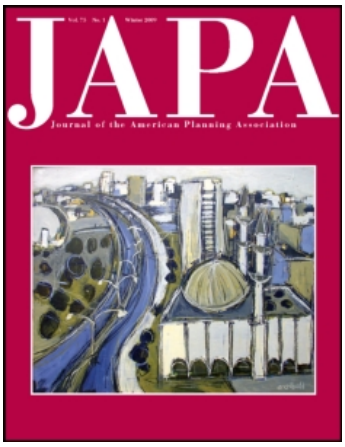

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Preserving Prime Farmland in the Face of Urbanization

Lessons from Oregon

Arthur C. Nelson

This article combines theory and a literature review with empirical and descriptive findings to demonstrate that Oregon's mix of policies is effective in preserving prime farmland in the face of urbanization. Exclusive farm use zones preserve farmland for farming; urban growth boundaries limit urban sprawl; exurban districts accommodate the demand for rural residential development without harming commercial farm operations; farm tax deferral and right-to-farm laws create incentives for farmers to keep farming; and comprehensive plans legitimize the entire package. This article proposes a comprehensive scheme for farmland preservation that expands on the experience of Oregon, including its mistakes.

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Only a mix of policies mandated at the state level and implemented by local governments is effective in preserving resource land. Oregon's statewide land use planning program—developed over more than twenty years—exemplifies that mix. This article first reviews the reasons for farmland preservation near urban areas and then the economic impacts of urbanization on farmland. It examines the effectiveness of various farmland preservation policies. The article then describes Oregon's mixed approach to farmland preservation and offers empirical and descriptive evidence of its effectiveness. The article concludes with generalizable lessons for planning policy.

Why Preserve Farmland?

There are three general motivations for preserving prime farmland. First, prime farmland near urban areas is needed for the production of truck and specialty crops (Berry 1978; Sinclair 1967; Zeimetz et al. 1976; Volkman 1987). While some argue that there is no need to preserve farmland near urban areas because there is plenty elsewhere, only about 48 million acres of prime farmland (Soil Capability Class I and II) out of a total of about 250 million acres of cultivated prime farmland (Vining, Plaut, and Bieri 1977) are within fifty miles of the one hundred largest urbanized areas (Furuseth and Pierce 1982). Most prime farmland is located within the suburban and exurban counties of metropolitan areas (Nelson 1990b). Farmland that is most important for its location and productive qualities is also valuable for development (Solomon 1984). Urbanization of prime farmland is presently compensated for by putting lower quality, marginal land into production at greater economic and environmental cost (Platt 1985).

The second purpose of prime farmland preservation is the provision of certain public goods such as flood absorption, air cleansing, and water filtration. The third purpose is open space protection and giving spatial definition to urban areas (Rose 1984). Indeed, it is easy to conclude that the primary motivation behind farmland preservation is open-space preservation.

The Economic Effects of Urbanization on Farmland Value

Some argue that an unregulated land market would result in the most efficient use of land because property owners are best able to determine the appropriate use of their land. This is true only if owners face up to all their marginal social costs. But markets do not operate in an ideal way and so they are imperfect. The purpose of government intervention in the market is to offset many conditions causing inefficiencies (Lee 1979). Interventions can create a complex web that balances public interests with principles of efficiency. But intervention, in the form of economic incentives and disincentives, can sometimes unwittingly cause greater inefficiencies. Examples include underpriced urban facilities and highways

and tax incentives that induce people into buying larger homes on more land than they would without the inducements.

Ironically, land use regulation often aims to correct inefficiencies caused by other public policies.[1] In the absence of market intervention and given the considerable subsidies allocated to urban development relative to those to agricultural production, farmland near urban areas is likely to be overvalued for urban uses and undervalued for agricultural uses. When the land market internalizes those economic advantages into higher values, land is made more valuable for urban uses than would be the case otherwise.[2] This can lead to inefficient speculation of farmland for eventual conversion to urban development.

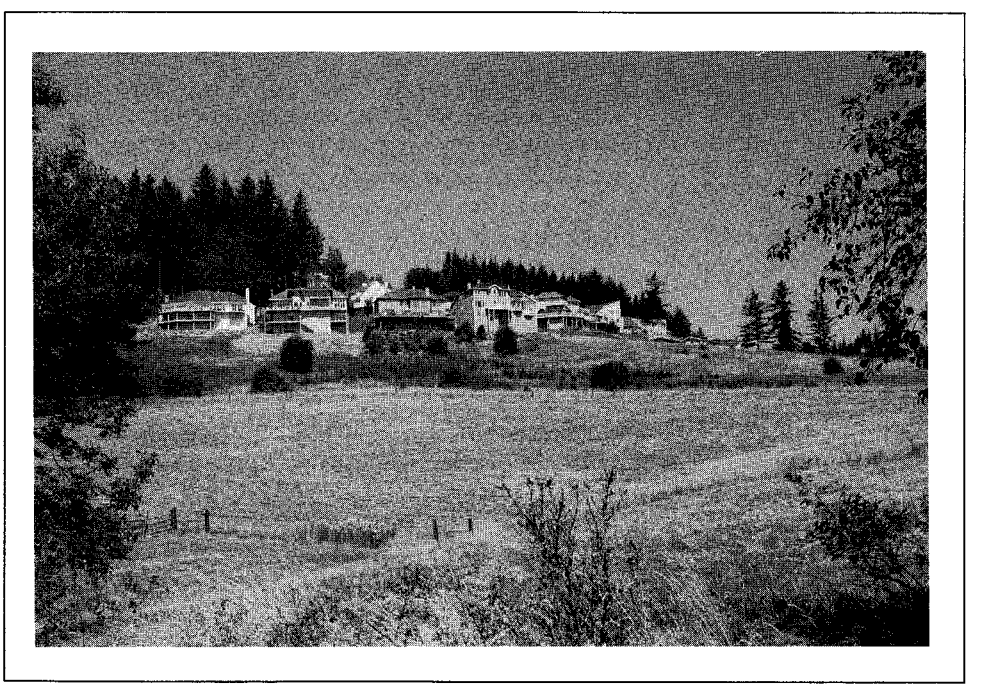
Undervaluation of farmland is also caused when urban development imposes spillovers on nearby farmland. Five common spillover effects are:

- Regulation of farming activities deemed to be nuisances by nonfarm residents in rural areas, including restrictions on fertilizers, manure disposal, smells, and slow-moving farm vehicles on commuter roads; limitations on use of pesticides and herbicides; restrictions on farm noises and hours of operation; restrictions on dust and glare; limitations on irrigation; and restrictions on other activities that may upset the lifestyle of suburban residents (Berry 1978).
- Increased property taxation to pay for schools, roads, services, and facilities intended to serve new residents (Keene et al. 1975).[3]
- Air pollution damage to crops caused by automobiles, industrial activity, and even residential space heating (Prestbo 1975).
- Destruction of crops or equipment or harassment of farm animals by residents of developments in rural areas, and theft of tree crops, berries, and vegetables (Berry, Leonardo, and Bieri 1976).
- Use of eminent domain to acquire at relatively low cost farmland for public uses serving primarily new residential development (Berry and Plaut 1978).

Spillovers reduce the productivity of farmland, thereby making it less valuable for farming and more attractive for speculation. The result of speculation induced by some public policies and by spillovers is that the productive use value of farmland falls the closer it is to urban and other nonfarm development (Sinclair 1967; Boal 1970; Rosser 1978; Nelson 1986a; Meier 1988).

Figure 1 traces several components of farmland value.[4] Raw land value, R_{raw}, is upward sloping to a point to account for the spillover effects that urban development has on farming. The line R_{inv} shows that the higher the investment in land, the more productive farmland is and the more valuable it is for farming. The line is upward sloping with respect to distance from urban development because of spillover effects. The line R_{farm} reflects the total value of farmland. The purpose of farmland preservation policies is to maintain, if not increase, productive value. As the raw value of farmland is fixed with respect to distance from urban development, productive value increases only by investment. Farmland preservation policies are effective only if they result in an increase in farmland investment.

Consumptive value of farmland is sometimes confused with speculative value. Consumptive value, shown as line R_{home}, is the value of farmland if it were "consumed" for nonfarm purposes (Pope 1985). No distinction is made



Urban development is contained by the regional urban growth boundary. The foreground is underutilized farmland within the shadow of urban spillovers.

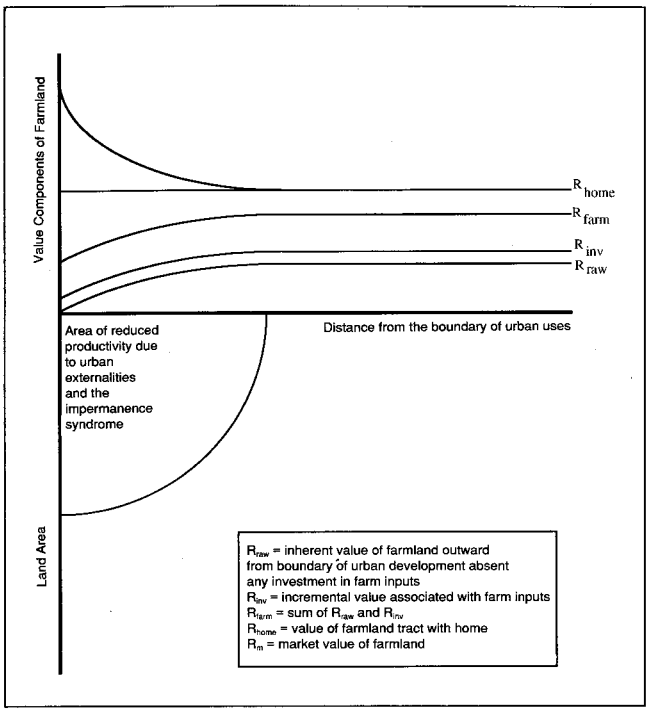


FIGURE 1: Effect of urban development on farmland value.

between the single homesite and subdivision potential values. Every farmland tract with a home has a consumptive value component. Consumptive value is the incremental value of a farmland tract as a single homesite, assuming no further partitioning of the tract can occur.

The difference between R_m and R_{farm} is speculative value. It includes a component called "inefficient speculation," which is the difference between R_m and R_{home}. It arises from distortions created by policies and market imperfections that overvalue land for urban uses and undervalue land for agriculture uses. In the absence of subsidies and urban spillovers, land is more efficiently allocated for farm and urban uses. In Figure 2, the efficient allocation of land occurs where U_1 and R_1 intersect. Land to the left of Q_1 is put to urban uses and land to the right is put to resource uses. The value of land for urban uses increases to U_2, because of subsidies for development, while the value of land for resource uses decreases to R_2 because of urban spillovers. The new equilibrium of land allocation is Q_2. Inefficient allocation of land for urban uses is the difference between Q_1 and Q_2. One aim of planning to preserve farmland in the path of urbanization is to restore the original equilibrium. To be effective, farmland preservation policies must not only eliminate inefficient speculative value, but speculative value that is efficient but for distortions. If speculative value is eliminated, farmland would remain in productive farm use.

There is one more dynamic at work that places farmland in the face of urbanization at a disadvantage. This is the "impermanence syndrome" (Keene et al. 1975; Currier 1978), characterized by the belief among farmers that agriculture in their area has limited or no future and that urbanization will absorb the farm in the not-too-distant future. It is manifested by disinvestment in farming inputs, sale of farmland tracts for hobby farm or acreage development, and shifting of crops from those requiring labor or capital intensity, such as berries and orchards, to those requiring little labor or investment, such as pasture or annual crops. The result can be vast areas of underutilized and idled land near and between urban areas (Gottmann 1961; Berry 1976; Vining, Bieri, and Strauss 1977). It seems that for every acre of prime farmland that is urbanized, up to another acre becomes idled due to the impermanence syndrome (Plaut 1976). When farmers become uncertain about the future viability of agriculture in their area, farmland production falls and so does farming income. Ultimately, the critical mass of farming production needed to sustain the local farming economy collapses (Berry 1976; Daniels and Nelson 1986; Daniels 1986; Lapping and FitzSimmons 1982). The ultimate purpose of a farmland preservation scheme, in the opinion of several researchers, is to remove the impermanence syndrome (Plaut 1976; Berry, Leonardo, Bieri 1976; Berry 1978; NALS 1981; Nelson 1984; 1986a). This occurs only when all speculation for nonfarm purposes is removed.

The Effectiveness of Common Preservation Techniques

Every state has farmland preservation policies. Effective preservation policies, however, must influence the land market in four ways. First, they must increase the productive value of farmland. Second, they must stabilize, reduce, or eliminate consumptive value (value of farmland tracts as a single homesite). Third, they must eliminate inefficient speculative value of farmland, which can happen only if speculative value attributed to urban spillovers, inefficient urban development subsidies, and undervaluation of the public goods provision of resource land, is offset. Fourth, they must eliminate the impermanence syndrome. This is accomplished when the first three objectives are met. Most farmland preservation techniques are ineffective and many have perverse effects. This section reviews why.[5]

Property Tax Relief

When farmland is assessed property taxes to pay for urban services and education mostly benefiting urban residents, farmers bear more than their equitable burden of the tax and they are pushed into developing their land prematurely (Forkenbrock and Fisher 1983). Property tax relief programs reduce the property taxes that farmers would have to pay. To prevent farmers from taking speculative advantage of those programs, most states assess a penalty equal to some of the taxes saved if the farmland tract is developed. No state requires full payback. Many charge no interest or limit the payback period from two

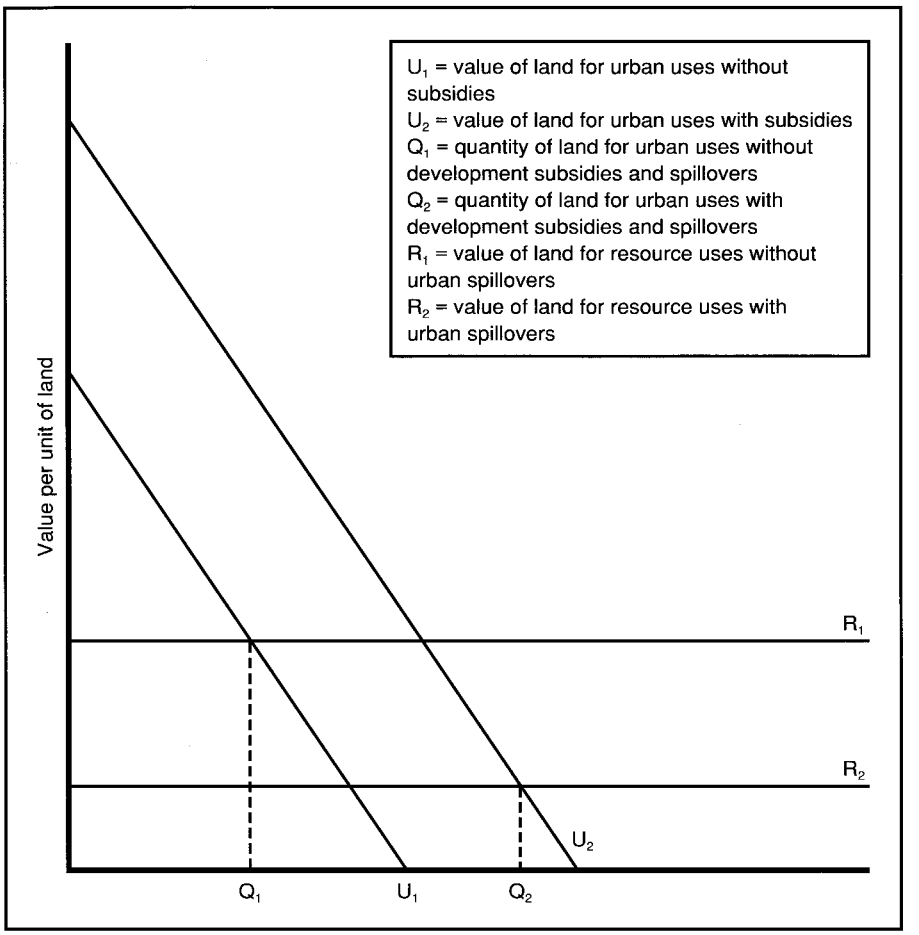


FIGURE 2: Absorption of greater agricultural land area for urban uses because of urban development subsidies and urban spillovers.

to five years. Owners of farmland actually use these programs to speculate, because they never pay 100 percent of the potential payback penalty. These programs have the tendency to induce urban sprawl.[6] In practice, all property tax relief programs create or raise speculative value by distorting land value. All extend the impermanence syndrome farther into the landscape by subsidizing the holding costs of inefficient speculation or turning farmers into speculators.

Right-to-Farm Laws

Suits and the threat of suits can threaten viable commercial farming (Hagman and Juergensmeyer 1987). Right-to-farm laws prevent urban residents from filing nuisance complaints against farmers.[7] All states have right-to-farm laws. At best, they give short-term protection to farmers at the urban-rural fringe. But a farmer could win all the legal battles in court only to lose the proverbial war to expense and wariness. Moreover, the law of trespass has so evolved as to potentially undermine right-to-farm legislation altogether (Leutwiler 1986; Bradbury 1986). The problem is that farmers and urban residents do not coexist. Right-to-farm laws are not likely to be effective in preserving farmland in the long term (Leutwiler 1986; Hagman and Juergensmeyer 1987; Lapping and Leutwiler 1987; Rose 1984; Bradbury 1986; Nelson 1990a).[8]

Acquisition of Development Rights

Some tout transfer of development rights (TDR) and purchase of development rights (PDR) programs as the most effective means of preserving farmland (Rose 1984; NALS 1981; Berry and Plaut 1978). TDR programs, which transfer development to urban areas, preserve farmland at no direct cost to taxpayers. The problem is that the owners of farmland most distant from urban areas are most likely to participate while owners of farmland closest to urban areas anticipate eventual windfalls from development and do not participate. TDR programs do not assure maintenance of the critical mass of farmland needed to sustain the long-term viability of the local farm economy (Lapping and FitzSimmons 1982). Moreover, TDR programs are randomly applied and, thus, do not prevent the scattered subdivision of farmland tracts. Yet, a regional farming economy can be so disrupted by scattered development on land not in PDR programs that it can no longer support the necessary farming infrastructure (Furuseth 1980; 1981; Furuseth and Pierce 1982;

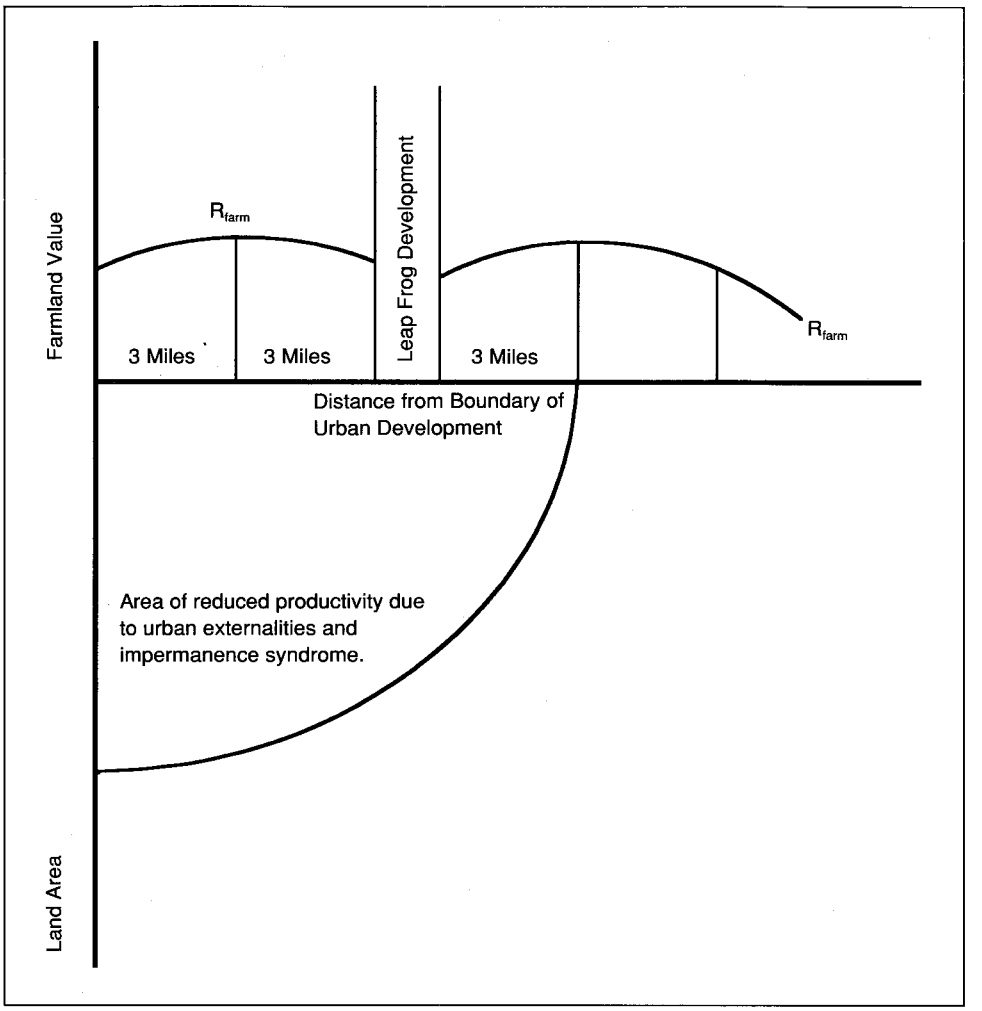


FIGURE 3: Effect of urban sprawl on the productivity of farmland and the impermanence syndrome.

Gustafson, Daniels, and Shirack 1982; Nelson 1983a; 1983b; Daniels and Nelson 1986; Daniels 1986).[9]

PDR programs involve local government purchase of development rights. Taxpayers retire general obligations bonds used to make these purchases to assure the permanent preservation of farmland.[10] Most tracts from which rights are purchased retain single homesite rights or rights in multiples of acres through minimum lot size zoning. Near urban areas, farming districts created by PDR programs can become attractive to affluent households more interested in open space and privacy than in farming (Nelson and Dueker 1989). The preservation of the critical mass of productive farmland is not assured. Moreover, taxpayers pay twice for those rights: once for the infrastructure that creates development value and again for the development value created by infrastructure. Shrewd speculators buy farmland in the path of urban development and then sell development rights at a later time. There are, thus, serious theoretical, practical, equity, and legal problems associated with PDR programs.

At their best, TDR and PDR programs are effective open space measures. At their worst, they are expensive, do not necessarily preserve the local farming economy, and can turn farmland regions into exclusive enclaves of affluent estate holders, while destroying productive farming.

Agricultural Zoning

Agricultural zoning restricts land uses to farming and other kinds of open space activity. It limits subdivision and home construction. It is sometimes used in tandem with regional urban containment planning (Nelson 1985). There are two types of agricultural zoning: nonexclusive and exclusive.

Nonexclusive agricultural zoning restricts lot sizes in agricultural areas from 1 to 160 acres.[11] The higher the density the lower the effectiveness of the minimum lot size approach to preservation. Minimum lot sizing at up to forty-acre densities merely causes rural sprawl—a more insidious form of urban sprawl.[12] However, Napa

County, California, uses 160-acre minimum lot size zoning, coupled with very strict review of building permits in agricultural areas. Perhaps low-density coupled with development review can be effective. Unless very high minimum lot size restrictions are imposed, however, nonexclusive agricultural zoning does little to prevent the development of farmland in the long term. It also does little to increase productive value, but can lead to increasing consumptive and speculative value by stimulating scattered, low-density urban sprawl into the countryside.

Figure 3 shows the effect of urban sprawl on the productivity of farmland. When development leaps over farmland or occurs along corridors bounded on either side by farmland, vastly more farmland is removed from production. Regional farmland productivity declines and the impermanence syndrome is extended deep into the landscape. In this example, the impermanence syndrome would only extend three miles from the boundary of urban development were it not for leapfrog development (Nelson 1986a). Leapfrog development, however, extends the impermanence syndrome nine miles. Leapfrog and radial development can be stimulated by well-meaning farmland preservation policies that distort speculative and development behavior.

Together with property tax relief, minimum lot size zoning can result in pushing the impermanence syndrome farther into the landscape by forcing urban residents to purchase larger tracts than they want or can manage (Fuller and Mage 1975; Archer 1977; Berry, Leonardo, and Bieri 1976; Nelson 1983a; 1983b; 1986a). Voluntary agricultural districting, which combines some of the elements of tax relief programs and of nonexclusive agricultural zoning, provokes similar effects.

Exclusive farm use zoning prevents nonfarm activities in farming districts. True exclusive farm use zoning requires that farmland be devoted to commercial production. Nonetheless, exclusive farm use zoning can also extend the impermanence syndrome by forcing urban residents to purchase farms larger than they want or can manage. This is countered only when all prime farmland is made subject to exclusive farm use zoning and urban households are funneled away from areas explicitly set aside for nonexclusive farming uses.

The Oregon Approach

Oregon's statewide land use planning program is primarily intended to preserve prime farmland in the Willamette Valley, the state's most heavily urbanized area. The valley stretches one hundred miles north to south and about forty miles east to west. With only 10 percent of the state's land base, one-third of the state's entire supply of prime farmland is found there. It produces about 40 percent of the state's agricultural goods and is home to more than two million of the state's three million people. While Oregon's farmland preservation policies affect the entire state, this evaluation of policy effectiveness primarily focuses on the Willamette Valley.

Instead of relying on one principal technique, Oregon's farmland preservation policies work as a package, which includes exclusive agricultural districts, urban growth boundaries, restrictions on development of exurban districts, and, of lesser importance, farm use tax deferral and right-to-farm provisions. Comprehensive plans legitimize the entire scheme (Daniels and Nelson 1986). The result is a regulated landscape where land is explicitly allocated and restricted to specific uses (Knaap and Nelson 1992). Of the state's 61.6 million acres of land, 55 percent is publicly owned, 2 million acres are contained in urban growth boundaries, and 25.8 million acres are restricted to resource, exception, and other rural uses. Only slightly more than 3 percent of all privately owned land is set aside for hobby farming, ranchettes, or other nonresource uses outside urban growth boundaries, and another 3.3 percent is contained within urban growth boundaries. Table 1 illustrates the distribution of land use designations in Oregon.[13]

Oregon's preservation package centers on statewide planning Goal 3, which conveys Oregon's intent to preserve farmland:

> Agricultural lands shall be preserved and maintained for farm use, consistent with existing and future needs for agricultural products, forest, and open space. These lands shall be inventoried and preserved by exclusive farm use zones. . . . Conversion of rural agricultural land to urbanizable lands shall be based upon consideration of the following factors: (1) environmental, energy, social, and economic consequences; (2) demonstrated need consistent with LCDC [Land Conservation and Development Commission] goals; (3) unavailability of an alternative suitable location for the requested

TABLE 1: Distribution of land use designations in Oregon, 1986

Land use category	Acres[a]	% all land	% privately owned land
Total land area	61,587	100.00	
Publicly owned	33,750	54.80	
Privately owned	27,837	45.20	100.00
Inside UGBs	2,048	3.33	7.36
Outside UGBs	25,789	41.87	92.64
Exclusive farm use	16,036	26.04	57.61
Primary forest use	8,771	14.24	31.51
Rural residential	710	1.15	2.55
Commercial	10	0.02	0.04
Industrial	46	0.07	0.17
Rural service centers	29	0.05	0.10
Other	189	0.31	0.69

a. Figures rounded to nearest 1,000 acres.
Source: Adapted from Department of Land Conservation and Development 1986.

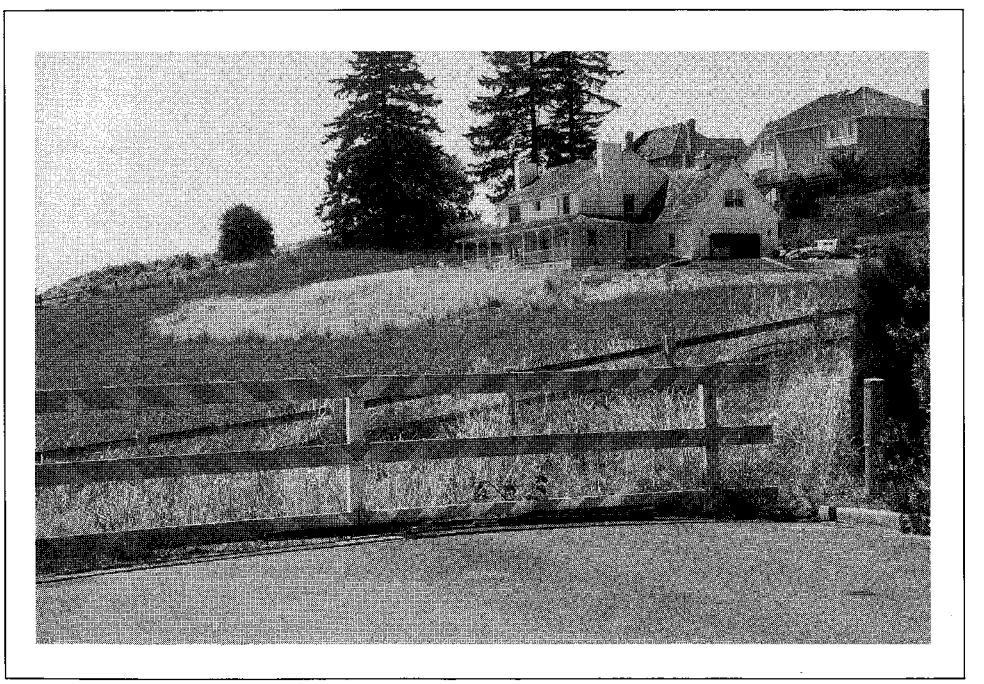
> use; (4) compatibility of the proposed use with related agricultural land; and (5) the retention of (Soil Conservation Service–determined) Class I, II, III, and IV soils in farm use. A governing body proposing to convert rural agricultural land to urbanizable land shall follow the procedures and requirements ... for goal exceptions (LCDC 1990, 5).

The policy is administered by the Land Conservation and Development Commission (LCDC), a seven member gubernatorially appointed board and its staff, the Department of Land Conservation and Development (DLCD). All prime agricultural and related land is placed in exclusive farm use (EFU) districts. This land is restricted to farm use unless the impracticability of doing so can be demonstrated in a quasi-judicial proceeding.

Preserving farmland evolved in Oregon from a minimum lot size approach to performance zoning. At first, the LCDC allowed local governments to establish minimum lot size districts to limit parcelization and home construction to large lots. Some eastern Oregon counties created 320-acre minimum lot size districts. Some western Oregon counties attempted five-acre minimums, but most settled on twenty- to forty-acre minimums. This approach, while it prohibited nonfarm uses in theory, did not clearly define acceptable uses. The approach failed largely because many counties attempted to gain the smallest minimums acceptable to LCDC. Owners divided farms and sold the parcels as hobby farms or very large suburban lots. Many critics viewed the minimum lot size restrictions as resulting in worse land use patterns, because they created rural sprawl and the loss of many times more prime farmland than would have resulted from an unrestricted land market (Archer 1977; Nelson 1983a; 1983b; 1990a; Daniels and Nelson 1986). Thus, during the 1980s, the LCDC required counties to create performance-based exclusive farm use (EFU) districts with no minimum lot sizes. Now, the only way to secure a subdivision or home construction approval on such land is to prove in a quasi-judicial setting that the change would improve agricultural production.

In theory, all land outside UGBs is preserved for resource uses. But this is impractical, because some rural land is already built on or committed to nonfarm uses and cannot be converted back to resource use. Other lands simply have soils too poor to sustain reasonable resource practices. Oregon, thus, devised an "exception" category for some rural land.[14]

Oregon's effort to preserve prime farmland is aimed primarily at preventing the occupation of those lands by hobby farmers.[15] "Rural residential areas" are used to attract hobby farmers away from prime farmland. An outgrowth of the exception process, this is an important but often overlooked component of Oregon's farmland preservation program (Gustafson, Daniels, and Shirack 1982).[16] Counties have set aside more than 300,000 acres within the Willamette Valley for rural residential—often called "exurban"—development. Statewide, more than 700,000 acres are set aside for exurban uses. Exurban districts are well suited for hobby farms since their soil is of lower quality and they are situated away from commercial farming areas.



The barricade marks the UGB. Before the boundary was finalized the road was to continue up the hill to a completed subdivision. For two years hobby farmers fought, but lost against a corrected UGB to accommodate subdivision build-out.

Empirical Evidence of Effectiveness

Is Oregon's approach effective in eliminating speculative use value, limiting consumptive use value, sustaining the critical mass of farmland needed to support the regional agricultural economy, and increasing the productive value of farmland? The regional land market can be evaluated to answer these questions (Nelson 1986a).

Urban growth boundaries, exclusive farm use restrictions, and restricted exurban development policies must effect the outcomes shown on Figure 4. First, the regional demand for land to be used for urban purposes must be shifted from rural land to areas contained within urban growth boundaries to the left of U_1 and to exurban enclaves to the right of U_2. The value of land must shift from R_m to R_p, resulting in an increase in the value of urban and exurban land, but a decrease in the value of farmland. Second, because farmland provides nearby urban and exurban land with scenery, privacy, and other benefits, there is an amenity value increment to urban and exurban land, shown as R_a from U_a to U_1 and from U_d to U_2, respectively. Third, because urban and exurban land impose spillovers, or disamenities, on farmland, resulting in reduced productivity along the urban and exurban boundaries, farmland value falls by the increment R_d from U_1 to U_b and from U_2 to U_c, respectively.

With Portland and Salem, Oregon, as the laboratories, the combination of UGBs and EFU districts indeed shifted the demand for urban land to areas inside UGBs. This resulted in higher urban values and lower farmland values (Knaap 1982; 1985; Nelson 1984; 1985; 1986a; Knaap and Nelson 1988). Exurban land values also shifted upward (Nelson 1984; 1986a; 1986b). These studies show that farmland preservation policies, in combination with urban and exurban containment policies of the sort used in Oregon, are effective in realizing the first objective of farmland preservation: shifting regional demand for urban and exurban development away from prime farmland and into targeted areas.

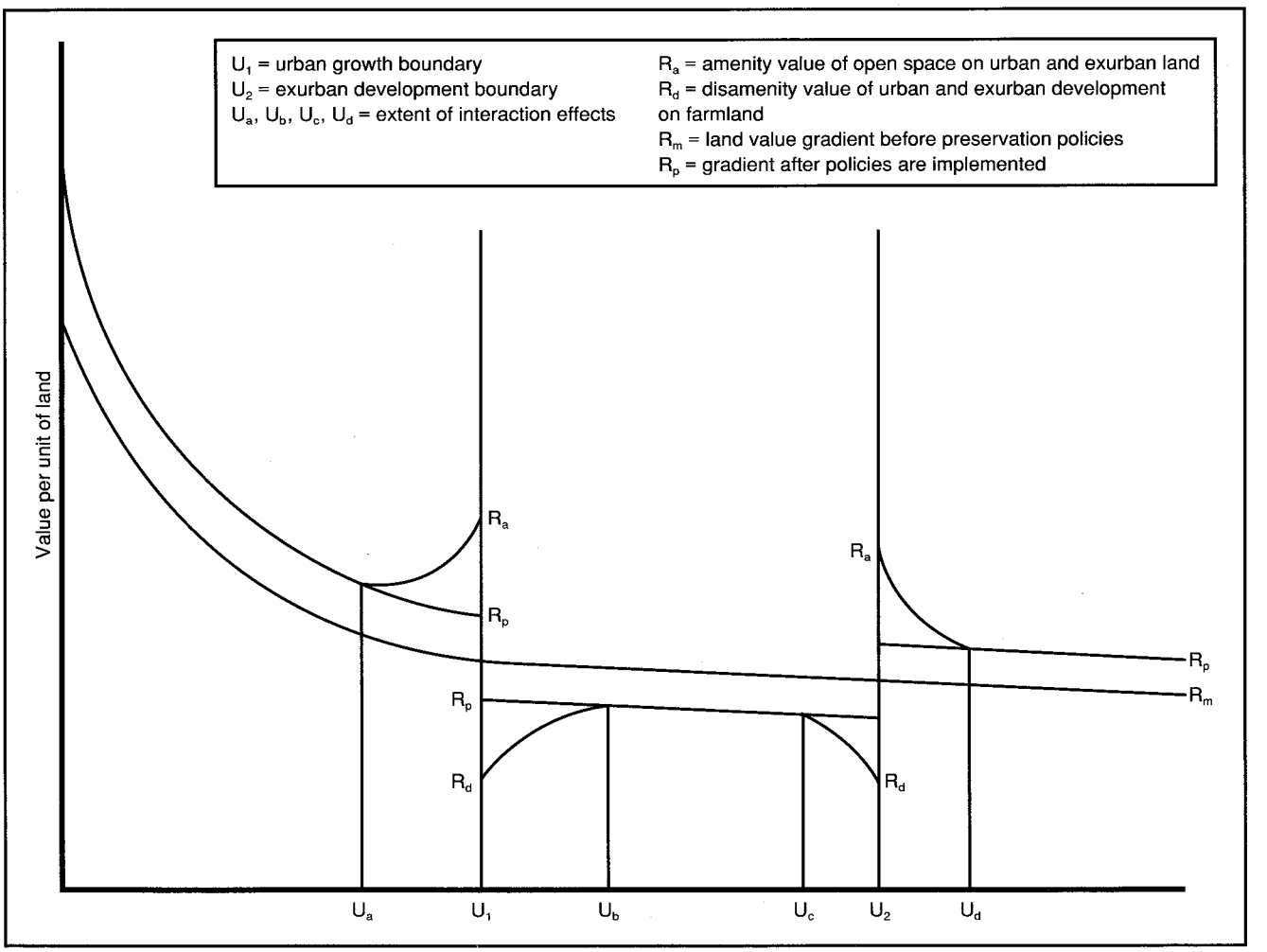


FIGURE 4: Economic objectives of farmland preservation and urban containment policies.

Second, urban and exurban land proximate to farmland must exclusively internalize quasi-public goods, such as privacy and scenery, into higher values the closer the land is to farmland (Correll, Lillydahl, and Singell 1978). The absence of this effect means that the urban and exurban land markets expect urban development of farmland in the near future. The evaluation of Salem, Oregon, shows that the value of urban land rose with proximity to the Salem UGB where that boundary separated urban development from EFU districts (Nelson 1984; 1986). This phenomenon did not occur where the UGB separated urban development from exurban districts.

The effect should also be found along the boundary separating EFU from exurban districts, as exurban households are like urban or suburban households in their pursuit of space and privacy (Davis 1990; Davis, Nelson, and Dueker 1993; Nelson 1991; Nelson and Dueker 1989; 1990). An evaluation of rural Washington County, Oregon, indicated that the value of exurban land rose with proximity to the EFU boundary (Nelson 1988).

Third, speculation of farmland for nonfarm uses, whether urban or exurban, is eliminated only when the market value of farmland falls as it nears urban and exurban land. This is because non–farmland uses will impose all the negative externalities on nearby farmland. If this effect is not detected, then the market for farmland is internalizing expectations of conversion to urban or exurban nonfarm uses.

The Salem analysis revealed that farmland value fell with proximity to the UGB (Nelson 1984; 1986). This indicates the effectiveness of the exclusive farm use restrictions in eliminating speculative use value from farmland. Farmland value seemed unaffected by urban development only three miles away from the UGB.

An analysis of the interaction between farmland and exurban land in Washington County, Oregon, used the same approach (Nelson 1988). The central question was simple: Does farmland value behave at the exurban boundary as it behaves at the urban growth boundary? The original statistical analysis revealed ambiguous interaction, suggesting no statistically meaningful effects. Perhaps exurban and farmland owners coexist principally because exurban landowners consider themselves quasi-farmers and are therefore sympathetic with commercial farming. Perhaps exurban landowners do not impose spillovers on farmland owners. But this analysis is wrong (Nelson 1990c).

A reevaluation asked at what minimum density does exurban development have no adverse influence on farmland values. Proximity to five- or ten-acre exurban districts resulted in rising farmland value, indicating that the farmland market was internalizing the expectation of conversion to exurban development. This would suggest failure of preservation policies to influence the farmland market in intended ways, resulting in the underproduction of farmland, underinvestment in that land, and emergence of the impermanence syndrome among affected farmland owners. Proximity to twenty-acre exurban districts, however, resulted in declining farmland value, indicating that speculation for conversion to twenty-acre exurban development was not evident.[17] Thus, any exurban density less than twenty acres along the exurban and farmland boundary would have undesirable effects in the farmland market.

Finally, the value of farmland in exclusive farm use districts should rise over time as the farming economy has been preserved and farming investments can be made without concern for the impermanence syndrome. While there is as yet no empirical test of this outcome, the descriptive evidence reported below seems compelling. Production is increasing and this should be associated with increasing farmland value.

Descriptive Evidence of Effectiveness

Based on the 1978 and 1982 Census of Agriculture, Daniels and Nelson (1986) concluded that Oregon's farmland preservation policies were working to preserve large blocks of farmland because of large minimum lot size zoning, but they could not determine whether agricultural production had improved or whether hobby farming and commercial farming coexisted. Instead, they found that Oregon led the nation in the formation of hobby farms between 1978 and 1982, and the future viability of commercial agriculture was in doubt.

A recent study prepared by the LCDC indicates that the preservation of prime farmland improved during the late 1980s (1989). Analysis of the period July 1985 through August 1986 and September 1987 through August 1988 indicates that new and replacement dwellings on EFU lands decreased (see Table 2). The average parcel size of new farm dwelling approvals increased: Two-thirds were on parcels greater than twenty acres in 1987 to 1988 in contrast to one-half in 1986 to 1987. New land divisions within EFU districts increased in size: In 1987 to 1988, 84 percent were larger than twenty acres in contrast to 70 percent in 1986 to 1987. Concern over nonfarm dwellings approved for EFU districts continues. Slightly less than one-half of the nonfarm dwellings were approved for the Willamette Valley and another one-quarter in southwestern Oregon. However, 84 percent of the nonfarm dwellings were approved for parcels of less than ten acres and 70 percent of the land affected was of Soil Class IV or worse. Nonfarm dwelling approvals will become more difficult in future years as the legislature, the LCDC, and special interest groups seek to contain this activity.

Recent data from the United States Department of Agriculture, in its 1987 Census of Agriculture, strongly suggests that Oregon's prime farmland preservation policies seem to work despite the continued proliferation of hobby farms. The conclusion is an important milestone for planning policy everywhere: Urban development and farming can coexist but only when certain land use planning policies are employed and strictly enforced.

TABLE 2: New dwellings on EFU lands, 1985–1988

Type of dwelling	Approved		Denied	
	1987–1988	1985–1986	1987–1988	1985–1986
New farm dwellings	205	230	9	0
Replacement farm dwellings	65	79	1	0
New farm worker dwellings	103	97	8	8
Replacement farm worker dwellings	18	21	1	1
New nonfarm dwellings	279	264	36	17
Replacement nonfarm dwellings	34	60	0	1
Total new dwellings	587	591	53	25
Total replacement dwellings	117	160	2	2

Source: Department of Land Conservation and Development 1989.

How Does Oregon Compare to the Northwest and the Nation?

Although there are problems with the use of the census, it is the most reliable source of longitudinal data on changes in the farming economy at the county level. The analysis here compares the performance of Oregon's agriculture with that of Washington State and the United States between 1982 and 1987. Washington State is a reasonable control, because it does not have Oregon's statewide farmland preservation mandate, but is otherwise similar (Daniels and Nelson 1986). Comparison with the U.S. can indicate strengths and weaknesses of the Oregon farming economy relative to national trends. The analysis also evaluates changes in farming performance among the nine Willamette Valley counties. The farmland policies of Oregon are not conclusively related to changes in performance relative to other states, the nation, or periods of time. The evidence presented is only circumstantial, but reasonably compelling.

Between 1982 and 1987, the entire nation lost more than 50,000 farms (see Tables 3 to 5). Oregon lost more one- to nine-acre farms proportionally than Washington or the U.S., but generally lost fewer farms proportionally above ten acres. It actually gained in the number of farms of more than five hundred acres, whereas Washington lost farms in this category. Overall, Oregon lost more smaller farms but gained more larger farms than Washington or the U.S. This is limited evidence that the preservation policies discouraged proliferation of smaller farms and preserved, if not expanded, larger farms. Unfortunately, census data do not allow analysis of what happened to those smaller farms. They may have been taken entirely out of the farmland pool (which may be undesirable) or merged to make larger units (which may be desirable).

During the same period, the nation added almost 18,000 farms reporting more than $10,000 in earnings. They can be considered *commercial* farms (Daniels 1986).[18] Oregon gained proportionately more commercial farms of 1 to 49 acres than Washington or the U.S., lost proportionately fewer commercial farms of 50 to 499 acres than the nation, and gained proportionately more

TABLE 3: Changes 1982–1987 in distribution of farms by size and total farm acreage

	Oregon			Washington			United States[a]		
	1982	1987	% change	1982	1987	% change	1982	1987	% change
Number of farms									
1–9 acres	5,987	5,476	−8.54	6,425	6,040	−5.99	181,712	177,781	−2.16
10–49 acres	12,415	11,448	−7.79	12,717	11,362	−10.66	436,886	400,989	−8.22
50–179 acres	7,662	7,219	−5.78	7,755	7,216	−6.95	704,039	637,630	−9.43
180–499 acres	3,906	3,617	−7.40	4,035	3,796	−5.92	522,660	474,677	−9.18
500 or more acres	4,117	4,254	3.33	5,155	5,145	−0.19	361,740	364,668	0.81
Total, all sizes	34,087	32,014	−6.08	36,087	33,559	−7.01	2,207,037	2,055,745	−6.85
Acreage (thousands) in farm use									
Total, all farms	17,740	17,809	0.39	16,470	16,116	−2.15	996,724	946,662	−5.02

a. Figures adjusted to exclude Oregon for comparability purposes.
Source: U.S. Department of Agriculture, *1987 Census of Agriculture.*

TABLE 4: Number of commercial farms and acreage in commercial farms, 1982–1987

	Oregon			Washington			United States[a]		
	1982	1987	% change	1982	1987	% change	1982	1987	% change
Number of commercial farms[b]									
1–9 acres	476	634	33.19	864	994	15.05	40,128	44,008	9.67
10–49 acres	1,767	1,891	7.02	3,100	3,072	−0.90	75,528	71,574	−5.24
50–179 acres	3,156	3,010	−4.63	3,832	3,697	−3.52	284,171	241,058	−15.17
180–499 acres	2,706	2,479	−8.39	2,982	2,760	−7.44	398,585	353,971	−11.19
500 or more acres	3,658	3,694	0.98	4,843	4,764	−1.63	334,083	340,948	2.05
Total, commercial farms	11,763	11,708	−0.47	15,621	15,287	−2.14	1,132,495	1,051,559	−7.15
Acreage (thousands) in farm use									
Total, commercial farms	15,488	15,441	−0.30	13,017	13,766	5.75	795,792	813,580	2.24

a. Figures adjusted to exclude Oregon for comparability purposes.
b. Farms reporting $10,000 or more in annual sales, not adjusted for current dollars.
Source: U.S. Department of Agriculture, *1987 Census of Agriculture.*

commercial farms of more than 500 acres than Washington. Overall, Oregon lost some commercial farm acres while Washington and the nation gained. On the other hand, the proportion of commercial farms to all farms rose faster in Oregon than in Washington, but fell across the nation.

What accounts for the considerable discrepancy in the proportion of small commercial farms in Oregon relative to Washington and the nation? Reduction of commercial farms of 180 to 499 acres may be partly explained by the rise in small farms. Farmland preservation has possibly induced an increase in commercially active hobby farms in Oregon, because settlement on small farms requires demonstration of commercial production. Has Oregon's farmland preservation program led to the division of large farms into smaller ones, or resulted in declining overall farmland production? The answer to this is based on an evaluation of the Willamette Valley, where hobby farm and land subdivision pressures are the greatest.

Performance in the Willamette Valley

Tables 6 and 7 report performance in the Willamette Valley.[19] The number of farms in the Willamette Valley fell by more than one thousand from 1982 to 1987, while the amount of farmland acreage remained nearly the same, falling by slightly more than 1 percent. The virtually unchanged farm acreage figure suggests that the farmland base stabilized over this period. Considering that in 1973 the valley lost 30,000 acres of farmland to urban uses, it would appear that farmland preservation policies caused stabilization since 1978.

Note that the number of commercial farms in the valley rose by nearly 18 percent and the farm acreage in commercial farms rose by 11 percent, or nearly 130,000 acres. The largest share of commercial farm increases occurred in the one- to nine-acre category, while the largest farm acreage gain occurred in the more than five hundred acre category. The proportion of commercial farms to all

TABLE 5: Ratio of commercial farms to all farms, 1982–1987

	Oregon			Washington			United States[a]		
	1982	1987	% change	1982	1987	% change	1982	1987	% change
1–49 acres	0.122	0.149	22.40	0.207	0.234	12.83	0.187	0.200	6.81
1–9 acres	0.080	0.116	45.62	0.134	0.165	22.38	0.221	0.248	12.09
10–49 acres	0.142	0.165	16.06	0.244	0.270	10.91	0.173	0.178	3.25
50 or more acres	0.607	0.609	0.26	0.688	0.694	0.95	0.640	0.634	−1.01
50–179 acres	0.412	0.417	1.23	0.494	0.512	3.68	0.404	0.378	−6.34
180–499 acres	0.693	0.685	−1.07	0.739	0.727	−1.62	0.763	0.746	−2.22
500 or more acres	0.889	0.868	−2.27	0.939	0.926	−1.44	0.924	0.935	1.24
All sizes	0.345	0.366	5.98	0.433	0.456	5.23	0.513	0.512	−0.31

a. Figures adjusted to exclude Oregon for comparability purposes.
Note: Commercial farms include those reporting $10,000 or more in annual sales, not adjusted for current dollars.
Source: U.S. Department of Agriculture, *1987 Census of Agriculture.*

TABLE 6: Willamette Valley, 1982–1987, distribution of farms by farm size; farm acreage by farm size; and commercial farms by farm size

	Number and percentage change		
	1982	1987	% change
Distribution of all farms by farm size			
1–49 acres	10,986	9,900	−9.89
1–9 acres	3,721	3,256	−12.50
10–49 acres	7,265	6,644	−8.55
50–499 acres	5,076	4,674	−7.92
50–179 acres	3,579	3,301	−7.77
180–499 acres	1,497	1,373	−8.28
500 or more acres	764	791	3.53
All farms	16,826	15,365	−8.68
Distribution of farm acreage by farm size			
1–49 acres	189,129	174,745	−7.61
1–9 acres	18,913	16,315	−13.74
10–49 acres	170,216	158,430	−6.92
50–499 acres	770,047	714,556	−7.21
50–179 acres	330,066	309,182	−6.33
180–499 acres	439,981	405,374	−7.87
500 or more acres	820,547	868,490	5.84
All farms	1,779,723	1,757,791	−1.23
Distribution of commercial farms[a] by farm size			
1–49 acres	1,157	1,490	28.78
1–9 acres	242	391	61.57
10–49 acres	915	1,099	20.11
50–499 acres	2,133	2,248	5.39
50–179 acres	1,323	1,233	−6.80
180–499 acres	810	1,015	25.31
500 or more acres	644	900	39.75
Total, all farms	3,934	4,638	17.90
Total commercial farm acreage	1,196,618	1,326,453	10.85

a. Farms reporting $10,000 or more in annual sales, not adjusted for current dollars.
Source: U.S. Department of Agriculture, *1987 Census of Agriculture.*

farms rose substantially in all major farm size categories during this period.

There has been a general reduction in smaller farms but an increase in commercial farms in all farm size categories. Farmland owners are either taking their land out of production— thereby accounting for reductions in all but the largest of the farm size categories for all farms— or they are making their land commercially productive by merging it with other land through sale, rental, or other agreement. Overall, commercial farm production rose to $909 million in 1987 from $619 million in 1982, or nearly 50 percent. Per farm income among commercial farms rose from $157,000 in 1982 to $196,000 in 1987, or nearly 25 percent. These increases exceed the inflation rate during the period.

Table 8 compares Oregon to Washington and the nation. Oregon lost farms on a pace with the nation and Washington. It gained land in farms, however, while Washington and the nation lost land. Average farm size increased more in Oregon than in Washington and the nation. Oregon lost proportionately slightly more cultivated and irrigated farmland than Washington and the nation. Its average value per farm and per acre fell slightly more relative to Washington and the nation. Yet, its sales of farm products per farm rose at nearly twice the rates of Washington and the nation.

Earlier studies revealed no substantial differences in farming performance between Oregon and Washington, and with most national trends, between 1978 and 1982 (Daniels and Nelson 1986). Evidence now suggests the budding of divergent trends. The Willamette Valley farming economy appears more robust after full implementation of farmland preservation policies. Hobby farms and commercial farms in Oregon, especially in the Willamette Valley, are gaining in economic vitality. There has been some concern that the rise of hobby farms could result in reduced commercial farming productivity. Yet, in the valley, while the total number of smaller farms fell, the rise in productivity of commercial hobby farms (one to forty-nine acres) parallels the rise in productivity of commercial farms. This suggests that in Oregon's regulatory environment, both commercially minded hobby farmers and large-scale farmers not only coexist but mutually benefit. They may add dimensions to the farming economy and infrastructure that are mutually reinforcing. The formation of hobby farms has slowed, and some farms appear to have consolidated. Many hobby farmers have become viable commercial farming operators in their own right. It seems likely that were it not for hobby farmers and their sustenance of the economic infrastructure, the large-scale commercial farming operations might be jeopardized. Firm confirmation of this symbiotic relationship remains an open question. Also mutual coex-

TABLE 7: Willamette Valley, 1982–1987, ratio of commercial farms and acreage to all farms and acreage

	Number and percentage change		
	1982 ratio	1987 ratio	% change
Ratio of commercial[a] farms to all farms			
1–49 acres	0.105	0.151	42.91
1–9 acres	0.065	0.120	84.64
10–49 acres	0.126	0.165	31.34
50–499 acres	0.420	0.481	14.46
50–179 acres	0.370	0.374	1.05
180–499 acres	0.541	0.739	36.63
500 or more acres	0.843	1.138	34.98
Total, all farms	0.234	0.302	29.11
Ratio of total acres in commercial farms to total acres in all farms			
Total commercial farm acreage	0.672	0.755	12.35

a. Farms reporting $10,000 or more in annual sales, not adjusted for current dollars.
Source: U.S. Department of Agriculture, *1987 Census of Agriculture.*

TABLE 8: Farming vitality indicators, 1982–1987, Oregon, Washington, and United States

		Oregon			Washington			United States[a]		
Indicator	Unit	1982	1987	% change	1982	1987	% change	1982	1987	% change
All farms	Number	34,087	32,014	−6.08	36,087	33,559	−7.01	2,207,037	2,055,745	−6.85
Land in farms	Acres, k	17,740	17,809	0.39	16,470	16,116	−2.15	996,724	946,662	−5.02
Average farm size	Acres	520.43	556.29	6.89	456.40	480.23	5.22	451.61	460.50	1.97
Harvested cropland	Acres, k	3,306	2,833	−14.31	5,279	4,597	−12.92	326,306	282,224	−13.51
Irrigated farmland	Acres, k	1,808	1,648	−8.85	1,638	1,519	−7.26	49,002	46,386	−5.34
Nominal value/farm	Dollars	$371,644	$299,755	−19.34	$423,352	$355,976	−15.91	$345,869	$289,387	−16.33
Nominal value/acre	Dollars	$705	$542	−23.12	$933	$739	−20.79	$784	$627	−20.03
Value, sales/farm	Dollars	$48,129	$57,664	19.81	$78,469	$87,000	10.87	$58,858	$65,165	10.72

a. Figures adjusted to exclude Oregon for comparability purposes.
Source: U.S. Department of Agriculture, *1987 Census of Agriculture.*

istence may not work outside Oregon. One of the underpinnings of Oregon policy is that farmland buyers must engage the land in farming, and many exurban districts have land use and development restrictions that aim to minimize potentially adverse interactions between exurban residents and farmers.

Weaknesses in Implementation

Effectiveness is always dictated by implementation. Daniels and Nelson (1986) recount how local government actions through the mid-1980s undermined state resource land preservation policies. Although recent analyses by the LCDC (1989) and the *1987 Census of Agriculture* show improvement in local government implementation, there is room for more rigor. For example, in an analysis of parcelization and dwelling unit approvals in prime agriculture and forest areas, Pacific Meridian Resources (1991) found some evidence of potentially lax enforcement of preservation policies:

- The majority of new dwellings approved in EFU areas were not being used in conjunction with commercial farm use, defined as $10,000 annual income from farming.
- Most farm operations of less than 80 acres on which new dwellings were permitted reported no farming receipts; about 90 percent of farm operations of less than 160 acres reported no farming receipts.
- More than one-half (358) of farm operations approved for new dwelling units statewide (667) were found in the Willamette Valley.
- About one-third of the forest operations that received approval for new dwellings units are not being managed for timber production.

In part because of this analysis, LCDC amended the agricultural and forest land goals in late 1992. By the late 1990s, local plans will identify and regulate "high-value" and "important" farmlands and "small-scale resource lands." High-value farmlands are suitable for commercial scale operations. Small-scale resource lands are suitable for noncommercial scale agriculture and forest operations. Important farmlands are all other rural lands, other than exception lands, suitable for some level of agricultural production. The purpose of the amendments is to put more pressure on local governments to preserve prime (high-value) farmland. Hobby farm activities would be steered into small-scale resource lands and, to a lesser extent, into important farmlands.

Toward Effective Farmland Preservation Policies

Perhaps the most important lesson from Oregon's experience is that successful farmland preservation relies on a package of techniques that reinforce each other. EFU districts preserve farmland for farming in the long run; UGBs prevent urban sprawl; exurban districts accommodate the demand for rural residential lifestyles without harming commercial farm operations; farm tax deferral and right-to-farm laws create incentives for farmers to keep farming, and comprehensive plans legitimize the entire package. This concluding section offers a regional landscape planning scheme that incorporates the best of Oregon's experiences while improving on its shortcomings.

Urban Containment

The argument that urban development ought to be contained within urban growth boundaries, urban service limits, urban stoplines, or other regulatory fixtures on the regional landscape map has been extensively and persuasively made.[20] Urban containment planning begins with estimates of future land use needs by general land use categories. Status quo trends are not simply projected into the future. The whole idea behind containment planning is achieving more efficient use of urban land: more housing units per acre, higher single-family detached dwelling densities, more flexible site planning standards allowing zero lot line and cluster opportunities, more mixed use projects and comprehensively planned communities, and higher density work environments. The

planning horizon may be set at twenty years but the UGB may have a much longer life as redevelopment and in-fill to higher densities occurs after twenty years. Such planning, however, should also include an *ultimate* UGB that establishes for perpetuity the final extent of urban development within a region.

Figure 5 illustrates the regional landscape scheme. Within the ultimate UGB there are three classes of land, each catering to a particular generation of development—the urban and urbanizable, the future urbanizable, and the urban reserve. The intermediate boundary at U_1 marks the area to accommodate immediate urban development needs. Point U_2 marks the near-term urban growth boundary, and U_3 is the ultimate growth boundary. The future urbanizable land would be expected to be developed within twenty years. The urban reserve land would accommodate very low-density uses until redeveloped to higher densities after twenty years.

Future urbanizable land would not be developed until land inside the intermediate boundary was suitably developed. This concept has been used in the urban areas of Portland, Salem, and Eugene. Minimum lot size zoning of at least ten acres would apply to the future urbanizable land to keep it in such sizes and shapes as to accommodate efficient future development.[21] Long-term facility and transportation plans would explicitly include this land. As all future urbanizable land is developed, within twenty years or so, expansion into the urban reserve lands toward the ultimate UGB would occur only if in-fill and redevelopment options failed.

The urban reserve area would contain land that Oregon now places outside the UGBs in "exception" areas. If Oregon has made any mistake in its planning it is in making its UGBs too small and in preventing adjacent or nearby exception lands from being placed within them. The LCDC required all urban areas to include within their UGBs just the amount of land needed to accommodate the urban development needs to the year 2000.[22] Many UGBs are virtually encircled by these exception lands, which are not needed for urban development and are not suitable for resource or open space activities.

These exception lands should have been included inside the UGBs to better manage their development and to improve long-term management of urban development. Under the present arrangement, because exception lands are neither urban nor resource lands, they are routinely developed for large acreage housing subdivisions, churches, convenience stores or centers, and other patently urban uses. Even though many exception lands adjacent to UGBs are subject to five-acre minimum lot size development, there is concern that it is actually easier to develop them than urban lands (Nelson 1992).

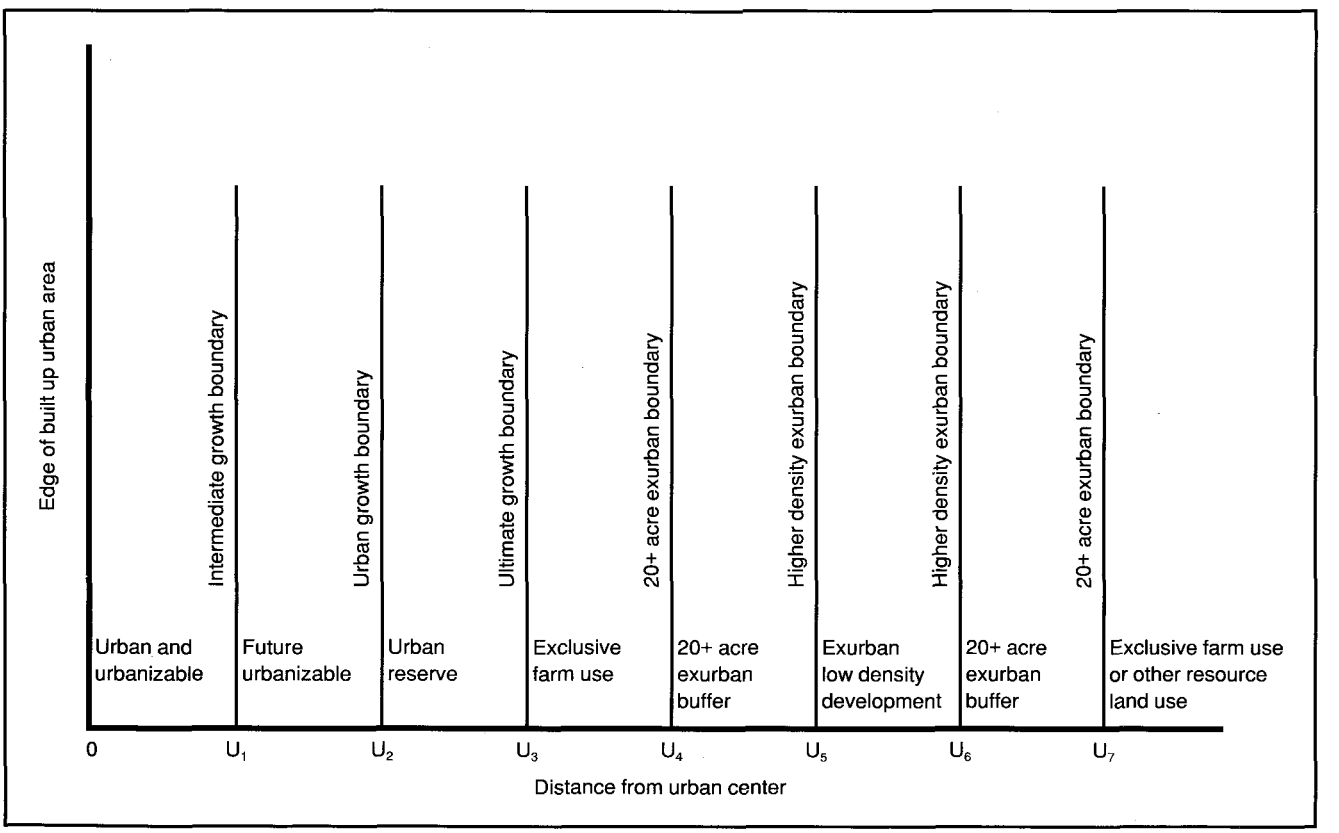


FIGURE 5: Regional planning scheme to preserve farmland.

Portland's Buddhist community could not receive a conditional use permit to build their temple in the city. Instead, they built it outside the UGB on prime farmland, as EFU zoning in Oregon allows churches as conditional uses.

What will happen when urban development under Oregon's scheme hits the twenty-year UGB? The assumption is that urban development will be accommodated through in-fill and redevelopment. But this may not take care of all needs. In some situations, the UGB must be expanded. One logical place for expansion would be the exception areas already abutting UGBs. However, by the time UGB expansion into those areas becomes necessary, they will have been developed and occupied by affluent households capable of mounting serious opposition. This is already happening (Nelson 1990b). Is UGB expansion the NIMBY of the future?[23]

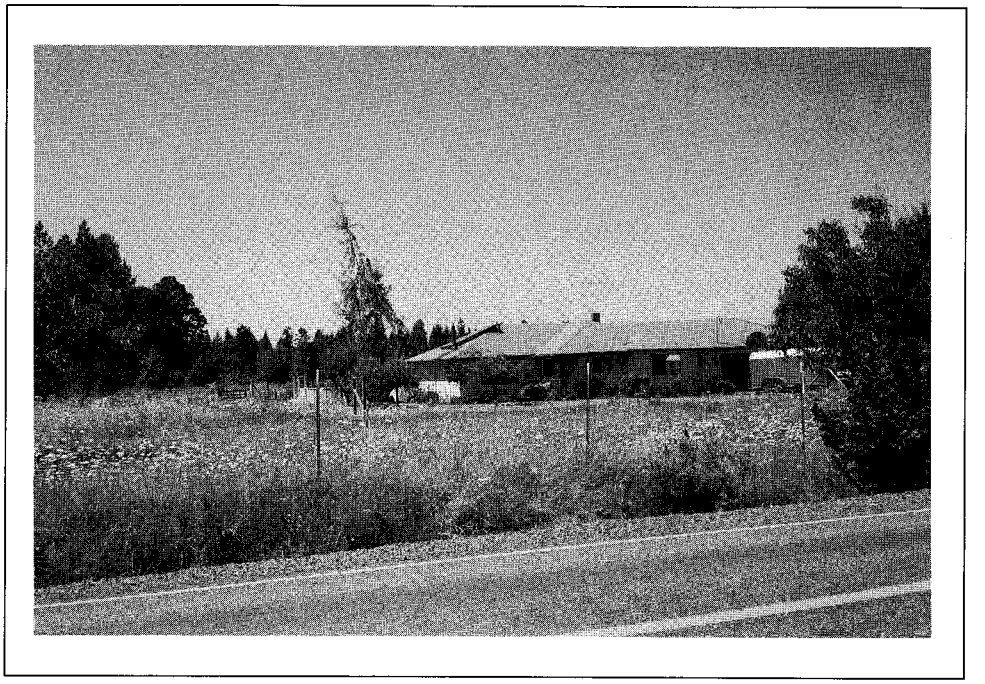
A corollary mistake was that Oregon ignored the demand for hobby farms and exurban development (Nelson 1983a; 1983b; Daniels and Nelson 1986). While prospective hobby farmers or pursuers of rural living require only one to two acres, most exception areas are limited to five-, ten-, and twenty-acre minimum lot sizes. As those seeking small tracts are forced into buying larger tracts, more, not less, land is absorbed to accommodate this demand. It would have been far better for the LCDC to have allowed for the accommodation of the demand for small, one- to two-acre tracts within prescribed areas. Those areas should have been within UGBs to the maximum extent possible, and actual development of those sites should be subject to site planning restrictions requiring large setbacks—one hundred feet or more—from nearby resource lands, placement of homes to enable efficient resubdivision into single-family detached sites at some time far into the future, and prohibitions against covenants and deed restrictions that prevent future land assembly or resubdivision. Much of the legitimate demand for five- to ten-acre tracts should be accommodated in the same way.

Exurban Land Outside Urban Growth Boundaries

Even if much of the exception land could be placed inside UGBs there would remain pockets of exception land, classified as antiquated rural subdivisions, five- to ten-acre hobby farms, and twenty acre or more buffer areas.

Antiquated rural subdivisions were approved prior to modern planning review. Many are already developed or committed to residential uses, but these areas can be better managed to preserve the integrity of nearby resource lands. For example, site planning restrictions should require home construction at least one hundred feet away from nearby or abutting resource lands. Owners of those sites should waive remonstrances against resource land use practices as a condition of receiving a building permit. In cases where antiquated subdivision plats are largely undeveloped but nonetheless committed, planning review should result in identifying those portions of the plat that may be reasonably used for resource or buffer activities (Nelson and Recht 1988).

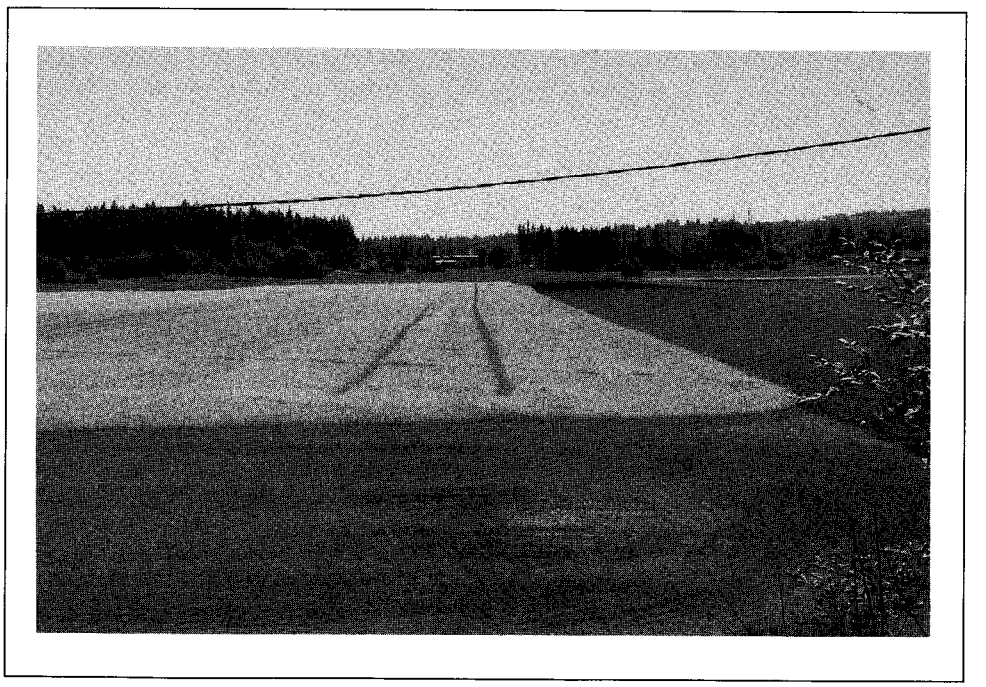
Small-acre hobby farms on exception land outside the UGB should not abut EFU districts to avoid the expectation of conversion to exurban development. The exception lands abutting EFU districts should be subject to higher minimum lot sizes, of at least twenty acres. Development restrictions should be imposed to have those lands used for legitimate resource purposes as a condition of receiving building permits. In the case of forest land, the state forester could review and approve a small woodlot plan set aside by the homebuilder, where forest uses are proposed. The local county assessor could attest to the property being eligible for farm and forest use tax deferral. With these assurances the building permit could



Only a small strip of land is mowed around this hobby farm in an exception area bounded by EFU restrictions. The unmowed areas contain plants toxic to livestock.

be issued. Failure to carry out the pledge would result in zoning violations. Only in rare cases where land is clearly unusable for resource activities, such as developed or committed antiquated plots, would these requirements not apply. In all cases, home construction would also be subject to site plan review, which would require the maximum possible distance from farmland or other primary resource lands.

Where possible, twenty plus acre exurban districts would be placed between EFU and other primary resource land, and higher density exurban land or the UGB. At twenty and more acres, land can be used for a variety of resource activities, which would be required as a condition of building approval. By placing twenty plus acre tracts next to and near farmland and other primary resource districts, operators on those districts can more



A large farm adjacent to an exception area operates only two miles from the UGB. Onions are the dominant crop in this area.

easily rent the tracts for a variety of resource uses. Moreover, owners of these buffer tracts are more likely than owners of higher density exurban land to consider themselves like farmers and should be more tolerant of farming, forestry, and other resource practices.

Summary Scheme: Toward Regional Urban Form

The planning scheme divides the regional landscape beyond the ultimate urban growth boundary into twenty plus acre minimum lot size exurban districts buffering EFU lands from small acreage exurban districts. Regardless of regional urban development pressures, the ultimate UGB would remain fixed to preserve farmland and other resource lands. The twenty plus acre exurban buffer districts would also remain fixed, although low-density urban-type development could possibly invade selected exurban districts. The ideal regional urban form is achieved through regional landscape planning that includes the creation and rigid enforcement of development boundaries supplemented by rigidly enforced land use restrictions on exurban and resource land.

Figure 6, which combines elements of Figures 4 and 5, shows what the regional economic landscape must look like. If these relationships are not observed, farmland preservation policies may not be effective and perverse outcomes may be at work. Failure may be caused by uniquely local circumstances that require refinement of the scheme. Failure may also be attributable to lax enforcement in issuing development approvals.

First, the regional landscape planning scheme must affect the regional land market in predictable ways. The regional demand for urban land must be shifted from the regional landscape to areas inside the UGB. Actually, the near-term regional demand should be entirely shifted to the area within the intermediate growth boundary and the long-term demand should be shifted to the area between the intermediate and the twenty-year UGB. The regional demand for exurban land uses should be shifted principally from all rural land to areas either between the twenty-year and ultimate UGBs or within exurban districts located outside UGBs.

Second, there should be no interaction of land value along the intermediate growth boundary. Owners of urban land just inside and owners just outside the intermediate boundary should expect the boundary to be moved outward and urban development to occur in the new space in the near future. Similarly, there should be no interaction effect between land just inside and outside the twenty-year UGB.

Along the ultimate UGB there should be interaction effects. Land just inside the ultimate UGB should rise in value the closer it is to the UGB, because it should capitalize the quasi-public goods or benefits that it exclusively enjoys. Just outside the ultimate UGB, farmland or other resource land value should fall the closer it gets

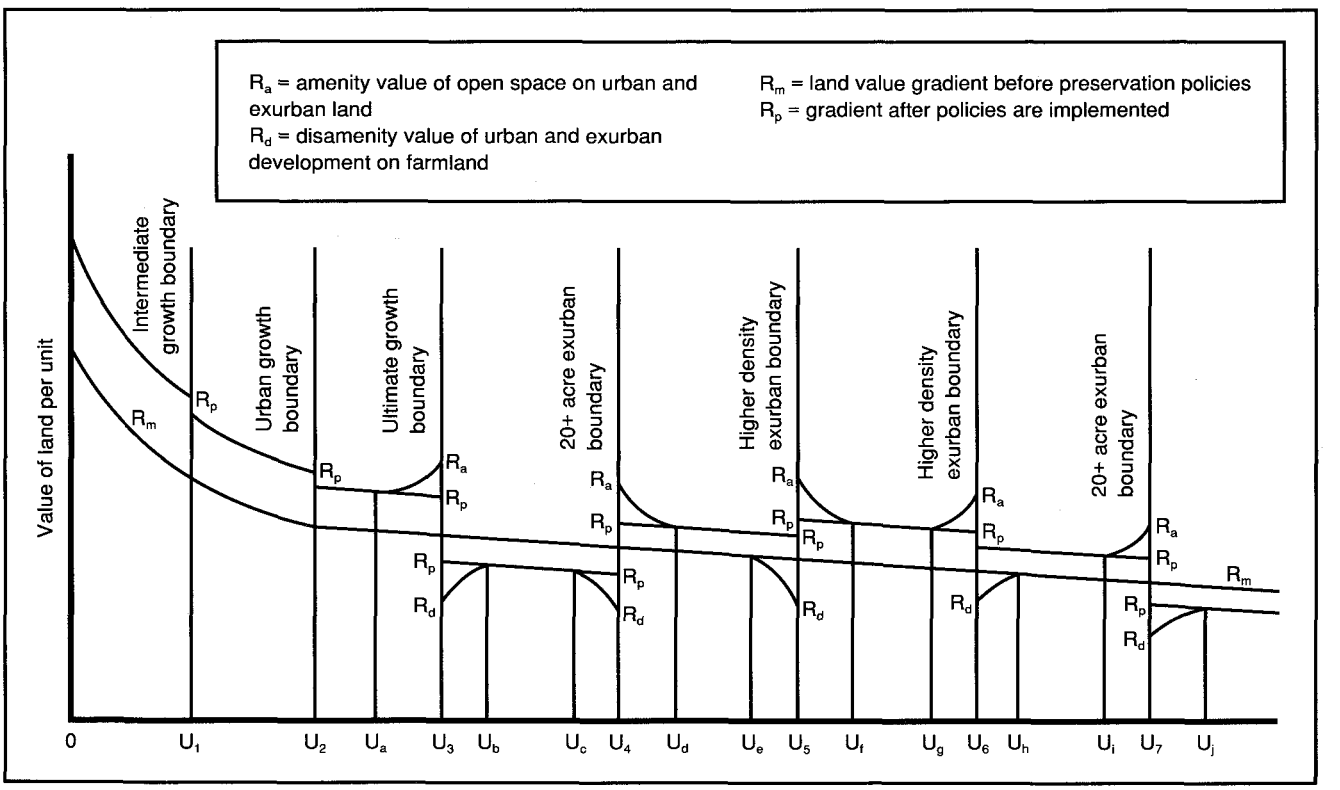


FIGURE 6: Regional economic landscape that preserves farmland in the face of urbanization.

to the UGB, because urban spillover effects dampen productivity and therefore reduce the value of this land for resource production. It is possible that these effects would not be detected until exurban or urban development came to the UGB.

Along the boundary separating farmland and the exurban twenty acre plus buffer districts there should be similar effects. Through site development review home and work structures could be so removed from the boundary that they would not necessarily impose spillovers on farmers. If home construction in this district required putting land into resource activities and waiving remonstrances against farming activities, spillovers could be prevented. Farmers could lease these tracts for farm use. Avoiding the internalization of spillovers is a desirable outcome that is limited to twenty plus acre exurban buffer districts. In any event, the value of the exurban buffer land would rise the closer it gets to farmland, because it will exclusively enjoy the quasi-public goods and benefits of farmland proximity. However, public policy must be firm in maintaining the integrity of the exurban buffer district to avoid undesirable interactions between owners of those tracts and farmers.

Along the boundary separating the exurban twenty plus acre buffer districts from higher density exurban districts, the interactions are much more fluid and problematic, even ambiguous. If public policy is firm in maintaining the integrity of the twenty acre plus buffer districts, the value of the buffer land will fall the closer it gets to higher density exurban districts because of spillovers. On the other side of the boundary, the value of higher density exurban land would rise the closer it is to the exurban buffer districts because it should capitalize the quasi-public benefits that those districts offer. This is the desirable interactive outcome. Undesirable outcomes would be revealed if exurban buffer land values increased closer to the boundary, reflecting expectations by landowners of conversion to higher density exurban uses.

Cultivating the Preservation Hybrid

Fully effective farmland preservation policies have eluded local and state governments. Many have unwittingly accelerated the conversion of farming districts to hobby farms or low-density urban subdivisions. There is evidence that urban land is overvalued through government development subsidies, inefficient utility provision, and other market distortions induced by policy and inherent market imperfections. Farmland is undervalued for the same reasons and because of urban spillovers. In result, vastly more farmland is removed from production than should occur. Moreover, just a small reduction in farmland productivity can undermine the critical mass of farming infrastructure needed to sustain viable operations in a region. Perhaps, as Daniels (1990) observes, the best way to preserve farmland is to generate greater income for farmers. Sweden guarantees prices for farmers so they can outbid urban developers for the best farmland (Lapping 1979). Sweden also employs sophisticated new town and urban expansion planning. But the U.S. lacks a clear national policy toward the preservation of prime farmland, especially in the face of urbanization, and, therefore, state and local governments are left to their own devices to protect their long-term interests in farmland.

State and local governments are limited in their economic and legal capabilities. They cannot alter food prices. They cannot interfere with federal policies that raise or lower commodity supports. They cannot afford the purchase of the development rights of farmland—nor should they. The most effective farmland preservation tools available to state and local governments are land use planning and development regulation. The most effective mix are those used by Oregon plus the modifications proposed here.

NOTES

1. See Brown and Roberts (1978) on the role of local, state, and federal policies in stimulating inefficient land owner behavior and, implicitly, the need for land use regulatory mechanisms to compensate for these inefficiencies. See also Harvey and Clark (1965), Clawson (1962), and Nelson (1990a).
2. It is not known the extent to which farm subsidy policies offset urban subsidies. While total federal government commodity support policies totaled less than $20 billion in 1989, federally backed mortgage loans issued in 1989 exceeded $150 billion. According to the *1991 Statistical Abstract of the United States*, more federally backed home loans were delinquent in 1989 than all commodity price support policies in 1989 combined.
3. Farmers pay for those new facilities and services on the basis of land value, but not on whether they use them.
4. This figure is adapted from Nelson 1986a, 1990a.
5. For an extensive review of all common farmland preservation techniques see Nelson (1990a), a reply by Daniels (1990), and a rejoinder (Nelson 1990c).
6. Some farmers who enroll in those programs produce less than farmers who do not. While farmers realize a reduction in the cost of operations and this raises net revenues, it does not pressure them into making their land more productive (Bahl 1968; Goldberg and Chinloy 1984; Mills and Hamilton 1988). When urban development leapfrogs over farmland enrolled in a property tax relief program, the volume of land made underproductive increases.
7. Most right-to-farm laws also limit the ability of public agencies to condemn farmland for public works projects that can adversely affect the viability of farming districts.
8. At the heart of right-to-work laws is the desire to protect innocent farmers from land use actions or restrictions over which they have little or no control (Leutwiler 1986). These laws make it difficult for

nearby nonfarm residents to restrict operations through nuisance suits. There are many shortcomings, however. Right-to-farm laws do not prevent farmers from converting their land to an urban use or prevent the sale to speculators; may not apply to the operations of new owners; and do not protect changes in agricultural practices (Lapping and Leutwiler 1987). Farmland that is fallow during the year in which new development occurs nearby may not be protected when actively farmed.

9. If these programs can succeed in protecting a critical mass of land, they can help sustain the agricultural infrastructure. In Montgomery County, Maryland, for example, the TDR program may have transferred sufficient development rights from large areas considerable distances to create the necessary critical mass to sustain agriculture into the long-term future.
10. PDR programs, because they are voluntary, suffer from the same limitations as TDR programs. They do not assure preservation of prime farmland in quantities and in locations suitable to sustain a viable agricultural economy. Nonparticipants remain free to farm or subdivide their land.
11. Incredibly, some farmers in Florida claim that one-acre minimum lot size zoning is perfectly acceptable in farming districts. They argue that higher minimum lot size zoning reduces land value, which reduces the amount they can borrow for agricultural purposes. The argument is specious. Farm loans do not exceed more than a certain percentage of the value of land for agricultural purposes. Moreover, with one-acre zoning, large-lot residential subdividing could not be prevented. Ironically, some farmers say they will volunteer not to subdivide and develop in return for the zoning. This promise would be difficult to enforce at best. Would a foreclosing lender be prevented from subdividing? Studies show that restrictive farm use zoning has not prevented farmers from securing agricultural loans in the amounts they would have received anyway (Coughlin 1984).
12. Nonexclusive agricultural zoning usually includes large minimum lot sizes; entitlement to single-family home construction on any preexisting and newly created but conforming lot; no requirement to demonstrate the effects on farm production of land partitioning at the minimum lot size; and conditional use permits allowing commercial recreation, smaller than minimum lot size developments, patently nonfarm dwelling units, agriculturally related industrial activities, and planned developments sometimes at higher densities.
13. The distribution has changed slightly since 1986 through continual fine tuning and plan revisions required by Oregon planning law.
14. The original criteria for determining whether land qualified for exception status were difficult to meet and carried a heavy burden of judicial review. Consequently, most plans failed to meet LCDC approval. Acceding to legislative demands, the LCDC replaced the original test with the impracticability test, which allows more flexibility in classifying rural land for exception status. One result has been a scattered and pervasive pattern of exception lands throughout the state.
15. Lapping (1980), Healy and Short (1981), and Buttel (1982) observe that hobby farmers often purchase more land than they are able to put to productive use; are generally unwilling or unable to make the investment in farm equipment and labor necessary to produce a commercial volume of farm products; compete with commercial farms for the same land, causing fragmentation of land holdings, driving land prices upward beyond what can be paid for out of a farm income; are a source of vandalism on nearby commercial operations and a cause of legal attempts to limit commercial farming practices; and create in commercial farmers questions of the future viability of farming, making them less willing to undertake long-term investments. As commercial farmers go out of business, an area can lose the "critical mass" of farms and farmers needed to maintain agricultural support services.
16. The framers of Oregon's farmland preservation program did not anticipate the magnitude of the demand for hobby farms. Between 1978 and 1982, Oregon led the nation in the formation of hobby farms and many analysts expressed concern that the trend would undermine Oregon's farmland preservation policies (Nelson 1983a; 1983b; Daniels and Nelson 1986; Daniels 1986).
17. The finding also indicates that even at twenty-acre minimum lot size restrictions, exurban development can be expected to impose negative spillovers onto farmland. The question now becomes: At what minimum density should we expect no statistically meaningful impacts of exurban development on farmland value? Would it be forty acres? Eighty acres?
18. Census tabulations do not adjust for inflation.
19. Willamette Valley includes Benton, Clackamas, Lane, Linn, Marion, Multnomah, Polk, Washington, and Yamhill counties.
20. Proper urban containment planning results in public facility and service savings (Nelson and Knaap 1987; Nelson 1987); improved delivery of social services; more efficient transportation systems (Newman and Kenworthy 1989); improved interaction among economic activities; lower housing package costs, although with possibly higher density and lower housing space (Real Estate Research Corporation 1974; Frank 1989); lower energy costs (Keyes and Peterson 1977); more efficient government management, assuming flexible management schemes such as interlocal cooperative agreements (Nelson 1991b); improved interaction between social classes (Jacobs 1961); improved sense of place (Lynch 1983); and, of course, preservation of open spaces outside urban development for farming, forestry, recreation, flood

control, air cleansing, watershed, and related purposes.

21. Alas, all urban areas allow subdivision of future urbanizable land into one- to two-acre tracts. Although subdivision plans must include homesite locations that theoretically enable wise redivision in later years, the practical effect is to condemn future development in these areas to hodgepodge in-fill that residents are likely to oppose.
22. Some larger urban areas received approval for more land inside UGBs than strictly needed for development, arguing that more land was needed to prevent monopolistic behavior among landowners and to provide adequate locational choices for developers. The Portland UGB contained 15.8 percent more land than strictly needed and Salem's UGB contained 25 percent more than needed.
23. In mid-1992, the LCDC adopted the "urban reserve" rule, which would effect a few of the points argued in this article. By the mid-1990s, seven urban areas, including metropolitan Portland, will identify areas for UGB expansion, mostly on exception lands but also on selected prime farm and forest lands. Although not to be included in the UGB initially, lands placed into the urban reserve would be managed in such a way as to make urban expansion more efficient. In effect, this rule creates a longer term UGB, somewhat akin to the ultimate UGB proposed here.

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