



## Formulating and Evaluating Agricultural Zoning Programs

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# Formulating and Evaluating Agricultural Zoning Programs

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Robert E. Coughlin

**Agricultural zoning, the most common method of preventing the development of agricultural land, is the method that holds the most promise for protecting a major portion of the nation's farmland. This article reports on data and analyses necessary to formulate effective, politically acceptable, and legally sound agricultural zoning programs. Because agricultural zoning is intended to protect a resource (unlike more typical zoning that is intended to give order to development), it is first necessary to demonstrate that the land constitutes a valuable natural resource whose protection is in the public interest. The ordinance must be strong enough to make possible the continuation of agriculture and yet must permit enough development that the program will be accepted politically and can withstand legal challenges. The effectiveness of agricultural zoning can be evaluated by examining changes in ownership and sales patterns following adoption of agricultural zoning.**

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PDR and TDR get most of the headlines, but agricultural zoning is the method most commonly used in the United States for preventing the conversion of agricultural land to nonagricultural uses. The National Agricultural Lands Study (NALS) found that, in 1980, 104 counties and 166 municipalities in 22 states had instituted agricultural zoning (Coughlin, Keene, et al. 1981). Since then, the number has increased substantially, despite the weakness of the agricultural economy. For example, Toner (1984) reported that, in Wisconsin, 32 counties and 242 townships were using agricultural zoning in 1984, compared with the 13 counties and 116 townships reported by NALS in 1980. Two other examples are from Pennsylvania: in Lancaster County, the number of municipalities with agricultural zoning rose from 7 in 1980 to 35 in 1990, and in York County, the number increased from 9 to 15.

Agricultural zoning is most likely to continue to be the most common method of directly protecting agricultural lands from conversion, because of the high cost of the only other general approach—the acquisition of development rights. (Indirect methods, such as tax incentives and agricultural districting, make it easier for farmers to continue farming, but, in almost all cases, do not prevent them from selling for development.) Despite its evident importance, agricultural zoning has been the subject of few analytic studies. The two most recent collections of articles on agricultural land protection (Lockert 1987; Hiemstra and Bushwick 1989) do not contain a single paper that addresses agricultural zoning.

If agricultural zoning is to reach its potential for protecting farmland, zoning programs must be formulated to be effective as well as politically acceptable and legally sound. This article therefore provides guidelines for formulating programs. The article also addresses the question of how to determine the effectiveness of agricultural zoning programs.

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## The Varieties of Agricultural Zoning

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Agricultural zoning ordinances come in two basic varieties: exclusive and nonexclusive (Coughlin, Keene, et al. 1981). Exclusive agricultural zoning, which prohibits the construction of any non-farm dwellings, is the most extreme, but by far the least common. Nonexclusive agricultural zoning, which allows a limited amount of non-farm development, was the type adopted by 87 out of the 94 jurisdictions analyzed in detail by NALS. There are two major types of nonexclusive agricultural zoning ordinances: large minimum-lot-size zoning and area-based allocation. Large minimum-lot-size ordinances require a substantial minimum lot size, usually about 40 acres, but range from as little as 10 acres in one township to as many as 320 acres in Madera County, California.

Under an area-based allocation ordinance the number of dwelling units a landowner is allowed to build is determined by the total acreage of the property. The dwellings, however, must be built on small building lots, typically of one acre. The advantages of the area-based al-

location over large-lot zoning are that the former leaves a much larger proportion of the land uninterrupted and suitable for farming and that it provides much more flexibility in site planning, often making it possible to place all dwellings on the soils that are least good for agriculture.

Area-based allocation ordinances come in two varieties: fixed and sliding scale. Under fixed area-based allocation ordinances, owners are allowed to build one dwelling for every 40 acres, or some other specified area of land. Under sliding scale area-based allocation ordinances, the number of dwellings allocated per unit area decreases as the size of tract increases. Thus, small tracts (which are less useful for agriculture and are often owned with the expectation of some development in the foreseeable future) are allowed development at a somewhat higher density than larger tracts (which are more valuable for agriculture and have not yet moved out of the rural land market). Because sliding-scale area-based allocation ordinances allow owners of smaller tracts somewhat more development, they are more palatable politically in areas where urban development pressures are beginning to be felt than are fixed area-based allocation ordinances or large-lot ordinances.

Despite the stringent limitations it imposes on development, agricultural zoning as a concept has been upheld by several state courts. In response to substantive due process challenges on constitutional grounds, courts in New Jersey, Pennsylvania, Illinois, and Maryland have found that agricultural zoning serves a legitimate public purpose (*Wilson v. County of McHenry*, Ill. [1981]; *Hopewell Twp. Bd. of Supervisors v. Golla*, Pa. [1982]; *Grand Land Co. v. Twp. of Bethlehem*, N.J. [1984]).<sup>1</sup> Courts have also held that the ordinances being reviewed were not unduly restrictive and therefore did not constitute a "taking" of property without just compensation (e.g., *Gisler v. County of Madera*, Cal. [1974]; *Joyce v. City of Portland*, Or. [1976]; *Grand Land Co. v. Twp. of Bethlehem*, N.J. [1984]; *Cordorus Twp., Pa. v. Rogers* [1985]; *City National Bank v. County of Kendall*, Ill. [1986]; *Petersen v. Dane County*, Wis. [1988]; *Gardner v. New Jersey Pinelands Commission* [1989]).<sup>2</sup>

The successful challenges to agricultural zoning have relied on arguments less central to its concept and more related to its application. For instance, in the *Golla* case, the township's crudely drawn ordinance (which limited each tract to a maximum of five 1.5-acre lots, regardless of the size of the original tract) was found by the Pennsylvania court to be overly restrictive and to deny landowners equal protection. In *Grand Land*, the New Jersey court invalidated the ordinance primarily because of its exclusionary effect—a fault that could have been remedied by providing for higher density, and presumably more affordable, residential development elsewhere in the township while leaving the agricultural zone intact.

Of all the variants of agricultural zoning, the sliding-scale area-based type has the most desirable characteristics. Its area-based feature makes it capable of protecting the extensive land base necessary for the contin-

uation of agriculture and permits flexibility in site planning. Its sliding-scale feature enhances the political feasibility of its being adopted and increases the probability of the zoning proving legally defensible. In *Boundary Drive Associates v. Shrewsbury Township Bd. of Supervisors* [1985]<sup>3</sup> the Pennsylvania Supreme Court specifically upheld this type of ordinance. In the remainder of this article "agricultural zoning" refers to sliding-scale area-based agricultural zoning, except where otherwise indicated.

## Formulating Agricultural Zoning Programs

Agricultural zoning programs must be designed in such a way that they will both protect agricultural land adequately and be defensible against legal challenge. Three major conditions must be met. First, it must be demonstrated that the land designated for the agricultural zone constitutes a valuable natural resource whose preservation is in the public interest. Second, the controls must be designed so that they are adequate to support the continuation of agriculture. Third, enough development must be permitted to guard against any court challenges (on the bases of a taking without just compensation or of exclusion of low and moderate income housing) and to satisfy the voters that the regulations are not too restrictive.

### Demonstrate that a Valuable Natural Resource Exists

The necessity of demonstrating that a regulation furthers a public purpose and that it is crafted specifically to further it has been brought to public attention by the Supreme Court's 1987 decision in *Nollan v. California Coastal Commission*.<sup>4</sup> Accordingly, it is important to demonstrate that the designated land is a valuable natural resource worth protecting. To do this it must be shown that there is both fertile land and a viable agricultural economy in a jurisdiction that is considering adoption of an agricultural zoning ordinance.

As a first consideration, the land must be shown to constitute a valuable resource base. Data are needed to show that the soils are good for agriculture. The county soils survey is invaluable here. For any county for which a soils survey is available one can easily apply the agricultural land capability classification, the long-standing method for classifying the value of soils for agriculture. (Nearly all counties with significant agriculture are covered: complete soils survey reports are available for some 60 percent of the nation's counties and soil maps are available for another 10 percent.) While the Agricultural Land Capability Classification has been found over the years to be a less-than-perfect indicator of soil productivity, some of its shortcomings have been corrected by the Important Farmlands system.<sup>5</sup> Important farmlands have now been mapped for many counties in the United States; for other counties, soils have been classified according to Important Farmlands criteria and can be

mapped readily. An additional aid in classifying land that is valuable for agriculture is the Land Evaluation and Site Assessment System (LESA) (Wright 1985), which makes possible the creation of ratings for farmland tracts reflecting the quality of their soils and their location in relation to non-farm development. Many states and counties have custom-tailored LESA to yield rating systems that are responsive to the characteristics of agriculture in their regions.

For an area to be farmable, the land must be not only fertile, but also in relatively large holdings. Data on the size of each tract and the name of its owner are usually available from records of the county tax assessor. They can be extracted readily if they have been put into a computer system; more and more counties are doing this. Tax maps, too, are usually available, and completely compiled tax atlases—with the whole jurisdiction mapped at one scale—are becoming common.

The second consideration is whether a strong farm economy exists. To demonstrate this, data on number of farms, area in farms, number of farm operators (both full-time and part-time), number of farm employees, and farm income should be assembled for the most recent year, and trends should be documented. These data are available from the *Census of Agriculture* at the county level, where planning and zoning are administered in most parts of the country. In the East, where municipalities have the primary planning and zoning power, the lack of census data presents a problem, but often data can be obtained with the help of local extension agents, Agricultural Stabilization and Conservation Service agents, and others with working data files. Mapped data on area in farms, preferably by type of farm, and on area in cropland, farmland, and other uses are the most essential. The mapping can usually be accomplished from aerial photographs and the detailed records and knowledge of local officials.

A third consideration in demonstrating the land's value as a resource is whether land values in the area to be zoned for agriculture are supportable by agriculture. That is, have the market values of land remained low enough that, if agriculture is the only use allowed, land costs would not make that use unprofitable? If land values are too high, proposed agricultural zoning will probably be politically unacceptable and, if enacted, may be successfully challenged as a taking without just compensation. Here one can turn to real property sales data, which are available from records in the county assessor's office. In order to sort out the factors that affect value, data on physical attributes and locational attributes of each property also must be gathered and analyzed carefully in conjunction with the sales data. Only then do statistical results have any meaning. Land is not a homogeneous commodity by any means. If a high level of statistical reliability is demanded, such data gathering and analysis can be very time consuming and expensive.

Another way of getting extremely valuable information on the land market is to conduct interviews with real estate agents, appraisers, and other people with local

experience. Through structured interviews with such people, one can get direct estimates of the market values of certain types of land. People who are experienced in the local market often are able to account for variations in physical and locational attributes, define land types, and come up with rough value ranges for them that are sufficiently precise to show whether land values are too high for farmers to afford.

Appraisers and real estate agents can also add greatly to one's knowledge by making clear what the characteristics of demand are. For example, a recent study addressed how the National Park Service Plan for the Upper Delaware National Scenic and Recreational River would affect land values (Coughlin and Keene 1985). This river valley protection plan, calling for 5-acre and 2-acre zoning, was being fought bitterly by local people who feared that it would result in a taking of their land values without compensation. However, a broad sampling of real estate agents in the valley indicated, almost uniformly, that the people coming out from New York and northern New Jersey, who constituted the major market for land in the valley, were not looking for 1-acre and 2-acre sites. They were looking for 5- and 10-acre sites. So the planned recommendations for 2- and 5-acre zoning would not constrict choice and therefore would not really have any significant effect on the market.

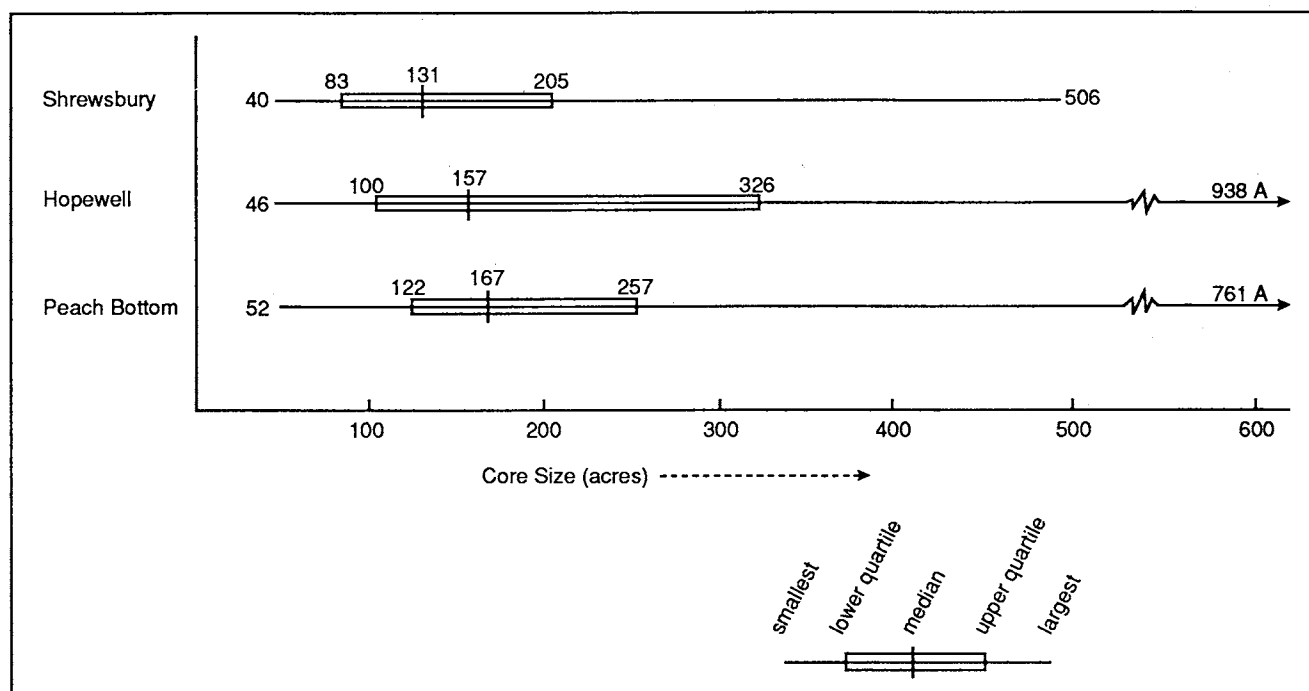
### **Demonstrate that the Zoning Will Protect the Agricultural Land Resource**

The major objective of agricultural zoning is to maintain the land resource in a form amenable to the continuation of agriculture. The first sub-objective is to restrict the division (or parcellation) of farmland so that it does not become broken up into relatively small parcels, thereby accelerating the shift of the land market from rural to urban. In many states in the nation, divisions of farmland into parcels as small as 10 acres can occur outside of the subdivision process—that is, without any planning review. The object here is to reduce the unconsidered partition of prime farmland tracts into lots below a minimum size by bringing such partitions under subdivision review.

The need for restrictions on land division is not generally recognized by planners, but Pease (1989) accords it utmost importance: “[I]f the generally endorsed goal of protecting farmland is to have any chance of succeeding, the decisive battles will be fought over two issues: the designation of farmland to be protected and the criteria for land divisions and dwelling permits in farm zones” (see also Harrison 1984 and Pease 1982, 1988). The designation of the land to be protected has been discussed above. This section addresses criteria for land division and for the number of non-farm dwelling units.

### **Establish Criteria for Land Division**

When land is broken up into smaller tracts, it becomes somewhat less useful for agriculture because the tract division usually implies an ownership division. Under these circumstances the assembly of enough acreage for



**FIGURE 1: Size of farm cores in three townships, in acres (full-time farms only).**

a farm of minimum efficient size becomes difficult. Also, smaller tracts generally sell for a higher price per acre than do larger tracts. So when a tract is broken into two or more smaller tracts, the per-acre values generally tend to rise. These smaller tracts, with higher value per acre, are less attractive to farmers, whose incomes depend on per-acre revenues minus costs. But they are more attractive to non-farm buyers, who often find that, although the price per acre for these smaller tracts is higher, the total cost of an available tract is considerably lower (because the tract is smaller than is typical in a true rural market) and comes within their investment range for a piece of land. The land is valuable to them, not because of its fertility and corresponding income-producing capacity, as it is to a farmer, but simply as a place for a second home or perhaps eventually for a development. Hence, the availability of smaller tracts at lower total cost attracts more urban or non-farm buyers into the market—an undesirable occurrence if a community is interested in the continuation of agriculture.

The designer of an effective farmland protection program therefore must address the question “How do you define the acreage beneath which division of a tract should not be permitted?” There is no easy answer to this question and there are very few studies to rely on. Zoning regulations apply to individual tracts or groups of contiguous tracts under one ownership, not to entire farms, which may be made up of a number of scattered and rented tracts in addition to a core of contiguous tracts. Therefore, the extensive literature on the economics of farm size is of little direct use in determining the minimum acreage that should be permitted.

A 1984 study of three townships in York County, Pennsylvania, mapped data on the configuration of individual full-time farms to find out, first, how large individual farms were in the area of interest. The researchers then looked more closely at what they termed the “farm core” and the remaining outlying tracts (Coughlin, Keene, and Laarakker 1984). The “farm core,” an entity suitable for zoning regulation, consists of the contiguous tracts that typically include the farmstead, barns, equipment sheds, and other agricultural facilities. Outlying tracts, separated from the core, are sometimes owned by the owner of the farm core, but are often just rented. This classification suggests a new level in land use analysis. Instead of simply identifying the use “farming,” it breaks down farming in a functional way between the farm “core” and the outlying tracts.

The size of the farm core is also particularly relevant to the economics of farming; a minimum amount of contiguous land is necessary in order to mount an efficient farming operation. The farm core is really the economic basis of the farming activity and it is the part of the farm that is the most efficient to operate and has the most permanence. Although it might be possible to constitute a farm with no substantial core, such a farm probably would not be very efficient to operate. Farming of outlying tracts may be necessary in order to reach efficient farm size, but farming them is likely to be inefficient. They are often at scattered locations considerable distances from the core, and of less than optimal field size. In addition, to the extent that the outlying tracts are rented, the configuration would tend to vary from year to year.

## AGRICULTURAL ZONING PROGRAMS

**TABLE 1: Area left for agriculture at full development under the Clarke County, Virginia, sliding scale**

Size class (acres) (1)	Tract size		Area in non-farm dwellings per average-size tract		Area of average-size tract left for agriculture				Total area left for agriculture	
	Average size (2)	Number of development rights (3)	1-acre lots (acres) (4)	2-acre lots (acres) (5)	1-acre lot (acres) (6)	Size (%) (7)	2-acre lot (acres) (8)	Size (%) (9)	1-acre lots (acres) (10)	2-acre lots (acres) (11)
0-14.9	4.2	1 <sup>a</sup>	1	2	0	0	0	0	0	0
15.0-39.9	23.6	2	2	4	22	92	20	83	5,881	5,336
40.0-79.9	51.6	3	3	6	49	94	46	88	8,158	7,655
80.0-129.9	102.7	4	4	8	99	96	95	92	12,338	11,838
130-179.9	142.1	5	5	10	137	96	132	93	10,830	10,435
180-229.9	196.1	6	6	12	190	97	184	94	11,407	11,047
230-279.9	268.3	7	7	14	261	97	254	95	9,147	8,902
280-329.9	302.3	8	8	16	294	97	286	95	4,709	4,581
330-399.9	388.5	9	9	18	380	98	371	95	5,953	5,812
400-499.9	418.7	10	10	20	409	98	399	95	4,904	4,784
500-599.9	552.3	11	11	22	541	98	530	96	2,165	2,121
600-729.9	703.5	12	12	24	692	98	680	97	1,383	1,359
730-859.9	814.0	13	13	26	801	98	788	97	1,602	1,576
860-1029.9	930.0	14	14	28	916	98	902	97	916	902
Total									79,393	76,347

a. Tracts with only one development right are usually not subdivided when built on, therefore none of their land is left for agriculture.  
 Note: Due to rounding, numbers may not check exactly.

Even in a homogeneous farming region, farm cores vary considerably in size. Therefore, if regulations are to be devised to prevent division of land into parcels smaller than a typical farm core, a representative size of core must be identified. The standard, though arbitrary, must be reasonable. The York County researchers chose the lower quartile from the array of all farm cores (of all full-time farms) ranked from largest to smallest. That is, three quarters of all farms in the region had larger cores than the size chosen for protection through regulation. The researchers found that three-quarters of all farm cores were larger than 83 acres in one township, 100 acres in a second township, and 122 acres in a third (Figure 1). On the basis of this information, a general standard of 100 acres was chosen as the limit beneath which division should not be permitted outside of the subdivision process. A Virginia study (Coughlin and Keene 1987) yielded a similar limit.

Recent studies in Oregon have followed a generally similar approach and have arrived at standards of roughly the same magnitude. The Oregon studies for Polk County (Pease 1989) and Yamhill County (Pease 1990) base standards for limiting land division on examination of the size distribution of farm cores classified by important types of farming in the county. Because the best that can be done using Census of Agriculture data to identify farm cores is to obtain a county-wide estimate (by subtracting rented acreage from total land in farms), the Yamhill study turned to site-specific assessment data.

Although these four examples reach generally similar

conclusions on the size beneath which farmland should not be divided, they should not be interpreted as a general standard. The limit is likely to differ from region to region, depending on the type of farming, historic ownership patterns, soil quality, climate, and other factors. Local survey and analysis are recommended.

### *Keep an Adequate Proportion of Land Open*

The second sub-objective of agricultural zoning is to keep open enough land that agriculture remains functionally viable. One of the purposes of area-based allocation zoning, whether it be sliding-scale or fixed, is to provide flexibility in site planning so that a large proportion of land can be kept open. The total amount of land that can be kept open clearly depends on the tract size-class schedule, which is given in the sliding scale ordinance; the minimum (and, where specified, the maximum) allowable lot size, which is also given in the ordinance; and finally, the size distribution of all the tracts existing at the date specified in the ordinance. The size distribution of tracts can be determined from data on the size of each tract available from assessors' records.

Table 1 provides an example of a computation showing how much area will be left for agriculture in Clarke County, Virginia, following full build-out under a sliding scale agricultural zoning ordinance (Coughlin and Keene 1987). The numbers of building rights assigned by the zoning ordinance to tracts in the various size classes are shown in column 3. In addition to requiring a minimum building lot size of one acre (to assure the feasibility of



*An example of development possible under Clarke County's (Virginia) sliding scale agricultural zoning ordinance. Permitted density of development decreases with increase in size of farm property: a 50-acre farm property is allowed 3 non-farm dwellings, a 500-acre property is allowed 11. The dwellings must be built on 1-to-2-acre lots.*

on-site sewage treatment), the Clarke County ordinance specifies a maximum building lot of 2 acres for buildings to be constructed on good agricultural land (to limit the amount of farmland consumed for non-farm uses).

Table 1 shows that the percentage of land left open for agriculture increases with size of tract. Assuming that the maximum building lot of two acres is always used, for a tract of 24 acres, 83 percent would be left open. For tracts of 100 acres, 92 percent would be left open; for tracts of 600 acres, 97 percent. For building lots of one acre, the comparable percentages would be 92, 96, and 98. The percentages in column 7 of Table 1 multiplied by the total acreage in each class yield the total acreage left free for agriculture (columns 10 and 11). Under the two-acre building lot assumption, 76,347 acres, or 86 percent of the total area, are left open; under the one-acre assumption, the area left open is 79,393 acres or 88 percent.

Closely related to the question of how much land would be left open under full build-out is the question "Will the density of dwelling units permitted at full development under agricultural zoning be low enough so that

land use conflicts will be acceptably low for the farmers?" This is a central question in agricultural zoning, because it has been observed repeatedly that normal farm operations and a suburban life style have many points of conflict. An increased level of conflict between farmers and non-farmers makes farming more difficult, fosters an "impermanence syndrome" among farmers, and leads eventually to the dissolution of the agricultural economy.

Research on the acceptable number of non-farm dwelling units is practically nonexistent. The 1984 York County study approached the question in two different ways. One was through a questionnaire mailed to all farm operators in the three townships. Two-thirds of the respondents said that no more than three non-farm dwelling units per 100 acres (that is, one non-farm dwelling per 33 acres) should be permitted: they felt that beyond this density it would be very difficult for them to continue farming.

In order to introduce spatial considerations more explicitly, the York County researchers prepared three maps—one showing a development pattern of 1.7 dwelling units per 100 acres, a second showing 2.5 dwelling



units per 100 acres, and a third showing 5 dwelling units per 100 acres. These maps were placed before small groups of farmers in two of the townships. In one township, farmers said that they could continue farming in a situation depicted by the map showing a density of 2.5 non-farm dwellings per 100 acres and possibly in the depicted situation with 5 dwellings per 100 acres. These densities correspond to one non-farm dwelling unit for 40 and 20 acres, respectively. In the other township, after discussing the maps, the farmers concluded that between 2 and 2.5 non-farm dwelling units per 100 acres is all that should be permitted. Beyond that, they said, farming would become too difficult. This density corresponds to one non-farm dwelling unit per 40 or 50 acres. Studies such as these should be replicated widely to determine the extent to which farmers agree on how much non-farm development they believe they can co-exist with.

### **Guard Against Other Legal Challenges and Ensure Political Acceptability**

Another major objective in designing land use controls is permitting enough development to guard against court challenges and to satisfy voters that the regulations are not too restrictive. Typically, legal challengers argue that the controls constitute a taking without just compensation or that they constitute exclusionary zoning (see Keene 1984 for a summary of the legal tests an agricultural zoning ordinance should meet). Here it is necessary to operate somewhat intuitively.

The courts have not provided any clear guidance as to how large the reduction in value must be to constitute a taking, although they have indicated that a very large reduction would be acceptable to the courts as long as the zoning's public purpose was clear and the way the zoning was crafted to achieve that purpose was also clear. It is certain, however, that a reasonable amount of development must be permitted, particularly on tracts that are too small to be ideal for farming or that have otherwise moved out of the rural land market.

The requirement that agricultural zoning not constitute exclusionary zoning may be an issue wherever the jurisdiction is in the path of urban development—precisely where the zoning is important to protect farmland. This requirement can be met by zoning for small lot sizes in other districts in the jurisdiction.

In designing the ordinance to satisfy the voters that the regulations are not too restrictive, it is important to note that the owners of smaller tracts tend to have development in mind more than do the owners of larger tracts, because smaller tracts are worth more per acre and are less useful for agriculture. It is also important to note, as a policy issue, that the owners of small tracts are likely to outnumber the owners of large tracts significantly, and also that those small tracts make up a very small proportion of the total area. Politically speaking, these owners are the people who must be allowed enough development that they will be satisfied with the zoning proposal. In fact, considerable development may be al-

lowed on their limited lands while still keeping large areas in open uses and suited for agriculture. These are the kinds of issues that planners have to face if they are going to institute what seems to be the most propitious way to protect agricultural land on any large scale in this country.

### **Evaluating Agricultural Zoning Programs**

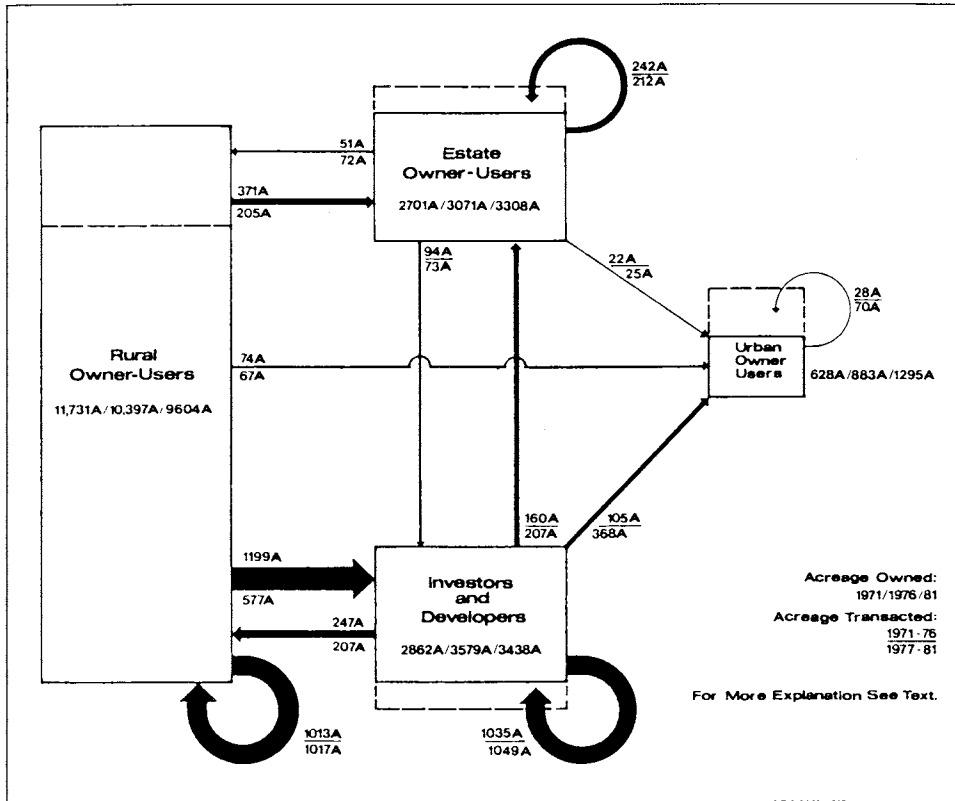
A convincing evaluation of the effectiveness of agricultural zoning is not easy to carry out, and few researchers have attempted it (Daniels 1989). The fact that conversions to non-farm uses do not occur after the institution of agricultural zoning does not, in itself, prove that the zoning is effective. If farmland owners do not have the desire or opportunity to sell their land for conversion to non-farm uses, conversions will not occur, whether or not an agricultural zoning ordinance is in place. It is necessary to look more deeply to determine the effectiveness of the regulations.

A critical factor to examine is the pattern of land ownership. Information on ownership is crucial because the decision to develop occurs long before the bulldozer is seen on the land. Incentive programs may work well with farm owners who intend to stay in farming, but they can easily simply provide a windfall to those investor landowners who are looking forward only to the day when they can develop. It is important, therefore, to institute agricultural zoning programs early on, when the expectations of the owners are for a continuation of the land in agriculture. If this expectation can be bolstered by incentives and regulations, it is likely that a firm base can be built for the continuation of agriculture. If a locality waits too long, and the ownership begins to change, it becomes much harder, perhaps impossible, to institute zoning and other regulatory programs. Then the only program possible is the purchase of development rights, and by that time the cost of those rights will have become very high.

Data on ownership are not easy to get. Records at the county court house will provide names and addresses of landowners, but they will not tell whether Mr. Jones is a farmer, an estate owner, an investor in land, a developer, or a builder. Such information can still be obtained, however, at least in certain jurisdictions. In one study it proved possible to trace every sale of tracts of five acres or more over a ten-year period in a semi-rural township, Shrewsbury Township in York County, Pennsylvania (Coughlin 1985). There, the zoning officer (who had been responsible for the township for about 15 years) and other members of the township government were able to classify every seller and every buyer over the ten-year period as either a rural owner-user (primarily farmers), an estate owner, an investor, a developer, or an urban owner-user.

The process of change among owner types in Shrewsbury Township is shown in Figure 2, which shows both stocks and flows of land. Stocks of land—the amounts owned at given dates by each user type—are proportional





**FIGURE 2: Flow chart of acreage transferred among generalized user types, Shrewsbury Township, 1971-76 and 1977-81.<sup>6</sup>**

to the areas of the rectangles. Solid lines constituting rectangles refer to 1972; broken lines refer to 1981. The actual acreages are given for the three years 1972, 1976, and 1981 in the following format: 1972 acreage/1976 acreage/1981 acreage. The flows of land ownership among owner types are indicated by arrows whose widths are roughly proportional to the averages of the 1972-76 and 1977-81 flows. The numbers of acres transferred in each period are shown as common fractions, with the numerator referring to 1972-76 and the denominator to 1977-81.

Figure 2 shows a major flow of ownership in these two periods from rural owner-users to investors and developers, and the strong, but much smaller, flow from rural owner-users to estate owners and from investors and developers to estate owners and urban owner-users. To be noted also is the perhaps unexpected flow from investors and developers to rural owner-users. This flow indicates that the dominant movement from rural owner-users to investors and developers is not entirely one-way.

Because Shrewsbury Township adopted agricultural zoning in 1976, more detailed data for the two time periods depicted in Figure 2 can be used to evaluate the effectiveness of its ordinance (Table 2). During the five years before the sliding scale agricultural zoning ordinance was adopted, rural owner-users in the agricultural district sold 1,138 acres to investors and developers; in the five years after adoption, they sold only 339 acres. In contrast, before adoption, rural owner-users outside

of the agricultural district sold only 61 acres to investors and developers, and in the period following adoption their sales to investors and developers increased to 238 acres. The shift is even more apparent when expressed in relation to the original stocks of land owned inside and outside of the agricultural district at the beginning of each time period (see Table 2).

Clearly, investors and developers concluded that the zoning in Shrewsbury Township could not be changed easily to permit development and that it would prove to

**TABLE 2: Land sold by rural owner-users to investors and developers<sup>6</sup>**

	Before agricultural zoning (1972-76)	After agricultural zoning (1977-81)	Difference
<b>Acres sold</b>			
Land in agricultural district <sup>a</sup>	1,138	339	-799
Land not in agricultural district <sup>b</sup>	61	238	+177
<b>Acres sold in percentage of original stock at beginning of each period</b>			
Land in agricultural district <sup>a</sup>	11.3	3.8	-7.5
Land not in agricultural district <sup>b</sup>	3.6	15.8	+12.2

a. Land owned by rural owner-users and located in the geographic area included in the agricultural district as delineated by the zoning ordinance enacted in November 1976.  
 b. Land owned by rural owner-users and located outside the agricultural district.

be relatively permanent. As a result, in buying land for eventual development, they turned their attention away from the agricultural district and toward the remainder of the township. This information on land ownership, and implied intention of use, demonstrates that the adoption of agricultural zoning significantly reduced the flow of land in the agricultural district from owners who generally intend to keep it in rural use to owners whose ultimate intention is development.

Despite the strong findings in the Shrewsbury study, the long-standing contention that zoning is easily and regularly changed when development pressures rise remains a substantial argument that agricultural zoning, like other types of zoning, will not prove to be permanent. But, for several reasons, agricultural zoning is less likely than other types of zoning to be changed to allow development. First, the public purpose it serves is different from that of most other zoning. While most zoning is intended primarily to guide the orderly development of land, agricultural zoning is intended to provide permanent protection to a valuable natural resource. Therefore, to change agricultural zoning to permit development would be to abrogate the public purpose for which it was instituted.

Second, in well-designed programs, agricultural zoning is supported by other programs and policies that strengthen the economic viability of farming the zoned land. If the farmers in the zoned area can continue to farm profitably and with minimal conflict from non-farm uses they will have less incentive to seek zoning changes, and the courts will be less likely to sustain a challenge to the zoning, than if farming becomes difficult or impossible. An array of incentives designed to offset added costs and conflicts brought about by nearby urbanization can put farmers in the urban fringe in a competitive position with farmers far away from the threats of urbanization. Often these incentives, including differential assessment for property tax purposes, "right-to-farm" protection, limitations on special assessments for construction of utilities and other facilities, and restrictions on the location of public facilities in farming areas, are provided under the umbrella of agricultural districting (Coughlin, Keene, et al. 1981).

Finally, agricultural zoning by local government is greatly strengthened if local government officials are not acting alone, but instead are answerable to state legislation. An example of such legislation is Oregon's Land Use Act, which requires local government officials to protect agricultural land. In such a system, these officials are protected against local political pressures to weaken agricultural zoning from landowners eager to share in profits from land development. Needless to say, the long-run effectiveness of agricultural zoning is also greatly enhanced by growth management programs that not only discourage development in or near agricultural areas, but also facilitate development in other areas where public facilities are provided, development incentives are made available, and the development approval process is expedited.

NOTES

1. *Wilson v. County of McHenry*, 416 N.E.2d 426 (Ill. App. 1981); *Hopewell Twp. Bd. of Supervisors v. Golla*, 452 A.2d 1337 (Pa. 1982); *Grand Land Co. v. Township of Bethlehem*, 483 A.2d 818 (N.J. App. Div. 1984).
2. *Gisler v. County of Madera*, 112 Cal. Rptr. 919 (Cal. App. 1974); *Joyce v. City of Portland*, 24 Or. App. 689, 546 P.2d 1000 (1976); *Grand Land Co. v. Township of Bethlehem* 483 A.2d 818 (N.J. App. Div. 1984); *Cordorus Twp. v. Rogers*, 492 A.2d 73 (Pa. Commw. 1985); *City Nat'l. Bank v. County of Kendall*, 489 N.E.2d 486 (Ill. App. 1986); *Petersen v. Dane County*, 402 N.W.2d (Wis. App. 1987); *Gardner v. N.J. Pinelands Commission*, 547 A.2d 725 (N.J. Ch. Div. 1988).
3. *Boundary Drive Associates v. Shrewsbury Twp. Bd. of Supervisors*, 491 A.2d 86 (Pa. 1985).
4. *Nollan v. California Coastal Commission*, 107 S.Ct. 3141 (1987).
5. The Important Farmlands classification system was incorporated into the federal Farmland Protection Policy Act of December 1981 (PL 97-98). It is expressed as Soil Conservation Service policy in the U.S. Secretary of Agriculture's Memorandum 9500-2, Statement on Land Use Policy in March 1982.
6. Source: Robert E. Coughlin, "Land Ownership, Use, and Regulation: A Case Study Analysis of a Township in the Early Stages of Urban Development." *Landscape Planning* 12 (1985): 132.

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**Erratum**

In the article "Planning and Chaos Theory," by T. J. Cartwright, which appeared in the Winter 1991 issue of the *Journal* (57, 1: 44-56), the work *Public Policymaking Reexamined* (Chandler, 1968) was cited incorrectly, through an editor's error. The author of the work was shown as D. S. Dendrinis. The correct author is Yehezkel Dror. The editors apologize to all authors concerned.