrations of highly productive agricultural counties that appear most vulnerable to urban influences are located. Significant concentrations of red counties were first identified on the map. Data were aggregated for counties within these concentrated areas in five categories: total farm production, production per acre of land in farms, production of specialty crops, population growth rate and decline in land in farms. Areas were then ranked from top to bottom in each category and, giving equal weight to each category, the rankings were then aggregated to yield an overall "vulnerability rating".

This analysis suggests that the following are the "top 12" agricultural areas most vulnerable to urban influence and, thus, in the greatest need of measures to protect agriculture:

- California Central Valley
- Southern Florida
- California Coastal Region
- Mid-Atlantic Piedmont/Chesapeake Bay (Maryland to New Jersey)
- North Carolina Piedmont
- Puget Sound Basin (Washington)
- Chicago-Milwaukee-Madison Metro "Triangle"
- Willamette Valley (Oregon)
- Twin Cities Metro Region
- Western Michigan Lake Shore
- Shenandoah/Cumberland Valley (Virginia to Pennsylvania)
- Hudson/Champlain Valley (New York to Vermont)

Additional data on farm production, population and land use in these areas are found in the Appendix.

Summary of Data Analysis
All data from U.S.

Higher National Agriculture
Higher Statewide Agriculture
All Other Urban-Influenced
All Urban-Influenced Counties
All Other U.S. Counties
Rank as Percentage of Total
Urban-Influenced Agriculture
Urban-Influenced Comparison

California Central Valley
South Florida
California Central Valley
Mid-Atlantic Region
North Carolina Piedmont
Puget Sound Basin
Chicago Metropolitan Area
Midwestern Valley
New England
Northeast
Southeast
Southwest
Top 12 in Percentage of Total
Top 12 in Percentage of Total
Top 12 in Percentage of Total

Appendix

Table 1 -- Summary of Data Analysis

Table 2 -- Value of Agricultural Production in Urban-Influenced Counties,
State-by-State Comparison

Map -- Farming on the Edge

Summary of Data Analysis

(All statistics from U.S. Census of Agriculture and U.S. Census of Population)

	Number of Counties	Population (Million)				Land in Farms (Million Acres)		
		1980	1990	Increase	Percent	1978	1987	Decrease
Higher National Agricultural Value Counties ("Red")	203	46.4	57.2	10.8	23%	71.0	65.6	(5.42)
Higher Statewide Agricultural Value Counties ("Orange")	107	8.9	10.4	1.5	17%	26.7	25.1	(1.62)
All Other Urban-Influenced Counties ("Green")	1239	144.7	154.0	9.3	6%	248.0	228.2	(19.78)
All Urban-Influenced Counties	1549	200.0	221.6	21.5	11%	345.7	318.9	(26.83)
All Other U.S. Counties	1520	24.3	24.7	0.4	2%	663.8	641.4	(22.35)
Red" as Percentage of All U.S.	7%	21%	23%	49%		7.0%	6.8%	
Urban-Influenced as Percentage of All U.S.	50%	89%	90%	98%		34%	33%	
Urban-Influenced Compared to All Other U.S. Counties					6.6			1.1
California Central Valley	13	3.2	4.2	1.0	33%	13.0	12.5	(0.61)
South Florida	18	6.2	8.4	2.1	34%	5.9	5.3	(0.61)
California Coast	13	14.2	17.3	3.2	22%	6.7	6.4	(0.38)
Mid-Atlantic/Chesapeake Region	27	6.9	7.6	0.7	10%	3.9	3.6	(0.30)
North Carolina Piedmont	9	0.9	1.1	0.2	23%	1.7	1.4	(0.25)
Puget Sound Basin	5	2.3	2.8	0.5	22%	0.43	0.41	(0.01)
Chicago-Milwaukee-Madison Metro	19	2.9	3.1	0.3	10%	5.5	5.2	(0.30)
Willamette Valley	8	1.6	1.8	0.2	13%	1.24	1.18	(0.05)
Twin Cities Metro	14	0.8	0.9	0.2	22%	4.3	3.9	(0.35)
Western Michigan	8	1.2	1.3	0.1	10%	1.6	1.5	(0.07)
Shenandoah/Cumberland Valleys	9	0.7	0.8	0.08	11%	1.54	1.48	(0.06)
Hudson/Champlain Valleys	14	1.6	1.7	0.1	8%	1.9	1.7	(0.22)
Total of Top 12 Most Vulnerable Agricultural Areas	157	42.4	51.1	8.7	21%	47.8	44.5	(3.28)
Top 12 as Percentage of All U.S.	5%	19%	21%	40%		5%	5%	7%
Top 12 Compared to All Other U.S. Counties					2.1			1.1
United States Total	3,069	224.4	246.3	21.9	10%	1,009.4	960.3	(49.19)

	Market Value of Agricultural Products Sold in 1987 (\$Million)							Sales Per Acre (\$)
	Dairy	Meat	Poultry	Vegtbls	Fruit/Nuts	Grains	Total	
Higher National Agricultural Value Counties ("Red")	5,458	5,172	4,717	3,117	5,196	1,806	32,845	50
Higher Statewide Agricultural Value Counties ("Orange")	627	1,295	733	80	85	832	4,618	18
All Other Urban-Influenced Counties ("Green")	6,473	11,130	2,884	876	738	10,762	39,941	17
All Urban-Influenced Counties	12,558	17,597	8,334	4,073	6,019	13,401	77,404	24
All Other U.S. Counties	3,233	27,872	3,409	508	793	14,913	57,995	9
Red" as Percentage of All U.S.	35%	11%	40%	68%	76%	6%	24%	
Urban-Influenced as Percentage of All U.S.	79%	39%	71%	86%	87%	47%	56%	
Urban-Influenced Compared to All Other U.S. Counties								2.1
California Central Valley	1,138	664	695	649	2,565	334	7,673	61
South Florida	147	137	77	611	804	0	2,998	56
California Coast	144	138	153	843	822	28	3,212	50
Mid-Atlantic/Chesapeake Region	499	327	483	134	94	175	2,277	63
North Carolina Piedmont	22	110	332	10	1	43	785	54
Puget Sound Basin	266	46	62	30	21	1	523	1,26
Chicago-Milwaukee-Madison Metro	507	403	36	65	2	502	1,712	33
Willamette Valley	81	47	55	66	86	26	627	53
Twin Cities Metro	380	265	202	18	1	272	1,210	31
Western Michigan	120	126	69	39	78	65	647	43
Shenandoah/Cumberland Valleys	213	126	311	2	39	13	745	50
Hudson/Champlain Valleys	328	54	5	38	49	8	577	34
Total of Top 12 Most Vulnerable Agricultural Areas	3,845	2,444	2,480	2,503	4,563	1,467	22,985	51
Top 12 as Percentage of All U.S.	24%	5%	21%	55%	67%	5%	17%	
Top 12 Compared to All Other U.S. Counties								3.1
United States Total	15,791	45,470	11,742	4,581	6,811	28,314	135,399	14

Value of Agricultural Production in Urban-Influenced Counties State-by-State Comparison

State	1987 Agricultural Sales * in Urban-Influenced Counties (\$ Thousands)	Percentage of Total State Sales**	
		In MSA	Adjacent
AL	\$1,601,087	33%	51%
AR	\$1,558,239	26%	20%
AZ	\$605,458	37%	0%
CA	\$12,710,855	86%	6%
CO	\$1,186,610	38%	0%
CT	\$357,702	79%	21%
DE	\$114,024	7%	19%
FL	\$3,933,397	73%	18%
GA	\$1,642,132	19%	40%
IA	\$3,665,848	11%	30%
ID	\$427,917	16%	3%
IL	\$4,973,847	32%	46%
IN	\$3,569,869	35%	52%
KS	\$685,518	5%	5%
KY	\$1,332,906	31%	33%
LA	\$916,112	22%	46%
MA	\$337,315	92%	7%
MD	\$600,550	43%	18%
ME	\$248,550	27%	34%
MI	\$2,147,827	54%	30%
MN	\$2,202,528	17%	22%
MO	\$1,531,862	20%	22%
MS	\$534,302	6%	22%
MT	\$150,328	10%	0%
NC	\$3,157,398	35%	54%
ND	\$259,128	12%	0%
NE	\$590,146	5%	4%
NH	\$84,602	34%	44%
NJ	\$492,064	100%	0%
NM	\$202,499	19%	0%
NV	\$35,567	11%	4%
NY	\$2,330,102	58%	38%
OH	\$3,422,912	41%	59%
OK	\$914,053	11%	22%
OR	\$901,780	37%	11%
PA	\$2,996,032	66%	32%
RI	\$37,786	71%	29%
SC	\$866,842	42%	57%
SD	\$230,834	7%	2%
TN	\$1,237,383	29%	48%
TX	\$3,697,523	20%	15%
UT	\$218,143	25%	11%
VA	\$1,289,413	26%	46%
VT	\$295,335	29%	50%
WA	\$1,664,695	51%	10%
WI	\$4,176,599	31%	54%
WV	\$110,384	22%	19%
WY	\$40,288	6%	0%
US	\$76,286,291	33%	23%

* Market Value of Agricultural Products Sold (U.S. Census of Agriculture, 1987)
 ** Market value in counties within Metropolitan Statistical Areas (MSA), and in counties adjacent to MSAs (and having a population density of at least 25 people per square mile), respectively, as a percentage of total state market value.

1

1