

Land Use Changes and an Estimate of Prime Farmland Loss to Development in Hamilton County, Indiana 1940-1980

T. G. VAN HORN, G. C. STEINHARDT AND J. E. YAHNER
Department of Agronomy, Purdue University
West Lafayette, Indiana 47907

Introduction

The 1980 U.S. Census has shown that for the first time in the history of this country, rural population is growing as fast as urban population (7). The effect of this movement on rural land use changes and on prime farmland conversion is the subject of this study.

The National Agricultural Land Study (NALS) has indicated that of the new houses build in the 1970's, over 40 percent were constructed on rural lands (3). Any population increase in rural areas has both direct and indirect effects on agriculture. The most obvious direct effect is the conversion of farmland to other uses. The most common indirect effect has been termed the "impermanence syndrome" (1). As farmers' beliefs in the longevity of their farming operations decrease, their long-term capital investment in those operations also decrease. Thus, the "impermanence syndrome" can be observed in such things as lowered production, run down buildings and equipment, and a decrease in use of some conservation practices.

According to NALS between 1967 and 1975 in the North Central Region about 5.2 million acres of agricultural lands were converted to other uses. This region includes the lake states of Michigan, Wisconsin and Minnesota; the corn belt states of Ohio, Indiana, Illinois, Iowa and Missouri; and the northern plains states of Kansas, Nebraska, South Dakota, and North Dakota. Indiana has seen the conversion of about 740,000 acres of agricultural lands to urban built-up, transportation, and water during a similar period from 1967-1977 (5). In 1979 the Land Use Subcommittee of the Legislative Interim Study Committee of the Indiana General Assembly found that about 88,000 acres of Indiana land were being converted to non-agricultural uses every year (6). A micro-scale example of this process can be found in Hamilton County, Indiana, north of Indianapolis. Between 1940 and 1980 the population of the county rose from 24,614 to 82,027. Just over 25% of this growth occurred between 1960 and 1970, while about 48% occurred between 1970 and 1980 (2). To understand how this growth has affected land use change, especially conversion of prime farmland, the concept of Relative Development Values (RDV) was employed as a study tool.

Relative Development Values

Using plat books available for the years 1940, 1960, 1970 and 1980, a methodology has been developed to (1) observe land change by section in the county and (2) indicate a Relative Development Value (RDV) for the townships in each of the years cited. Plat book information for 1950 was not available.

Subdivision and tract lands present in any given year are indicated in plat books. Subdivisions are areas of land divided into parcels for residential development, while tracts are areas designated for future subdivisions. Approximation of these as a development percentage per section was done. Five development ranges were arbitrarily selected: 0%, 0-25%, 25-50%, 50-75%, and 75-100%. The 0% development range indicated that

no development had taken place in the section beyond the farmstead level. A development level of 0-25% indicated that some development in the form of a subdivision or tracts had taken place, but that it covered less than 25% of the land surface of the section.

With this simple method maps were prepared delineating the percentage range of development of each section in Hamilton County for the years 1940, 1960, 1970, and 1980 (Figure 1). Changes in any given section can be observed over time on the maps. Note that some sections actually appeared as less developed in 1970 than in 1980 in Washington Township. This was because some tracts designated for development in 1960 were never developed and had reverted to farmland by 1970.

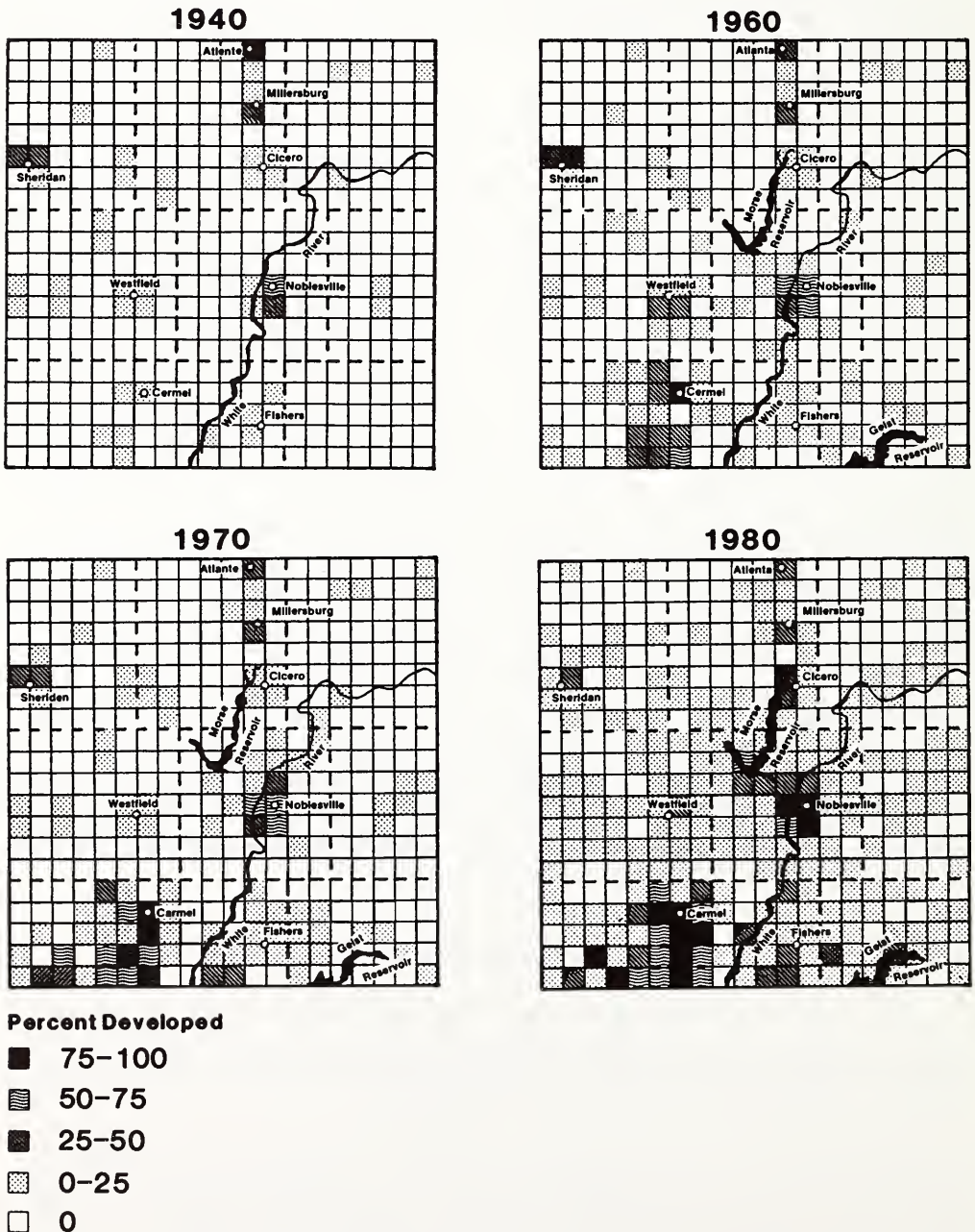


FIGURE 1. Land Development by Section in Hamilton County, Indiana (1940-1980)

From this evaluation a Relative Development Value (RDV) was determined for each township for each year. Methodology for this required first a compilation of the number of sections in each development range for each year (Table 1). Then a weighted value for each component was determined by multiplying the number of sections in each range (Table 1) by the mid-point percentage value of the range. For example the mean value for the range 0-25 is 12.5. In Adams Township in 1940 there were five sections in the 0-25 range. The weighted development values for each range

TABLE 1. *Number of Sections Per Development Ranges (%) for Hamilton County, Indiana (1940-1980)*

TOWNSHIP	SEC PER TWP	1940 DEVELOPMENT RANGE				
		0%	0-25%	25-50%	50-75%	75-100%
		NUMBER OF SECTIONS				
Adams	48	41	5	2	0	0
Clay	50	45	5	0	0	0
Delaware	15	11	4	0	0	0
Fall Creek	35	35	0	0	0	0
Jackson	56	46	8	2	0	0
Noblesville	49	45	2	1	1	0
Washington	36	46	10	0	0	0
Wayne	35	33	2	0	0	0
White River	56	52	4	0	0	0
TOTALS	400	354	40	5	1	0

TOWNSHIP	0%	1960 DEVELOPMENT RANGE			
		0-25%	25-50%	50-75%	75-100%
		NUMBER OF SECTIONS			
Adams	41	5	2	0	0
Clay	25	16	7	1	1
Delaware	6	9	0	0	0
Fall Creek	24	11	0	0	0
Jackson	45	9	2	0	0
Noblesville	32	13	1	3	0
Washington	40	14	2	0	0
Wayne	32	3	0	0	0
White River	52	4	0	0	0
TOTALS	297	84	14	4	1

TOWNSHIP	0%	1970 DEVELOPMENT RANGE			
		0-25%	25-50%	50-75%	75-100%
		NUMBER OF SECTIONS			
Adams	40	6	2	0	0
Clay	22	15	3	6	4
Delaware	4	9	2	0	0
Fall Creek	23	12	0	0	0
Jackson	43	11	2	0	0
Noblesville	34	10	2	3	0
Washington	46	10	0	0	0
Wayne	30	5	0	0	0
White River	50	6	0	0	0
TOTALS	292	84	11	9	4

TABLE 1.—Continued

TOWNSHIP	1980				
	DEVELOPMENT RANGE				
	0%	0-25%	25-50%	50-75%	75-100%
NUMBER OF SECTIONS					
Adams	28	19	1	0	0
Clay	9	20	7	7	7
Delaware	0	11	4	0	0
Fall Creek	8	25	2	0	0
Jackson	31	21	4	0	0
Noblesville	6	34	4	2	3
Washington	15	40	1	0	0
Wayne	17	18	0	0	0
White River	39	17	0	0	0
TOTALS	153	205	23	9	10

gave the weighted development values for each township and the county in specified years.

A Relative Development Value for each township was calculated by dividing the total of the weighted values by the number of sections in each township (Table 2). Adams Township in 1940 had a weighted development value of 137.5 and 48 sections. Thus its rounded RDV was 3.

The highest possible RDV in each township was 88. If all sections in the township were fully developed, the mid-point of the highest weighted development level (87.5) rounded off to 88 would be the RDV for each township since the number of sections cancel each other in the RDV procedure. In a like manner the highest possible RDV for the whole county would be 787.5 rounded to 788. By dividing the RDV for each section of the county in each year by the highest theoretical value that could be obtained, a relative percentage of development for each township or the county in each year was obtained (Table 3). This figure indicated the relative amount by percentage of the total land development that had occurred by a given date in the townships and the county. For example, better than one-third of the land surface in Clay Township had been developed into subdivisions and tracts by 1980, as had just over one-fifth of the land in Noblesville and Delaware Townships.

Using Table 3 as a base, a change in the relative percentage of land development showed how the development of subdivisions and tracts has progressed in each township over time (Table 4).

TABLE 2 *Relative Development Values (RDV) for Hamilton County, Indiana (1940-1980)*

TOWNSHIP	1940	1960	1970	1980
Adams	3	3	3	6
Clay	1	12	21	31
Delaware	3	8	13	19
Fall Creek	0	4	4	11
Jackson	3	3	4	7
Noblesville	3	8	8	20
Washington	2	4	2	10
Wayne	1	1	2	6
White River	1	1	1	4
TOTALS	17	44	58	114

TABLE 3 *Relative Percentage of Land Development By Township in Hamilton County, Indiana (1940-1980)*

TOWNSHIP	1940 %	1960 %	1970 %	1980 %
Adams	3	3	3	7
Clay	1	14	24	35
Delaware	3	9	15	22
Fall Creek	0	5	5	13
Jackson	3	3	5	8
Noblesville	3	9	9	23
Washington	2	5	2	11
Wayne	1	1	3	7
White River	1	6	7	14
TOTAL	2	6	7	14

Prime Farmland

In Indiana the Soil Conservation Service (SCS) has used a set of predetermined criteria to classify those soils that are considered prime farmland (9). Using the list of soils found in the county, each can be defined as prime or non-prime farmland. Finally, the amount of prime farmland in the county can be determined by addition of the acreage of prime farmland soil as listed in the *Soil Survey of Hamilton County* (4).

Of the thirty soils listed which compose Hamilton County's land surface, eighteen meet the criteria for prime farmland soil. These accounted for 88 percent or 226,087 acres of the total of 256,640 acres in the county (Table 5).

Preliminary Results

As indicated below (Table 4) between 1940 and 1980 about 12% of the land surface of Hamilton County was occupied by subdivisions and tracts. Also as indicated above, prime farmland accounted for about 88% of the land surface of the county. The assumption was made that prime farmland was spread rather evenly throughout the county. All of Hamilton County is in one physiographic region—the Tipton Till Plain. Other than the valley of the White River, about one section side, and other smaller drainageways, the landscape and soils are similar over the whole country (8). With

TABLE 4 *Change in Relative Percentage of Land Development in Hamilton County, Indiana (1940-1980)*

YEARS TOWNSHIP	1940-1960 %	1960-1970 %	1970-1980 %
Adams	0	0	4
Clay	13	10	11
Delaware	6	6	7
Fall Creek	5	0	8
Jackson	0	2	3
Noblesville	6	0	14
Washington	3	-3	9
Wayne	0	1	5
White River	0	0	4
County Average Totals	4	1	7

TABLE 5 *Prime Farmland Soils of Hamilton County*

Map Symbol	Soil Name	Acres of Land	Percent Farmland	Prime Farmlands
Br	Brookston silty clay loam	62,510	24.4	x
CrA	Crosby silt loam, 0-3% slopes	93,746	36.5	x
FnA	Fox loam, 0-2% slopes	1,402	0.5	x
FnB2	Fox loam, 2-6% slopes, eroded	1,465	0.6	x
FxC3	Fox clay loam, 8-18% slopes severely eroded	1,099	0.4	x
Ge	Genesee silt loam	3,295	1.3	
HeF	Hennepin loam, 18-50% slopes	1,960	0.8	
Ho	Houghton muck	321	0.1	x
MmA	Miami silt loam, 0-2% slopes	7,718	3.0	x
MmB2	Miami silt loam, 2-6% slopes eroded	29,379	11.4	x
MmC2	Miami silt loam, 6-12% slopes eroded	3,923	1.5	
MmD2	Miami silt loam, 12-18% slopes eroded	1,311	0.5	
MoC3	Miami clay loam, 6-12% slopes severely eroded	3,496	1.4	
MoD3	Miami clay loam, 12-18% slopes severely eroded	946	0.4	
MxA	Milton Variant silt loam, 0-2% slopes	701	0.3	x
NnA	Nineveh loam, 0-2% slopes	228	0.1	x
OcA	Ockley silt loam, 0-6% slopes	8,278	3.2	x
OcB2	Ockley silt loam, 2-6% slopes eroded	1,225	0.5	x
Or	Orthents	1,044	0.4	
Pa	Palms muck	217	0.1	x
Pn	Patton silty clay loam	11,158	4.3	x
Ps	Patton silty clay loam, limestone substratum	501	0.2	x
Pt	Pits	1,017	0.4	
Ra	Randolph Variant silt loam	336	0.1	x
Ro	Ross loam	656	0.3	
Sh	Shoals silt loam	6,775	2.6	
St	Sleeth loam	931	0.4	x
Sx	Sloan silty clay loam, sandy substratum	1,273	0.5	
We	Westland silty clay loam	4,886	1.9	x
Wh	Whitaker loam	1,007	0.4	x
	Water areas	3,758	1.5	
TOTAL		256,640	100.0	226,087 ACRES

this assumption, if 12 percent of the county's land surface was developed, then over 10 percent of the land surface was developed on prime farmlands. Thus, about 27,000 acres of prime farmlands in the county were occupied by subdivisions and tracts between 1940 and 1980. This represents about 42 sections out of the 400 in the county or about the equivalent area of Adams Township.

It should be noted that this development was not evenly spread. While White River and Adams Townships have seen only an estimated 4 percent of their land surface developed in this period, Clay Township has seen better than one-third of its area developed. Also, about 20 percent of Delaware and Noblesville Townships has been developed. Thus, it can be surmised that more prime land was lost in Clay, Noblesville, and Delaware townships than in the others.

Finally, of this 27,000 acres of prime farmland, about 15,800 acres or about 6 percent of the county's total prime farmland were lost in the period between 1970 and 1980. It is difficult to tell if a trend has as yet been established because the prime farmland converted to subdivisions and tracts between 1960-1970 was less than one percent of the total.

Obviously there is at least one major flaw in this determination of prime farmland loss. In describing actual land loss we have neglected the indirect effect. Not as yet accounted for are the "impermanence syndrome" lands described earlier. Expecta-

tions are that parcels in the limbo of impermanence would add significantly to the county's potential loss of prime farmland to other uses. However, no means of measuring this loss has yet been established. One indication, however, may be shown by an estimation of the number of these parcels per section found in each township in specific years (Table 6). A parcel implies a particular piece of real estate and its improvements.

TABLE 6 *Average Number of Parcels 30 Acres or Less in Size Per Section Per Township in Hamilton County, Indiana (1940-1980)*

	1940	1960	1970	1980
Adams	3.1	2.3	2.8	3.5
Clay	2.2	3.1	6.9	5.7
Delaware	2.4	4.3	5.2	4.9
Fall Creek	2.3	2.5	4.3	5.8
Jackson	3.0	2.2	3.5	3.6
Noblesville	2.9	1.8	4.8	4.1
Washington	3.2	3.2	5.2	6.4
Wayne	2.2	1.6	3.5	4.0
White River	1.3	1.2	1.5	2.0
COUNTY	2.5	2.5	4.2	4.4

Several observations can be made from Table 6. First, it should be noted that for the county as a whole, there was no overall change in the average number of "impermanence syndrome" parcels between 1940 and 1960 although individual townships changed. Second, most parcel development in the country occurred between 1960 and 1970, where on the average 1.7 parcels, 30 acres or less in size, were subdivided in each section. Third, Washington Township (6.4), Fall Creek Township (5.8), and Clay Township (5.7) appeared in 1980 to have the most "impermanence syndrome" parcels per section. Fourth, if an average of 1.9 parcels, 30 acres or less in size, have been divided off in each section of the county (using 15 acres as an average size), a total of 11,400 acres of farmland have been influenced by the characteristics of impermanence since 1940. If it was also assumed that 88 percent of this was prime farmland, then about 10,000 additional acres of prime farmland have been used for this type of development from 1940 to 1980. Therefore, about 37,000 acres of prime farmland have been consumed by some form of development from 1940 to 1980 in Hamilton County. This is the equivalent of just over 14 percent of the total county and just over 16 percent of the county's prime farmland.

Summary

Hamilton County, Indiana between 1940 and 1960 saw relatively little in the way of development changes. However, the 1960-1970 period appears to have been a time of movement to rural non-farm acreages. Clay and Noblesville Townships were the most affected and Adams and White River the least. The 1970-1980 period was one of rapid expansion of subdivisions and tracts. Again, Clay and Noblesville Townships led the way. Much of this expansion occurred around several towns including Noblesville and Carmel.

About 37,000 acres of prime farmland have been diverted to other than farmland uses between 1940 and 1980. This is equivalent to just over 14 percent of the county and is larger than any one of the nine townships in the county. About 27,000 acres

of prime farmland (12%) went into subdivisions and tracts and about 10,000 acres of prime farmland (4%) were designated "impermanence syndrome" lands.

By 1980 over 62,000 total acres in the county were used for other than agricultural purposes or reduced in production. This is almost one-fourth of the county. Based on the analysis of the data, almost 55,000 acres of this was prime farmland. Better than 66 percent of this prime farmland conversion occurred in the 1940-1960 period.

Finally, the "impermanence syndrome" lands accounted for about 42 percent of this 62,000 acres or over 26,000 acres by 1980. This figure is about 12 percent of the country's total prime farmland.

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