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SAVING THE GARDEN:
THE PRESERVATION OF FARMLAND AND
OTHER ENVIRONMENTALLY VALUABLE LAND

APR 2 4 1978

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Table of Contents

I. Introduction 1

A. Perspective 1
B. General Framework for the Study..... 4

II. The Nature of the Problem..... 11

A. The Direct Effects of Urbanization..... 12
1. The National Perspective 14
2. Regional Perspectives 33
3. Local Perspectives 43
4. Conclusions 50
B. Indirect Effects of Urbanization 50
1. The Nature and Causes of Indirect Effects..... 52
2. Spatial Expression of Indirect Effects..... 58
C. Conclusions 73

III. Forces and Institutions Influencing Land Use..... 77

A. The Land Market 78
1. Actors in the Land Market 79
2. The Demand for Land 84
3. The Availability of Land 85
4. Market Processes 87
5. The Price of Land 90
B. Attitudes of the Courts 95
C. Popular Attitudes 98
D. Viability of Agriculture 100
1. Physical Constraints 103
2. Prices and Costs 105
3. Shifts in Infrastructure 105
4. Other Forces and Constraints 110

IV. The Nature of Land Use Controls 112

A. Mechanics of Land Use Controls 112
1. Direct Controls 114
a. Acquisition of Development Rights 114
i. Direct Purchase of Development Rights 117
ii. Purchase of Fee and Subsequent Resale with Restrictions 118
iii. Purchase of Fee and Subsequent Lease with Restrictions 118

iv. Exercise of the Right of Preemption 120
b. Regulatory Methods 120
i. Exclusive Farm or Rural Use Zoning . 121
ii. Inverse Condemnation 121
iii. Transfer of Development Rights 122
iv. Development Permit Systems 125
2. Indirect Controls 126
a. Tax Incentives 126
i. Differential Assessment for Property Tax 126
ii. Differential Valuation for Estate and Inheritance Taxation 129
b. Tax Disincentives 132
i. Capital Gains Tax on Land Sales 132
c. Protection from Urban Effects 135
i. Agricultural Districting 135

V. Experience With Land Use Controls 137

A. Experience with Direct Controls 137
1. Experience with Acquisition of Development Rights 137
a. Direct Acquisition of Development Rights . 137
i. The Wisconsin Scenic Easement Program 137
ii. Suffolk County (N.Y.) Farmland Preservation Program 145
iii. The New Jersey Farmland Preservation Program 152
b. Purchase and Sale or Lease with Restrictions 162
i. Massachusetts Town Conservation Commissions' Programs of Purchase and Lease 163
ii. Saskatchewan Land Bank Program 167
c. Exercise of the Right of Preemption 172
i. The French Experience 172
2. Experience with Regulatory Methods 182
a. Exclusive Farm Zoning 182
i. A General Survey 182
ii. The Oregon Land Use Act and Exclusive Agricultural Zoning 198
b. Inverse Condemnation 210
i. The Massachusetts Wetland Restriction Program 210

c. Transfer of Development Rights 217
d. Development Permit Systems 219
i. California: Coastal Commissions ... 219
ii. Florida: Developments of Regional Impact 221
iii. Vermont's Environmental Control Act (Act 250) 223
B. Experience with Indirect Controls 233
1. Experience with Tax Incentives 233
a. Differential Assessment for Property Taxation 233
i. Illinois' Differential Assessment Program: The Chicago Area 235
ii. California's Land Conservation Act . 238
b. Experience with Differential Valuation for Federal Estate and State Inheritance Taxation 241
2. Experience with Tax Disincentives 243
a. Capital Gains Tax 243
3. Experience with Agricultural Districting 248

VI. Characteristics of Land Use Controls Affecting Their Enactment and Implementation 259

A. Introduction and Overview 259
B. Complexity 267
1. Definition and Application of Basic Concepts . 268
a. Environmentally Valuable Land and Prime Agricultural Land 269
b. Use Value 272
2. Establishment of New Institutions 281
C. Magnitude and Distribution of Costs 290
D. Uncertainty 300
1. Familiarity 300
2. Permanence of the Control and Certainty of Outcome 302
E. Conclusions 308

VII. Potential Effectiveness of Land Use Controls 311

A. Considerations Related to Effectiveness 311
1. Extent to Which the Control Prevents Unwanted Land Use Changes 311
2. Coverage of the Control 315

3. Permanence of the Control 318
a. Effects of other Public Plans, Policies, and Programs 318
b. Effect of the Control in Reducing the Landowner's Economic Need to Develop 319
c. Susceptibility of the Legal Instrument to Change 320
B. Conclusions 322

List of Tables

2-1 Estimates of the Conversion of Rural Land to Urban and Built-up Uses in the United States 18
2-2 Percent of Base Year Stock Converted to Urban and Built-up Uses During 1975 - 2000 26
2-3 Total Acres and Acres of Prime Land, for All Counties, SMSA Counties, and Counties Adjacent to SMSA Counties, Aggregated by U.S. Census Regions, Exclusive of Alaska and Hawaii, in Percentages 27
2-4 Total Acreage, Prime Acreage, and Built-up Acreage Within 50-Mile Radii of the 100 Largest Urbanized Areas of the Coterminous United States 28
2-5 Correlations Between Annual Rates of Population Growth and Percentage Prime Agricultural Land, 1960 - 1970 and 1970 - 1974 31
2-6 Conversion of Land From Rural to Urban Use for Selected Regions 34
2-7 Conversion of Rural Land to Urban Uses in 26 Towns in Massachusetts, 1951 - 1971 37
2-8 Conversion of Rural Land to Urban Uses Estimated for Massachusetts, 1951 - 1971 38
2-9 Transition Matrix of Land Use Changes in Anoka County (part) Minnesota 1968 - 1975 - All Soils 46
2-10 Transition Matrix of Land Use Changes in Dakota County (part) Minnesota 1968 - 1975 47
2-11 Idling of Farmland in Six Counties in the Philadelphia Metropolitan Region, 1930 - 1970 62
2-12 Change in Land in Farms: Regression Results for the Northeast and Cash Grain East 65
2-13 Median Relative Shift of Agricultural Components Classified by Population Characteristics of Counties New York, New Jersey, and Pennsylvania 70

3-1 Increment in the Price of Land When a Parcel has Certain Attributes, Burlington County, New Jersey 94

4-1 A Classification of Land Use Controls 113
4-2 Summary Descriptions of Land Use Controls 115

5-1 Comparison of Per Acre Sale Prices in the Great River Road Study Area (near LaCrosse, Wisconsin) 1950-1975.. 142
5-2 Offers and Appraisals for Phase I, Suffolk County Farmland Preservation Program 150
5-3 Purchase and Lease Restrictions in Massachusetts Towns 164

5-4 Summary of Saskatchewan Land Bank Commission Operations 171
5-5 SAFER and IDV Retirement Program Land Activity, 1964 - 1975 180
5-6 Provisions of Exclusive Agricultural Zoning Ordinances 183
5-7 Minimum Required Lot Acres in the Most Restrictive Agicultural Zones of Each Jurisdiction 186
5-8 Urban Pressure on Jurisdictions with Exclusive Agricultural Zoning 192
5-9 Changes to Exclusive Agricultural Zoning to Accomodate Development 194
5-10 Answers by Local Officials to Question: How Would You Evaluate Your Experience With Agricultural Zoning So Far? 197
5-11 Provisions of State Differential Assessment Laws, 1977 234
5-12 Correlation Between Acres of Differentially Assessed Land Per Square Mile (1973) and Various Characteristics of Townships in the Chicago Area 237
5-13 Participation in California's Land Conservation Act .. 240
5-14 Tax Rates on Capital Gain: Vermont Land Gains Tax ... 245
5-15 Formation of Agricultural Districts in New York, 1973 - 1976 252
5-16 Participation in New York's Agricultural Districting Program 254
5-17 Comparison of New York Agricultural Districts and Oregon Exclusive Farm Use Zones in Mitigating Problems Due to Nearby Urban Development 258

6-1 Characteristics of Controls Relating to Initial Enactment 261
6-2 Characteristics of Controls Relating to Implementation Once Enacted 263

7-1 Characteristics of Controls Relating to Effectiveness 312

List of Figures

1-1 Overview of Study 6

2-1 Class I and II Soils, 1967 and Population, 1970 15
2-2 Class I and II Soils, 1967 and Population Increase, 1970 - 1974 16
2-3 Urban Land Requirements as a Function of Population Density at the County Level 21
2-4 Urban Land Requirements as a Function of Housing Density at the County Level 22
2-5 Land Area Within 50 Miles of the 100 Largest Urbanized Areas 29
2-6 Location of Cropland, 1967 and Population Growth, 1960 - 1974, in California 41
2-7 The Relationship Between Urbanization and the Loss of Irrigated Cropland Harvested During 1959 - 1969 for 20 Metropolitan Counties in California 42
2-8 Built Up Land in Anoka County, Minnesota 44
2-9 Built Up Land in Dakota County, Minnesota 45
2-10 Expansion of Urban Land Use in Massachusetts, 1950 - 1970 49
2-11 Townships with Potential for Conflict Between Agriculture and Urbanization 60
2-12 Farmers' Response to Urbanization in the Context of Other Exogenous Forces and Constraints 75

3-1 A Simplified Model of the Land Market of the Rural-Urban Fringe 80
3-2 Average Price of Parcels Sold in Five New Jersey Counties 1972 - 1976 by Size of Parcel 92
3-3 Average Price Per Acre of Parcels Sold in Five New Jersey Counties, 1972 - 1976 by Year Sold 93
3-4 Farming by Region 1959 - 1974 102
3-5 Index of Prices Paid by Farmers and Prices Received by Farmers for All Farm Products 106
3-6 Regional Concentration of Some Farm Infrastructure, 1958 and 1968 109

4-1 The Effect of Land Tax on the Supply of Land in Rural Areas 133

5-1 Location of Optimum Farmland and Parcels Offered 148
5-2 Gross Activity Levels of SAFER 178
5-3 The Vermont Act 250 Permit Process 225

5-4 Process For Forming Agricultural Districts in New York 251
5-5 Participation Rate in Agricultural Districts in New York 253

6-1 Supply and Demand Aspects of Transferable Development Rights 283
6-2 Estimated Development Value of Farmland in Five New Jersey Counties 293

Chapter I
INTRODUCTION

A. Perspective

From the earliest days of European settlement, the American landscape was regarded by perceptive commentators as a garden incorporating, combining, and generating a number of powerful cultural elements having to do with the individual, work, the land, and the relationships among them. As the historian Henry Nash Smith summarized it in his interpretation of the West, "the symbol of the garden embraced a cluster of metaphors expressing fecundity, growth, increase, and blissful labor in the earth, all centering about the heroic figure of the idealized frontier farmer armed with that supreme agrarian weapon, the sacred plow."

Cultural characteristics related to this garden image include 1) a belief that a farmer, with hard work, could become prosperous, and if he did not, he could always move to the frontier; 2) a very individualistic outlook enhanced by isolated farmsteads but tempered by voluntary collective activities; 3) private ownership of land by many small landowners; 4) an egalitarian society but one in which worth was measured by prosperity and hard work; and 5) an unbounded frontier.

These characteristics were identified by Lemon in describing Southeast Pennsylvania during colonial times, but to some extent they persist nearly everywhere in the country. They

have been and are being modified, however, by natural limits and by social forces which have overtaken them. Leo Marx, for example, has described the cultural impact of "the machine in the garden," the advent of the industrial society which in many ways conflicted with the idyll of the garden. The closing of the frontier is a second prominent example of a constraint limiting and altering the garden image. The combination of science, technology, industrialism, and the realization of the finiteness of resources gave rise to a functional or utilitarian view of the landscape, exemplified by the conservation movement at the end of the nineteenth century,which put emphasis on the efficient use of natural resources including the soil (Hays, Ekirch).

Today we are witnessing still another conflict with the sturdy remnants of the garden image, this time with the expansion and decentralization of the largely urban population of the United States into the suburban and rural hinterlands. This contemporary conflict is focused on two issues: 1) the visible loss of the ruralness of much of the landscape and the virtuous images of life style that ruralness still creates in many people's minds, and 2) the potential for the loss of agricultural productivity that the conversion of rural land to urban uses may entail.

The very components of the garden image of the landscape make it difficult to resolve the conflicts of urbanization and

the garden. For example the individualistic outlook toward land use and the belief in private ownership of land, the tenets of the garden image, are part of the problem of urban incursions into rural areas, not part of the solution to saving the garden from the effects of urbanization.

It is not our purpose here to characterize the cultural and historical context of this conflict--which would be a major undertaking in itself. Rather we shall concern ourselves with the widespread and growing interest of the federal government, states and localities in saving the "garden" from urban intrusions.

In particular, we shall pursue three questions concerning the use of the land along the many rural-urban fringes of the nation. First, what is the nature of the effects of urbanization on rural lands and agricultural activity? Second, what is being done about it ? And third, are any of these responses potentially effective in altering the pattern of change in the landscape? We certainly cannot be definitive about the answers to any of these questions, and, in fact, it may be best to let the reader decide the importance of the effects of urbanization on the rural landscape and the potential effectiveness of land use controls. We have gathered some new evidence on these questions, assembled and collated the work of others and studied several dozen of the attempts at enacting and implementing land use

controls; and while the questions are clear, the answers are not. Our contribution, then, would seem to be in the clarification of the questions and in enlargement of the data base from which to answer them rather than the answers themselves.

B. General Framework for the Study

Very broadly speaking, the goals of the programs we are studying fall into two overlapping categories--the retention of farmland and the preservation of open space. Programs in the first category are designed specifically to encourage farming activity in a certain area subject to development pressures and generally do not consider nonagricultural land uses as part of the rural landscape to be protected. One recurrent feature of these programs is emphasis on protection of the better soils. Programs in the second category are oriented toward preservation of open space threatened by development pressures. The goals of these programs generally reflect a variety of values: aesthetic values of rural landscapes, ecological values of plant and animal habitats such as wetlands or wilderness areas, functional and conservation values such as protection of topsoil, avoidance of fire hazards, avoidance of pollution of ground water, and so on, and in some cases, recreational values such as those provided by easements along scenic trails, although these are often dealt with by means of public purchase of land for parks. These two

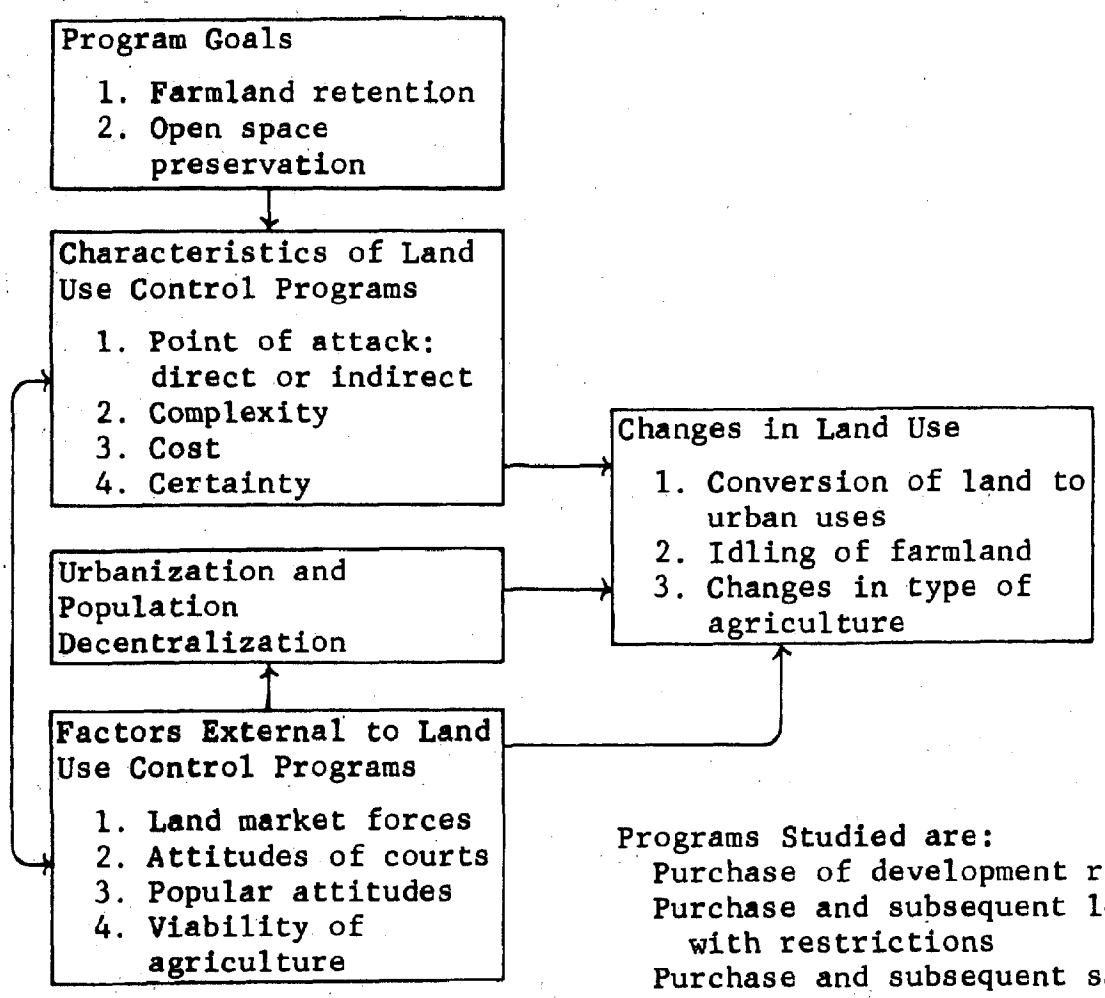
categories of goals clearly overlap to a large extent, but inherent conflicts do exist.

We view the introduction of a particular land use control as an intervention in the on-going processes of land use change, and our study objective is to determine, as clearly as is possible, whether that intervention has any significant effect in maintaining a desired pattern of land uses. A government program is only one of the many factors which affect changes in the pattern of land uses. Therefore, the identical public program in different circumstances may lead to different results; even if the desired pattern of land uses is maintained while a program is in effect, one may not necessarily conclude that the program was critical in achieving the result.

An overview of the study is diagrammed in Figure 1-1. The patterns of urbanization and population decentralization occurring over the country lead directly to the conversion of land from rural to urban uses. They also induce changes in the rural landscape, such as the idling of farmland, and changes in the type of agricultural activity occurring in the sphere of urban influences. Besides urbanization and population decentralization, these changes in the rural landscape are influenced by a number of factors exogenous to any land use control program: the operation of the land market itself, the viability of agriculture in a particular region, attitudes of the courts, and attitudes of the people in general toward land use patterns and the control of those patterns.

Figure 1-1

OVERVIEW OF STUDY



Programs Studied are:

- Purchase of development rights
- Purchase and subsequent lease with restrictions
- Purchase and subsequent sale with restrictions
- Exercise of right to preempt
- Inverse condemnation
- Exclusive farm use zoning
- Transfer of development rights
- Development permit systems

- Differential assessment for property tax
- Differential assessment for federal estate or state income tax
- Capital gains tax on land
- Agricultural districting

Land use controls are introduced in the hope of altering the pattern of changes in land use resulting from urbanization and population decentralization. The goals behind this intervention, farmland retention and open space preservation, are shown as affecting the characteristics of the land use program.

The results of a land use program--its effects upon the landscape--must be measured against a number of criteria. It is more than simply a question of the quantity of land protected. First, to what extent can the maintenance or preservation be ascribed to the program rather than to other operative factors? Increased prices for farm products or a recession in the housing market both have contributed to a slowing of the loss of agricultural land in some localities, for example, and these must be considered along with land use controls.

Second, every acre retained in the desired use may not be of the same value. Some farmland has better soil than others, and some is buffered from urban or suburban development while other farmland is broken up by such development. Some land is of greater aesthetic importance than other land, and some land is closer to urban centers so that its landscape value can be enjoyed by more urban people. In short, quality of land and location make a difference to the value which can be ascribed to retaining an acre of land.

Third, the permanence of the retention should be considered. One type of land use control might be expected to be relatively long lasting, another type might be designed to be a stopgap measure, and a third might be subject more than others to political attack and possible change over the years.

Number of acres, then, must be interpreted with care as a measure of program effectiveness. We have neither the analytic framework nor the data to take account of all the qualifications listed above, to say nothing of many other qualifications which might be relevant. In fact, it is nearly impossible to estimate how much farmland or open space was "saved" from conversion or idling due to a land use program. The programs are too new and the data too scarce. However, it is possible to identify the weak and strong points of a program with particular characteristics that bear upon how much open space can be preserved or farmland retained under the influence of urban pressures. It is this identification of program characteristics that we shall set as our goal. From this analysis, then, we should be able to say in a general way what types of programs are more likely to be effective under certain conditions than others in preserving open space or retaining farmland.

The organization of this report follows that of Figure 1-1. We begin in Chapter II by reviewing the nature of the problem, the

problem being the conversion of land from rural to urban uses, the idling of farmland due to urban pressures, and the changes in agricultural activity due to the pressures of urbanization. Because of the availability of data we are forced to concentrate on farmland and can give relatively little attention to other types of open space in this chapter. This is not so severe a shortcoming as one might at first think, though, since many changes in the landscape occur on agricultural land and since so many land use programs are oriented toward farmland retention.

In Chapter III we summarize the factors affecting changes in the landscape external to land use controls such as the land market and the viability of agriculture.

A detailed discussion of each of twelve types of land use controls is presented in Chapter IV with case studies of actual experiences, insofar as there may be actual experiences with some of the controls. Seven of the controls affect land use directly without any intermediary steps required:

Purchase of development rights
Purchase and subsequent lease or sale with restrictions
Exercise of the right to preempt
Inverse condemnation
Exclusive farm or rural use zoning
Transfer of development rights
Development permit systems

Four of the controls are designed to affect land use changes indirectly through incentives:

Differential assessment for property tax
Differential valuation for Federal estate and state inheritance taxes
Capital gains tax on land
Agricultural districting

Then in Chapter V an analysis of major characteristics pertaining to the enactment or implementation of land use controls is carried out: costs, complexity, and certainty are given particular attention.

The potential effectiveness of various land use controls is assessed in Chapter VI. In this assessment, we draw together the processes of urbanization and population decentralization, factors exogenous to the land use control programs, and the characteristics of the land use controls relevant to enactment and implementation to evaluate the potential effectiveness of different kinds of controls. As previously noted, it is not possible to present a definitive evaluation of any of the controls -- they have not been in effect long enough and in most cases it is not even possible to obtain quantitative information on the extent to which land in the program has withstood the pressures of nearby urbanization. All we can do is assess potential effectiveness at this point.

Chapter II
THE NATURE OF THE PROBLEM

The growth and rearrangement of the population across the nation constitutes a primary force affecting the decline of competitively productive farmland, the intrusion of urbanization into forest land, the development of wetlands, and in general, changing the appearance of the American landscape. Broadly speaking, the urban, suburban, and exurban development accompanying these population changes produces two types of effects upon the landscape: direct effects--those which cause the use of the land to be changed from rural to urban, and indirect effects--those which cause rural landowners to feel uncertain about the continued ruralness of their locality and consequently to begin altering their land use practices in response to this uncertainty without actually converting the land to urban uses.

Our analysis of these problems concentrates primarily upon agricultural land for five reasons. First, the obvious importance of food production areas for the long run well-being of the nation and the world has made their continued viability the subject of public concern. Second, this is the only type of land use for which extensive data are available and for which a number of previous studies have been done concerning the effects of urbanization. Third, agricultural activities cover about one-third of the nation's land (excluding Alaska) and many of the nation's urban centers are

located in important agricultural regions. And fourth, agricultural activities experience a number of indirect effects from urbanization which are not felt in other types of land uses. This is not to slight the importance of urbanization on forest land, wetlands, desert, or other landscapes, but there is simply less information available about them on which to draw any conclusions.

A. The Direct Effects of Urbanization

The direct effects of urbanization on the rural landscape are the conversions of land from rural to urban uses. These effects may be brought about by increases in population in a particular region such as in the rapidly growing Phoenix metropolitan area, by decentralization of population from a metropolitan core as is occurring around many declining cities in the Northeast, or by scattered development in nonmetropolitan areas, including second homes, as has recently been occurring over much of the country (Beale, Beale and Fuguitt, Vining and Strauss, and Zelinsky, et al.) Thus, the conversion of land to urban uses may be associated with regional growth, decentralization of the population into the suburbs and exurbs, and the revival of growth in nonmetropolitan areas of the country.

These development processes can be characterized in terms of the types of land that are converted to urban uses: for example, we may express the direct effects of urbanization in terms of the

conversion of land classified by its previous use--cropland, pasture or rangeland, woodland, wetlands, old fields, or other "vacant" land. Or we may characterize the conversion processes in terms of the physical characteristics of the land being converted. Of the various ways of doing so, the most widely available useful information is that of soil capability classes developed by the Soil Conservation Service for use in erosion control. [Soil Conservation Service, Conservation Needs Inventory.] These capability classes take into account slope, drainage, soil depth, and the like. Capability Classes I and II, which have the least limitations for agricultural use (Class I has no limitations) also are often quite suitable for development since they are flat and well drained (but may have other limitations for development). It should be noted that soils of capability Classes I and II are not necessarily the best soils for agriculture, in the sense that they are the most productive,but the Soil Conservation Service has noted that Classes I and II are almost always among the most productive soils, which include some capability Class III soils as well. For lack of a better term, we shall call soils in capability Classes I and II "prime" throughout this report, recognizing that prime means different things to different people.[1]

We shall now turn to a discussion of the conversion of rural land to urban or built-up uses at three levels of analysis: na-

[1] See Raup (1976) for a more complete discussion of the concept of "prime" land.

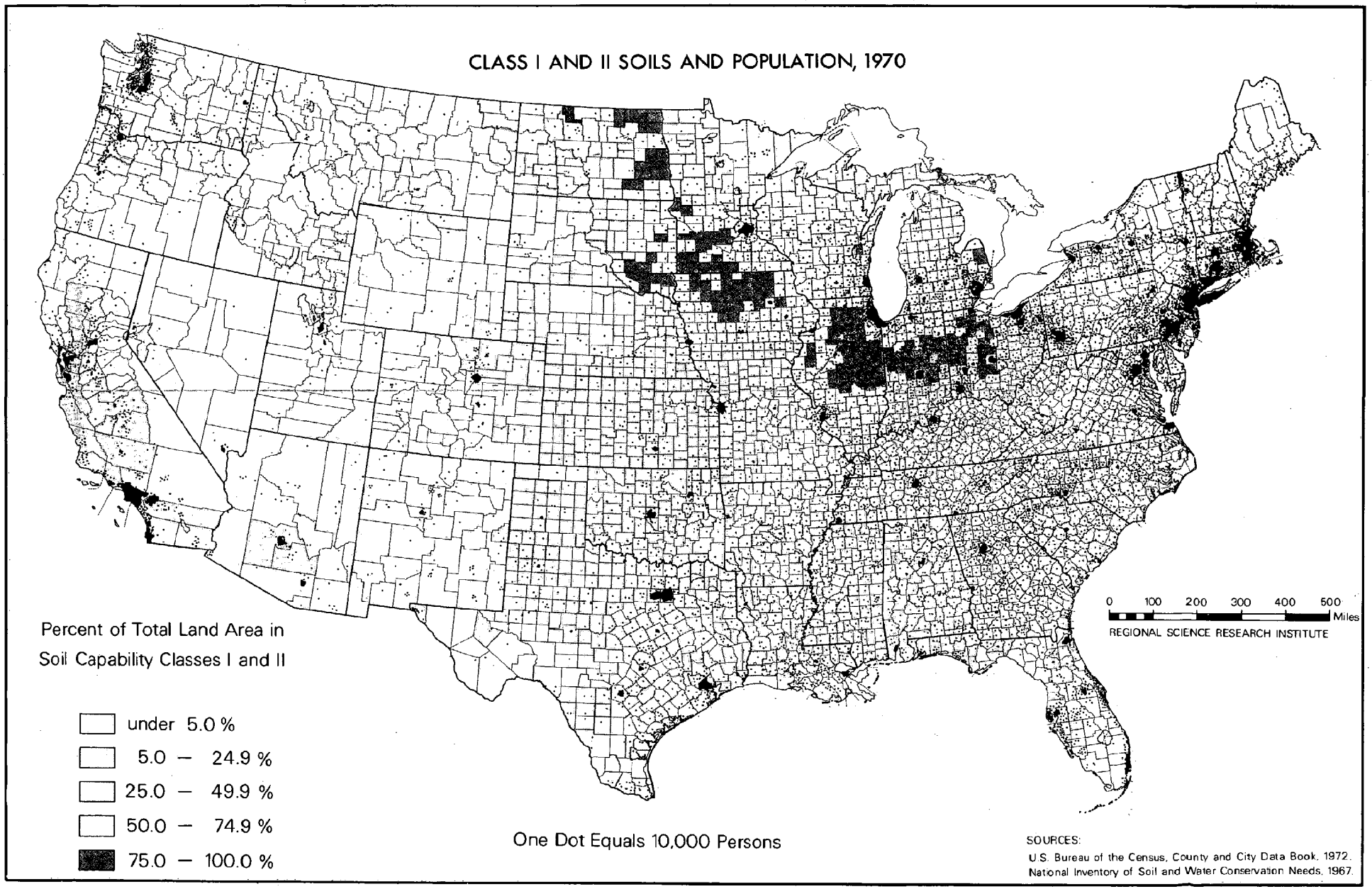
tional, regional, and local. The nature of the effects of urbanization on rural areas is different at these different scales, the national being more than the aggregate of local problems and local problems reflecting different concerns than the national issues.

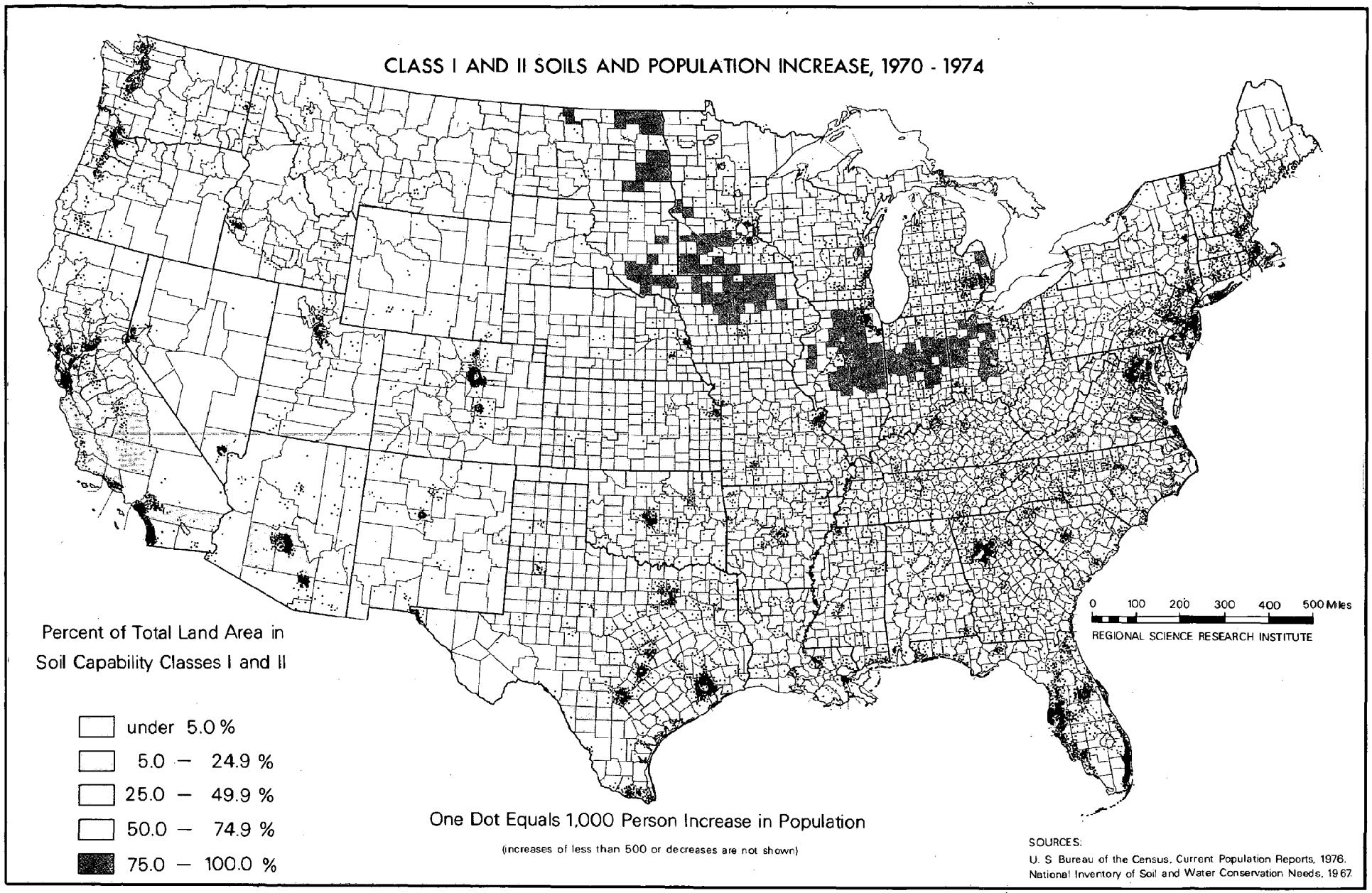
1. The National Perspective

The overall pattern of population and population growth in relation to the location of the soils in capability Classes I and II (prime soils) throughout the nation can be seen in Figures 2-1 and 2-2.[1] The best land is in the Middle West where population density varies from very low to very high and where population growth varies greatly as well. There is also a noticeable bias of population toward areas with better soils as one might expect, but the bias is certainly not everywhere present nor overwhelming where it does occur. We now turn to a closer examination of population pressure on rural land and the subcategories of farmland, cropland, and prime land at the national level.

There are few nationwide estimates of conversion of rural land to urban uses from which to gain a perspective of the magnitude of the urbanization processes. One source of information is the Conservation Needs Inventories (CNI) for 1958 and 1967 which

[1]The production of Figures 2-1 and 2-2 was funded in part by NSF Grant SOC-76-04821 to Daniel R. Vining.


CLASS I AND II SOILS AND POPULATION, 1970
Percent of Total Land Area in
Soil Capability Classes I and II
under 5.0 %
5.0 – 24.9 %
25.0 – 49.9 %
50.0 – 74.9 %
75.0 – 100.0 %
One Dot Equals 10,000 Persons
0 100 200 300 400 500
Miles
REGIONAL SCIENCE RESEARCH INSTITUTE
SOURCES:
U.S. Bureau of the Census, County and City Data Book, 1972.
National Inventory of Soil and Water Conservation Needs, 1967.


CLASS I AND II SOILS AND POPULATION INCREASE, 1970 - 1974
Percent of Total Land Area in
Soil Capability Classes I and II
under 5.0 %
5.0 — 24.9 %
25.0 — 49.9 %
50.0 — 74.9 %
75.0 — 100.0 %
One Dot Equals 1,000 Person Increase in Population
(increases of less than 500 or decreases are not shown)
0 100 200 300 400 500 Miles
REGIONAL SCIENCE RESEARCH INSTITUTE
SOURCES:
U. S Bureau of the Census, Current Population Reports, 1976.
National Inventory of Soil and Water Conservation Needs, 1967

includes estimates of urban and built up land[1] that is not federally owned. These data are based on site inspections of randomly sampled plots of 100 or 160 acres constituting a 2% random sample of nonfederal land in each county. Comparing the two inventories, the annual conversion of all rural land to urban uses between 1958 and 1967 is around 1.1 million acres per year. Assuming these conversions took place in proportion to the amount of land in farms, cropland, and prime land, about half the conversion took place on farmland, about one-third took place on cropland and 30% took place on soil capability Classes I and II. See Table 2-1.

A more recent estimate made by the Soil Conservation Service for the period 1967 to 1975 using 6000 of the sample plots from the 1967 Conservation Needs Inventory gives a dramatically dif-

[1] The Conservation Needs Inventory defines urban and built-up areas as follows: "includes cities, villages, and other built-up areas of more than 10 acres each in size, industrial sites, railroads, roads, cemeteries, airports, golf courses, shooting ranges, institutional and public administrative sites, and similar types of areas. This separation will not necessarily include all land inside city and village limits, and will include some land outside of such limits. Area of nonfarm rural residences less than 10 acres in size are accounted for as other land not in farms and are not included in urban and built-up areas."

Table 2-1

ESTIMATES OF THE CONVERSION OF RURAL LAND TO URBAN AND BUILT-UP USES IN THE UNITED STATES

	Annual Shift to Urban & Built-Up Uses (Acres)[1]			
RSRI Estimate	All Rural Land	Farmland[2]	Cropland	Prime Land[3]
In SMSAs 1959-1969 (to urban uses)[4]	489,000	240,000	163,000	146,000
In Non-Metropolitan Areas 1959-1969 (to urban uses)	273,000	133,000	91,000	82,000
In Non-Metropolitan Areas 1959-1969 (to rural transportation uses)[5]	140,000	69,000	47,000	42,000
Total U.S. 1959-1969 (to Urban & Built-Up Uses)	902,000	442,000	301,000	270,000
RSRI Estimate Using CNI Base				
Total U.S. 1958-1967 (to Urban & Built-Up Uses)	1,148,000	563,000	383,000	343,000
Potential Cropland Study-CNI Estimate				
Total U.S. 1967-1975 (to Urban & Built-Up Uses)	2,050,000	995,000	598,000	753,000

Notes:

1. Definition of Farmland and Cropland are reported in the Census of Agriculture, except for Potential Cropland Study which uses Conservation Needs Inventory determination of what is cropland or farmland. In general, farmland includes cropland, pasture, range, farm woodlots, farm building lots, wasteland, farm ponds, etc.
2. Farmland includes cropland, pasture, and range.
3. Prime Land includes land in soil capability Classes I and II.
4. Urban Uses includes residences, industry, commerce, recreation and urban transportation.
5. Rural Transportation Uses includes rural highways, railroad rights-of-way, and airports. Estimated from U.S. Department of Agriculture, ERS, Misc. Publ. 1290, 1974.

ferent picture. [Diderikson and Sampson,Potential Cropland Study]. It indicates that about two million acres of rural land are converted to urban uses annually, about half of which comes from a combination of cropland, pasture and range, 30% from cropland itself, and about 38% from soil capability Classes I and II (last row Table 2-1).

Because of the total amounts of rural land lost according to the two Soil Conservation estimates are so strikingly different, one is led to believe that one estimate is in error or that there has been a drastic change in the pattern of urban development after 1967, perhaps reflecting the revival of population growth in many nonmetropolitan counties which occured in the 1970's [Beale, Beale and Fuguitt, Vining and Strauss]. To attempt to resolve this issue, we made an independent set of estimates of conversion of rural land between 1960 and 1970 and between 1970 and 1974 using data from sources other than the Conservation Needs Inventory.

As the basis for making estimates of the conversion of land to urban uses, we compiled land use data for 50 counties in the eastern half of the United States from various local and regional studies. These counties were selected because they are in urban regions or very urban states and because they were the only reliable sources using information from about 1970 that we were able to locate after writing to regional planning agencies all over the country. The percent of land in urban uses (residential, commercial, industrial,

transportation, institutional, and recreational)[1] was estimated as a function of population density in 1970 (for 41 of the counties) and as a function of housing units per square mile in 1970 (for 46 of the counties) using ordinary least squares regression analysis. The results are shown in Figures 2-3 and 2-4. Housing density is a more useful predictor of percent of land in urban uses than population density--especially for many counties which are experiencing population losses from old central cities but are nonetheless undergoing suburbanization processes, the full extent of which would not be captured by looking solely at population changes in the county during that time period. For the period 1970 to 1974, the only estimates of urbanization pressures are those of population changes, so we cannot make use of the housing density- percent urban land relationship for data after 1970; we must use the population density-percent urban land relationship instead.

From the graphs it is apparent that the proportion of land in any county classified as urban increases at a decreasing rate as population density or housing density increases. Thus, in counties with lower population or housing densities, population

[1] Doubtless there will be minor discrepancies between the CNI definition of urban and built-up and these various regional and local estimates of land in the urban uses defined here.

Figure 2-3

URBAN LAND REQUIREMENTS AS A FUNCTION OF POPULATION DENSITY AT THE COUNTY LEVEL

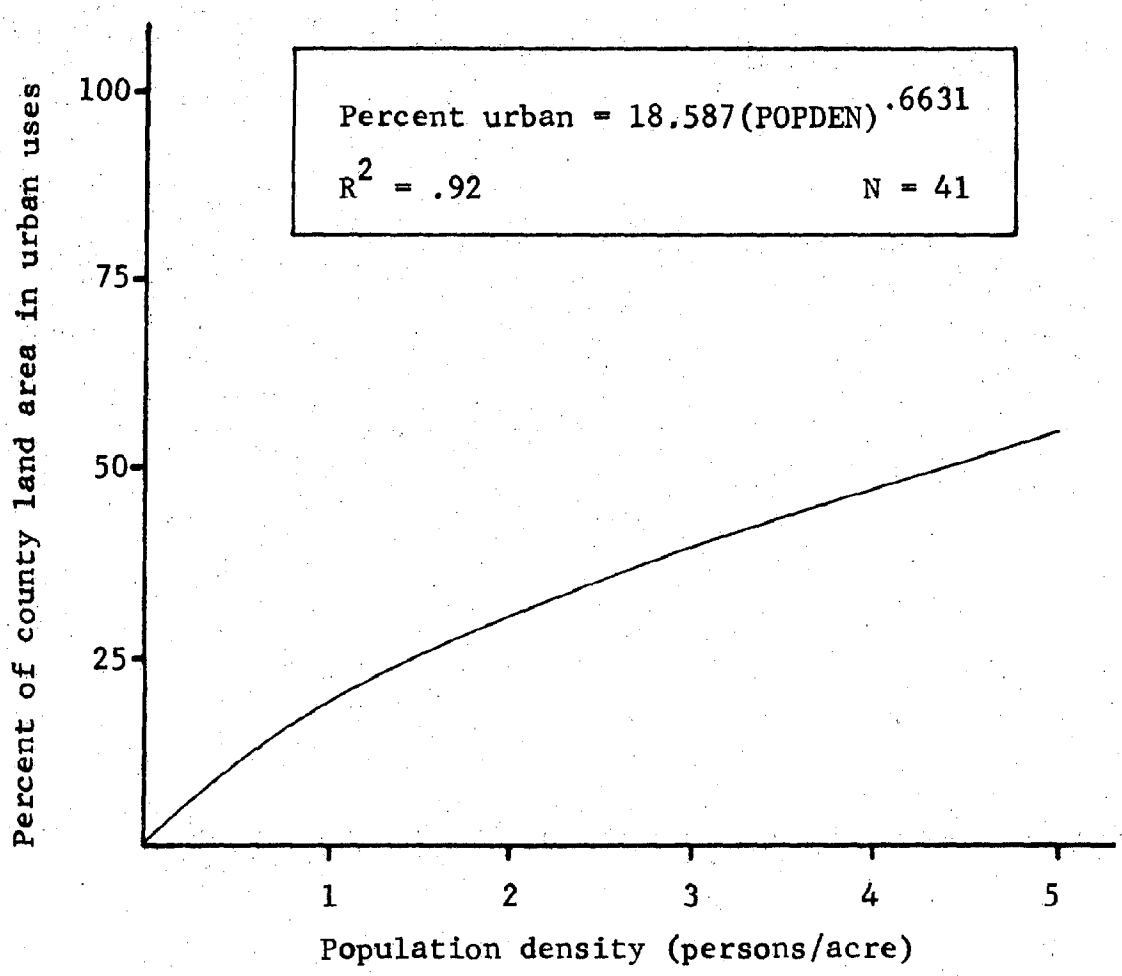
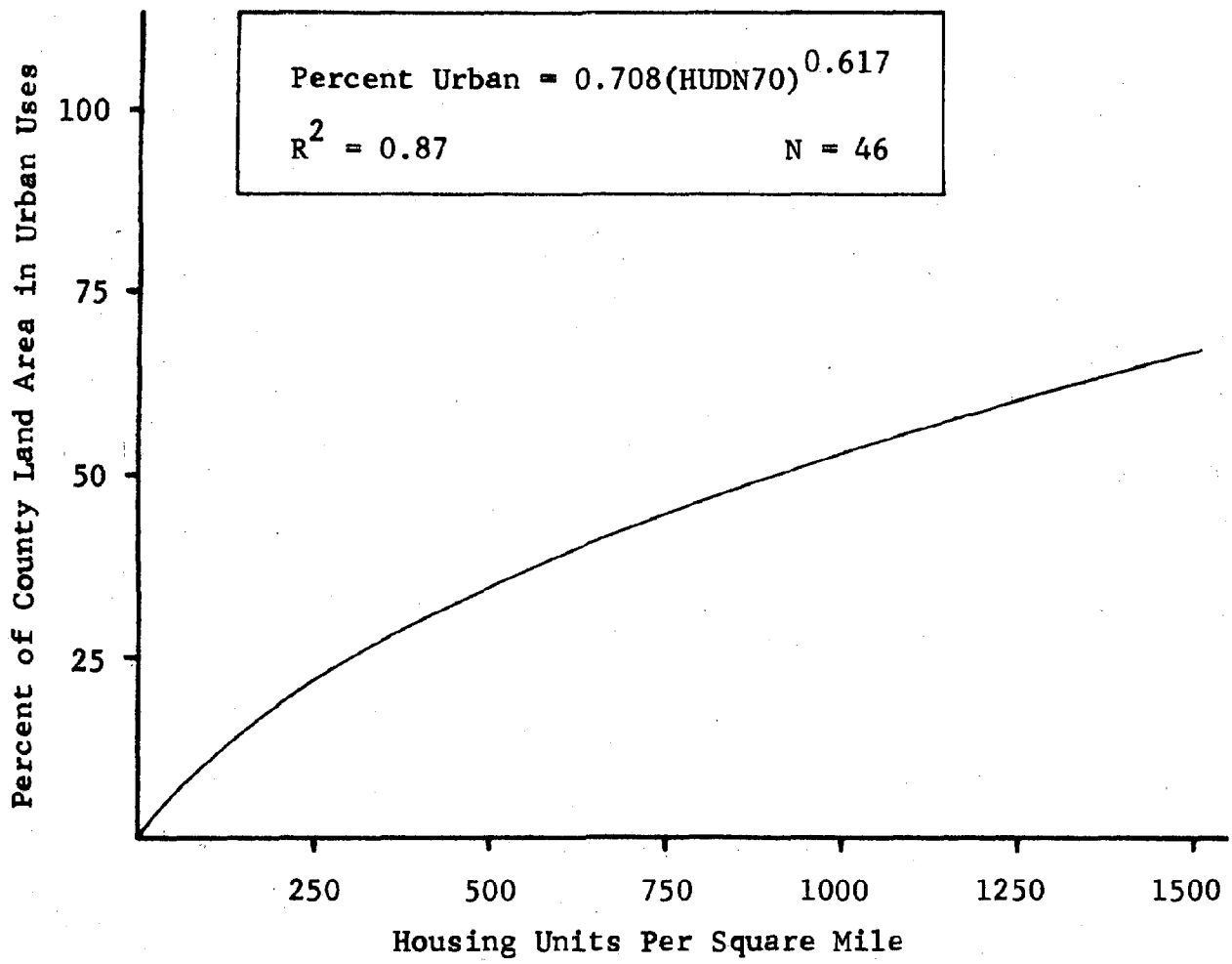


Figure 2-4

URBAN LAND REQUIREMENTS AS A FUNCTION OF HOUSING DENSITY AT THE COUNTY LEVEL



growth can replace rural uses of the land at a higher rate than such densities might at first suggest. This is because of the lower densities of nonmetropolitan development and because of the necessity of installing infrastructure such as roads before very much urban development can occur.

By calculating the estimated percent of land in urban uses as a function of housing density for all metropolitan counties in the U.S. using the relationship described above for 1960 and 1970 (i.e., by assuming, 1) that the percent urban - housing density relationship applies to all counties, and 2) that it applies to both 1960 and 1970, a pair of simplifying assumptions) we can make crude estimates of the annual conversion of land from rural to urban uses. For nonmetropolitan counties we estimated the total rural land converted to urban uses (excluding rural transportation) by multiplying the average acreage of rural land converted to urban uses per housing unit built in metropolitan counties times the number of housing units built per year during 1960-1970 in nonmetropolitan counties.[1]

The results of these calculations are summarized in Table 2-1. The total conversion figures are fairly close to those obtained

[1]This may understate conversion of rural land because nonmetropolitan development is typically more land extensive than metropolitan development.

by using the Conservation Needs Inventory for 1968 to 1967, albeit slightly smaller.

As a second part of our independent estimates of conversion of land to urban uses, we applied the percent urban - population density relationship to all counties for 1960, 1970, and 1974 and computed the annual changes in built-up land. It should be noted that this method underestimates the conversion of land to urban uses since it does not completely account for suburbanization in counties where there are declining populations in central cities or other older developed areas. However, the annual rate of conversion after 1970 is certainly nothing like the doubling obtained by the Soil Conservation Service for the period 1967 to 1974 in comparison to 1958 to 1967; our estimate of the annual acreage built up between 1960 and 1970 is 444,000 acres and between 1970 and 1974 is 522,000 acres. Thus, even though we can document the revival of population growth in many nonmetropolitan counties in the 1970's we still cannot account for the drastic difference between the Conservation Needs Inventory estimates for 1958 to 1967 and the study by the Soil Conservation Service for the period 1967 to 1974. The source of this difference remains an unanswered question.

Is the national pattern of rural land conversion something to be concerned about? At this level of analysis, the question

really becomes one of whether urbanization threatens our natural resource base. Although some forestry activities are being invaded by urban development, most research has been concentrated on the agricultural base of the nation, especially the development of prime farmland.

John Fraser Hart [1976] has estimated that by the year 2000 no more than about 4% of the nation's land will be in urban uses; indeed whether we look at all rural land, farmland, or cropland, assuming the present rates of conversion, it is unlikely that more than 4% of the current land in any of these categories (including Alaska in the base) would be developed. See Table 2-2. Thus, we will not be experiencing wall to wall urbanization.

However, there are questions concerning the quality of the land that is being converted to urban uses and the nation's ability to replace cropland or prime cropland that is converted to urban uses. There is a clear bias of metropolitan development toward counties with better soils. See Table 2-3 and compare columns 4 and 5 and columns 6 and 7. The same kind of picture can be obtained from looking at the bias of prime land toward those counties lying largely within 50 miles of one of the one hundred largest urbanized areas in the conterminous United States (Columns 2 and 4 in Table 2-4 and Figure 2-5).

Table 2-2

PERCENT OF BASE YEAR STOCK CONVERTED TO URBAN AND BUILT-UP USES DURING 1975-2000
(Assuming Present Rates of Loss)

Base	Acres	All Rural Land	Farmland	Cropland	Prime Land
Rural land Area in 1975 (ex. Alaska)	1,839,000,000	1.2 - 2.8*	----	----	----
Farmland in 1974	1,021,000,000	----	1.1 - 2.4	----	----
Cropland in 1974	438,000,000	----	----	1.7 - 3.4	----
Prime Land in 1975	385,000,000	----	----	----	1.8 - 4.9
Potential Cropland in 1975**	111,000,000	----	----	6.8 - 13.5	----
Potential Prime Cropland in 1975**	60,000,000	----	----	----	11.3 - 31.4

Notes:

* Low estimate based on RSRI estimates of the conversion of rural land to urban and built-up uses, high estimates based on potential cropland study.

** Land currently non-cropped with high or medium potential for conversion to cropland. Source: 1975 Potential Cropland Study. Land is of high or medium potential for cropland according to the Soil Conservation Service if it could be brought into production under current economic conditions -- i.e., if it is not in too small parcels, not heavily wooded, not water logged, and the like.

Table 2-3

TOTAL ACRES AND ACRES OF PRIME LAND, FOR ALL COUNTIES, SMSA COUNTIES, AND COUNTIES ADJACENT TO SMSA COUNTIES, AGGREGATED BY U.S. CENSUS REGIONS, EXCLUSIVE OF ALASKA AND HAWAII, IN PERCENTAGES

Census Region	Percent of U.S. Land Area in Region (1)	Percent of U.S. Prime Land in Region (2)	Percent Land in Region Prime (3)	Percent of Region's Land in SMSAs (4)	Percent of Region's Prime Land in SMSAs (5)	Percent of Region's Land in SMSAs and Counties Adjacent to SMSAs (6)	Percent of Region's Prime Land in SMSAs and Adjacent Counties (7)
New England	2.1	1.4	11.7	22.6	24.3	41.5	40.7
Middle Atlantic	3.4	3.6	18.8	41.0	49.8	82.6	90.1
South Atlantic	9.0	10.0	19.4	24.8	20.9	51.7	61.7
East North Central	8.2	20.2	43.1	27.2	32.3	64.8	74.9
West North Central	17.1	33.5	34.3	7.2	6.2	23.8	24.5
East South Central	6.0	7.6	22.2	18.4	22.9	52.2	51.7
West South Central	14.4	16.2	19.7	17.5	23.8	55.9	65.8
Mountain	28.9	4.0	2.4	7.5	9.7	27.1	31.9
Pacific	10.8	3.5	5.6	30.5	46.8	51.3	72.3
Nation	100.0	100.0	17.6	16.7	20.2	43.2	51.7

Sources: National Inventory of Soil and Water Conservation Needs, 1967, State Summaries.

U.S. Bureau of the Census, "County and City Data Book, 1972" (U.S. Bureau of the Census, Washington, D.C.), Table 2.

Table 2-4

TOTAL ACREAGE, PRIME ACREAGE, AND BUILT-UP ACREAGE WITHIN 50-MILE RADII OF THE 100 LARGEST URBANIZED AREAS OF THE CONTERMINOUS UNITED STATES

Urbanized Areas (ranked according to size)	Total Area (Acres) (1)	Total Area (Percent of U.S.) (2)	Prime Area (Acres) (3)	Prime Area (Percent of U.S.) (4)	Built-Up Area (Acres) (5)	Built-Up Area (Percent of U.S.) (6)	Prime Acreage / Total Acreage (7)	Prime Acreage / (Total)-(Built-Up) (8)
1-10	46,531.1	(2.6)	11,555.4	(3.4)	9,228.6	(15.1)	.248	.310
11-20	42,950.4	(2.3)	10,454.6	(3.1)	4,386.3	(7.2)	.243	.271
21-30	43,372.6	(2.3)	8,843.2	(2.7)	3,249.0	(5.3)	.204	.220
31-40	35,285.7	(1.9)	11,831.6	(3.6)	2,180.6	(3.6)	.335	.357
41-50	37,055.3	(2.0)	7,871.7	(2.4)	2,604.4	(4.3)	.212	.228
51-60	27,053.4	(1.4)	6,488.4	(1.9)	1,464.8	(2.4)	.240	.254
61-70	39,889.9	(2.1)	6,458.4	(1.9)	1,870.8	(3.1)	.162	.170
71-80	39,427.8	(2.1)	11,800.2	(3.5)	1,866.0	(3.1)	.289	.304
81-90	31,287.7	(1.6)	9,046.5	(2.7)	1,558.8	(2.6)	.267	.281
91-100	38,952.9	(2.1)	10,419.7	(3.1)	1,818.3	(3.0)	.267	.281
Total, 100 Largest	381,806.8	(20.1)	94,769.7	(28.4)	30,227,6	(49.7)	.248	.270
Nation	1,897,052.8		333,172.5		60,875.9		.176	.181

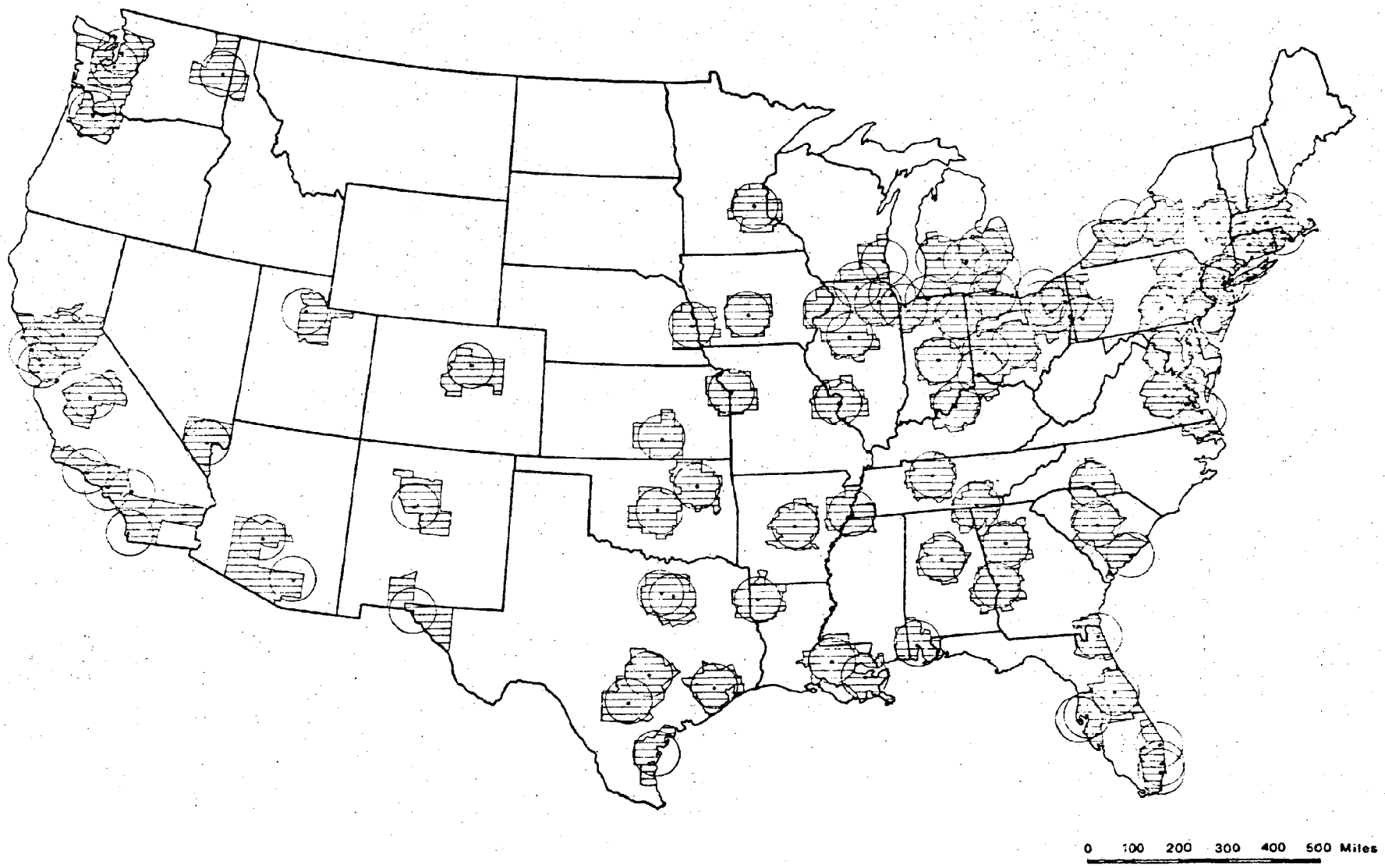
Sources: National Inventory of Soil and Water Conservation Needs, 1967, State Summaries.

U.S. Bureau of the Census, "County and City Data Book, 1972" (U.S. Bureau of the Census, Washington, D.C., Table 2, pp. 29-545.

U.S. Bureau of the Census, "U.S. Census of Population: 1970 Vol. I, Characteristics of the Population, Part A, Number of Inhabitants" (U.S. Bureau of the Census, Washington, D.C.), Table 21.

Figure 2-5

LAND AREA WITHIN 50 MILES OF THE 100 LARGEST URBANIZED AREAS



Despite this locational bias of metropolitan areas, at the current rates of conversion the proportion of the stock of the best soils to be converted to urban uses by the year 2000 is likely to be under 5% (Table 2-2). Indeed, the correlations between annual rates of population growth and percent of land in soil capability Classes I and II (using counties as the unit of observation) are close to zero or slightly negative for the periods 1960-1970 and 1970-1974 (Table 2-5). This shows no bias of population growth rates toward counties with the better soils but it does not mean that the better soils are not being built upon.

Can the cropland and prime cropland that is being developed for urban uses be replaced at reasonable cost by other lands? This is an important question in light of recent climatic conditions and increasing world demand for food. Although many people minimize the effect of climatic changes on American agricultural output, others such as Schneider have argued that there is growing evidence of greater climatic variability from year to year in the entire nation and a noticeable cooling of the eastern half of the United States. Thus, increases in agricultural output in the future that are based on extrapolations of past years, which were unusually favorable for continuously high output, will be far too optimistic. We need a "Genesis Strategy", Schneider's argument goes, of storing agricultural output from good years to

Table 2-5

CORRELATIONS BETWEEN ANNUAL RATES OF POPULATION GROWTH AND PERCENTAGE PRIME AGRICULTURAL LAND*
1960-1970 and 1970-1974

Census Region	1960-1970	1970-1974	No. of Counties
New England	.094	-.010	63
Middle Atlantic	.088	.056	150
East North Central	.078	-.345	436
West North Central	-.115	-.270	619
South Atlantic	-.167	-.179	552
East South Central	.161	-.034	364
West South Central	.037	-.015	470
Mountain	-.103	-.150	278
Pacific	.232	-.115	133
Nation	-.072	-.233	3065

*Unit of observation is county; Rhode Island, Alaska, and Hawaii excluded.

tide us over through bad years which will inevitably occur as they did following the seven years of good harvest described in the Book of Genesis.

Besides increasing variability in climate and increasing world demands for food we are also likely to be faced with binding energy and fertilizer constraints on the agricultural industry which may have the effect of lowering crop yields in the future. Thus, it can be argued that we need the ability to replace cropland and prime cropland that becomes urbanized with land that is not now in cropland.

This ability is summarized in Table 2-2, which shows that our national reserve of potential cropland and potential prime cropland (Diderikson and Sampson) will be used up rather quickly over the next fifty or more years if cropland and prime cropland are brought into production at the same rate that current cropland or prime land is converted to urban uses.

In conclusion at the national level, the major problem associated with conversion of rural land to urban uses appears to be the long-term loss of future agricultural potential under conditions of poorer climate or great pressure upon American agriculture to supply foreign food needs. The problem is certainly not the develment of even a moderate proportion of our land base

or cropland base; it is rather the effect on our food and fiber production fifty years from now under unfavorable but not far-fetched world-wide conditions.

2. Regional Perspectives

The conversion of rural land to urban uses is not a uniform process across the whole country. There are regional variations in housing style, topography, and urban pressures that contribute to differences in rates of conversion as well as to regional magnitudes of conversion. There are two issues that particularly interest us here: 1) the acreage of urban land used per new person in different regions, and 2) the type of land converted to urban uses -- i.e., the presence of biases toward conversion of farmland or forest land, for instance. Our sources on such information are scattered, so it is not possible to present a comprehensive overview of the major issues by region of the U.S. At best, we can address the issues partially for a number of overlapping and not completely exhaustive sets of regions.

With regard to the acreage of land used per additional person for urban development, Table 2-6 summarizes several regional studies

Table 2-6

CONVERSION OF LAND FROM RURAL TO URBAN USE FOR SELECTED REGIONS

Region	Approximate Time Period	All Rural Land: Acreage converted Per New Person	Farmland: Acreage Converted Per New Person	Definition of Farmland	Source
78 towns in New York	1951-1966	.193	.081	Cropland only	Allee, *et al.*
48 western counties	1950-1960	.071	.067	Cropland & Grassland	Dill & Otte (1970)
2 rapidly growing counties in Colorado	1956-1969	.234	.148	Cropland only	Zeimetz, *et al.*
3 rapidly growing counties in Florida	1957-1969	.481	.030	Cropland only	Zeimetz, *et al.*
5 rapidly growing counties in North Carolina & Georgia	1960-1970	.216	.043	Cropland only	Zeimetz, *et al.*
90 SMSA counties in Northeast	1959-1969	.112*	.051*	All land in Farms	This study
87 SMSA counties in Cash Grain East	1959-1969	.115*	.076*	All land in Farms	This study
All towns in Mass. except heavily urbanized	1957-1971	.280	.083	Cropland and Pasture	This study
4 fringe counties in Kansas City SMSA	1969-1974	.290	.133	Prime Farmland only (differs slightly from SCS Classes I and II)	Shaklee

*Obtained by multiplying acreage per new housing unit built by 3.3 persons per household.

including the results from new work in this study.[1]

It is evident that there is a great variation in the acreage of rural land converted to urban uses per person gained in population from one part of the country to another. This can be explained by both differences in style of development and the amount of infrastructure and other development needed (more will be needed per new person in low density counties than in high density counties, as we saw when examining the relationships between population or housing unit density and percent of land in urban uses).

There is also a great deal of variation in the acreage of farmland converted to urban uses per person gained. One possible cause of a bias of development toward farmland, especially cropland, is that in areas where there is little other flat, cleared land on which development can take place cropland becomes a prime target. To investigate this question we employed the land use data compiled for Massachusetts by MacConnell for 1950-1 to 1970-1 and for the 26 towns in Massachusetts for which Foster constructed

[1] For the Northeast region and the Cash Grain East (the U.S. corn belt) region the conversion of rural land was determined using the relationship between percent of land in urban uses and change in housing unit density described in the previous section. Changes in farmland were calculated assuming that farmland was converted to urban uses in proportion to its percent of all land in the relevant counties. The Massachusetts methods and results will be described in more detail later on.

transition matrices of land uses for the same time period. Table 2-7 shows the bias toward conversion of farmland as opposed to forest or idle land in the 26 towns studied by Foster. The liklihood of conversion to urban uses is the ratio of the proportion of rural land of a given type converted to urban uses divided by the proportion of all land in the study area of a given type. Development occurs more frequently on agricultural land and idle land than on forest land, which tends to be hillier in Massachusetts. Agricultural land and urbanization both tend to occur in valleys and lowlands, and so the threat of urbanization to agriculture is quite concentrated in these 26 towns.

Foster's 26 towns are not representative of the state, however; they tend to be located in the more rural parts of Massachusetts where soil quality data were available to Foster. To estimate the loss of agricultural land, idle land, and forest land in the entire state it was necessary to adjust the conversion of rural land per additional person for each category of rural land by the same scaling factor so that the total of all rural land converted per person gained for the entire state equals that inferred from MacConnell's sample data on rural land loss. Highly urbanized towns are not included in the calculations nor are they included in Table 2-8. These towns are already built up and include older cities and suburbs. As expected the table reveals both a

Table 2-7

CONVERSION OF RURAL LAND TO URBAN USES IN 26 TOWNS IN MASSACHUSETTS, 1951-1971

Land Use	(1) Acres Converted to Urban Uses Per Net Additional Person, 1951-1971	(2) Percent of Rural Land Area Converted to Urban Uses 1951-1971	(3) Percent of Rural Land Area in 1951	(4) Likelihood of Conversion to Urban Uses 1951-1971 ((2)÷(3))
All Rural Land*	0.386	100.0	100.0	1.0
Active Agriculture	0.114	29.6	17.3	1.7
Intensive	0.059	15.3	9.1	1.7
Extensive	0.055	14.2	8.2	1.7
Idle Land	0.026	6.7	5.3	1.3
Forest Land	0.246**	63.7	77.4	0.8

* Includes all land area except land in urban uses and "other" land uses.

**Calculated by subtracting actively farmed land and idle land converted to urban uses per person gained (from Foster) from all rural land converted to urban uses per person gained (from MacConnell (1975)).

Source: Foster

Table 2-8

CONVERSION OF RURAL LAND TO URBAN USES
ESTIMATED FOR MASSACHUSETTS, 1951-1971*

Land Use	(1) Acres Converted to Urban Uses Per Net Additional Person, 1951-1971	(2) Average Annual Loss to Urban Uses, 1951-1971 (Acres)	(3) Loss to Urban Uses, 1951-1971, As a Percent of the 1951 Base
All Rural Land	0.280	15,729	7.8
Active Agriculture	0.083**	4,662	13.1
Intensive	0.043**	2,415	12.3
Extensive	0.040**	2,247	14.0
Idle Land	0.019**	1,067	8.2
Forest Land	0.178**	9,999	6.6

* Includes all towns except those which were already highly urbanized in 1951.

** Calculated by multiplying each of the rural land use coefficients for the 26 sample towns (Table 2-7, col. 1) by the ratio of rural land urbanized per capita in the state to rural land urbanized per capita in the 26 sample towns (0.280 ÷ 0.386).

Source: Foster

rather large magnitude and proportion of agricultural land being converted to urban uses over the twenty years between 1950 and 1970.

One region deserving of special attention is the State of California, which has been growing in population at an average annual rate of 2.7% in the 1960's and 1.2% between 1970 and 1974. This rapidly urbanizing state ranks first in the value of agricultural production ($7,366,364,000 in 1974) and there is a strong bias for development to occur on agricultural land -- the land in small valleys and in the Central Valley. For example, Zeimetz, et al., found that between 1956 and 1963, 70.1% of the urban development in Santa Clara and Santa Cruz Counties occurred on cropland, which constituted only 16.3% of the land area of the counties. Thus, there is the potential for intensive conflict between urbanization and agricultural activities in this important agricultural state.

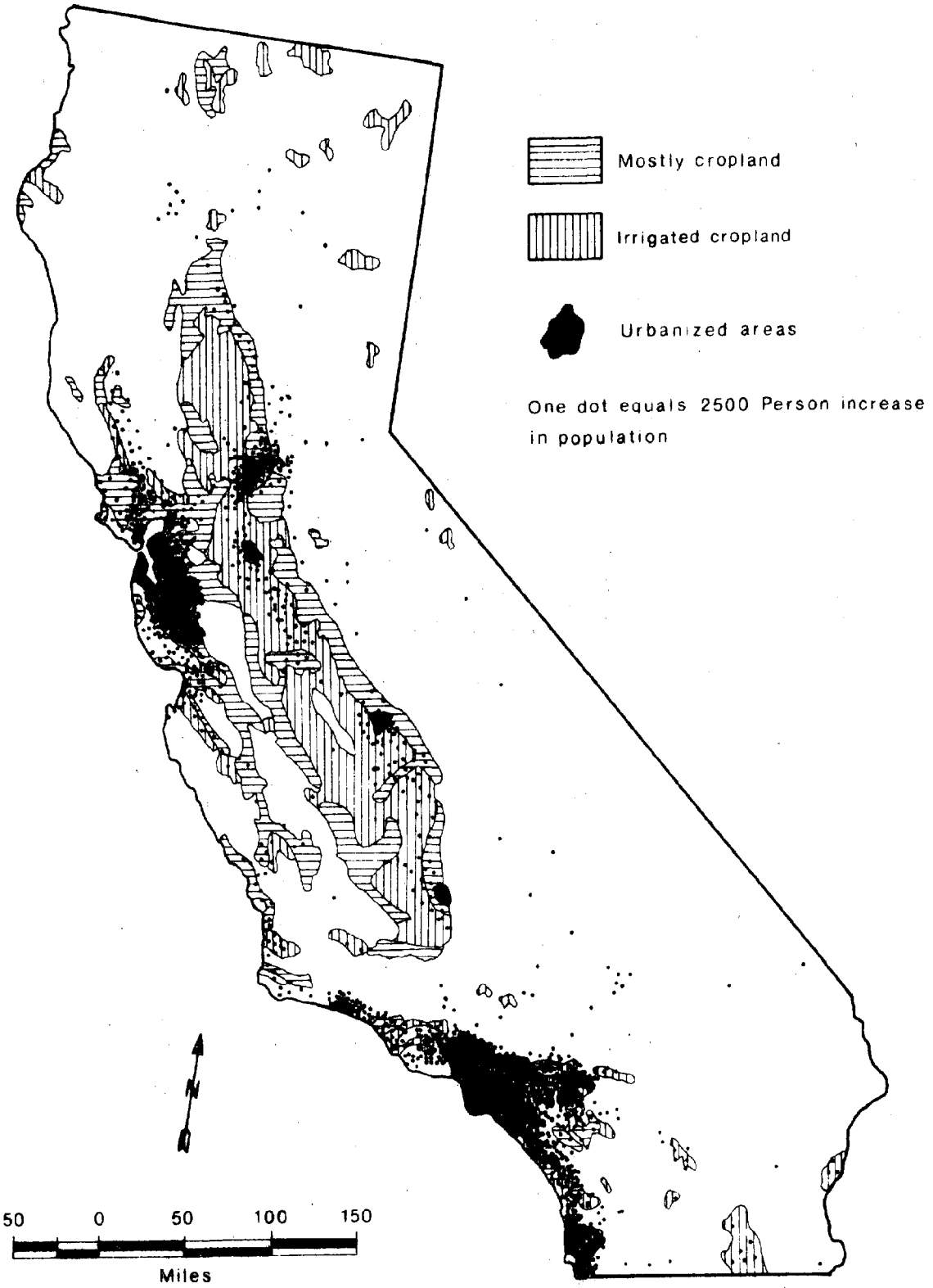
California's great agricultural productivity is based upon irrigation. In 1969, 82% of all cropland harvested was irrigated (some 6,195,000 acres according to the Census of Agriculture). Not too surprisingly, though, there is a strong association between local declines in irrigated cropland harvested between 1959 and 1969 and density of housing units built between 1960 and 1970, suggesting that urbanization is intruding upon the State's agri-

cultural potential. See Figures 2-6 and 2-7. Yet in the 1960's irrigated cropland harvested statewide dropped only slightly from 6,217,000 acres in 1959 to 6,195,000 acres in 1969, indicating that farmers were able to expand irrigation sufficiently to offset urban encroachment upon irrigated farmland. Now with the severe drought situation and other demands on water sources in California it is unlikely that irrigation can continue to spread as urbanization expands -- indeed we might even expect irrigated acreage to decrease as water becomes scarcer and scarcer and concomitantly we would then expect California's preeminent position in supplying the nation with fruits, nuts, vegetables, grains, cotton, and other agricultural products to be imperiled. Urban development of irrigated farmland can only exacerbate these circumstances.

For the state as a whole, the magnitude of conversion of the best agricultural land between 1970 and 1985 has been projected by the California Office of Planning and Research to run about 41,380 acres per year. This includes all land in soil capability Classes I and II (which is largely irrigated) plus other cropland grossing $200 per acre or more per year or land with an annual carrying capacity of one animal unit or more per acre per year. This projection was made by attempting to define urban growth boundaries for all cities with populations greater than 50,000 in

Figure 2-6

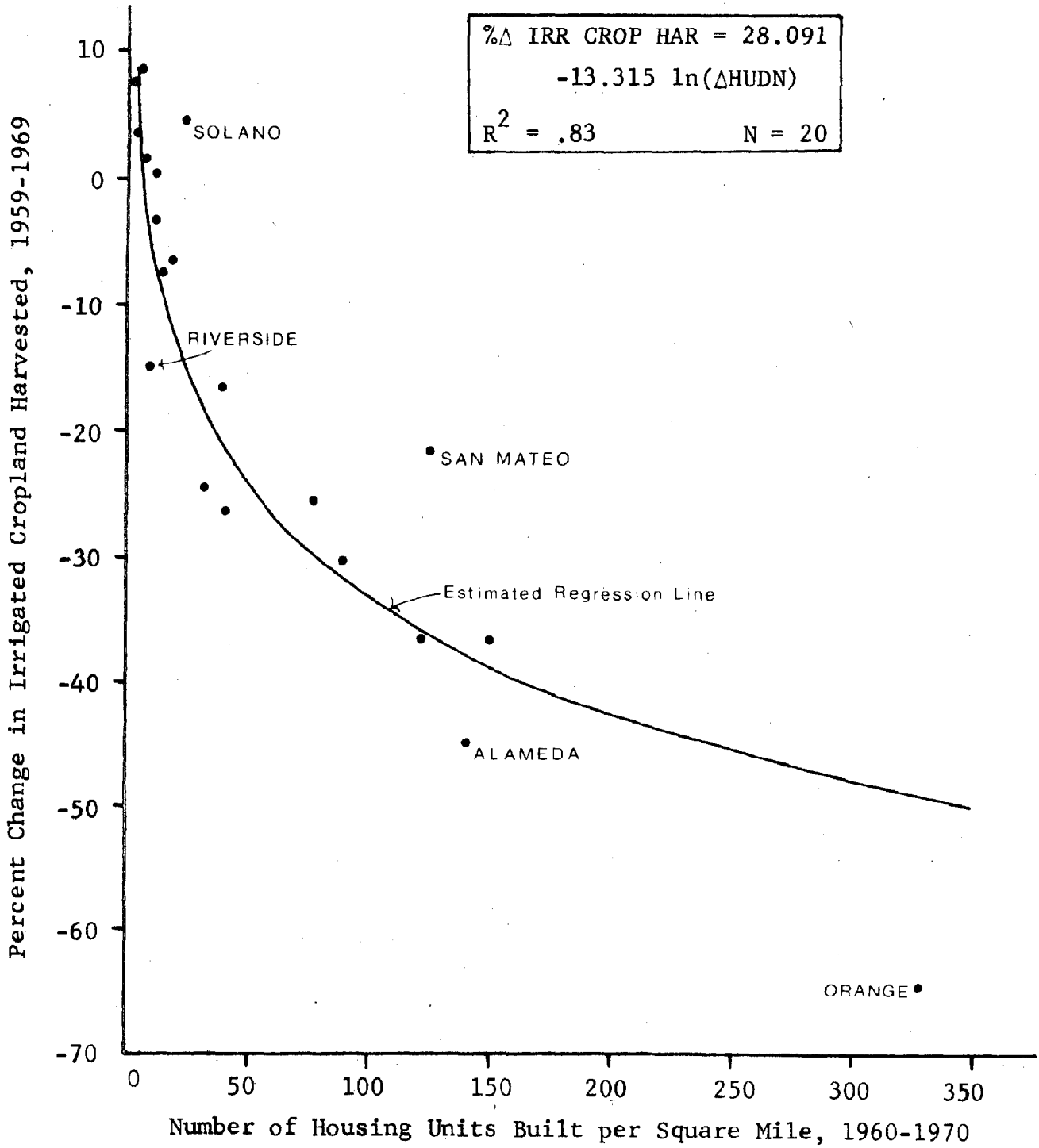
LOCATION OF CROPLAND, 1967 AND POPULATION GROWTH, 1960 - 1974, IN CALIFORNIA



SOURCES: National Atlas of the United States, US Census of Population, 1960 and 1970, and Current Population Reports, 1976.

Figure 2-7

THE RELATIONSHIP BETWEEN URBANIZATION AND THE LOSS OF IRRIGATED CROPLAND HARVESTED DURING 1959-1969 FOR 20 METROPOLITAN COUNTIES IN CALIFORNIA



1970 and estimating the volume of the best farmland required for urban development.

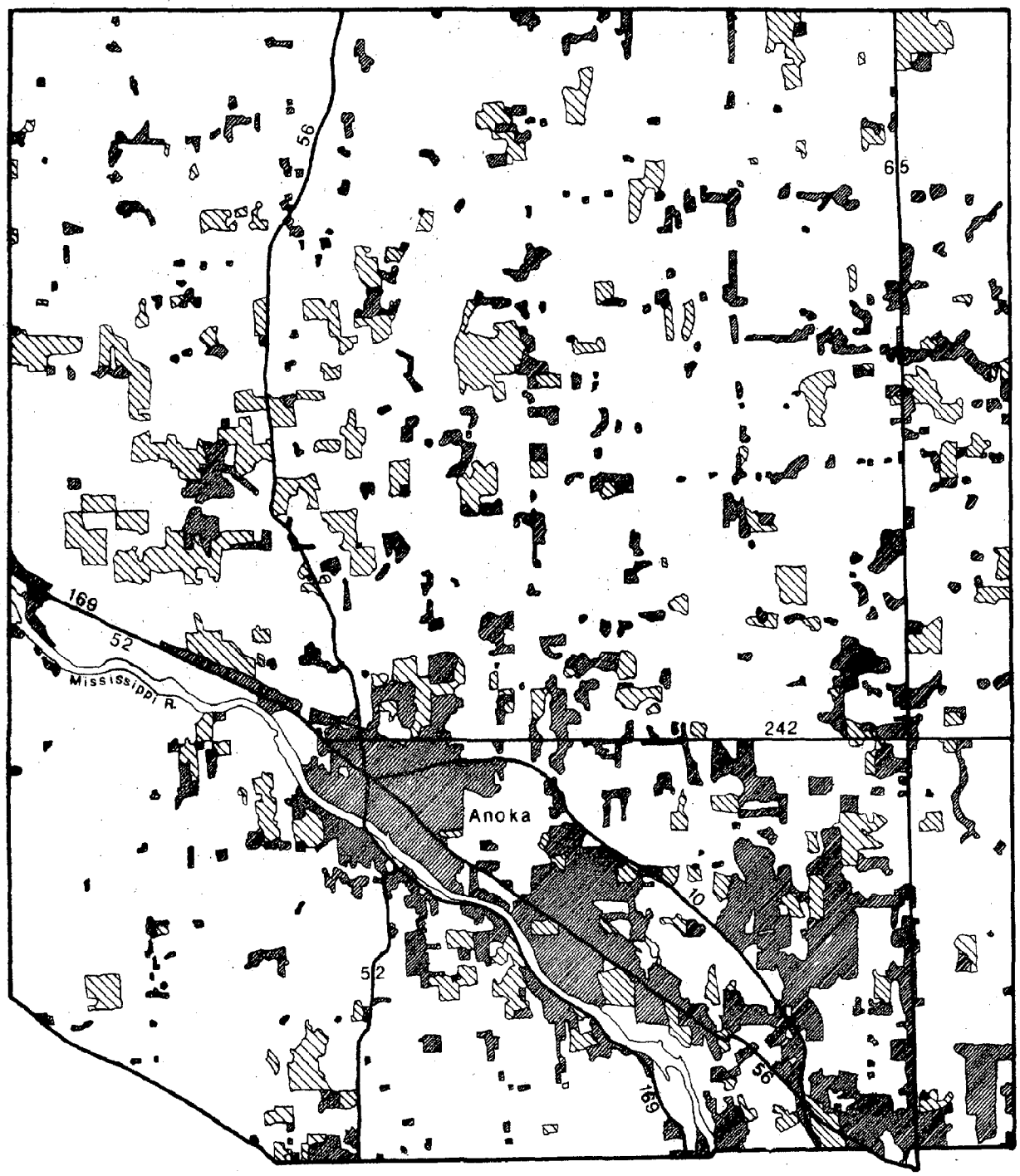
At the present time, our regional perspectives on the direct effects of urbanization on rural landscapes are quite limited and unsystematic. It is difficult to put together a coherent picture. Obviously, there are significant regional differences in the magnitude and nature of urban development of rural lands, but we can do no more than highlight a few scattered instances of these differences. Massachusetts' and California's experiences, for example, are certainly only partly applicable to other states which do not have the rough, costly-to-build upon, terrain that encourages development of agricultural lands there.

3. Local Perspectives

At the subcounty level, the most remarkable feature of the urbanization process is its great dispersion over the landscape. Urban development proceeds by scatteration and some infilling rather than by accretion contiguous to past development. This process may be seen in Figures 2-8 and 2-9, which show parts of Anoka and Dakota Counties near the cities of Minneapolis and St. Paul, Minnesota. The changes in land uses between 1968 and 1975 for these two areas are summarized in Tables 2-9 and 2-10, which show the percent of land in the category in row i in 1967 that was in the category in column j in 1975. Note that in Dakota County

Figure 2-8

BUILT UP LAND IN ANOKA COUNTY, MINNESOTA



Built up before 1967

Built up 1967 to 1975

1 0 1 2 3 4
Miles

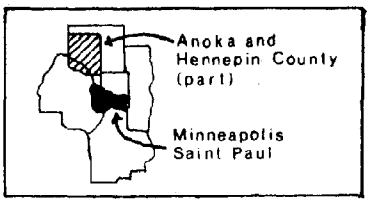


Figure 2-9

BUILT UP LAND IN DAKOTA COUNTY, MINNESOTA

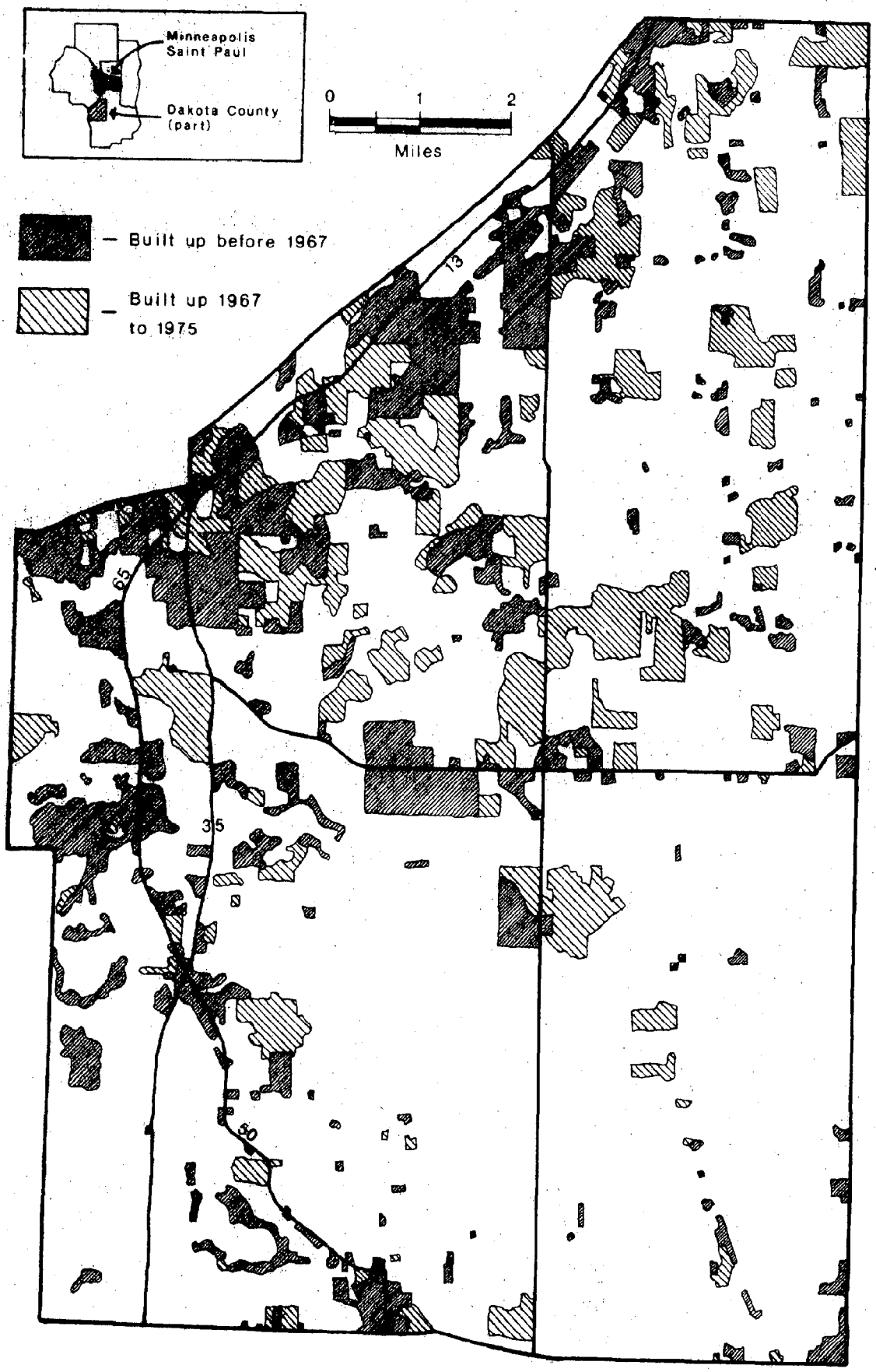


Table 2-9

TRANSITION MATRIX OF LAND USE CHANGES IN ANOKA COUNTY (Part) MINNESOTA 1968-1975 - ALL SOILS
(Percent of 1968 Acreage in Uses Indicated in 1975)

Use in 1968	Use in 1975						Total Acreage 1968
	Cropland, Orchards & Nurseries	Other Cleared Land	Wood-lands	Residen-tial	Other Urban	Other	
Cropland, Orchards & Nurseries	85.6	5.8	0.1	7.1	1.4	0.0	56,396
Other Cleared Land	1.0	90.2	1.1	5.1	2.4	0.2	31,473
Woodlands	0.4	1.3	89.6	8.4	0.3	0.0	30,790
Residential	0.0	0.0	0.0	100.0	0.0	0.0	14,135
Other Urban	0.0	0.0	0.0	0.0	100.0	0.0	5,851
Other*	0.1	0.0	0.0	0.0	0.1	99.8	7,809

*Largely lakes.

Table 2-10

TRANSITION MATRIX OF LAND USE CHANGES IN DAKOTA COUNTY (Part) MINNESOTA 1968-1975
(Percent of 1968 Acreage in Uses Indicated in 1975)

Use in 1968	Use in 1975						Total Acreage 1968
	Cropland, Orchards & Nurseries	Other Cleared Land	Wood-lands	Residen-tial	Other Urban	Other	
			A. ALL SOILS				
Cropland, Orchards & Nurseries	84.6	4.6	0.1	6.5	4.1	0.1	37,197
Other Cleared Land	0.0	77.0	3.6	11.4	7.2	0.8	8,994
Woodlands	0.1	1.1	84.9	12.5	1.4	0.0	10,172
Residential	0.0	0.0	0.0	100.0	0.0	0.0	7,236
Other Urban	0.0	0.0	0.0	0.0	100.0	0.0	2,193
Other	0.0	0.0	0.0	0.0	0.0	100.0	2,504
			B. PRIME SOILS ONLY				
Cropland, Orchard & Nurseries	88.0	3.6	0.1	5.4	2.9	0.0	23,666
Other Cleared Land	0.0	75.0	2.1	12.4	10.5	0.0	1,552
Woodlands	0.0	0.3	84.7	15.0	0.0	0.0	1,090
Residential	0.0	0.0	0.0	100.0	0.0	0.0	2,181
Other Urban	0.0	0.0	0.0	0.0	100.0	0.0	1,038
Other	0.0	0.0	0.0	0.0	0.0	100.0	157

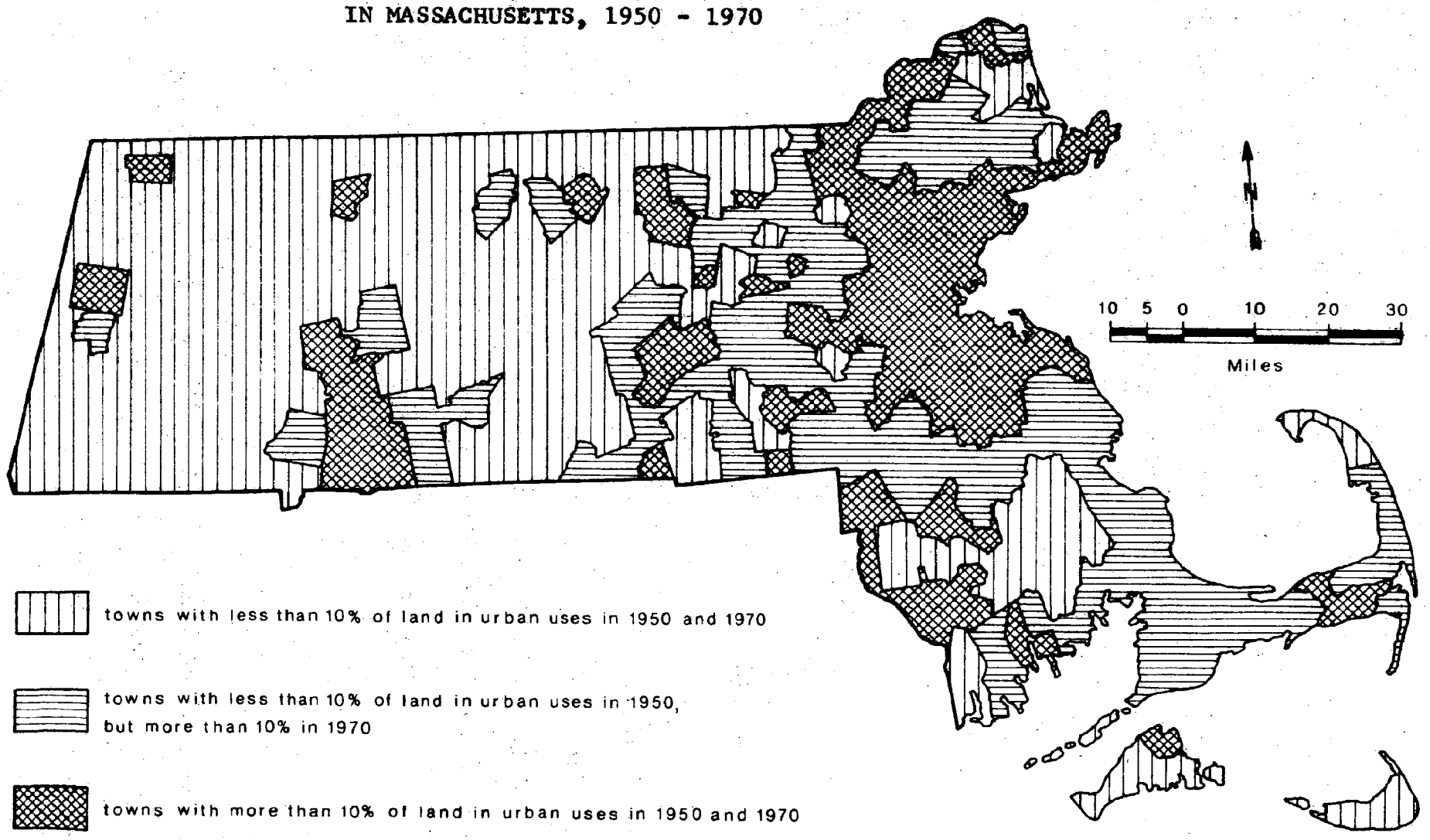
there is a slight preference for residential development to occur in wooded areas (that are often adjacent to lakes) but little differences in the matrix for all soils as compared with the matrix for prime soils only. In both counties, land development is proceeding at a moderately rapid pace.

The scatteration of urban development at the local level brings about a number of indirect effects which will be discussed in the next section. But it is apparent that a relatively small amount of rural land converted to urban uses by this process will drastically alter the appearance of the landscape, making formerly rural areas neither truly rural nor truly urban. Although the visual effects of suburban and exurban land uses may be very apparent driving along any road, much undeveloped land may remain. From the local perspective then, we can see that it is not necessarily the volume of conversion of farmland, woodlands, or other components of the rural landscape to urban uses as an absolute acreage that matters, but rather the dispersal of this development over the landscape. The visual effects are thus another of the "costs of sprawl."

Using data gathered by William MacConnell and his associates for Massachusetts for 1950-1 and 1970-1, it is possible to get some idea of the extent of urban intrusions into rural landscapes. Figure 2-10 shows those towns in Massachusetts where less than 10%

Figure 2-10

EXPANSION OF URBAN LAND USE
IN MASSACHUSETTS, 1950 - 1970



of the land was in urban uses in 1950-1 and where more than 10% of the land was in urban uses in 1970-1. Although this is but a rough indicator it suggests that urban uses of the land are dispersing over the Massachusetts landscape. (Of course, one should not assume Massachusetts' experience holds for all parts of the country -- Massachusetts is a very urban state.)

4. Conclusions

It is apparent that the consequences of the expansion of urban development are different when viewed from the national, regional, and local perspectives. In contrast to the long term conversion of farmland as a proportion of potential cropland at the national level the dominant local issue is the change in the character of the landscape from rural to something neither rural nor urban as development disperses over the landscape. At the regional level, the severity of urban development varies spatially as seen in the Massachusetts and California examples. The threat of urbanization falls most heavily on agricultural land, and in California this may add to that state's difficulties in maintaining its high level of agricultural production.

B. Indirect Effects of Urbanization

The expansion of urban development brings with it a variety of effects and influences which transcend the boundaries of the

developed land itself. These effects may be called indirect in contrast to the direct conversion of land to urban uses. They are characterized by their inducement of a change in attitudes toward the future of land use in a particular locality by rural land owners in that locality. Rural nonfarm residents who live in the country because they like low density rural living may find that increases in population change the visual and contemplative characteristics of the area to the point that it no longer appears rural to them. Some may be induced to move farther from this urban influence to regain a sylvan or agricultural surrounding. In some areas, forestry operations may be interferred with by urban expansion, although there is probably more second home speculation by forestry companies than indirect effects of urbanization interfering with foresters (see the discussion by Fellmeth for the California case). As a further example, the effects of land speculation have left a lasting mark upon the deserts of New Mexico, where speculators have bulldozed a grid pattern for future roads leaving strips of sand devoid of bunch grasses, sagebush, and other desert vegetation and increasing the severity of dust storms. So far, only a negligible portion of this land has been built upon or is likely to be built upon. But the rural activity which seems to fall most strongly within the sphere of urban influence is agriculture and the indirect effects of urbanization

upon farming will be the subject of much of the remainder of this chapter.

1. The Nature and Causes of Indirect Effects

Increases in population in rural and semi-rural areas are the ultimate source of indirect effects. The pattern of these increases has shown a remarkable change in the past decade with the revival of growth in many counties which were formerly losing population (Beale, and Beale and Fuguitt). Indeed in some states such as New York, Massachusetts, and Connecticut the population has been deconcentrating from metropolitan areas since the 1960's and for many more states such as Pennsylvania, Ohio, Georgia, California, Oregon, and several others, there has been a deconcentration of population since 1970 (Vining and Strauss).

There are a number of forces at work behind population deconcentration and rural revivals [Zelinsky et al., Beale]. One is that preferences for low density living have continued to attract people out of central cities into the suburbs and beyond; a second related force has been the extension of commuting fields because of relatively cheap transportation and rising incomes. Third, some rural areas are now gaining population because retired individuals are moving back to their old home counties or to rural retirement communities in general. A fourth factor has been the

rapid growth of state colleges and universities in nonmetropolitan areas, which has of course attracted large numbers of students, faculty, staff, and other people. And a fifth factor has been the relocation and founding of manufacturing firms on the urban fringe, in rural areas, or in small cities which may attract workers in those firms to live in nearby areas.

The increases in population in rural and semi-rural areas often tend to bring with them three types of indirect effects which lead to uncertainty over the future of that rural area in the minds of the rural residents. First the rural residents -- farmers and others -- begin to lose their political, economic, and social status in the community in which they live as they become outnumbered by people with different economic, political, and social interests. One Hartford County, Connecticut farmer summarized the farm-nonfarm conflict in values by noting that "young people have no respect (for older farmers) -- moral decay is upon us."

This decline in status leads to the second type of effect -- which may be called spillover effects of urbanization. Among these are:

a. Regulation by suburban residents of farming (and perhaps other) activities that are deemed nuisances by these new residents. For example, regulations on fertilizer use, manure disposal, smells, slow-moving farm vehicles on commuter roads, etc. are imposed so as to accommodate a

suburban lifestyle as opposed to a rural lifestyle. In addition existing ordinances are being extended to apply to farming in urbanizing areas; in Pocopson Township, Chester County, Pennsylvania, a long-standing provision limiting noise at night has recently been applied to farm activity.

b. Increased taxation to pay for new schools, roads, utilities, and other services required by new suburban residents. Farmers and other rural land owners often end up paying for these services on the basis of the amount of land they own or front footage rather than on the basis of how much they use the services.

c. Destruction of crops or equipment or harrassment of farm animals by nonfarm residents. Many urban-fringe farmers complain that they cannot leave farm equipment outdoors overnight for fear of vandalism and many also complain that tree crops are stolen or that children shoot arrows at their cows requiring the installation of expensive fencing to keep people out. Referring to nonfarm youths, one Howard County, Maryland farmer remarked "It is hard to live with the (expletive deleted) ... I rented some land near Laurel and put in a corn crop. Now it's hard to police all 600 acres at one time. I would come back to that field and find litter and motorbike trails and a lot of trampled ground."

d. Use of eminent domain to acquire farmland and other rural land for public uses aimed at serving the growing non-rural population. Roads and reservoirs are two important categories of public use requiring the removal of land from farms, sometimes even splitting farms into two mutually inaccessible parts.

e. Air pollution damage to crops caused by automobiles or industrial activity or by residential space heating. This problem has been well publicized for the area around Los Angeles [Prestbo] but the extent of the problem is difficult to ascertain.

f. Disruption of farm infrastructure. While we have found no evidence that farm suppliers, assemblers of raw farm products, and other components of farm infrastructure have disappeared from urbanizing farm areas, we have found that farmers face increasing inconvenience as traditional farm suppliers begin to accommodate suburban gardeners rather than commercial farmers. Farmers must travel farther than before to obtain machinery or repair services, for instance. Moreover, the urban northeast in general has experienced difficulty in obtaining specialized farm machinery that is routinely shipped to the major farming areas of the midwest and elsewhere.

g. Diminishing availability of farmland. Acquisition and rental of farmland are difficult in much of the country -- many farmers, both older and younger, are in search of land to expand their farms or to start farming and the competition is intense, driving up land prices or rentals. In urbanizing areas there are the further difficultites of 1) competing with nonfarmers for purchase of land and 2) the uncertainty created by the possibility that owners of land rented to farmers will not renew a lease when a speculative buyer or developer wants to purchase the land.

Farmers have exhibited a differential ability to cope with these spillover effects generated by nearby urbanization. Some have the managerial ability and the willingness to accommodate themselves to inconveniences created by urbanization. A Hartford County, Connecticut farmer whom we interviewed worked diligently at community relations and had established himself as a friend and employer of many local youths whom other farmers in the area regarded as quite mischievous. An older farmer in one Chester County, Pennsylvania family spoke of a changing lifestyle in general. He observed that the farmers in his area are no longer ignorant dirt farmers, using intuition and a gambling spirit to succeed. Instead, the farmer today must become an expert in financial affairs, in new farm technology, in politics, and in community relations while still keeping a love for the land and putting in a 16 hour day when the work demands it.

Because taking on a whole new set of problems created by urban neighbors requires the farmer to be a businessman as well as a traditional skillful risk taker there has been a selective effect on farmers near urbanizing areas. Those farmers who cannot cope may tend to sell out faster to other farmers who can cope or to nonfarmers.

A third indirect effect of urbanization is land speculation. The potential for rapid appreciation in land value as urban

pressures emerge in a rural or semi-rural region puts within sight the time-honored dream of reaping a windfall profit in the land market. Such circumstances may transform the farmer or other land owner into an active speculator if the urban pressures are strong enough. Conklin and Dymsza have argued that such active speculation causes the farmer to disinvest in his farming operation. There is little need to keep up equipment, barns, soils, drainage, fencing, or soil conservation procedures if one is going to sell out to a land speculator or developer in the near future. Thus, farmers who feel that urban pressures are strong will be led to idle their farmland while waiting for the speculator or developer to come.

Where urban pressures are weaker but not absent, many farmers and other rural land owners become passive speculators in their land. They hope to realize a large capital gain in the value of their land when they retire, and this becomes an important component of their expectations about the future.

The combination of declining status, spillover effects from urbanization, and land speculation lead the rural land owner to a change in his or her attitudes about the future of agriculture or the rural environment in the locality. There are strong and strengthening pressures to force the farmer or other land owner toward a feeling of the uncertainty of that rural lifestyle --

what the Blueprint Commission on the Future of New Jersey Agriculture called the impermanence syndrome. In the next section we shall examine the spatial expression of that syndrome giving special emphasis to the Middle Atlantic Region of the country.

2. Spatial Expression of Indirect Effects

The indirect effects of urbanization upon the agricultural landscape vary with the strength of urban pressures. Where these pressures are strong we find a much more intense effect upon agriculture -- the idling of farmland. But where they are weaker, though still present, we find a slow switchover from those types of agricultural activity requiring heavy, long term investments to other agricultural activities for which the return on investment is quicker and the investment not so heavy.

Intense indirect effects, that is the idling of farmland, are fairly localized. They occur where population growth is strong and where there is already a substantial amount of land in farms, of course. When small extensions of development are scattered in relative isolation, these effects will probably be weaker.

To identify the extent of the potential for strong indirect effects (and concomitant direct effects) within a metropolitan area we examined six counties in the Philadelphia and Syracuse metropolitan areas for simple evidence of the potential for con-

flicts between agriculture and urbanization at the town or township level. These counties were among the few for which reliable land use data exist at the township level.

After some experimentation, a potential for conflict between agriculture and urbanization was defined to exist if at least 20% of land in the township was in farms around 1970 and if the township had either a) an increase in population density, 1960-1970, of 100 persons per square mile (.156 persons per acre), or b) a population density of at least 640 persons per square mile (1 person per acre) in 1970. The choice of these criteria for conflict are somewhat arbitrary, but changing them slightly alters the results only slightly.

The resulting maps for the counties in the Philadelphia and Syracuse metropolitan areas (Figure 2-11) correspond to one's general impressions upon driving through the areas. The maps suggest that intense conflicts (both direct and indirect) between agriculture and urbanization are frequently localized within metropolitan counties.

Looking in more detail at the Philadelphia metropolitan area, Berry estimated the amount of land in farms in 1930 that was not developed or no longer being farmed in 1970; this is the amount of farmland that was permanently idled during 1930-1970. These estimates were made by township for six of the eight counties in the region -- Bucks, Chester, and Delaware Counties in Pennsylvania and Camden, Burlington, and Gloucester Counties in New Jersey. Table 2-11

Figure 2-11

TOWNSHIPS WITH POTENTIAL FOR CONFLICT BETWEEN AGRICULTURE AND URBANIZATION IN 1970

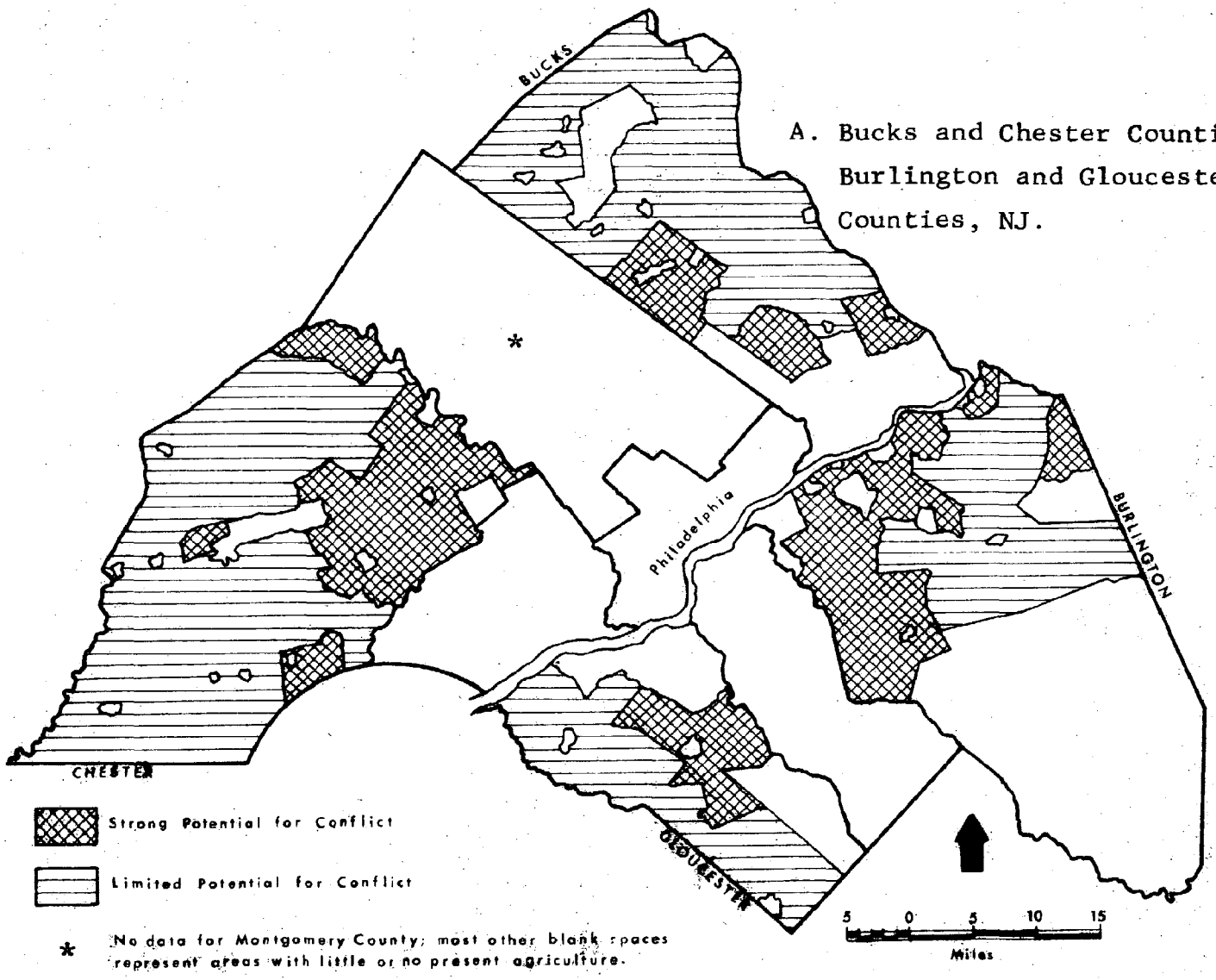
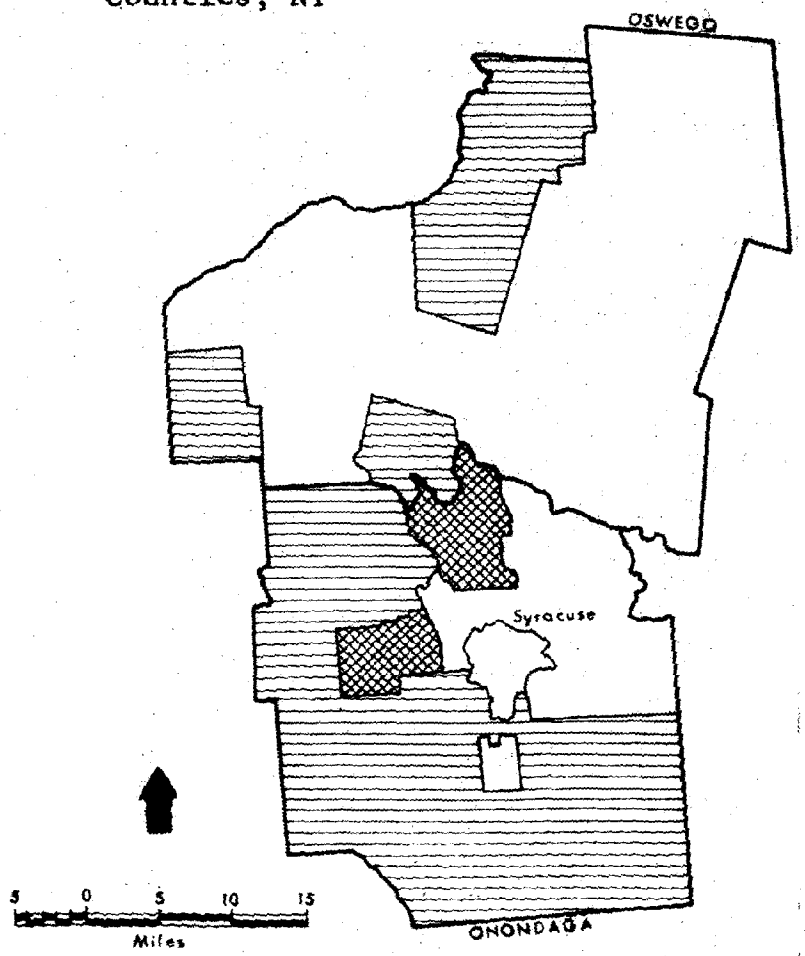


Figure 2-11, continued

B. Oswego and Onondaga Counties, NY



Strong potential for conflict: at least 20% of land in farms and a) population density ≥1 person per acre, or b) change in population density 1960-1970 ≥.16 persons per acre.

Limited potential for conflict: at least 20% of land in farms, but population density and change in population density less than above.

For Onondaga and Oswego Counties, land in farms refers to commercial farms only, that is, those with at least $10,000 of income in 1972 in Oswego County and those with at least 2/3 of income from farming in Onondaga County.

Sources: Philadelphia Region: Delaware Valley Regional Planning Commission; 1960 and 1970 Census of Population.

Onondaga County: Syracuse-Onondaga County Planning Agency, Map of Commercial Farms in 1972; 1960 and 1970 Census of Population.

Oswego County: Oswego County Planning Board, Map of Commercial Farms in 1972; 1960 and 1970 Census of Population.

Table 2-11

IDLING OF FARMLAND IN SIX COUNTIES IN THE PHILADELPHIA METROPOLITAN REGION,* 1930-1970

A. FARMLAND IDLED (Acres)

1970 Population Density (persons per acre)	Percent of Land in Capability Classes I and II				
	0-9.9	10-19.9	20-49.9	50+	Totals
less than 1.0	60,897	38,711	89,375	46,668	235,652
1 or more	22,307	22,551	15,778	1,184	61,820
Totals	83,205	61,262	105,153	47,851	297,472

B. PERCENT OF FARMLAND IDLED

1970 Population Density (persons per acre)	Percent of Land in Capability Classes I and II				
	0-9.9	10-19.9	20-49.9	50+	Totals
less than 1.0	35.1	31.2	26.4	22.6	28.0
1 or more	36.4	37.8	30.9	27.4	35.0
Totals	35.4	33.3	27.0	22.7	29.2

*Calculated for 167 minor civil divisions in Bucks, Chester, Delaware, Burlington, Camden, and Gloucester Counties.

Note: Acreages may not add due to rounding.

Source: Berry, 1976a.

reports these estimates of the idling of farmland for 167 townships in the study counties broken down by percent of the land in the township in soil capability Classes I and II and by 1970 population density. It is apparent that much of the farmland that was idled during this period was idled because it was rather poor land and uncompetitive in the agricultural marketplace. However, in the more densely populated areas much of the idling can be attributed,, at least in part, to pressures from urbanization. Assuming all of the idling of farmland in townships where the 1970 population density was at least one person per acre was caused by urbanization, then 35% of the land in farms was idled because of these urban pressures. It is probably true that urban pressures affected some farmers' decisions in less densely populated areas as well -- perhaps as much as one third of all the farmland idled in the six counties could be attributed to urban pressures, some 100,000 acres.

To estimate the magnitude of idling of farmland due to urban pressures in other parts of the country, we employed a two-step procedure. First, percent change in land in farms in various regions for the period 1959 to 1969, % LF, was regressed on the change in the number of housing units per square mile between 1960 and 1970, HUDN; the percentage of non-federally owned non-urban land in soil capability Classes I and II in 1967, SCC 12; the percentage of farmers over 65 years of age in 1959, OLD; and the percentage

of farmers who earned a gross farm income of over $40,000 per year in 1964, 40 + F. The unit of observation was the individual county and the universe was all such counties classified as metropolitan in 1970 (i.e., SMSA counties) which contained significant agricultural activity. The most successful formulations were found for the metropolitan counties in the cash grain east and in the northeastern parts of the country.[1] See Table 2-12.

The regression equations provide estimates of the loss of farmland due to direct and indirect urban causes (which includes the idling of farmland due to urbanization as well as the conversion of farmland to urban uses) while holding constant some aspects of the effects of soil quality, demographic features of the farming population, and economics of farming operations on the decline of land in farms. Thus, the coefficient of ΔHUDN estimates the decline in land in farms (as a percent of farmland in 1959) attributable to increases in residential development (expressed as a density of net new housing units).

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[1]The metropolitan counties constituting the northeast are those in New York, New Jersey, Pennsylvania, eastern Ohio, Michigan, Wisconsin, and the Duluth, Minnesota SMSA. The metropolitan counties comprising the cash grain east region are those in : central and western Ohio (excluding southwestern Ohio), Indiana (excluding the Louisville SMSA), the Evansville SMSA in Kentucky, Illinois, Missouri (excluding the Springfield SMSA), Iowa, Minnesota (excluding the Duluth and Fargo-Moorhead SMSAs), the Topeka SMSA, and the Nebraska and Kansas parts of the Omaha and Kansas City SMSAs respectively.

Table 2-12

CHANGE IN LAND IN FARMS: REGRESSION RESULTS FOR THE NORTHEAST AND CASH GRAIN EAST*

Region	Constant	ΔHUDN	SCC12	OLD	40 + F	R^2	SEE	N
Northeast (metropolitan counties only)	-22.030	-0.151 (6.51)	0.236 (5.72)	-0.454 (1.81)	0.631 (2.91)	.58	6.77	90
Cash Grain East (metropolitan counties only)	-9.384	-0.103 (7.96)	0.056 (2.02)	0	0.477 (2.48)	.48	6.21	87

*Dependent variable is % ΔLF, percent change in land in farms 1959-1969.

Note: Numbers in parenthesis are ratios of coefficients to their standard errors; coefficients are shown as 0 if this ratio is less than 1.5.

Using these regression equations we calculate that about 0.51 acres of farmland were lost between 1959 and 1969 due to urbanization per housing unit built in the average county in the cash grain east region; in the northeast this figure is 0.46 acres of farmland lost between 1959 and 1969 per housing unit built.

The second step in estimating the idling of farmland due to urban pressures requires removing the effect of conversion of agricultural land from the regression results. We can accomplish this by subtracting from the total loss of farmland the estimates of conversions obtained from the analysis of the direct effects of urbanization. The difference is an estimate of the acreage of farmland idled due to urban pressures.

The result of these calculations shows the following for the average county in the cash grain east region and in the northeast region between 1959 and 1969:

	Cash Grain East	Northeast
Direct Effects		
acreage of farmland converted to urban uses per housing unit built	0.35	0.20
Indirect Effects		
acreage of farmland idled due to urban pressures per housing unit built	0.16	0.26

Indirect: Direct	Cash Grain East	Northeast
ratio of farmland idled due to urban pressures to farmland converted to urban uses	0.46	1.30

Thus, it is evident that a significant quantity of farmland is being idled due to pressures from urbanization but that this varies from region to region when expressed as a proportion of farmland converted to urban uses. The Philadelphia study reported above [Berry, 1976] indicated that about 120,000 acres of farmland were converted to urban uses, so the ratio of idling to conversion was around .625 to 0.833, slightly lower than for the average county in the northeast region.

In contrast to the localized idling of farmland caused by urban pressures, changes in the type of farming attributable to the declining status of farmers, urban spillover effects, and passive land speculation are much more widespread according to our analysis of changes in farming activities between 1950 and 1974 in New Jersey, New York, and Pennsylvania [Berry, et al.].

For each of 18 different measures of farming activity in the 133 counties having significant agriculture in New York, New Jersey and Pennsylvania the relative percent changes in activity were calculated for the periods 1959 to 1969 and 1969 to 1974 using

Census of Agriculture data.[1]

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[1]The 18 measures of agricultural activity are:

land in farms (acres)
number of farms
value of agricultural production* ($)
value of machinery ($)
chickens in inventory 3 months old and older (number)
milk cows (number)
cattle and calves other than milk cows (number)
hogs sold (number)
corn for grain* (bushels)
alfalfa* (dry tons)
wheat (bushels)
soybeans (bushels)
Irish potatoes* (cwt)
vegetables* (acres)
orchards and vineyards* (acres)
nursery products* (acres)
cut flowers under glass* (square feet)
oats* (bushels)

All figures are for farms with sales over $2,500, except those denoted by * where the 1959 figures are for all farms; data are from the Census of Agriculture.

The relative change between years 1 and 2 for activity X, in county i, $R^i_{1,2}$ is:

$$R^i_{1,2} = X_2^{\,i} - (X_1^{\,i} \cdot M_{1,2})$$

Where $X_2^{\,i}$ is the quantity of agricultural activity in year 2 in county i, $X_1^{\,i}$ is the quantity of agricultural activity in year 1 in county i, and $M_{1,2}$ is $\sum_i X_2^{\,i} / \sum_i X_1^{\,i}$ where the sums are over all counties in the three state area.

The relative percent change for county i is

$$\%R^i_{1,2} = \frac{R^i_{1,2}}{X_1^{\,i}} \cdot 100 \text{ which simplifies to}$$

$$\%R^i_{1,2} = \frac{X_2^{\,i}}{X_1^{\,i}} - M_{1,2} \cdot 100$$

These percent changes are relative for each county in that they are expressed as deviations from the rate of change for the entire region for the appropriate time period and activity.

The relative changes in percentage form for each county were then tabulated by the following county population classes:

1. Metropolitan Counties
   a. Having a fast growth rate (10% or more) from 1960 to 1970
   b. Having a slow growth rate (under 10%) from 1960 to 1970
2. Nonmetropolitan Counties
   a. Having a fast growth rate (10% or more) from 1960 to 1970
   b. Having a slow growth rate (under 10%) from 1960 to 1970

Those changes in agricultural activity which vary in a systematic way with county population characteristics can be identified using the Kruskal-Wallis nonparametric analysis of variance. The activities that did exhibit such systematic variation (i.e., those for which the probability that the observed pattern of changes could have occurred by chance was less than 0.10) are shown in Table 2-13 along with the medians of the relative percent changes observed.

Two major features of agricultural activity in these three states stand out in the analysis: 1) dairying and related activities are most sensitive to urbanization and population growth

Table 2-13

MEDIAN RELATIVE SHIFT OF AGRICULTURAL COMPONENTS CLASSIFIED BY POPULATION CHARACTERISTICS OF COUNTIES*
NEW YORK, NEW JERSEY, AND PENNSYLVANIA
(Percent)

Component of Production and Years	Level of Significance	Metropolitan Counties		Nonmetropolitan Counties	
		Rapidly Growing	Slowly Growing	Rapidly Growing	Slowly Growing
1959-1969					
Milk cows	.000	-13.5	1.5	- 3.8	4.1
Cattle & calves other than milk cows	.070	- 9.3	- 0.1	- 4.1	0.0
Corn for grain	.010	-23.9	- 0.4	- 7.9	13.8
Alfalfa	.001	-14.7	-11.9	-18.1	8.6
No. of farms	.080	- 3.0	0.7	- 3.3	1.0
Value of Agric. Prod	.060	- 9.7	- 1.6	- 2.7	3.2
1969-1974					
Milk cows	.040	- 3.5	- 2.5	- 6.1	2.6
Number of Counties		24	28	23	58

* Based on Kruskal-Wallis Analysis of Variance. Activities with statistically insignificant distributions not shown.

and are the kinds of activities which decline most consistently in metropolitan counties and rapidly growing nonmetropolitan counties. These are the only specific activities whose relative percent changes are statistically significant. 2) The sensitivity of various aspects of agricultural production to urbanization and population growth over time is highly unstable. Only the relative change in number of milk cows remains significantly related to population growth after 1969.

The impermanence syndrome is probably the cause of this widespread pattern of decline in dairying and related activities that includes not only metropolitan counties but also rapidly growing nonmetropolitan counties. Dairying on a large commercial scale requires long term capital investments which, in an aura of uncertainty about the future of land use in metropolitan or rapidly growing nonmetropolitan counties, are not deemed prudent by farmers. There is little to be gained from making large investments in barns or equipment if one may sell out in a few years to someone who does not intend to use these capital investments. Because the dairy industry is the major component of agriculture in the Middle Atlantic States, its decline in urbanizing areas causes a relative decline in the value of agricultural production as well. (It should be noted that the decline in milk cows in the 75 metropolitan and rapidly growing nonmetropolitan counties

between 1959 and 1974 was from 1,076,894 cows to 751,969 or from 51.5% of all milk cows in the region in 1959 to 48.4% of all milk cows in the region in 1974. This is a rather small percentage decline even though it shows a distinct spatial pattern.)

That the relative change in number of farms is more negative in metropolitan or rapidly growing nonmetropolitan counties may be explained by the impermanence syndrome also. Farmers who are less able to cope with new pressures, new community relations, etc. may tend to sell out, and those farmers with the managerial ability to cope tend to stay and possibly purchase or rent more land and enlarge their farms. Thus, in metropolitan counties and rapidly growing nonmetropolitan counties farmers react selectively to urban-induced pressures not present in more remote areas. And there may then be a greater decline in the number of farms in counties subject to urbanization pressures.

Between 1969 and 1974, those activities not requiring great investments and long time horizons, such as growing corn or alfalfa, no longer showed a relative decline in metropolitan and rapidly growing nonmetropolitan counties in the Middle Atlantic States. Probably this change was in response to rapid price changes. Thus, the relative decline in some activities between 1959 and 1969 was reversed in the early 1970's. Whether this will continue into the future depends not only upon continued profitability in field crops but the intensity of urban pressures as well.

It is remarkable that the relative percent change in land in farms shows no significant relationship with growth rate and metropolitan or nonmetropolitan natures of the counties in the region. The probable explanation of this is that the proportion of farmland converted to urban uses over a five or ten year period tends to be rather small and that idling of farmland due to urban pressures is likely to be localized. Counties are sufficiently large so that for most of them, conversion and idling effects appear as little more than noise in the data.

C. Conclusions

The direct effects of urbanization, the conversion of land to urban uses, generally account for only a small percentage of all land in the United States or in any major region of the country. However, there has been a noticeable bias for urban development to take place in areas where the best soils are located -- in the Midwest, in lowland parts of the northeast and in the valleys of California, for example. Moreover, over a long period, such as fifty years, the conversion process may remove sufficient agricultural land from production so that it will be expensive to bring an equivalent acreage of high quality replacement land into production; to offset this loss of the ability to provide food and fiber for world demand there is no guarantee of future increased

yields per acre under less favorable climatic conditions than were experienced over the past thirty or forty years.

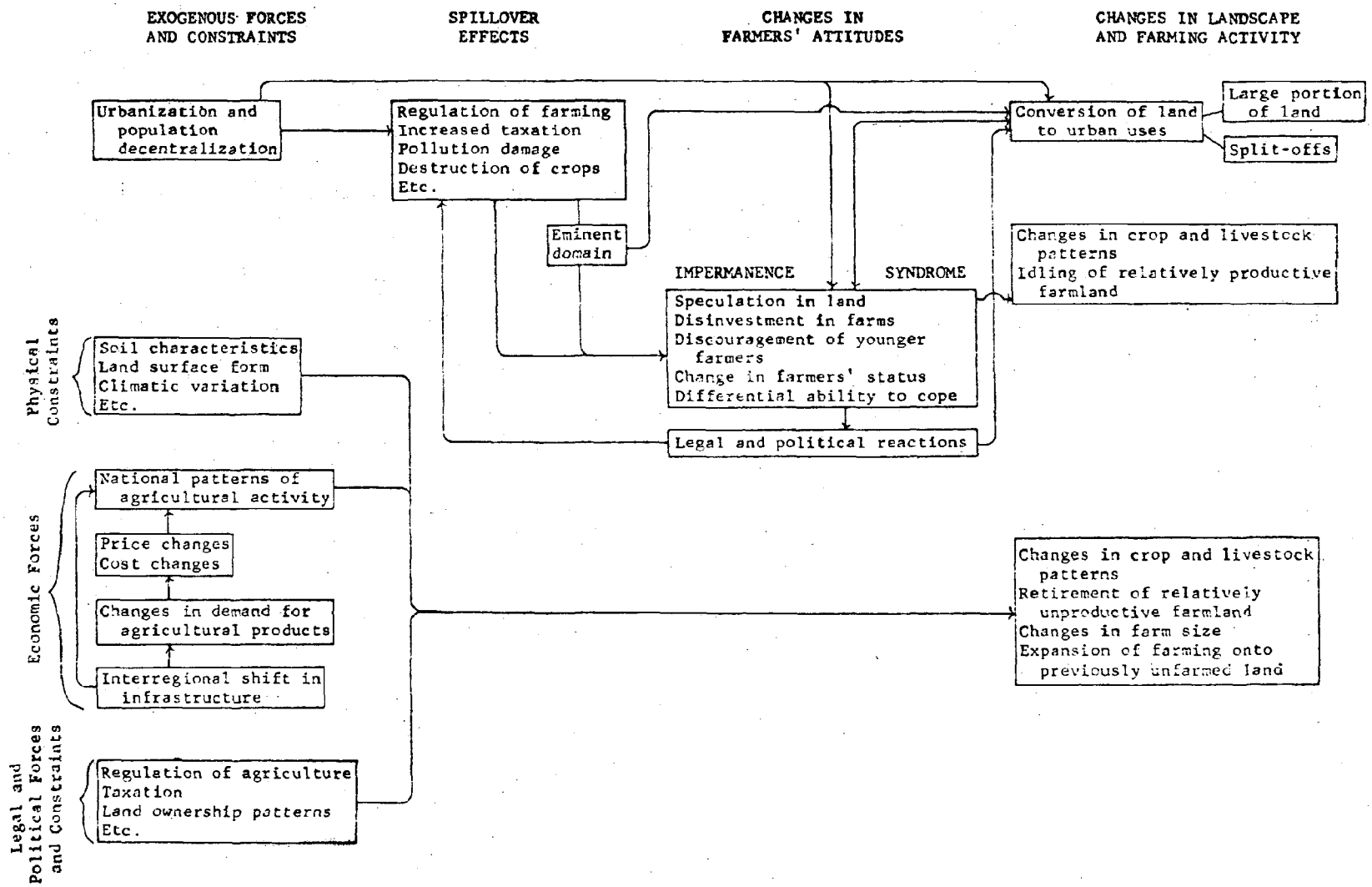
From a local perspective, the most notable feature about the pattern of urbanization is its great dispersal throughout the typical metropolitan region. This noncompact configuration of development alters the appearance of the landscape rather drastically and may strengthen the indirect effects of urbanization.

Indirect effects of urbanization result in changes in farmers' attitudes toward the future of agriculture in regions affected by urban pressures. At the source of these changes in attitudes are the increase in urban, suburban, or exurban populations, concomitant declines in the political, economic, and social status of farmers, spillover effects generated by urbanization, and land speculation. These forces combine to produce localized idling of otherwise productive farmland in areas subject to strong urban pressures and a widespread slow switch-over to types of agricultural activity requiring shorter term investments and more rapid returns on investment where these urban pressures are weaker.

The interrelationships among urbanization pressures and direct and indirect effects upon the agricultural landscape are depicted in Figure 2-12. The Figure also reminds us that not all

Figure 2-12

FARMERS' RESPONSES TO URBANIZATION IN THE CONTEXT OF OTHER EXOGENOUS FORCES AND CONSTRAINTS



changes in agricultural activities can be attributed to urbanization as we shall see in the next chapter.

Chapter III
FORCES AND INSTITUTIONS INFLUENCING LAND USE

The expansion of urbanization and the processes of wider population decentralization take place in the context of a land market and within legal and political constraints on the use, conversion, and exchange of land. Intervention in the operation of the land market is a major characteristic of some types of land use controls: this intervention may attempt to limit the types of uses to which particular parcels of land may be put or it may attempt to provide incentives to actors in the land market to alter the pattern of conversion of land from rural to urban uses. To understand the potential effectiveness of land use controls, then, requires an understanding of how the land market works and what types of constraints upon its operation are in force and what types of constraints are typically disallowed by the courts and popular attitudes.

Changes in rural landscapes do not occur solely because of urbanization pressures, of course. The viability of agriculture and other rural activities is going to affect the use of the land and is furthermore going to influence the effectiveness of incentives to farmers and others to keep their land in rural uses and will influence legal and popular attitudes toward constraints on the use of the land. Thus, it is important to examine the

factors which contribute to the viability of agriculture; as before, there is too little information available to allow us to study the viability of other types of rural activities that are strongly affected by urban pressures.[1]

A. The Land Market

The most influential set of factors affecting the conversion of land from rural to urban uses consists of those inherent in the land market. It is here that demands for conversion of land are translated into actions by rural land owners, speculators, developers, and builders. And it is also here that land use measures aimed at controlling the development processes must operate. Where and how they intervene in or influence the market will be critical in determining their success in saving farmland and open space. Thus, it is essential that we have an overview of the land market as it typically operates on the rural-urban fringe in order to understand and evaluate methods of land use control in relation to it.

This brief review focuses on five components of the rural-urban fringe market: the actors in the land market, the demand for land by nonrural users, the availability of land, market

[1] An economic analysis of forest industries, a topic that has been widely studied, would lead us too far afield, since the forest industry does not appear to be under great pressure from urban development.

processes, and the price paid for land. These are sketched in a simplified manner in Figure 3-1. This discussion is highly generalized based upon work by others. Empirical analyses of the land market other than purely economic ones are unfortunately quite rare and so what follows is a distillation of studies primarily by real estate experts and economic theorists.

1. Actors in the Land Market

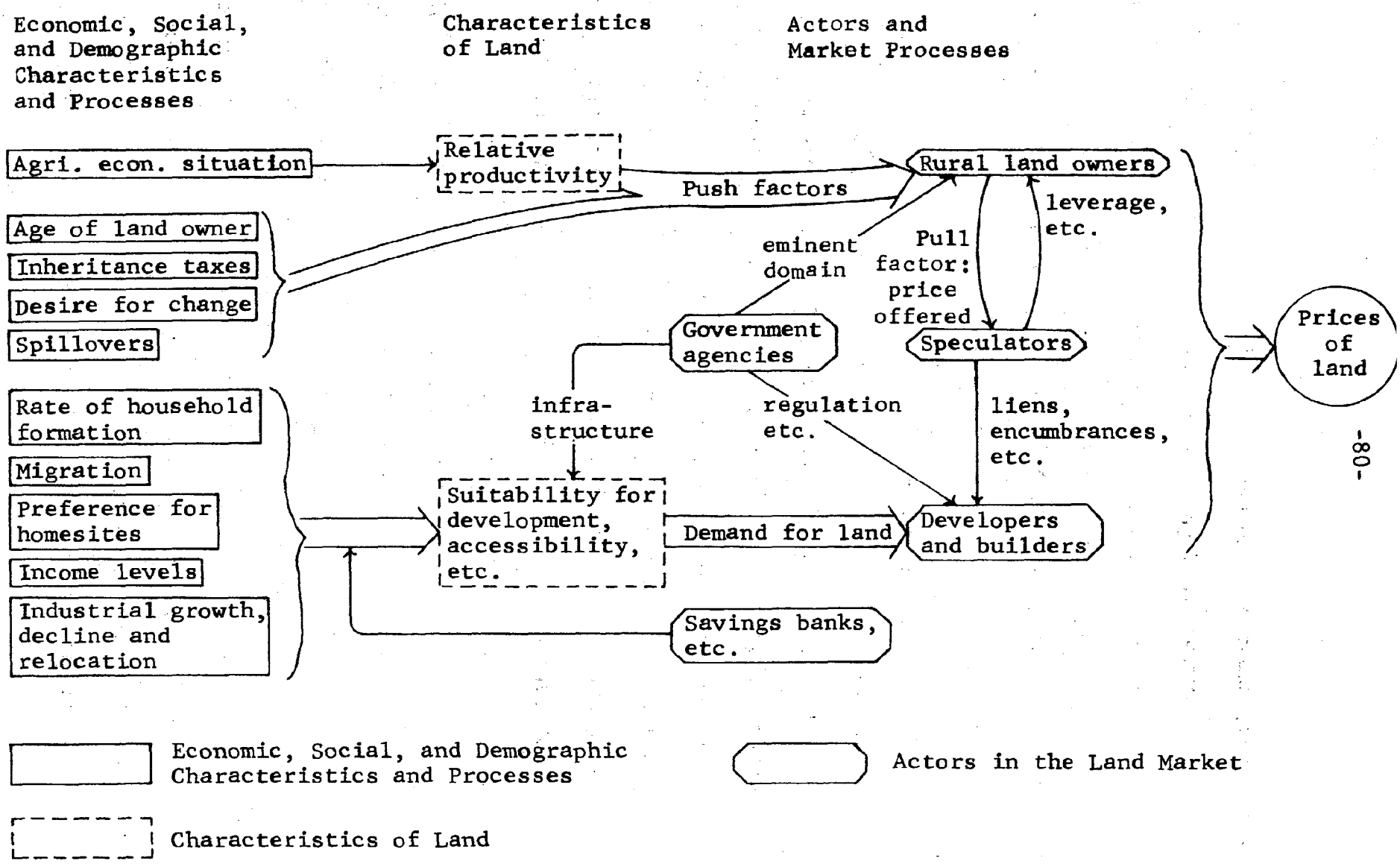
Actors in the land market may be categorized as rural land owners (e.g., farmers), speculators, developers and builders, government agencies, and savings banks and others who lend mortgage money. In some cases, these actors are not separate individuals but one person playing various roles. For instance, some farmers are not only initial land owners in the process of conversion of rural land to urban uses but also speculators. Or some developers and builders also act as land speculators.

We shall take the rural landowner to be the initial owner of land that may be sold to a developer, builder, speculator, or farmer. He may be a farmer, forest landowner, or a rural resident who works elsewhere.

In the most outlying areas where the process of land conversion has not begun, land is typically owned by farmers, lumber companies or mining companies who use the land for traditional rural economic purposes. In areas where development pressure has

Figure 3-1

A SIMPLIFIED MODEL OF THE LAND MARKET OF THE RURAL-URBAN FRINGE



begun it is not uncommon to find that many of the original landowners have been bought out by speculators or developers who are holding the land with the intention of ultimate development. Typically, they will rent farmland to farmers who may continue to farm it right up until the time that development actually begins.

The land speculator, in the abstract, is someone deciding where to invest his money to make the greatest return [Shoup]. He could put it in the bank or in some alternative scheme (including land speculation in another locality) that earned a rate of return, r. If the rate of appreciation of the development value of the land (g) minus the tax rate (t) on the land he holds in speculation falls below r, he will attempt to sell the land or will not buy the land if looking for an investment property. In symbols, he holds or would like to hold the land as long as $(g-t) \geq r$.

Although this is a skeletal view of the speculator, there are some similarities among farmers, professional investors, small time speculators, and anyone else involved in land speculation. First, all of them could put their money into some other venture, but the expected rate of appreciation in the value of land in anticipation of future urban development has attracted them all: farmers begin disinvesting in their farms and watch the value of their land appreciate (i.e., the rate of appreciation minus taxes exceeds the rate of return in farming); professional investors may

have a variety of choices open to them but choose a particular parcel of land because its rate of appreciation minus taxes exceeds tthe rate of return in other feasible investments; the small rural landowner may also simply be sitting on a piece of land waiting for a chance to sell as its value appreciates. Second, all speculators are working in an aura of uncertainty and their speculation entails risks. There is no guarantee that a buyer can be found for the land at the price they would like to sell it for or that the land will even be developed.

Land developers are "entrepreneur(s) engaged in the activity of converting tracts of open land into improved ... subdivisions wherein the finished lots are ready for ... building activities to take place." (Kenney, p. 14). Builders are those who construct houses, apartments, commercial facilities, industrial buildings, etc. Often developers and builders may be the same firm or may work jointly if they are two or more separate firms.

Government agencies are leading actors in the land market. State and Federal agencies purchase land for highways, dams, and reservoirs, outdoor recreation facilities, and so on. Local and, to a lesser extent, state governments influence the land market through their choices as to where to locate infrastructure such as sewers, water lines, electrical service, schools, roads, etc. They also regulate private builders and developers by accepting, modifying, or rejecting proposed land uses. And in their pur-

chases of land governments tend to set price levels for private sales. Hence, despite the oft-used term "the free market" the land market is certainly not free from government influence. Indeed government influence extends to judicial protection of the landowner's right to make money from the use, exchange or conversion of his land as we shall see later.

The final actor we shall consider is the set of lending institutions which provide mortgage money for land or building purchases or land development or construction. In addition to private banking institutions, Federal agencies which guarantee or make loans are important members of this set, particularly in farming areas. The real estate market is particularly sensitive to the availability of mortgage money and the interest rates at which money can be obtained. As a result, construction activity tends to vary cyclically with the state of the national (and regional) economy. In the figure, we have shown the lending institutions as primarily influencing the prospective ultimate land user such as the homeowner. If he is unable to obtain mortgage money at affordable rates, then he may well be excluded from the market processes.

Institutions such as insurance companies are also instrumental in land speculation via their investments or participation in Real Estate Investment Trusts and the like.

2. The Demand for Land

The demand for land which eventually results in the conversion of some rural land for urban uses can be characterized at two levels: regional and site-specific. Regional levels of demand for land depend upon rates of household formation, migration levels, income levels, and general patterns of national and regional economic growth and decline. As noted above, the demand for land for development purposes is strongly linked to the business cycle. At the site-specific level of analysis demand for land varies according to preferences for amenities such as good views, high quality school districts, and accessibility to roads and public transportation. When translating these regional and site-specific demands for land conversion into the conversion of specific parcels of land, it is necessary to take into account the characteristics of the parcels: the location of publc infrastructure, accessibility to major roads and public transportation, engineering characteristics of the soil, and availability of various services and amenities. Hence, the demand for land can be thought of as both a general regional variable and a set of site-specific variables which differ across the regional landscape. Knowing these demands, though, does not impart anyone with perfect foresight as to which land will be developed. There is generally sufficient space to accommodate urban growth in the foreseeable future and the

potential to create urban amenities and accessibility as needed. This leads us to consider the availability of land for development in more detail.

3. The Availability of Land

In order for land conversion to take place, it is necessary to have not only a demand for land but a supply of land as well. This supply ultimately originates in the rural landowners such as the farmer. His decision to put his land up for sale depends upon both push and pull factors.

The rural landowner may be pushed into the decision to sell his land to a speculator or developer by any of the following types of situations:

a. A poor economic return from the land. High costs relative to the prices he receives from farming or forestry, for example, may push a landowner into selling. Farming is a particularly volatile occupation as far as annual net income is concerned, and so the variable of interest here is the average net return over a fairly long time horizon and not just over one or two years, which may be unusually good or bad. Land that is relatively unproductive is unlikely to find many farmers or foresters as potential buyers, whereas highly productive land rarely lacks for a potential farm or forest buyer.

b. Advanced age. Rural landowners usually consider selling their land when they approach retirement age. This particular demographic push factor must eventually affect every rural landowner, unlike the other types of factors, so even though it may be unimportant to a particular land-

owner at one time in his life, it will, over the long run, be an extremely important factor in the conversion of land to urban uses.

c. The desire for a change of lifestyle. Some rural landowners may wish for an urban lifestyle or for work in manufacturing, services, or trade. This has historically been an important reason for the large emigration from rural to urban areas, and although it has largely run its course it has not stopped altogether. Currently, there is a partially offsetting force at work in the desire of many people, both old and young, to live in rural or semi-rural areas.

d. Spillover effects from urban areas. As discussed in the previous chapter, there are a number of spillovers from nearby urban areas, such as higher property taxes or regulation of agricultural activities that are nuisances to the farmer or to the landowner who enjoys living in a rural area. These may be thought of as push factors in discouraging rural landowners to retain their land.

e. Inheritance taxes. Traditionally, state and Federal inheritance taxes have been regarded as a push factor in the sale of rural land. To meet these tax obligations it may be necessary for the heirs to sell all or part of a farm or other rural property, thereby possibly allowing speculators or developers to acquire the land.

These push factors do not necessarily operate independently from each other. Rural landowners may not feel pushed into selling their land until several factors come into play simultaneously. At the same time, they may also feel pulled into selling their

land by high prices offered by speculators or developers. A price hundreds or thousands of dollars per acre higher than its current use value can look very tempting to someone, especially when the push factors are already making him think about selling his land.

4. Market Processes

The land market does not operate simply in terms of demands for and availability of land. There are processes and institutions which are instrumental to the functioning of the land market on the rural-urban fringe. We can only mention a few of the more prominent processes and institutions. The discussion to follow is based principally on the work of Lindeman.[1]

The first point to make is that the flow of land ownership from rural landowner through speculator to developer and builder is not as simple as depicted in Figure 3-1. Rather, there are often a series of speculative owners. Sometimes the speculator does not intend to hold onto the land long enough to pay off his financial obligations to the previous owner. Instead he will sell the land to another speculator, and any unpaid notes on the original mortgage will be passed on to the new speculator. Early speculators in this process often are more sophisticated in that they are able to take advantage of higher appreciation rates and are able to make more advantageous deals. Thus one speculator may buy from another speculator (rather than from a farmer) and sell to another speculator

[1]We have been able to observe many of the events discussed by Lindeman in our statistical analysis of land prices in New Jersey. These events were not systematically studied, but they are reported in the Appendix.

(rather than to a developer).

Generally speaking, the active speculator also likes to be able to purchase as much rapidly appreciating land as he can so as to increase the volume of his returns. This implies that he would like to extend the purchasing power of his own money by spending someone else's money as well through various borrowing schemes. That is, he desires to have "leverage," in which he makes as small a down payment on the land as possible and puts off as long as possible making any payments on interest or principal borrowed so that he can acquire more land with his initial funds. He anticipates that when he sells the land to another speculator or to a developer he will receive enough cash or notes to pay off whatever interest and principal remain outstanding.

In his attempts to get leverage he may obtain a mortgage from the previous owner of the land (a purchase money mortgage) rather than from a bank. In addition, so as to put off large immediate payments for interest or principal, he will pay a higher nominal price for the land in return for lower interest payments and a deferred payment schedule, the payments on the principal not being made until a few years later. Thus, the recorded sales prices of land are often overstated with respect to the actual present value of the anticipated development value of the land.

Another type of sale is called a sales contract or equity build-up sale. In this case, the seller retains use of the land until the buyer has paid a specified proportion of the principal, such as 25%. Then the deed is transferred to the buyer, and the seller relinquishes use of the land. The buyer does not pay any interest during the equity build-up period of the deal, which may be five years,and so may pay a higher price at the very beginning of the deal to obtain these terms.

These kinds of financial arrangements and sales to other speculators before the mortgages are paid off can encumber the title to a particular parcel of land. Lindeman argues that the financial obligations of the various speculators, and web of liens, release clauses, subordination clauses, and exculpatory clauses may make land unusable from the developer's or builder's point of view. It is far too risky and imprudent to attempt to acquire land with so many complicated obligations if one is in the business of building houses, for example.

When land prices are no longer appreciating and when buyers for properties are impossible to find, the speculative market may collapse, and then the financial obligations incurred by speculators may cascade into a tangle of legal conditions and possibly a series of defaulted payments that cloud the title to the land.

Tax laws also influence the market processes. Sellers of land may want a downpayment less than 30% of the sales price so as to spread out their income tax payments over the years when the installment payments are received rather than having to pay taxes on the revenue from sale of the land in one lump sum.

5. The Price of Land

The various supply and demand related forces at work in the land market ultimately result in transactions at certain prices. Regularities in these prices of land are often associated with a variety of parcel attributes: accessibility, acreage, soil characteristics, and the like. [Adams, Milgram, Crean, and Mansfield; Clonts; Coughlin and Fritz; Crowley; Harris and Allee; and Hushak, for example.] Determining the behavior of these prices is an important component of this study for it allows one to estimate the costs of public purchase of development rights on land or the costs falling upon landowners whose land is restricted from further development. There are some general statistical methodologies one can apply to make such estimates and these are described in detail in the Appendix and applied to transactions of large undeveloped parcels in New Jersey. One would, of course, expect that although there may be regularities in the price of land with regard to parcel attributes that these would vary from place to place and from time to time as far as

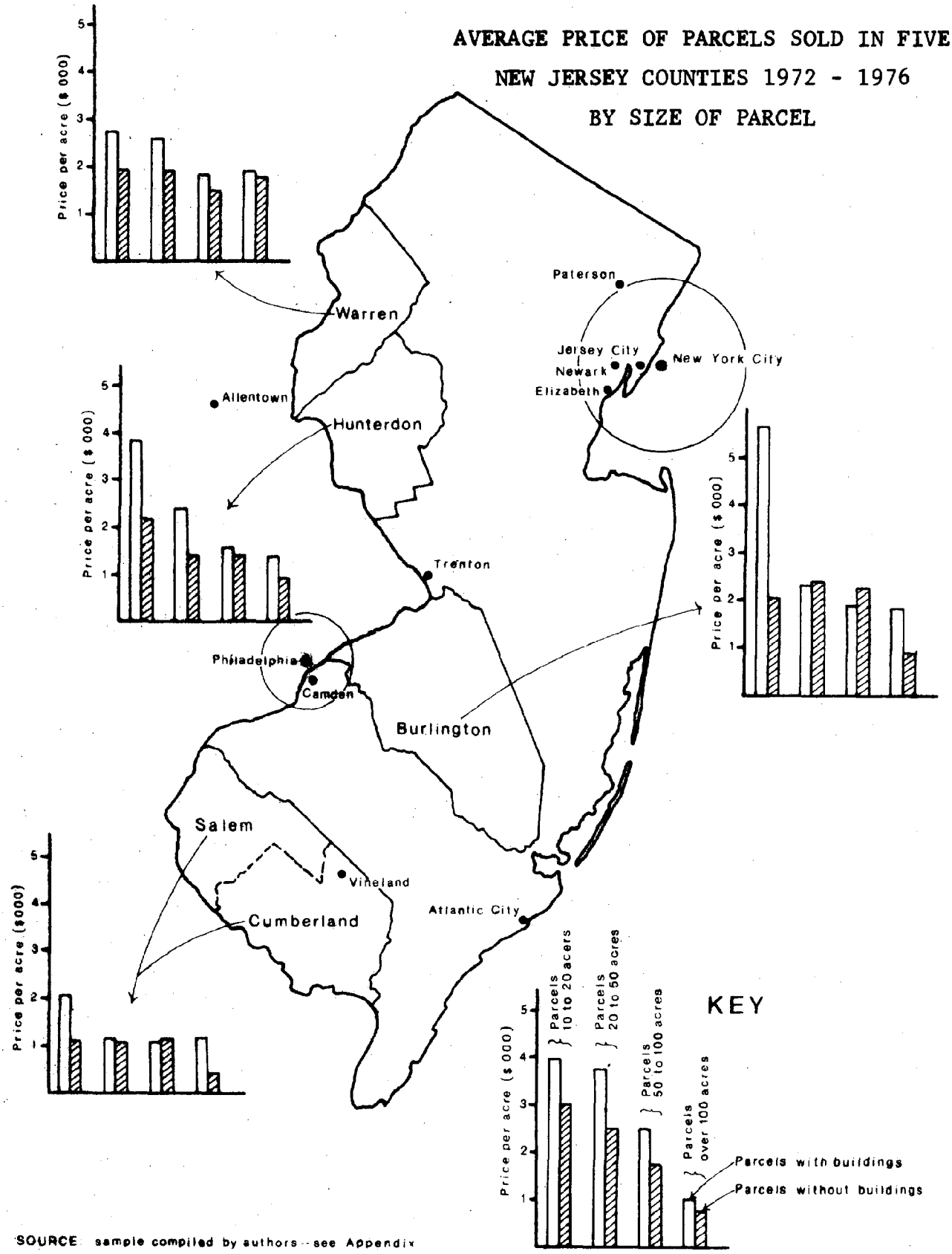
actual dollar impacts on the price are concerned.

A summary of some of the results from the statistical analysis of transactions in New Jersey (for the period 1972 to 1976 and only for parcels 10 acres or larger) are presented in Figures 3-2 and 3-3 and in Table 3-1. Broadly speaking, parcels with buildings command a higher price per acre than parcels without buildings, as one would expect. In addition, larger parcels tend to sell for less per acre than smaller ones, and parcels in more urban counties, such as Burlington and to some extent Warren, tend to sell for more than comparable ones in more rural counties, such as Cumberland and Salem. With regard to the effect of time on price, we see that prices tended to increase between 1972 and 1975 with some decline after 1975.

These trends are very rough as depicted in Figures 3-2 and 3-3. There are numerous forces at work on each transaction (including random ones) that must be taken into account to make improved predictions of land prices. For any one parcel, time trends may offset the effects of size or other attributes or may reinforce them. For example, Table 3-1 isolates some of these effects for sales in Burlington County for the years 1972 to 1976. The full details of these calculations can be found in the Appendix. From the table we can see the dollar effect of soil quality, road frontage, distance to Philadelphia, and other parcel and sale

Figure 3-2

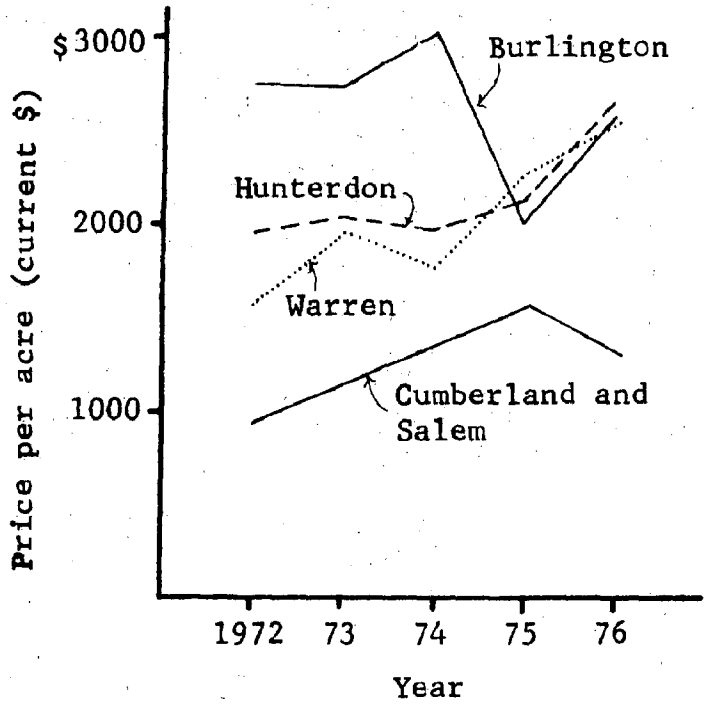
AVERAGE PRICE OF PARCELS SOLD IN FIVE NEW JERSEY COUNTIES 1972 - 1976 BY SIZE OF PARCEL



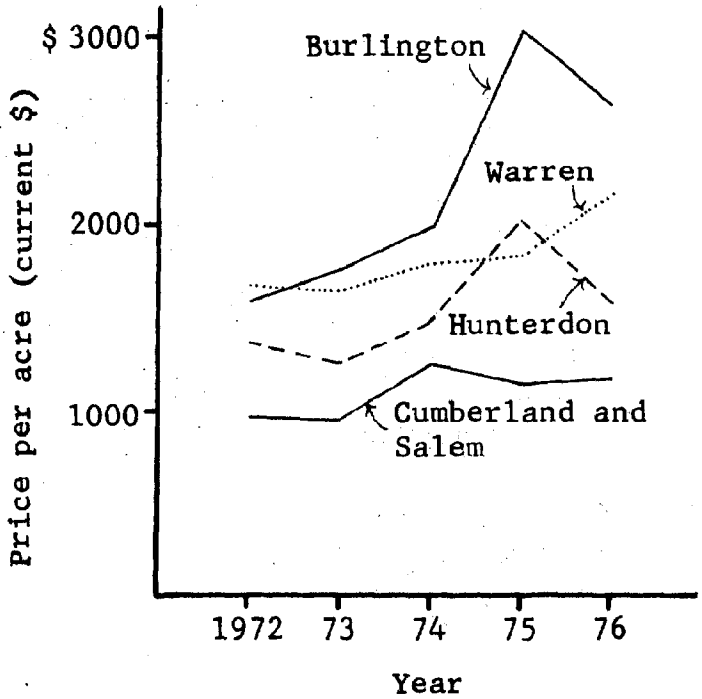
SOURCE: sample compiled by authors--see Appendix

Figure 3-3

AVERAGE PRICE PER ACRE OF PARCELS SOLD IN FIVE NEW JERSEY COUNTIES, 1972 - 1976 BY YEAR SOLD



parcels 10 acres or more with buildings



parcels 10 acres or more without buildings

SOURCE: Sample compiled by authors -- see Appendix.

Table 3-1

INCREMENT IN THE PRICE OF LAND WHEN A PARCEL HAS CERTAIN ATTRIBUTES, BURLINGTON COUNTY, NEW JERSEY*

Attribute of Parcel	Increment in Price of Parcel Assuming No Other Attributes are Changed ($/Acre)
Assessed value of buildings on parcel (written as deviation from mean assessed value)	$1.59 per dollar of assessed value of buildings**
Parcel includes soil in SCS Classes I or II (yes or no)	if yes, $2,140 if no, $0
Percent of soil in Parcel in SCS Classes I or II	$27.30 for each percentage point
Road frontage on minor roads per acre of land (written as deviation from sample mean)	$53.30 for every front foot on a minor road per acre of land
Distance from Philadelphia	- $156 per mile
Attribute of Sale	
Buyer-seller relationship	if neither buyer nor seller is a corporation or partnership: - $763 if either or both are corportations or partnership: $0

* Based on 139 transactions between 1972 and 1976.

** The fact that this is greater than $1.00 indicates that buildings are assessed at less than true market value.

Source: Calculated by authors: see Appendix.

attributes on sales prices in this particular case. For example, if the assessed value of buildings on a parcel were $1,000 more than the mean assessed value, the price of the parcel would increase by $1,590 per acre. Or if the parcel had 20% of its soil in SCS Classes I and II, its value would increase by $2,140 per acre plus $546 per acre for a total increase of $2,682 per acre over its price if it did not have soils in SCS Classes I and II.

These estimates of land prices are intended for illustrative purposes at this point. We shall have occasion to return to them in our discussion of the cost of land use controls. They have a further purpose as well though. They are the results of several alternative statistical analyses of land prices, the methodologies of which may be useful to state or regional planners who must make estimates of the costs of a land control program and have need of a useful approach to obtain estimates. A detailed discussion of methodology is contained in the Appendix.

B. Attitudes of the Courts

One of the most important institutions determining the use of the land is the judicial system: in particular, the courts' attitudes toward land as private property and the dimunution of the value of land caused by governmental regulation of land use. These attitudes quite naturally affect the applicability of a variety of types of land use controls.

With a few notable exceptions (and an increasing number in the past few years) the courts have, in the last fifty years, vigorously upheld the concept that great diminution of the exchange value of land caused by governmental regulations is unconstitutional. The argument has been based on several different concepts. The classical interpretation (from Oliver Wendell Holmes' 1922 opinion in the Case of Pennsylvania Coal Company vs. Mahon, et al., 260 US 393) is that if the diminution in the value of property is too great, then the regulation is tantamount to a taking of private property for public use without just compensation, which is clearly unconstitutional according to the Fifth Amendment. "The general rule at least is, that while property may be regulated to a certain extent, if regulation goes too far it will be recognized as a taking" (260 US at 415).

One need not make unconstitutional argument based upon the Fifth Amendment, however. If the diminution of property value caused by government regulation "frustrates" the private property owner in the use of his property the regulation may be interpreted as an illegitimate use of the power to regulate. (See the opinion by Justice Breitel in the case of Fred F. French Investing Co. vs City of New York, 350 NE 2d 381).

In either view, there is little agreement on what constitutes a sufficient diminution in exchange value so that private property

can be regarded as having been taken without just compensation. There are no hard and fast rules -- each case must be decided upon its merits and balanced between public benefits and private costs. As one might imagine, there is a great variation in how much diminution in value must occur before private property has been "taken or before a landowner has been frustrated in the use of his property.

A somewhat different view, and a minority outlook, is that as long as regulation protects an existing public benefit, such as the aesthetics of the natural landscape, while allowing the owner a "reasonable" return on his property, then the diminution question is irrelevant. It is irrelevant because the diminution in value is based upon a potential value generated by future development of the property, and is not a current use value. However, should the government wish to create a new benefit such as a park that would not permit the landowner a "reasonable" return from his property then the government action is equivalent to a taking without compensation. This view is expressed by Bosselman, Callies, and Banta and reflects the stance taken by the Wisconsin Supreme Court in Just V. Marinette County (201 NW 2d 761).[1]

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[1]The Justs argue their property has been severely depreciated in value. But this depreciation of value was not based on the use of the land in its natural state but on what the land would be worth if it could be filled and used for the location of a dwelling. "While loss of value is to be construed in determining whether a restriction is a constructive taking, value based on changing the character of the land at the expense of harm to public rights is not an essential factor or controlling [factor]." (201 NW 2d 711). See also the discussion by Large.

C. Popular Attitudes

People's suspicions of land use controls have played a dominant role in the characteristics of the types of restrictions that are placed on the operation of the land market. In their discussion of the taking issue, Bosselman, Callies, and Banta brought up the interesting point that many minor civil divisions do not use zoning approaches to protect environmentally valuable lands -- not because the courts in fact always find these programs unconstitutional but rather because they think that the courts will. Richard Babcock's account of zoning is replete with examples of fears that either a) zoning, if introduced, will bring with it all sorts of undesirable government interference in private matters, or b) development, if not controlled by zoning, will bring with it all sorts of evils such as motels, nonconforming uses, and undesirable individuals. It all depends on the point of view.

Even though there are recognizable benefits to land use controls, when it comes down to the private individual worrying about the control's effect on him personally and on his community, there is frequently opposition. For example, an attempt to persuade people to adopt a plan based on public purchase of development rights (i.e., conservation easements) along the Upper East Branch of the Brandywine in suburban Philadelphia ten years ago, failed in large part because the idea of giving up (even for money) one's

traditional rights in property was unthinkable, possibly even a Communist plot [Strong 1975]. An even stronger deterrent to the use of some controls is the decline or potential decline in property values that land use controls may impose upon some landowners.

Passing an innovative town zoning ordinance is no easy matter, especially when the exact implications of each phrase in the ordinance are not fully understood by the few citizens feeling strongly enough to attend public hearings. In Sunderland, Massachusetts, it took three attempts to pass a zoning bylaw which drew opposition from people because of its restriction on commercial and apartment development, because of the potential of diminshed property values, and because its transferable development rights provisions were incomprehensible to some citizens [Gowen and Mackenzie]. A major instrument in its eventual passage was the diffusion of correct information to the public by means of a clear written explanation of the bylaw posted throughout the town and distributed at the public hearing.

Upsetting the status quo with land use controls changes the rules of the land market game for all parties and, regardless of the benefits of the controls, these rule changes may be costly and require new thinking patterns. Thus one can understand why some farmers and other rural landowners in New York State feared the creation of agricultural districts including their land.

There is sufficient misunderstanding of the restrictions imposed upon land owners in an agricultural district that the Executive Director of the Agricultural Resources Commission must make frequent trips around the state to explain exactly how the program works. Speculators, developers, and builders often turn to litigation to react to the changed rules caused by land use controls.

In sum, then, one must deal with the conservatism inherent in the population in general. Merely because there are plainly visible benefits to a land use control program does not mean one can overlook the private costs, whether real or imagined, economic or noneconomic. Overcoming the fear of controlling land use and upsetting the status quo is not impossible, as the innovative land use controls to be discussed in the next chapter testify, but the road to effective control of land uses (if such a road even exists) is strewn with the prejudices of past practices and attitudes.

D. Viability of Agriculture

Although the direct and indirect effects of urbanization cause something between 1 and 2 million acres of farmland to be lost every year, there are other forces and constraints at work which cause an additional 3 to 4 million acres of farmland to go out of production each year. These net changes, including those

caused by urbanization, are summarized in Figure 3-4 by region of the United States.[1] The dynamics of agriculture as a commercial enterprise must be taken into account, then, if we are to consider the effects of controls on land use to retain land in farms in the sphere of urban influences. Where agriculture is not a viable economic activity then land use controls to protect it from urbanization will not be successful in keeping the land in farms. In this section we shall examine several aspects of agriculture which contribute to its viability, including physical constraints, price and cost changes, and interregional shifts in infrastructure.

A note of caution: farmers are famous for dwelling on tales of hardship (as well as for their own personal optimism in withstanding bad weather, low prices, and the like). The fact that American agriculture is still quite productive would indicate that

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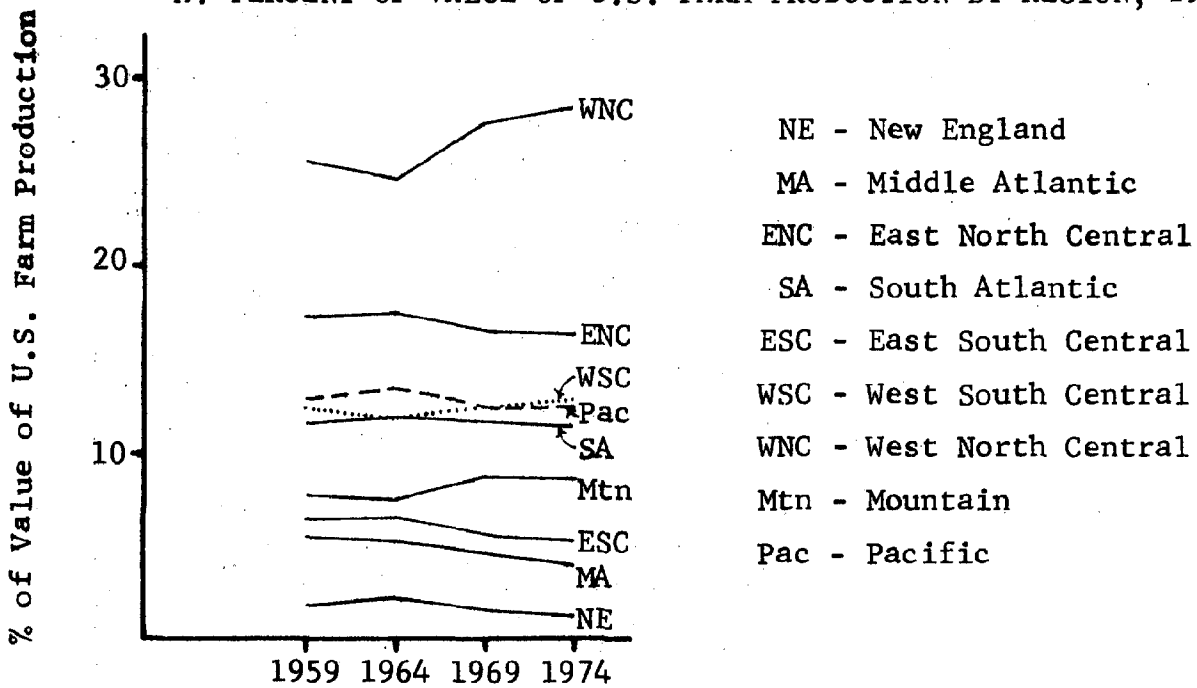
[1]The regions in Figure 3-4 are defined as follows:

New England -- Maine, New Hampshire, Vermont, Massachusetts, Connecticut, Rhode Island
Middle Atlantic -- New York, New Jersey, and Pennsylvania
East North Central -- Ohio, Indiana, Illinois, Michigan, and Wisconsin
West North Central -- Minnesota, Iowa, Missouri, North Dakota, South Dakota, Nebraska, and Kansas
South Atlantic -- Delaware, Maryland, Virginia, West Virginia, North Carolina, South Carolina, Georgia, and Florida
East South Central -- Alabama, Mississippi, Tennessee, and Kentucky
West South Central -- Arkansas, Louisiana, Texas and Oklahoma
Mountain -- New Mexico, Arizona, Colorado, Utah, Nevada, Wyoming, Idaho and Montana
Pacific -- California, Oregon, Washington, Alaska, and Hawaii

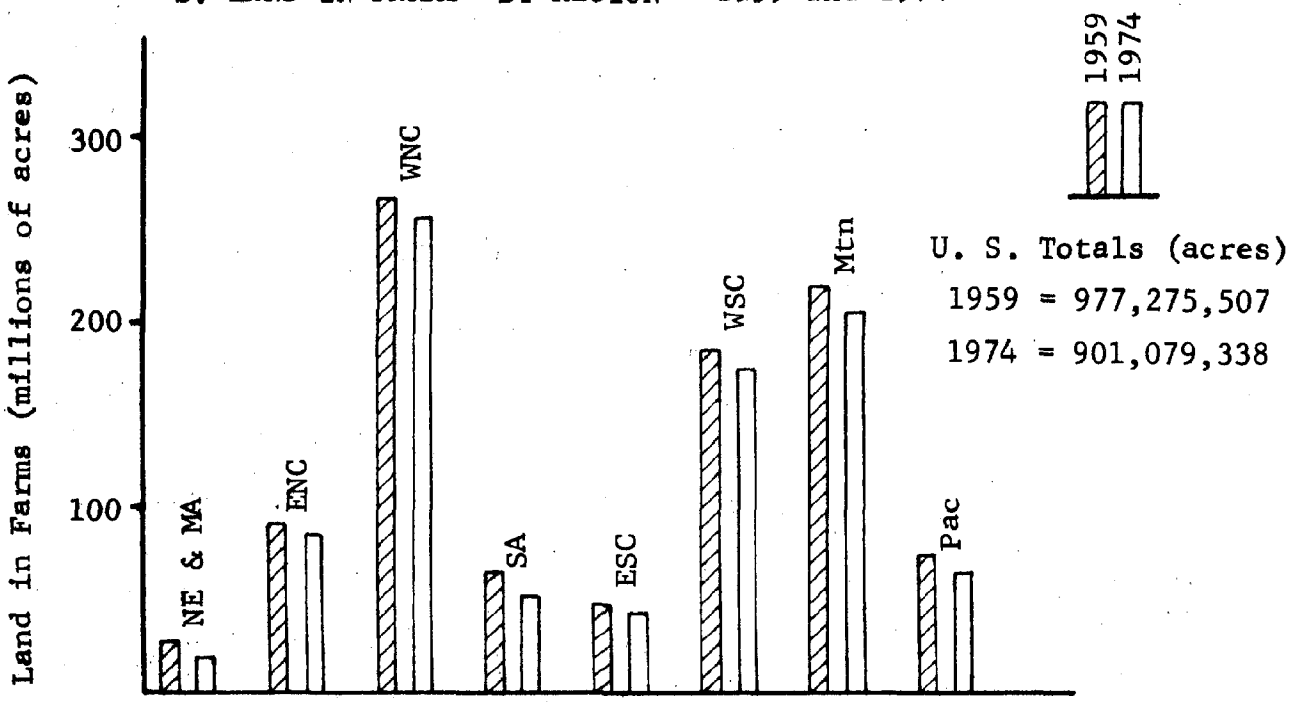
Figure 3-4

FARMING BY REGION 1959 - 1974

A. PERCENT OF VALUE OF U.S. FARM PRODUCTION BY REGION, 1959-1974



B. LAND IN FARMS* BY REGION - 1959 and 1974



* farms with sales over $2500 only.

Source: Census of Agriculture.

in total things are not as bad as the individual instances in the following sections might imply. Allan Grant, President of the American Farm Bureau Federation, tells the following story. A city man went to visit his farmer friend on spring and remarked how well the prospects for a good year seemed. The farmer replied that he had only just planted his corn and that a late freeze could wipe him out. Several weeks later the friend came back and noted that the corn was growing well and that it looked like a bumper crop. However, the farmer replied, there might be too much rain or too little rain and the crop would fail. Finally, in the fall, the friend came back and saw the farmer harvesting his best crop to date. When he reminded the farmer of his earlier good predictions, the farmer responded by saying "You'd be surprised what a good crop like that can do to the soil."

1. Physical Constraints

Broadly speaking, the two most important physical constraints on the viability of agriculture are soil quality and climatic conditions. During the twentieth century, American agriculture has undergone a significant technological revolution, three components of which were 1) the invention of tractors, combines, and other powered machines with the subsequent retirement of horses as work animals, 2) the introduction of new hybrid plants, genetic improvements in livestock, and new fertilizers and pesticides,

and 3) improved transportation allowing some agricultural activities to be located further from their markets. As agricultural innovations were adopted throughout the country, it was apparent that many areas with poorer soils and hillier terrain simply could not compete economically with the commercial farms of the Midwest, Great Plains, and California [Clawson, 1972, Hart, 1968, Higbee, and Statfeld]. Capital intensive farming plus the difficulty of farming commercially on poorer land pushed thousands of younger men off the farms into the cities. As a consequence, a large relic population of older farmers on less productive land has characterized the twentieth century. Even in areas where urban pressures are strong, much of the loss of land in farms has been due more to the retirement of marginal farmland than to intense direct and indirect effects from urbanization [Hart, 1968 and Berry, 1976A].

Climatic conditions for agriculture have been generally favorable over the past forty years with notable exceptions of regional droughts and floods [Schneider]. However, as Schneider argues, this was an unusually favorable period,and greater climatic variability and general cooling may force more restrictive constraints on farming in the more arid and colder parts of the nation. This,then,seems to be a possible cause for future interregional shifts in agricultural activity away from the west

back to the humid, urban east.

2. Prices and Costs

The viability of agriculture is also dependent upon the prices farmers receive and the costs they pay. Recent trends in prices and costs are shown in Figure 3-5; in the 1960's, prices and costs rose very slowly, but in the early 1970's they jumped drastically, reflecting general inflation and sudden increases in petroleum prices and in world demand for food and fiber products. In net, 1973 and 1974 were unusually good for the average farmer (U.S. Department of Agriculture, Agricultural Statistics, 1975), and cropland that was previously idled in many localities was brought back into production to take advantage of high prices for soybeans, corn, and other commodities.

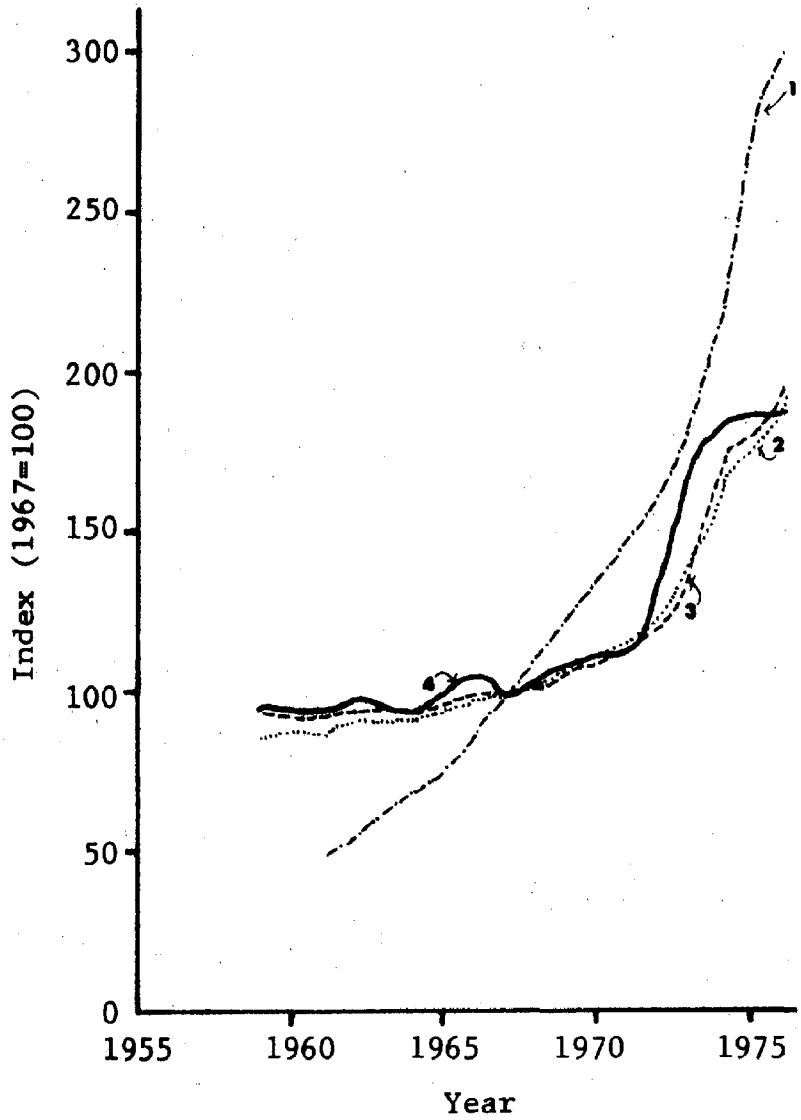
3. Shifts in Infrastructure

Part of the dynamics of agriculture is the relocation of farm infrastructure -- of dealers who sell inputs to farmers, assemblers of farm products, and some food processors. Farmers must be able to buy machinery and other inputs, obtain repair services, and sell their output to wholesalers or processors on a regular basis. Thus, these activities are essential to the production of food and fiber in the United States, and the proximity to farming of a great many specific types of infrastructure is necessary for farming to prosper in a particular region.

Figure 3-5

INDEX OF PRICES PAID BY FARMERS

AND PRICES RECEIVED BY FARMERS FOR ALL FARM PRODUCTS



1. interest payable per acre.
2. prices paid for all commodities for use in farm production and family maintenance plus interest, taxes, and wages for hired farm labor.
3. prices paid for all commodities for use in farm production.
4. prices received by farmers.

Sources: USDA, Agricultural Statistics, 1975.

USDA, Agricultural Prices, Dec. 1976.

Interregional shifts in the location of farm infrastructure can cause major problems with farm production in those areas which are declining. For example, Seabrook Farms, Minot Foods, and Ritter have all closed their doors in South Jersey in the last three years. These food processors have departed New Jersey for a combination of reasons -- high labor costs, utility costs, taxes, and possibly pollution control regulations. As a result, South Jersey vegetable farmers have lost a large portion of their market and are left with supermarket chains as the principal buyers of their vegetables. However, this has proved to be an unsatisfactory substitute, as some local supermarkets buy fresh market vegetables elsewhere on a year-round basis instead of from local producers on a seasonal basis.

These kinds of economic changes have their impact upon the individual farmer. One South Jersey farmer interviewed spoke of a neighbor who purchased $15,000 worth of new string-bean machinery. Then the only string-bean processor in the area closed down and he was left with expensive machinery that could not be easily sold off. Eventually he went bankrupt. There is great reluctance, especially for older farmers, to learn new types of farming in the absence of a large market for vegetables in the area: it is expensive and requires costly learning by doing.

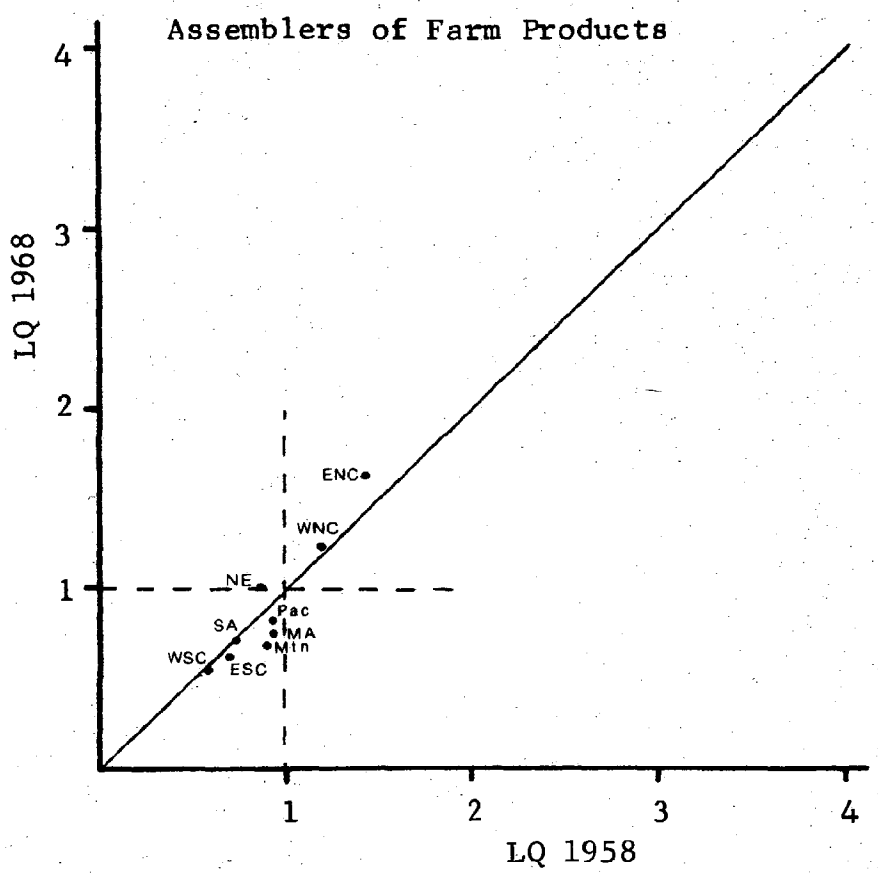
Changes in relative concentration of infrastructure over the period from the late 1950's to the late 1960's can be seen in Figure 3-6. Data on farm infrastructure are hard to obtain at the regional level,but it is possible to present location quotients for wholesale assemblers of farm products and the food processing industry. The location quotients show the concentration of a given type of infrastructure in the region in relation to the region's proportion of the nation's farm output.[1] The definitions are given in the figures. A location quotient of 1.0 indicates that the infrastructure occurs in the region in proportion to the region's farm output, a quotient of more than 1.0 indicates that the infrastructure is concentrated there, and a quotient of less than 1.0 indicates that the infrastructure in the region exists at a lower level than one would expect on the basis of the region's farm output.

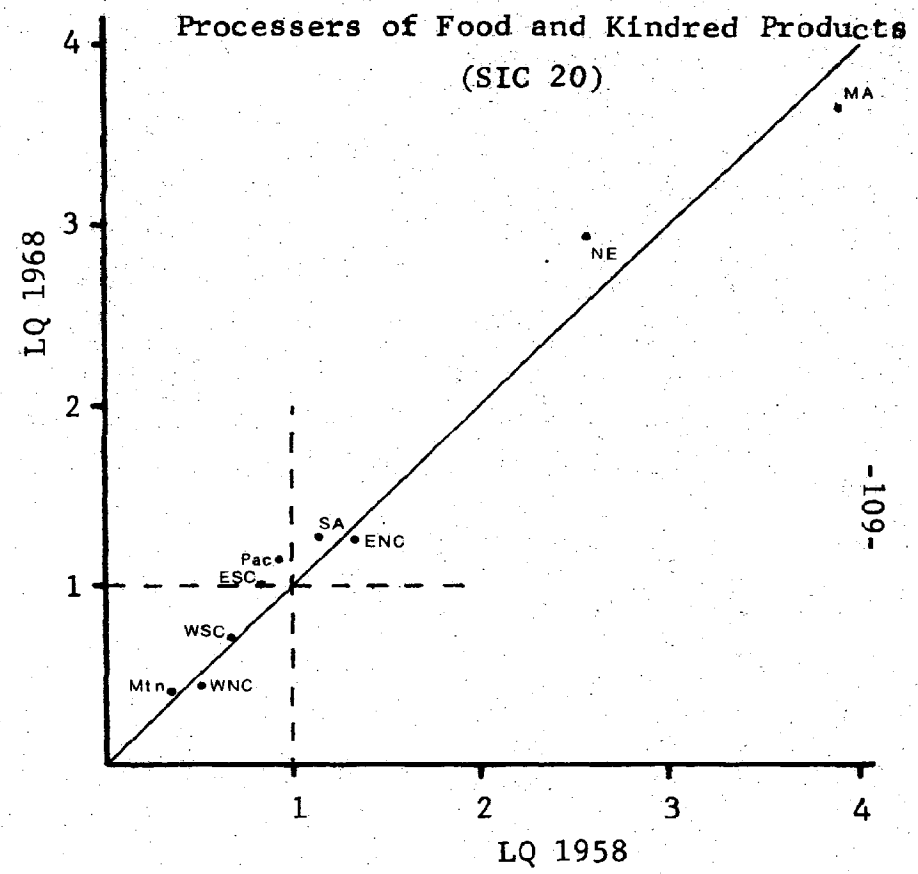
The figures show that up to 1968 food processing was concentrating in New England and the Middle Atlantic Region and was declining in concentration in the East North Central, West North Central, and Middle Atlantic Regions. Assemblers of farm products were becoming more concentrated in New England and in the West

[1]The data are from the 1958 and 1967 Census of Manufactures, the 1958 and 1967 Census of Wholesaling, and the 1959 and 1969 Census of Agriculture.

Figure 3-6

REGIONAL CONCENTRATION OF SOME FARM INFRASTRUCTURE, 1958 AND 1968





LQ=A/B

where A= $\frac{\text{Sales of assemblers in region}}{\text{Sales of assemblers in nation}}$

B= $\frac{\text{Value of farm output in region}}{\text{Value of farm output in nation}}$

LQ=C/B

where C= $\frac{\text{Employment in SIC 20 in region}}{\text{Employment in SIC 20 in nation}}$

B= $\frac{\text{Value of farm output in region}}{\text{Value of farm output in nation}}$

and East North Central States.

4. Other Forces and Constraints

One of the newest constraints on farming is the introduction of environmental regulations on pesticide use, fertilizer use, and manure disposal. These kinds of regulations are often imposed at the State or Federal level so they are not the direct result of nearby urbanization. Farmers interviewed in New Jersey are frequently aggravated over the inconvenience in acquiring pesticide licensing -- they must apply in person and attend the obligatory training sessions which are supposed to demonstrate safe methods for handling potent pesticides. Many feel that they have the professional competence to learn the methods effectively on their own without the condescending supervision of the government. To take a second example, in the last few years "... nearly every major agricultural state has moved to tighten its regulations on feedlots and to ensure that feedlot ponds can handle heavy rains. In some cases, these regulations have proven expensive for farmers." [Prestbo, p. 205].

The availability of land to expand farm operations and to take advantage of economies of scale has proven to be a major problem to many farmers. An Illinois farmer noted that "if a fellow dies, his neighbors are bidding on his place before he has time to cool off" (quoted in Prestbo, p. 14). Higher farmland

prices even in remote rural areas reflect this intense competition for high quality farmland (U.S. Department of Agriculture, "Farm Real Estate Market Developments," March 1977). Obtaining nearby land to expand one's farm is, however, quite difficult and noncontiguous tracts of farmland are quite common [Smith and Sublett].

There are, of course, numerous other factors which influence the viability of farming in a given region. However, we have covered those which figure most prominently in the potential success or future of programs designed to retain farmland on the rural-urban fringe,and so the discussion need not be continued.

Chapter IV
THE NATURE OF LAND USE CONTROLS

A. Mechanics of Land Use Controls

The many proposals to protect agricultural and environmentally valuable lands, and the fewer programs actually implemented, place reliance on a variety of land use control methods. In order to begin our discussion of the effectiveness of the various controls, the controls in question first must be identified and described. It is most convenient to classify the controls as either direct -- those controls which are applied to specific parcels of land with the purpose of putting restrictions on possible uses of the parcel -- or indirect -- those controls which provide economic or other incentives to farmers or other rural land owners in order to encourage them to remain in an approved land use, or which add to the costs of development in order to discourage it.

The controls to be analyzed are listed in Table 4-1, classified by direct and indirect and further grouped by the method they use to achieve their objectives. Direct controls rely on purchase of rights in land or regulation. Indirect controls make use of tax expenditures, tax penalties, or specific protections.

This section, which presents generic descriptions of the various types, will be followed by a section which will report specific experiences with the use of each of them.

Table 4-1

A CLASSIFICATION OF LAND USE CONTROLS

A. Direct Controls

Purchase of Fee or Lesser Interest in Land

- Direct Purchase of Development Rights
- Purchase and Sale with Restrictions
- Purchase and Lease with Restrictions
- Exercise of Right to Preempt

Regulation (Police Power)

- Exclusive Farm or Rural Use Zoning
- Inverse Condemnation
- Development Permit Systems

Regulation Combined with Exchange of Development Rights

- Transfer of Development Rights

B. Indirect Controls

Tax Expenditures

- Differential Assessment for Property Tax
- Differential Valuation for Federal Estate Tax Valuation
- Differential Valuation for State Inheritance Tax Valuation

Tax Penalties

- Capital Gains Tax

Protection from Urban Effects

- Agricultural Districting

1. Direct Controls

a. Acquisition of Development Rights

Public purchase of development rights directly protects farmland and other open space by removing the right to develop specific parcels of land and compensating the owner fully for the diminution in the market exchange value of the land as a result of the restrictions placed on it. The restrictions can be written to preclude any development at all, or to permit limited development which is consistent with goals of maintaining farming, preserving scenic views, or protecting environmentally sensitive areas. They can also be written to forbid changes to the landscape such as dumping, earth moving, or cutting of certain trees.

Once the development rights easement has been sold, the owner still retains the other rights of use and exchange normally inherent in ownership. Unless a right-of-way easement (e.g., hunting, fishing, or hiking easement) is purchased he retains the right to fence or otherwise prevent the public from entering his land. The owner also retains the responsibility of paying taxes on the land, which must be assessed giving consideration to the rights which have been removed.

Essentially, there are three procedures by which the development rights may be acquired:

i. Direct Purchase of Development Rights. Development rights may be acquired directly by purchasing a development rights easement (row 1 of Table 4-2).

Development rights easements are also referred to as scenic, conservation, or development easements. Easements which allow the holder of the easement (in this case the public) to use the land for some purpose (such as hiking or fishing by the general public or the right of entry for inspection by government officials) are called positive or affirmative easements. If the easement simply prevents the landowner from doing something with his land (such as developing it) it is called a negative easement. Most development easements are primarily negative, but may include positive provisions.

Easements are also classified as appurtenant or in gross. For an easement to be appurtenant, the owner of the easement must also own some adjoining land in fee simple; this land held in fee is benefitted by the easement. An easement is classified as in gross if the holder of the easement does not own land adjacent to the land under easement. An appurtenant easement can always be transferred to a future owner of the fee; but, depending on local statutes and court interpretations, it may not be possible to transfer an easement in gross. Therefore, most agencies that are active in acquiring easements recommend that a small part of the land be acquired in fee simple

Table 4-2

SUMMARY DESCRIPTIONS OF LAND USE CONTROLS

Type	General Description	Typical Variations
DIRECT CONTROLS		
Purchase of Fee or Lesser Interest in Land		
1. Direct purchase of Development Rights	A development rights easement is purchased. Owner is paid difference between market value and value based on permitted uses; owner surrenders right to develop, as specified in easement. Price of easement set by appraisal, not by market.	Sale of development rights mandatory or voluntary; purchase may depend on minimum percentate of area being offered for sale of development rights.
2. Purchase and subsequent sale with restrictions	Fee is purchased at market value. Use restrictions attached to deed; property then sold.	Sale of fee could be mandatory or voluntary. Resale price (and therefore net price to public) could be set by market, or by administrative formula.
3. Purchase and subsequent lease with restrictions	Same as 2, except that property is leased rather than sold.	Same as 2, except that property leased rather than sold.
4. Exercise of right to pre-empt	Owner must inform government of intent to sell. Government has right of first refusal. Government can then buy and resell or lease with restrictions.	
Regulatory Methods		
1. Exclusive farm or rural use zoning	Zoning forbids any development incompatible with farming or rural uses in the zoning district.	May specify large (20-80 ac) minimum lot size in addition to specific uses permitted or forbidden.
2. Inverse condemnation	Government imposes regulation on use of land; owner given specified time to file claim for compensation based on establishment that regulation constitutes a taking.	
3. Transfer of development rights	Developers in the growth zones may purchase development rights from landowners in the no-growth zone.	1. transfer restricted to adjacent parcels, to parcels in one ownership, or to any parcels within political jurisdiction. 2. development rights certificates issued to owners of parcels in no-growth zone, developers simply purchase development rights easements from owners of parcels in no-growth zone. 3. government supports market or else lets private market set values.

Table 4-2 - continued

Type	General Description	Typical Variations
4. Development permit systems	Specified types of development in specified areas must receive a permit from government. Permit may be subject to conditions.	Permit granting agency organized at state, regional or local level.
INDIRECT CONTROLS		
Tax Incentives		
1. Differential assessment for property taxes	Eligible land is assessed at use value rather than at market exchange value.	Under pure preferential assessment participation usually automatic and there are no sanctions on changing use. Under deferred taxation, owners who convert to ineligible land use pay back several years tax savings, usually with interest. Under restrictive agreements, participating owner contracts not to develop for given number of years. Deferred taxation and restrictive agreements usually voluntary.
2. Differential valuation for Federal estate and state inheritance taxes	Eligible land is assessed at use value rather than at market exchange value.	Minimum number of years in farming to be eligible. Sanctions in form of payback of portion of tax saving if change use within given time period.
Tax Penalties		
1. Capital gains tax	High tax rate on capital gains from land sales.	Tax rate decreases by number of years held, increases by percent capital gain.
Protection from Urban Effects		
1. Agricultural Districting	Limitations on power of: local government to regulate farming practices, utilities to impose assessments, state or local government to locate urban infrastructure.	Various combinations of specific limitations.

so that the easement can be considered appurtenant (Brenneman).

ii. Purchase of Fee and Subsequent Resale with Restrictions. Alternatively, (row 2) the public could first purchase the land, impose development restrictions on it comparable to the restrictions of a development rights easement, and then sell the land back to the original owner or to another party. The net result of this procedure is equivalent to that of purchasing the rights directly. In both cases, the restrictions on development would "run with the land," that is, would become a part of the deed and be binding on all future owners.

iii. Purchase of Fee and Subsequent Lease with Restrictions. Purchase and lease with restrictions is similar to purchase and sale with restrictions, except that the public retains title to the land and leases it to a private lessee. The resale and lease prices may be set directly by the market through competitive bidding. In contrast, the price paid when purchasing a developments right easement directly must be determined through appraisals.

Typically, any of these methods of removing the development rights from the bundle of rights held by the landowner would be exercised over a specific geographic area which might be defined generically (as for example all Class I and II land or all wetlands) or simply delineated on a map (agricultural preservation area A, environmental protection area B, etc.). The public might decide

on a mandatory program in which rights on all of the designated lands would be purchased, or a voluntary program in which rights would be purchased only from those owners who offered them for sale.[1] Under a voluntary program, the government might purchase rights only if it received reasonable offers on a given minimum percent of the designated land. Otherwise, the protected area might be so broken up by unprotected land that the land use objectives could not be achieved.

It may not be necessary to acquire development rights on all designated properties at the beginning of the program. For example, as long as a private landowner wishes to keep his land in its present rural uses, there is no immediate need for the public to acquire the development rights. The New Jersey Blueprint program would give owners the option of selling their development rights at any time over a period of 20 years. The owner could thus decide whether he would be better off by taking his cash payment early or waiting until a later date when the cash value would be

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[1] See New Jersey Blueprint Commission Report.

higher due to the appreciation of the land market.

The following method provides another procedure for scheduling the purchase of development rights.

iv. Exercise of the Right of Preemption. Under this method, when any parcel of a designated type (e.g., "prime" farmland) comes on the market, the government may (as is done in France) substitute itself for whoever has made an offer for the land. Then it may purchase and resell or lease with restrictions. The public purchases only those properties which, in fact, come on the market, at the time they come on the market, and if the proposed purchaser would convert the land to an unacceptable use. Thus, the total number of purchases is likely to be less than under the first two methods, and the purchases are likely to be somewhat spread out over time rather than occurring all at the beginning of the program period.

Although there is no formal program based on its use in the United States, preemption is a power compatible with the American legal system and American values. There is ample precedent for it in the private market's use of the right of first refusal.

b. Regulatory Methods

Other direct methods of protecting farmland and environmentally valuable lands are based on the "police power," that is, the power to regulate.

i. Exclusive Farm or Rural Use Zoning. Exclusive farm or rural use zoning is the most straightforward example of the regulatory approach. Under it, very stringent zoning restrictions are imposed on a class of lands which are delineated on the zoning map. Certain limited uses such as farms and farm-related dwellings are permitted by right; certain other uses, such as single family dwellings unrelated to farming, may be permitted as special exceptions if approval is obtained from the governing body. Other uses can be made only if a variance is obtained or if the zoning is changed. Exclusive farm or rural use zoning differs from the more familiar zoning only in that the permitted uses are much more limited and much larger minimum lot sizes (e.g., 20-80 acres minimum) may be mandated.

Zoning is normally imposed by local (county or municipal) levels of government. State policy may be injected by establishing planning and zoning guidelines which must be followed by local governments. No compensation to offset the restrictions is paid to the landowners.

ii. Inverse Condemnation. Inverse condemnation is a hybrid. Restrictions on development are placed on specified land and the landowners given a stated time within which to petition the court that the regulation is an unreasonable use of the police power because it is equivalent to a taking without

compensation. If the court agress, either compensation must be paid to the landowner and an easement acquired, or the restrictions must be revised or removed. Thus, although the restrictions are based on the power of the government to regulate, the possibility is held out that compensation is due the landowner because of the severity of the restrictions on development.

iii. Transfer of Development Rights. Transfer of development rights (TDR) also combines the concept of zoning with compensation to owners of restricted lands. The compensation, in this case, comes from developers who wish to build on less restricted land rather than from the government (although the government acting as developer also could purchase rights). TDR was first developed to protect urban landmarks,[1] but its application to the preservation of farmland, habitats of ecological value, landscapes of aesthetic value, and the like has been widely discussed.

Transfer of development rights schemes have many different forms, but generally have two basic components. First, environmentally valuable land inside the planning jurisdiction (it would most likely be a township or county) is delimited on a map and

[1]See "the Chicago Plan" worked out by Costonis and Shlaes.

zoned for little or no further development. This demarcation of a boundary is presumably based on aesthetic, ecological, agricultural, or other environmental arguments such as sensitivity of the land to development (e.g., steep slopes or aquifer recharge areas) or the presence of hazards to development (e.g., floods in floodplains). Other land in the planning jurisdiction is zoned for further development.[1]

The second component of a TDR plan involves the inducement mechanism for transferring development rights from the no-growth zone to the growth zone. The idea is that the development rights are separated from the land in the no-growth zone and are made available for purchase and attachment to land in the growth zone. This process of transferring the development rights from the no-growth zone to the growth zone is the most remarkable feature of TDR programs.

Land in the growth zone is zoned for development at a relatively low density. But if a developer wishes to exceed this low density constraint he can do so (up to a limit) by purchasing transferable development rights from land owners in the no-growth

[1]The most detailed explanation of the demarcation of a no-growth zone is that of South Brunswick Township in Middlesex County, New Jersey (Nieswand, et al.). The TDR study for Sonoma County is shorter on the details of delimiting the no-growth zones but a map is included in the report by Sedway/Cooke.

zone. Presumably, he would do so if the new higher densities in the growth zone allowed him greater economic surplus from which he could bid for transferable development rights. In this way, development rights are transferred to the growth zone from the no-growth zone, and landowners in the no-growth zone can still receive payment for their development rights even though their land cannot be developed much, if at all. Once the development rights are sold, development rights certificates attached to the deed of the land in the no-growth zone are cancelled so they cannot be used again.

Obviously, one of the most important aspects of this second component is the initial assignment of transferable development rights to landowners in the no-growth zone. This can be accomplished in a number of ways. They might simply be distributed on the basis of acreage owned,[1] in proportion to assessed value of the land or appraised value of the land,[2] in proportion to the assessed or appraised development value only of the land (that is, on the market value minus current use value),[3] according to the develop-

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[1]For example, as in Buckingham Township, Bucks County, Pa.

[2]As in the South Brunswick Demonstration Project by Nieswand, et al.

[3]The proposed New Jersey enabling legislation, the 1975 "Municipal Development Rights Act," Assembly Bill No. 3192 specifies the difference in assessed value before and after the TDR program.

ability of each acre as determined by soil and other conditions, according to current (i.e., pre-TDR) zoning, or by some other method. Allocating transferable development rights in proportion to the appraised value of the development rights (before the TDR program) is probably the most generally applicable approach, in that it is directly concerned with the diminution of the exchange value of the land caused by preservation of the landscape.

It is also necessary to define how much each transferable development right allows a builder to increase the density of his development. The certificate which he purchases to increase the density of the development may allow him so many more square feet of floorspace per acre or so many more dwelling units per acre, or something of that nature. Whatever approach is used the units must be clearly defined.[1]

iv. Development Permit Systems. Under development permit systems specified types of development must receive a permit from the government, in addition to the usual zoning and building permits.

A special commission may be set up to review applications for development and to determine whether or not to grant a permit.

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[1]A detailed discussion of one approach can be found in Nieswand, et al., Demonstration Project for South Brunswick Township.

Granting of a permit is usually based on criteria of suitability of land for development and permits frequently incorporate conditions to restrict development which conflicts with the criteria. Thus, development permit systems allow flexibility in dealing with the specifics of each proposal in a framework of general criteria.

2. Indirect Controls

Indirect controls are intended to encourage an owner to maintain his land in farming or some other open use. They do not put any direct restrictions on the use of a property. Rather they consist of tax or other kinds of incentives and disincentives.

a. Tax Incentives

Differential assessment for purposes of property tax, Federal estate tax, and State inheritance tax provides a positive incentive to refrain from development. The capital gains tax on land provides a negative incentive.

i. Differential Assessment for Property Tax. Differential assessment laws are usually categorized as falling into one of three categories: Preferential assessment, deferred taxation, and restrictive agreement (Hady and Sibold; Keene, *et al*.). Preferential assessment laws produce an abatement of taxes authorizing or requiring assessors to assess eligible land on the

basis of farm, forest or open space value, rather than on market value, which in many locations is much higher because of the demand for developable sites. Deferred taxation laws add an additional feature by imposing a sanction requiring owners of eligible land who convert land to non-eligible uses to pay some or all the taxes which they were excused from paying for a number of years prior to conversion. Restrictive agreement laws include both preferential assessment and, in all states except Vermont, a sanction in the form of a payment of back taxes. In addition, they require the owner to sign a contract spelling out his rights and duties. In California, for instance, he must wait until the end of a 10 year run-out period (or pay for breach of contract) after signifying his intention of nonrenewal before he can convert the land to noneligible uses as of right.

There are three factors relating to the land market and the real property tax system in a particular landowner's taxing jurisdiction which influence the magnitude of the tax benefits he might receive from differential assessment (Keene *et al.*):

a. the difference between the assessed value of the land based on fair market value and its assessed value based on current-use value. Obviously, eligible landowners at the rural-urban fringe would, in principle, enjoy the largest reduction, although the fact that *de facto* preferential assessment of open land is widespread in these

areas may, in practice, reduce the magnitude of the benefit. In such areas, however, differential assessment would protect the landowner against future increases in tax burden resulting from rising land values and reassessment.

b. the percentage which the assessed value of eligible land and associated real estate improvements, such as barns, is of the total assessed value tax base before the establishment of differential assessment. If all realty in the taxing jurisdiction is in the eligible use, there would be no benefit to an individual landowner. The assessed value of his land would be reduced, but, since the tax revenue needs of the municipality would remain the same, the tax rate would go up by an amount sufficient to produce the same tax revenue, and his tax bill would remain unchanged. At the other extreme, if there is a very small amount of eligible land in a jurisdiction, the tax saving for its owner would be proportional to the reduction in assessment.

c. the percentage which the improvements on a particular eligible property are of its total assessed value before differential assessment. The tax benefit usually involves only taxes on land, and improvements continue to be assessed at fair market value.

In general, if an owner is to be better off after the institution of a differential assessment program, the percentage of his property's value which is in eligible land must be larger than the percent of the entire tax base which is in eligible land. Thus, not all eligible landowners will enjoy a net benefit

from a differential assessment program. Those with a high proportion of improvement value to land value may see their tax bills rise, even though their land is assessed at a lower rate.

ii. Differential Valuation for Estate and Inheritance Taxation. Farming is a capital-intensive industry, with much of a farmer's capital tied up in land. Land value, therefore, contributes heavily to estate and inheritance taxes, even in rural districts. In areas experiencing urban pressure, the market value of the land increases far out of proportion to its economic worth to the agricultural process. Estate and inheritance taxes are correspondingly inflated.

Farmers have complained for years of this heavy tax burden. In response to their appeals, the Tax Reform Act of 1976[1] included two provisions designed to encourage preservation of family farms following the owner's death. These relate to the valuation of farmland based on farm use and a substantial relaxation in the time by which the Federal estate tax must be paid. Several states have enacted somewhat similar provisions, and more appear to be following their example.

Federal Estate Tax

The overall intention of the tax provision in the Tax Reform

[1] 2003, 2004. The description given in this report is intended as a general explanation. The individual property owner should not let it substitute for a careful reading of the relevant sections of the Act and interpretation by an expert in tax law.

Act of 1976 is to benefit heirs of small family farms. Therefore, current use valuation is restricted to a maximum of $500,000 of real property (valued at current use), and current use valuation can be applied only to land which had been actively farmed by the decedent for at least five of the eight years preceding his death and which passed to a nearby relative. The provisions apply only to farmland and buildings, not to farm machinery or fixtures.

More specifically, the eligibility requirements state that at least 50 percent of the decedent's gross estate (valued at fair market and after deduction for mortgages and other debts) must consist of real or personal property which was being used as a farm and was passed to a qualified heir. In addition, at least 25% of the gross estate must consist of real property (that is, not including personal property) that was owned and actively farmed by the decedent or a member of his family for at least five of the eight years preceding his death.

Use value is to be computed by a specified formula requiring data on rental of comparable lands:

$$\text{Farm use value} = \frac{\text{(gross cash rental)} - \text{(state and local property taxes)}}{\text{Annual effective interest rate for new Federal loans}}$$

If rental data on comparable farmlands are not available, or if the executor elects, the valuation may be based on capitalization

of income, capitalization of fair rental value, the assessed farm use value as used for differential assessment, comparable sales of farmland in the same geographic area, or "any other factor which fairly values the farm."

All or part of the tax saving must be repaid, if, within 15 years of the decedent's death, the heir disposes of the property or uses it for other than qualified farm use for a total of three or more years within any sub-period of eight years. The amount of tax saving to be repaid is computed to the nearest month, but can be summarized as follows:

Number of Years from Decedent's Death to Disqualification	Percent Tax Saving Recaptured by Government
10 or less	100
11	80
12	60
13	40
14	20
15	0

Property for which the Federal estate tax was based on use valuation is subject to a lien for recapture of the estate tax until the end of the 15-year recapture period or the death of the qualified heir.

The second important provision of the Tax Reform Act of 1976 makes it possible to extend to 15 years the time for paying estate taxes on farm real estate. In addition, only interest on the tax

need be paid within the first five years, and interest on the tax attributable to the first $1,000,000 of farm value is reduced to four percent. The remainder is subject to normal interest rates. The time extension and the low interest rate apply only if farm realty constituted at least 65% of the value of the decedent's adjusted gross estate,[1] another provision designed to limit benefits to bona-fide small farmers.

b. Tax Disincentives

i. Capital Gains Tax on Land Sales. The major purpose of a capital gains tax on land sales is to discourage speculation and premature subdivision activity. Therefore, the tax rate imposed is usually very high (over 50%) for land held for a short period. However, in order to relieve long-term holders of land, the tax rate may decline with the number of years the land is held. The tax rate may also increase with increases in the percent gain realized by the seller.

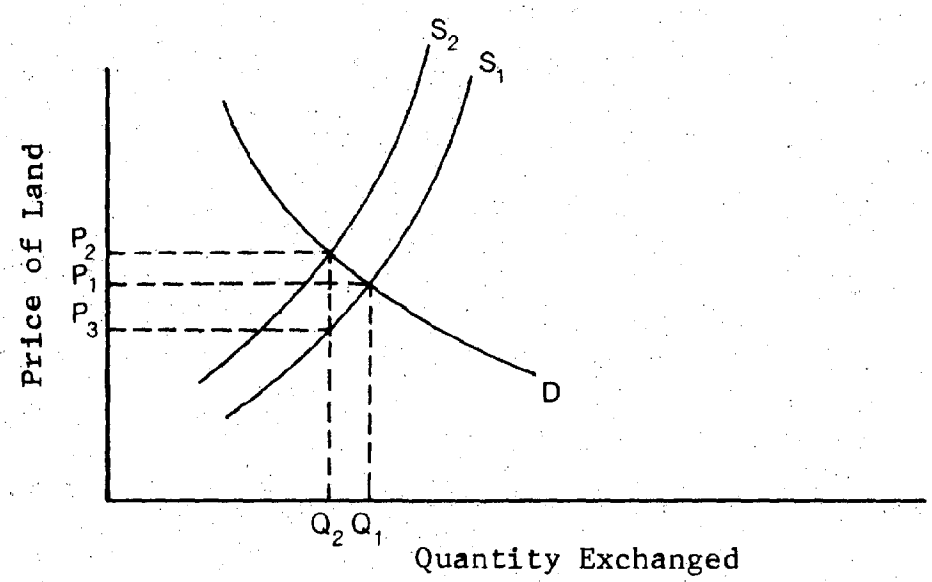
The capital gain is defined as the difference between the cost basis (the amount originally paid for the land by the present owner plus certain allowable expenses) and the selling price (gross consideration minus selling expenses). This is comparable

[1] Gross estate minus deductions for expenses, debts, taxes, and losses.

to the definition in the Federal Internal Revenue Code of any capital gain.

Theoretically, a tax on land should reduce subdivision activity. In Figure 4-1 the price of land before the tax (P_1) and quantity exchanged (Q_1) is determined by the "supply" of land made available by rural landholders to speculators and developers (S_1) and the demand for land for urban uses (D).

Figure 4-1



It should be noted that even though the total stock of land is fixed, the "supply" of land to speculators and developers is not. This is because at higher prices, more and more land will be offered for urban development.

A tax on land will increase its price to the buyer and thus, will shift the supply curve upwards (to S_2). The tax will not affect the demand for land since this is derived from the consumer's demand for housing and the commercial and industrial demand for floorspace. The amount of the tax that is shifted forward to the buyer depends on the elasticity of supply of land to urban uses. The more elastic (flat) the "supply" curve is, the more tax is shifted to the buyer. In our figure, the after-tax price of land increases to P_2 -- of this P_3 goes to the seller of the land (down from P_1 before) and P_2P_3 is the tax. Also note that the tax has reduced the amount of land exchanged (from Q_1 to Q_2). Generally, the more elastic the "supply" of land to urban uses, the greater will be the effect of the tax in reducing the amount of subdivision activity.

So far, this theoretical explanation of the land gains tax has been static in nature, and has ignored the effect of the tax on the allocation of land between rural and urban uses over time. Some observers have argued that land speculation has resulted in the withholding of fringe land from urban development and thus led to high land prices and a pattern of leap-frog development. In theory, a land gains tax would tend to discourage long-term investment in land. In terms of Figure 4-1, the imposition of a capital gains tax on land would lead to a once-and-for-all shift

in the "supply" curve to the right as land investors put their holdings on the market. This would lead to a more efficient pattern of land use and lower land prices.

c. Protection from Urban Effects

i. Agricultural Districting. Agricultural districting consists of designating geographic areas for long-term farming and instituting in the districts a combination of measures designed to offset the spillover effects of urbanization which make it difficult to continue farming.

The measures include limitations on the powers of local government to regulate farming practices which may be offensive to suburbanites because of smells, dust, noise, etc.; limitations on the powers of state and county governments to locate roads, sewers, water mains, public instutions, and other urban infrastructure in or near an agricultural district; limitations on the power of utilities to assess farmers in a district on a front-foot basis for utility lines which run through or along their property. Other measures, designed to offset the effects of speculation in land prices or other effects of urbanization may be included in an agricultural districting package. In this study, however, we define agricultural districting as excluding differential assessment for property taxation and differential valuation for Federal estate and state inheritance tax purposes, since these

measures are treated separately.

The designation of the boundaries of an agricultural district may be based on soil quality, current use for agriculture, and the commitment of existing farmers to remaining in farming. A minimum allowable size for a district may also be stipulated.

Chapter V
EXPERIENCE WITH LAND USE CONTROLS[1]

A. Experience with Direct Controls

1. Experience with Acquisition of Development Rights

Many individual development rights easements (conversion easements, scenic easements, etc.) have been donated or sold by private owners to national or local conservation trusts. There are very few examples, however, of government programs to acquire easements over extensive areas in order to protect scenery, environmentally valuable areas, or agricultural lands. To the extent that government programs for acquisition of development rights have been instituted in this country, simple purchase has been the usual approach. Three such programs have been examined carefully as part of this research project: the Wisconsin scenic easement program, the Suffolk County Agricultural Land Preservation Program, and the New Jersey Farmland Demonstration Project. No purchase-and-sale- with-restrictions programs are known, but purchase and lease back has been undertaken on a limited scale in Massachusetts and extensively in Saskatchewan, Canada.

a. Direct acquisition of development rights

i. The Wisconsin scenic easement program.

In 1939 a joint commission of ten states proposed a

[1] A more complete treatment of most of the cases reported in this chapter may be found in working papers prepared as part of this research project. They are:

Mississippi Parkway or Great River Road along the length of the Mississippi River from Minnesota to the Gulf of Mexico. Following the recommendations of a 1951 study, Wisconsin began to purchase easements

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[1] (footnote continued from previous page)

John E. Pickett, "The Wisconsin Scenic Easement Program."

John E. Pickett, "The Suffolk County Farmland Preservation Program."

John E. Pickett, "The New Jersey Farmland Preservation Program."

Kathleen Wallace, "Purchase and Leaseback of Agricultural Land in Massachusetts Towns."

Ann L. Strong, "Preemption and Farmland Preservation: The French Experience."

Ernest Leonardo, "A Survey of Exclusive Agricultural Zoning in the United States."

Robert E. Coughlin, "The Oregon Land Use Act."

Kathleen Wallace, "The Massachusetts Wetlands Program of Inverse Condemnation."

David Berry, "Economic and Legal Issues Inherent in the Transfer of Development Rights."

Ann L. Strong, "Vermont's Act 250 and Prime Farmland."

Ann L. Strong, "Estate Taxation of Farmland Under the Tax Reform Act of 1976."

Thomas Plaut, "A Capital Gains Tax on Land as a Technique for Preserving Farmland: A Brief Look at the Vermont Land Gains Tax."

David Berry, "Participation in New York's Agricultural Districting Program."

along the Great River Road in order to preserve continued rural uses compatible with the parkway's scenic objectives. In 1961, the state legislature extended authorization to allow purchase of scenic easements along routes fronting other major rivers and lakes. By 1975, easements had been purchased on 1,751 parcels, amounting to 17,375 acres along 290 miles of highway.

As initially applied along the Great River Road, easements were acquired to a depth of 350 feet from the highway centerline. Within the easement areas, farming was permitted; residential development on lots less than 5 acres was prohibited; signs and billboards were prohibited; and existing non-conforming uses, both residential and commercial, were permitted to remain. No affirmative rights were conveyed to the state.

After several years' experience with the program, the 5-acre requirement for single family residential development was changed to a minimum frontage of 300 feet, based on a safe spacing of driveway entrances. Subsequently the regulations were changed again to encourage cluster development of large tracts. The 350-foot depth criterion was also modified to permit the depth of easements to vary according to the topography. In addition, the state now acquires affirmative rights to enter easement areas for inspection, correction of violations, and cutting, pruning, and planting of trees. Since the typical type of "development" in the study area consisted of single-family

houses on very large lots, generally the primary restriction of a 300-foot frontage requirement has removed relatively little development potential from the typical landowner.

In order to appraise the value of the easements, specially trained state personnel are used, and 90% of all easements are negotiated amicably. Undoubtedly, the threat of condemnation has an influence on the high amicable settlement rate, but despite a favorable court ruling,[1] the Highway Commission is reluctant to condemn easements. If condemnation becomes necessary, the Commission prefers to condemn the property in fee simple, since enforcement of the easement restriction is believed to be difficult without the landowner's cooperation.

To deal with possible conflicts between perpetual easements and changing conditions, the Highway Commission has developed a system of permanent and temporary variances in return for grants of additional rights which, on balance, further the

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[1] Kamrowski vs. State (31 Wisc. 2nd 256, 142 NW 2d 793). Kamrowski contended that public enjoyment of scenic beauty did not constitute a public use for which eminent domain could be exercised. The court rejected this argument and held that the legislature, in passing the program had determined that protection of scenic resources was in fact a public purpose; that "visual occupancy" was sufficient to satisfy the plaintiffs' claims that occupancy of the land was necessary for public use; that alleged restrictions on the use of the state's police power for aesthetic objectives did not apply when eminent domain was exercised; and that limiting the easements to non-urban relatively undeveloped properties did not constitute a denial of equal protection of the law.

overall objectives of the scenic easement program. Temporary variances apply to such things as seasonal directional signs for off-premises activities, and may be granted by the highway district subject to headquarters approval. Permanent variances require the approval of the Highway Commission itself as well as the district and central offices. They consist of such modifications as allowing development of part of a property under easement in return for dedication of additional depth or frontage of easement in another part of a property.

Analysis of all land sales between 1950 and 1975, in each 40-acre tract including or bordering the Great River Road near La Crosse[1] indicates that land under easement has sold for lower prices than land without easement. See Table 5-1. Definitive conclusions cannot be drawn from the data, however, because of the limited sample size, the many years over which the sales took place, variability in slope and quality of land, range of distance from La Crosse, etc. One would, of course, expect land under easement to sell for less than unrestricted land. The more interesting question, which could not be answered because of the difficulty of retrieving data on payments for easements, is whether the owners were accurately compensated for their loss of development potential.

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[1] La Crosse is the largest city (and the only SMSA) near which a large number of easements has been acquired. This analysis also updates Matuszeski's 1968 study.

Table 5-1

COMPARISON OF PER ACRE SALE PRICES IN THE GREAT RIVER ROAD STUDY AREA (Near LaCrosse, Wisconsin) 1950-1975

	Number of Transactions[1]	Price/Acre (1967 $)
ADJACENT TO VILLAGES		
Tracts of 2 acres or less without easement	11	2072
with easement	2	1727
Tracts greater than 2 acres without easement	3	705
with easement	0	---
NOT ADJACENT TO VILLAGES		
Tracts of 2 acres or less without easement	9	2218
with easement	7	750
Tracts greater than 2 acres without easement	4	552
with easement	18	135
	54	

[1] Out of a total of 108 transactions, complete data were available on only 54. Most of the remainder were tax exempt, and therefore did not have revenue stamps from which sale price could be determined.

The goals of the easement program were never spelled out beyond the 1939 joint commission's recommendation to preserve the "heritage and folklore of the river area." The implicit goal of the administrators appears to have been to retain lands adjoining the Great River Road and other highways in the relatively undeveloped state they were in when the program began. The objective was not to prevent all development, and second homes and cabins were not felt to be inconsistent with the program goals. In fact, the efficient movement of traffic -- which was the basis for the 300-foot frontage requirement -- has played an important role in program decisions, while evidently little serious analysis of the landscape has been undertaken in order to find out how best to tailor the easements to preserve the more important views.

The proliferation of advertising signs and strip commercial development in unresticted areas near LaCrosse and in the villages, and its lack in the controlled areas, indicates that the scenic easements have had a definite effect. The scenic easement program appears to have been effective in meeting somewhat limited goals, but one can question whether the goals themselves were adequate in view of the problem. Involving a broader range of viewpoints in formulating and administering the program might have resulted in a more complete statement of

objectives and in operating guidelines more sensitive to protecting landscape values.

At any rate, for two reasons the results of the Wisconsin program are only marginally relevant to the preservation of agricultural lands or extensive areas of environmental value which are threatened by urbanization. First, most areas under easement are remote and development pressure is low (although the area chosen for sales analysis was under moderate urban pressure). Second, the restrictions are quite mild and generally do not critically hamper the type of development which has been going on in the area: primarily single-family houses, many of them vacation houses, on large lots. Stronger restrictions would be necessary if extensive areas are to be protected for agricultural or environmental reasons.

ii. Suffolk County (N.Y.) Farmland Preservation Program

Suffolk County's program was designed explicitly to retain extensive areas of highly productive farmland which were being threatened by urbanization. It was the first program approved by a legislative body which called for the public purchase of development rights to retain farmland. Even though the first development rights are yet to be purchased, the program is still one of the national leaders and can teach us much about the problems, issues, and potentials of this approach to agricultural preservation.

Suffolk County, occupying the eastern two-thirds of Long Island, has been under substantial growth pressure from the expanding New York metropolis. Population increased by 69% during the 1960's, and, by 1970, the county contained 1,211 persons per square mile. Most of the population, however, is concentrated in the western part of the county. The five towns on the eastern tip of the island had an overall population density of only 223 persons per square mile in 1970, and contained 46,000 acres of farmland -- 82 percent of all the farmland in the county. The county's agricultural soils are excellent (47,000 acres in class I and class II soils), and in 1974, the county led all other New York counties in value of agricultural production.

Although the annual sales of farm products per acre has risen in recent years, the value of farmland has risen even faster. Farmland in eastern Suffolk is often worth $6,000 per acre to a developer, but agricultural production can sustain at the most a value of around $2,000.

The amount of land in farms has dropped from 123,000 acres in 1950 to 56,000 acres in 1974. This loss of farmland has caused widespread concern in Suffolk County, not only because of the loss of food production, but because of the loss of very scenic open space, and because farms protect and help recharge Suffolk County's underground water supply, which increasingly is being depleted by urban demands.

In order to develop solutions to the problem described above, County Executive John V.N. Klein appointed an Agricultural Advisory Committee in 1972. Its 1973 interim report to the legislature named three problems facing farmers: increased property tax burdens, liquidation of farms to pay estate and inheritance taxes, and the disparity in value between agricultural and urban uses of the land. The report identified 40,000 acres of "optimum" farmland based on soil type, current farm use, and compatibility of adjacent uses, and propsed that 30,000 acres of the total be preserved by means of cluster zoning with either purchase of development rights or, when the value of development

rights approached full market value, purchase in fee and lease-back for farming. The optimum farmland identified for preservation is shown in Figure 5-1. In March 1974, in its final report to the legislature, the committee recommended that available funds be used to purchase the development rights of farmer-owned land and adjacent nonfarmer-owned land in contiguous parcels totalling at least 200 acres. An expenditure of 15 million in each of 1974, 1975, and 1976 was requested to implement the program, which was to be voluntary and not to involve condemnation.

The legislature responded by passing Local Law 19-1974, which authorized the County Executive to solicit offers from owners of farmland to sell development rights; Local Law 19-1974 did not appropriate any funds for acquistion. Klein, in turn, established a Select Committee on the Acquistion of Farmlands composed of county, local, and legislative officials to develop the precise procedures for implementing the plan. In a November 1974 report to the legislature the Committee outlined the following procedure:[1]

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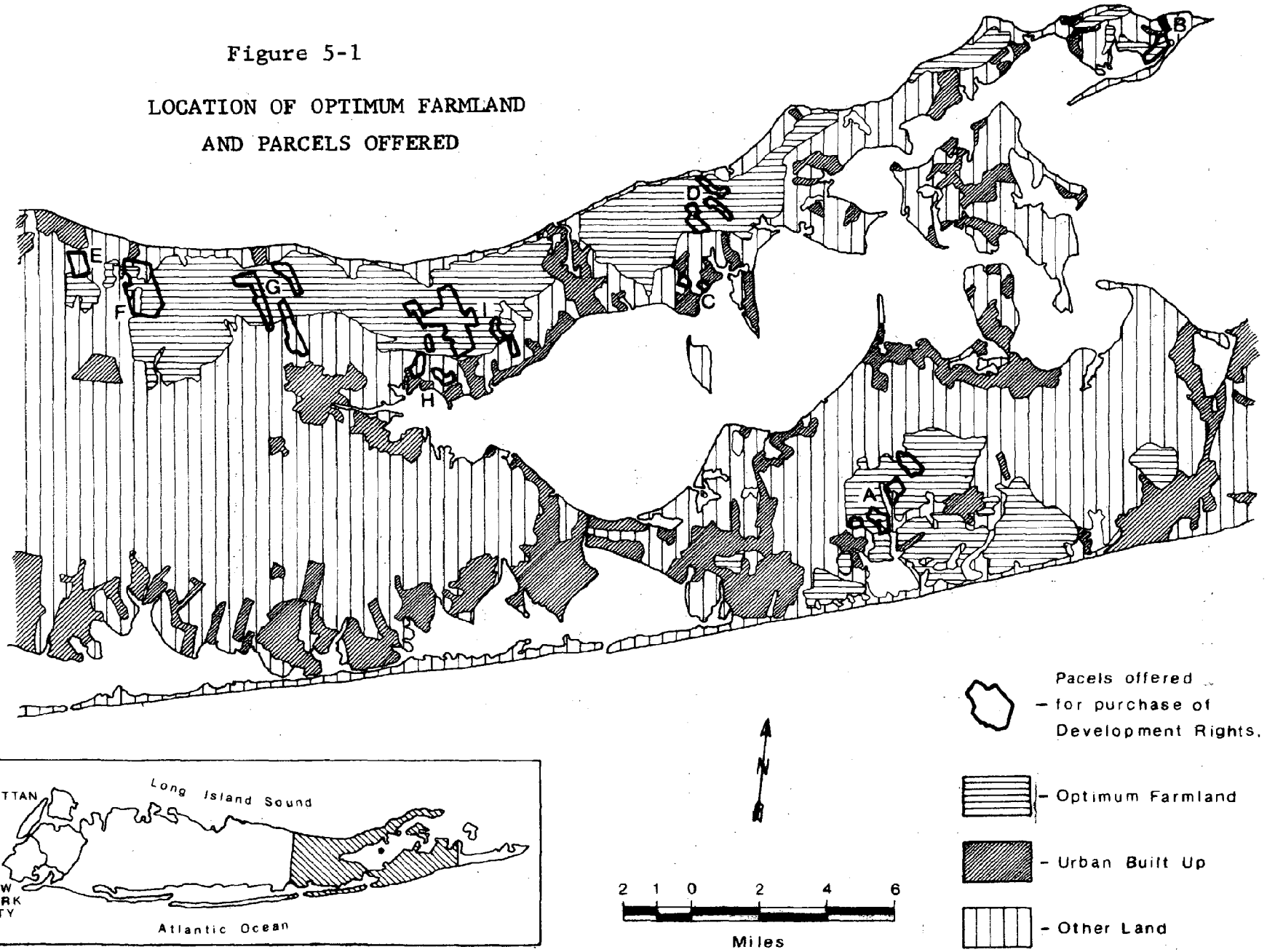
[1] Suffolk County Select Committee on the Acquisition of Farmlands, "Report of the Suffolk County Legislature," Nov. 7, 1974.

Figure 5-1

LOCATION OF OPTIMUM FARMLAND AND PARCELS OFFERED



1. Identify all farms and their owners.

2. Solicit sealed offers from owners.

3. Evaluate offers based on soil type, contiguity to other offered farms, price, development pressure, existing buffers, current use, and ownership (resident or absentee).

4. Appraise acceptable parcels to determine market and farm use value.

5. Based on comparison of appraisals and offers, request legislative approval to purchase development rights from certain parcels.

6. Following appropriation by the legislature, proceed with acquisition.

Offers were subsequently solicited, and on February 11, 1975, the county opened offers of sale of development rights on a total of 17,949 acres at a total cost of $116.5 million. Following review of the offers based on the Select Committee's criteria and independent appraisals to evaluate the reasonableness of the prices asked, the legislature was requested to approve a 30-year bond issue of $21 million to purchase development rights on 3883 acres. This was to be Phase I. In Figure 5-1, the Phase I parcels are overlain on the optimum farm areas. A second phase, involving $35 million for an additional 8000 acres, was to follow. Phase II was to include those parcels for which installment payments had been requested by the owners, but the county decided to withhold action on these offers pending receipt

Table 5-2

OFFERS AND APPRAISALS FOR PHASE 1, SUFFOLK COUNTY FARMLAND PRESERVATION PROGRAM

Location	Parcels	Acres	Offer/Acre ($) Mean	Offer/Acre ($) Median	Offer/Acre ($) Range	Appraisal/Acre ($) Mean	Appraisal/Acre ($) Median	Appraisal/Acre ($) Range
Southampton	10	547	4729	4500	3500-5218	4654	4675	4301-4875
Area A	10	547	4729	4500	3500-5218	4654	4675	4301-4875
Southold	17	609	4591	4595	2439-10,018	4330	4426	2625-6875
Area B	3	175	6252	7000	3800-7031	4560	4150	4000-6875
Area C	5	172	2892	4058	2439-4077	3231	4247	2625-4250
Area D	9	262	4982	4900	4000-10,018	4742	4750	4275-5208
Riverhead	33	2727	4474	4323	2483-6500	4622	4675	3000-8000
Area E	3	125	5325	4600	4600-6000	7204	7550	6700-8000
Area F	4	555	4625	4976	3467-5885	4059	4063	4050-4075
Area G	6	620	4682	4738	4200-6500	4513	4425	3750-5525
Area H	4	223	4277	4226	2483-5000	4590	4516	3000-5125
Area I	16	1204	4248	4100	3500-5572	4205	4775	3100-5775
ALL AREAS	60	3883	4550	4500	2439-10,018	4545	4612	2625-8000

NOTES:
1. Offers are for cash sales only; no installment payments included.
2. Appraisal figures do not reflect 1977 updating.
3. Total offers equal $17,689,000; average offer per farm equals $294,817.
4. Average size of farm offered equals 65 acres.

of an Internal Revenue Service ruling regarding the treatment of the installment gain.

By the time Phase I came to a vote in the spring of 1976, opposition to the program had developed among some legislators based on the size of the bond issue, which would cost approximately $2 million per year to retire (assuming 7.5% interest). When it became obvious to the program's supporters that they did not have the twelve votes (2/3 of the legislature) needed for passage, they voted on May 10, 1976 to table the program indefinitely. The supporters continued to lobby for the program during the summer of 1976, and on September 10th Phase I was approved, 13 to 2, at a special session of the legislature.

The vote was immediately challenged in court by the two dissenting legislators and one of the three who had abstained, based on a technicality in the way in which the bill was recalled for a vote. The suit was subsequently dismissed by the State Supreme Court, and at the time of this writing, appraisals are being updated by Klein's staff prior to commencing negotiations with property owners. The county administration also plans to proceed with Phase II, as well as possible additional phases involving new offers and condemnation of key parcels not offered by their owners.

iii. The New Jersey Farmland Preservation Program

The agricultural tradition remains strong in New Jersey, the "Garden State", even though it is the most densely populated of the 50 states, with 953 persons per square mile overall in 1970. Most of the population, however, is concentrated near New York City and near Philadelphia. Nine of the state's counties, predominantly located in the northwest and southern portions of the state, had less than 400 persons per square mile in 1970 and form the core of New Jersey's agricultural industry.

Between 1960 and 1974, land devoted to agriculture declined from 1.4 million acres to 1.0 million acres, while state-wide population density increased from 807 to 975 persons per square mile. During that time period the average value of land and buildings per farm increased almost 5 times, while the value of products sold per farm increased only half that much -- a clear indication that property values are being affected by factors other than the value of agricultural production.

The threat to New Jersey agriculture posed by the continued loss of farmland was first recognized by the electorate in 1963, when it approved a constitutional amendment permitting preferential assessment of lands devoted to agriculture and horticulture. In the mid-1960's Secretary of Agriculture Philip Alampi

realized that property tax benefits would not be enough to maintain farming in the face of strong urban development pressures. The experience in New Jersey suggested that zoning for low density uses was just a temporary arrangement which made possible a forum for discussion with developers, but rarely could prevent a change in use or intensity to accommodate suburban pressures. As early as 1964, therefore, Secretary Alampi began to talk about the possibility of purchasing development rights to preserve all or most of the good agricultural soil of the state.

In 1971, Governor William Cahill requested Secretary Alampi to appoint and chair a Blueprint Commission on the Future of New Jersey Agriculture. The Commission, consisting of representatives of farming, agri-business, banking, environmental protection, and farm labor issued its Blueprint Report on May 1, 1973. The report noted a widespread "impermanence syndrome" in New Jersey agriculture and proposed a strategy of 13 policies to deal with the problem.

The land use policy provided the major thrust, but the remaining policies were proposed as an integral part of the program. They included continuation of farmland assessment at use value, reduction of inheritance and estate taxes, and limitations on assessments by public utilities, as well as

other measures designed to strengthen the agricultural industry.

The Blueprint's major land use recommendation was that each municipality should designate at least 70% of its prime farmland (designated as Class I, II and III soils plus special areas such as cranberry bogs) as an Agricultural Open Space Preserve. These preserves would total about 1,000,000 acres. Owners of the designated land would be able to sell their development rights to the state for full compensation. The sale could be made immediately on inception of the program or, if the land owner felt that the land market would indicate higher development values in the future, he could delay the sale indefinitely. Funds for purchase by the state would be derived from a 4 mil (0.4%) transfer tax on all real estate transactions.

The objectives and approach of the Blueprint Report generated relatively little oppostition, but the funding scheme was soon determined to be inadequate. Based on the 1971 level of sales, the transfer tax would yield only $22 million per year, so a billion dollar program to acquire a million acres of development rights at $1,000 per acre would require 43 years. In addition, the value of development rights to agricultural properties in all probability would escalate more rapidly than revenues from a tax on property transfer. A 1974 Capital Needs Study Commission endorsed the concept of development easements

to protect farmland, but urged that a pilot project be undertaken to test the concept's feasibility prior to attempting statewide application.

It was decided that funds from a $200 million "Green Acres" bond issue for acquisition of open space could be used for purchasing development rights on agricultural land[1] and a project area consisting of the townships of Lumberton, Medford, Pemberton and Southampton in Burlington County were chosen by the New Jersey Department of Agriculture as the site of the pilot project after investigation of twelve sites in different parts of the state. In the summer of 1976 the legislature passed a bill authorizing the expenditure of $5 million of Green Acres funds for the demonstration project.

Bill A.B. 1334, as amended and approved, contains the following major provisions. The Agricultural Preserve Demonstration program will purchase easements on agricultural land on a voluntary basis: eminent domain will not be used. An appropriation of $5 million is available, to be used within two years. The program will be administered jointly by the N.J. Department of Agriculture and the N.J. Department of Environmental Protection, the agency which administers the Green Acres program. A program

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[1]The Green Acres program, funded by a bond issue, is intended to provide funds for municipal or state acquisition of open space.

steering committee, consisting of representatives of township, county and state government, will be established to communicate with land owners and other residents, advise program administrators on the suitability of preserves and appraisal procedures. A Legislative Oversight Committee consisting of Assembly and Senate agricultural committees will be designated to review the program prior to the purchase of easements, and after their purchase to determine the feasibility of further use of the development easement concept and the identification of possible alternative preservation methods.

Thomas J. Hall was appointed field manager, with offices in the demonstration project area. A brochure distributed to land owners indicated that the objectives of the program are to determine to what extent owners, especially owners of contiguous properties, are willing to sell development rights to the best farmland; to what extent easements will be offered on the least costly land as opposed to the most costly; to what extent offer prices will be comparable to appraised values; and to what extent the offered agricultural preserve will fit in with municipal master plans.

Dr. Hall sees the demonstration going beyond these objectives and providing at least partial answers to additional questions: To what extent are the objectives of open space

preservation and retention of agriculture compatible? What is the minimum size for an effective agricultural preserve? To what extent does the purchase of development rights assure the continued viability of agriculture? What effect will agricultural preserves have on surrounding development? Will the purchase of development rights concept be accepted within the general community as well as within the agricultural community?

In accordance with section 14 of the law, the administrators and the steering committee specified that no more than 35 percent of a single offer and no more than 20 percent of the entire preserve could consist of woodland (including land supporting cranberry bogs); and specified than no more than 20% of the farm acreage of a given property could be withheld from the amount offered by the owner for the preserve.

Restrictions on the use of farmland within the preserve proved to be much more difficult to agree upon. The Department of Environmental Protection argued that anything other than actual crop production would be in conflict with the open-space requirements of the Green Acres program. Local representatives on the steering committee, most of whom were farmers, urged that agriculture-related activities such as washing and packing of blueberries be permitted. After intense and lengthy

discussion at the September and October steering committee meetings, draft rules and regulations incorporating a compromise, were published in the New Jersey Register[1] on November 4, 1976. The compromise limited use of lands within the preserve to "the production for commercial purposes of crops, horticultural products, and livestock and livestock products." The following are also permissible activities:

1. Washing, cleaning, and packaging of raw products produced on-site.
2. Processing and retailing operations which are a continuation of activities existing at the time the easement is conveyed to the state.
3. Retail merchandising conducted from a non-permanent roadside stand.
4. Dwellings for agricultural laborers or farm families.
5. Recreational activities not interfering with agricultural production.

Subdivision of land under easement and erection of any improvements was prohibited without approval of both departments.

Following a public hearing on the proposed rules on November 23, 1976, the farm representatives on the steering committee again urged that the restrictions be relaxed to permit farmers to use the current technology. The Department of Environmental Protection refused, and according to some observers

[1] 8 N.J.R. 506.

almost terminated its participation in the demonstration project at that point. Through the personal efforts of Secretary Alampi the project was kept alive, however, and the final version of the rules and regulations was approved by both departments on January 26, 1977. The only changes to the draft were the following:

1. Retailing activities were limited to a maximum of 2 acres per farm and to 3,000 square feet of structure.

2. 60% of the products sold at stands within the preserve must be produced in New Jersey and 25% produced within the demonstration area.

The next order of business was drafting the deed covenant to be used in the actual conveyance of easements. After consideration of additional questions regarding permitted uses raised at the February 1977 steering committee meeting, and a brief delay in which the Attorney General was asked to resolve some remaining legal questions, the Commissioner of Environmental Protection and the Secretary of Agriculture approved the standard deed covenant on April 14, 1977, and the program became fully operational. The covenant contained essentially the same language as the rules and regulations concerning uses permitted within the preserve, but also provided that the state would have the right of first refusal in any sale of the fee simple interests of land subject to an easement. (This may be the first use in the U.S. of preemption for an environmental preservation program).

According to NJDA officials, this provision was included to protect the state's investment by allowing it to purchase the underlying fee in the event that agriculture was no longer viable. Since farm value would be close to zero in that event, presumably the state would be able to acquire full rights to the land for other public purposes at nominal cost.

Guidelines for appraisals were also approved in April 1977; these specified that the market value be based on the highest and best use of the property considering the likely land-use pattern in the community, and that farm value be determined by the residual income approach (as used for the Farmland Assessment Act) and other applicable methods. Appraisers will be provided with production cost and marketing data by Rutgers, the State University. Since the same data are used for the farmland assessment program, farm values for the two programs will be virtually identical.

On April 18, 1977, copies of the offer form and deed covenant were mailed to all farmland owners in the demonstration areas, and during May 1977 a final informational meeting was held in each of the four townships to answer questions from owners prior to the June 1st deadline for receipt of offers. While many of the comments and questions concerned matters which had been discussed previously by the steering committee, the thrust of the program was clarified by several comments by the N.J. Department

of Agriculture:

1. Offers will be used primarily to judge the seriousness of the owners' interest in participating in the project. Appraisals will constitute the basis for acquiring easements, even if higher than the owners' own evaluation.

2. The state cannot guarantee the right to farm within the preserve, but will do all it can to prevent local ordinances which limit normal farming activities on the basis of nuisances. State designation of farming as the primary land use within the preserve should aid farmers in this regard.

3. If land within a preserve is required for a public utility such as a pipeline or a power line, the owner will be compensated for additional encumbrance of the underlying fee. The state will do all it can to prevent condemnation which alters the character of the preserve, but has no power to prevent condemnation by public agencies with the power of eminent domain.

4. Farmland capable of sustaining production, even if not presently farmed, can be included in the offer.

5. The emphasis of the pilot program is on assembling large, contiguous tracts of prime farmland, but owners of smaller parcels should not hesitate to submit offers if they are genuinely interested in participating.

6. If a small number of "holdouts" threaten the viability of the preserve or a portion of it, the state will try to persuade the remaining owners to participate. In no event, however, will eminent domain be used. The possibility exists that a holdout property could be restricted to agriculture by zoning (without compensation) if farming was established as the most appropriate use for the area by the existence of the surrounding preserve.

7. If a local crop failure made it impossible to adhere to the retailing requirement of locally grown produce

specified in the regulations, the state would almost certainly grant a waiver.

8. Payment for development easements can be spread over five years to minimize capital gains tax.

9. Even though $5 million may be able to purchase only a small percentage of the eligible farmland within the demonstration area, that should not discourage interested owners from submitting offers. Since this is a demonstration project, much can be learned about the development easement concept which can be applied later at a larger scale. Furthermore, a favorable response by demonstration area owners could influence the legislature to provide more funds, either from the Green Acres bond issue or from other sources.

The last comment apparently was taken seriously by the pilot area property owners. As of June 1, 1977, offers on approximately 12,000 acres from close to 100 owners, at a price totaling about $35 million, had been received, and enough owners had requested additional time to submit their offers that the deadline has extended to August 1, 1977. At the time of this writing, the state is reviewing the offers for acceptability prior to assigning appraisers, and it appears that several large contiguous areas are included in the land offered.

b. Purchase and Sale or Lease With Restrictions

No useful examples of programs employing purchase and resale with restrictions are known of in the U.S. Some experience with purchase and leaseback, however, is being acquired in Massachusetts, where a number of Township Conservation Commissions have purchased farmland and other land for conservation purposes,

and in Saskatchewan where a major program of purchase and resale is in existence.

i. Massachusetts Town Conservation Commissions' Programs of Purchase and Lease.

In 1969 the town of Lincoln, Massachusetts, initiated a lease-back program which has served as a model for other concerned towns. Currently 12 Massachusetts towns lease more than 800 acres of public conservation land to nearby farmers. (Table 5-3) Much of the leased land was owned by town Conservation Commissions prior to the initiation of leaseback programs. In towns where Conservation Commissions have actively sought out farmland for purchase and leaseback, the agricultural resource value of the land has usually been only one of many attributes justifying public purchase. Other important considerations have been the land's visibility from the town center, proximity to other protected open space lands, location in a projected greenbelt, or value as a buffer between areas of conflicting land-use. Some farmland purchases have been incidental in that they have been acquired only by virtue of being included in a parcel sale in which other types of lands were the major motivation for purchase by the town's Conservation Commission.

Currently more than half of the land in town-operated leaseback programs is used for the production of low-value

Table 5-3

PURCHASE AND LEASE WITH RESTRICTIONS IN MASSACHUSETTS TOWNS

Year Program Began	Town	Acres Leased	Rental $/Acre	Terms of Lease (years)	Lease Renewable or Negotiable	Lease Selection Process	Formal Lease	Leased Land Close to Other Farmland
1966	Concord	92	20-25	life	----	personal	yes	----
1969	Lincoln	200-250	15-20	1-2	yes	personal	yes	yes
1971	Falmouth	140	f(output)	5	yes	open bid	yes	no
	Sudbury	33	18-25	2-3	----	personal	yes	yes
1972	Harvard	69	f(output)	3-10	yes-no	personal	yes	yes
	Wayland	67	5-35	3	no	open bid	yes	yes
1974	Duxbury	80-100	f(output)	10	yes	open bid	yes	----
	Ipswich	10	20	5	yes	personal	yes	yes
1975	Swansea	30-40	26	2	yes	open bid	yes	no
	Woburn	5	25	2	----	personal	yes	no
1977	Amherst	12	15	5	yes	personal	yes	yes

crops, such as field corn and hay. This is, in part, due to several factors: the location of many of the early-leased lands on conservation property which was unsuitable for higher value crop production; the minimal goal of most towns to keep the land cleared and in agricultural use: the objective of extensive recreational use of the land after harvest; and the desire of towns to support the preservation of agricultural lands without "getting into the agricultural business".

In some towns, initial leaseback efforts were cautiously limited to the leasing of land for low-value crops for short terms(ranging from 1 to 3 years) at low rates. These appeared successful in providing benefits to the town through the maintenance of agricultural land and open space, as well as beneficial to the farmer by providing him the use of agricultural land (not available for purchase at its agricultural value) needed to expand farm operations to an economically-viable scale. This success encouraged a number of towns to expand their farmland leasing programs.

In the past three years there has been an increase, not only in leased acreage, but also in efforts to focus on the preservation of prime agricultural-conservation land. And there has been an increase in the willingness of towns to enter into longer-term agreements whereby farmers can expect reasonable

returns on their investments in the land for high-value crop cultivation (e.g., fertilizers, soil conditioners, drainage ditches, etc.).

For the 725 acres of land leased for a fee,[1] the average license or lease fee is $25 per acre. For low-value crop lands within the program the average rental rate is $21 per acre; for high-value crops it is $27 per acre. Rental prices, arrived at either through open bidding or informal agreements, are slightly higher than private rental rates in the same areas. These vary from $15 to $20 per acre for field corn and hay and from $20 to $25 per acre for vegetable and small fruit crops.[2]

Private rental rates do not necessarily reflect the agricultural value of the land. Landowners often lease farmland at a modest rate, simply to maintain their property in a productive condition. Thus, while the average public rate is somewhat higher than that for private rentals, it is not inconsistent with the current value of rented farmland.

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[1] To circumvent a legality which requires that the legislature vote on the leasing (or other specified disposition) of any agricultural lands (Mass. Constitutional Amendment to Article XLIX) the towns issue legally-acceptable licenses rather than leases.

[2] Estimates of private rental rates for farmland were provided by County Cooperative Extension Service Agents in counties with towns participating in purchase and leaseback programs.

It appears that the rentals charged are sufficient to offset the property taxes lost yearly, but will not recapture the capital expense or interest on bonded purchases (even though towns often cite as benefits the recompense of the acquisition price).

In assessing this program, it is important to bear in mind that it is not a formal program established with broad-based state support, but rather a land-use technique adopted independently by towns as part of previously existing conservation programs. It is not an attempt to preserve agricultural land as such, but rather to include the agricultural use of land along with conservation and ecology as an important consideration in the protection of areas with high natural values.

ii. Saskatchewan Land Bank Program

In Saskatchewan, where the Land Bank Commission oversees a major and well established program for influencing the pattern of land tenure, there has been extensive experience with a purchase and lease system. The Land Bank Commission was created by the Land Bank Act of 1972 and consists of three full-time commissioners appointed by the Lieutenant Governor in Council. In addition, the Commission has several administrators, twelve regional counselors (covering ten regions), six appraisers, and an appeal board.

Since Saskatchewan is largely outside the sphere of urban influences, the objectives of the Land Bank Program are not oriented toward retention of farmland but rather toward aspects of land tenure. Despite this orientation, the operation of the program is instructive.

Basically, the Commission engages in three types of activities (Fifth Annual Report of the Land Bank Commission):

1) Purchase of farmland from retired farmers or others wishing to sell voluntarily;

2) Lease of farmland to younger, capable farmers to begin or expand commercial operations despite their relatively low level of assets; the leasing aspects of the program are also intended to encourage transfer of land from one generation to another within a family and to facilitate the establishment of viable farming units; and

3) Provision of advice on farm and financial management.

The Land Bank Commission can purchase farmland from anyone desiring to sell, but priorities are given to retiring farmers in financial difficulty and to larger tracts of land, especially those forming full farm units. The price offered for a tract of land is based upon expert appraised values of any relevant sales. Generally, once the land is acquired by the Commission it can be leased to a farmer in the next calendar year.

Leases are of two types: long term and short term. Long term leases are the norm and these are made for a period

extending until the time the farmer is 65. The annual cash rent paid by the farmer must lie between 5% and 6.5% of the current market value of the land (for 1977 it is 5.5% of the land value). Buildings and improvements are sold to the lessee and will be repurchased by the Commission at the termination of the lease. After five years, a long term lessee may purchase the land from the Commission if he desires.

Short term leases may be granted to farmers over 65 or to others if no long term lessees can be found.

In order to be eligible to lease land, the applicant must declare his intention of making farming his principal occupation, not exceed income and net worth restrictions, reside in Saskatchewan, and be a Canadian citizen or a landed immigrant. If more than one applicant desires the same land, the Commission has established a point system for determining objectively who is to get priority. Points are awarded on the basis of net income (fewer points for greater deviations from an optimum income based on family size), age (maximum points if the applicant is between 23 and 35), size of the applicant's farm, if any, proximity of the desired parcel to the applicant's current farming operation, if any, livestock productivity, expected use of land and improvements, education, experience in farming, preferences among applicants by the vendor of the land, previous

leasing of the land, and management ability. Applicants may be individuals, cooperatives, partnerships, or corporations.

Funds for purchase of land by the Commission are loaned over a long term to the Commission from the Provincial Department of Finance. In addition revenue comes from leases, interest, and other sources. Administrative costs are paid by a grant from the Provincial Department of Agriculture.

By the end of 1976 approximately 1,000 square miles of land were leased out to farm operators, indicating that the program is fairly popular. A summary of land acquisition for the period 1972 to 1976 and land disposition for 1976 is given in Table 5-4.

Table 5-4

SUMMARY OF SASKATACHEWAN LAND BANK COMMISSION OPERATIONS*

Acquisition 1972-1976	
Offers made to private vendors	3,359
Offers accepted and not retracted	1,573
Acreage acquired from private vendors	721,292
Value of private vendor acquisitions	$59,718,973
Disposition for 1976 Only	
Number of leases in effect as of Dec. 31, 1976	1,707
Number of lessees as of Dec. 31, 1976	1,623
Number of applications to lease land in 1976	1,187
Number of agreements entered into in 1976	401
Long term agreements: Number	368
Acres	133,696
Long Term Leases Commencing in 1976	
Number of lessees with no previous lease	340
Number of lessees who were the vendors	54
Number of lessees who were the direct decendant of vendor	48
Average age of lessee	33 years
% lessees 20-30 years of age	54%
% of lessees who farmed no other land	17%
Average net worth of lessee	$35,000

*Sources: Annual Reports of Land Bank Commission, 1972-1976.

c. Exercise of the Right of Preemption

In a number of European countries, various units of government have been granted the right of preemption in order to acquire land for land banks or for specific development projects. In France, in addition to this form of preemption, the law authorizes preemption for the purpose of preserving farmland.

The ample experience with preemption in France shows that it is a land use control which works to assist those who wish to remain in farming to obtain suitable land and to keep prime land from being subdivided. Preemption is a power compatible with the American legal system and with American values. There is ample precedent for it in the private market's use of the right of first refusal. With minor modifications, it could be adopted in the United States for the purpose of preserving farmland.

i. The French Experience. The Farm Law of 1960 authorized the creation of non-profit companies, called SAFERs,[1] to buy and sell farmland. A SAFER could be formed to serve either a single department (county) or several departments together. In response to the law, SAFERs were established in all but a

[1] Societe d'Amenagement Foncier et d'Establissement Rural, or Company for Land Planning and Rural Organization.

few departments of France.

Although not required by the law, all of the SAFERs elected a corporate form of organization. Ninety percent of their capital was subscribed by local farm organizations and farm lending institutions and 10 percent by a national company of farm organizations and farm lenders called SCAFR[1], which also provides financial, accounting, legal, and technical assistance.

The largest capitalizations, for SAFERs either covering five departments or located in areas of particularly high land prices, ranged from $250,000 to $400,000. The average capital subscription was $200,000 and was for SAFERs covering three departments. While these sums are small, the SAFERs use their capital as revolving funds and also receive national government assistance. By law, the subscribers receive five percent interest on their shares.

Although SAFERs are private corporations, control of their activities is divided between the shareholders and the national government, somewhat in the manner of utilities in the U.S.

Powers to Buy and Preempt: A SAFER may acquire land either by voluntary sale or by preemption.

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[1] La Societe Centrale d'Amenagement Foncier Rural, or Central Company for Rural Land Planning.

By voluntary sale, a SAFER may buy any farmland on the open market, or it may offer to trade some of its land for other land in order to assemble more efficient tracts. It learns of the availability of land from notaries, farmers, the press, and its own staff. Once it decides to make a bid, it is in open competition with any other bidders for the land.

Acquisition by preemeption was authorized by the Farm Law of 1962, with the strong backing of farm organizations. To acquire this right, the SAFER requests the prefect to designate a given area as subject to the right of preemption for farm use. About 60 percent of all agricultural land is now subject to a SAFER right of preemption (O.C.E.D.). No land in a development district[1] and no land shown in an adopted plan as intended for urban uses may be included. The prefect must seek the advice of farm organizations concerning the proposed designation and then submits a recommendation to the Minister of Agriculture. If the recommendation is favorable, the Minister publishes a decree designating the area. People selling farm land are deemed to have notice of the decree, and sale without prior notice to SAFER is void.

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[1] Under French terminology, this includes Z.U.P.s, Z.A.D.s, and Z.A.C.s.

Some sales and transfers are exempt from the right of preemption: exchanges between farmers, sales to close relatives, sales to a farmer or tenant farmer whose land has been expropriated, or sales to an adjacent farmer. Tenant farmers have a right of preemption superior to that of SAFER. In addition, rights of preemption held by the state and by other public bodies have priority over the SAFER's preemptive right.

An owner who wishes to sell, who has a prospective buyer, and whose land is subject to a right of preemption must notify the SAFER and the tenant farmer, if there is one, by registered mail of the intent to sell, the proposed sale price, conditions of sale, and the name of the proposed buyer. Preemption by SAFER must occur within 30 days of notification, either at the seller's price or by request to the court to fix the price. Between notification of an intent to sell and SAFER's decision to preempt, the seller can reconsider and decide not to sell. If SAFER accepts the offering price, the seller is bound; if SAFER obtains a court determined price, the seller can back out of the sale but must pay the expenses of setting the price.

Management and Resale: Once land has been acquired, the SAFER determines whether it is in need of improvements, such

as drainage, irrigation, berms, windbreaks, afforestation, or restoration or construction of buildings. If it is, the SAFER, will do the work.

While holding the land, the SAFER is likely to place it under short-term leases for farming. Land may be held for five years, or under special circumstances for 10 years, before being sold. During the holding period, which usually is between six and 18 months, the SAFER is likely to be acquiring adjacent parcels to assemble a larger and more efficient tract, contacting nearby farmers who may wish to buy the land or trade some distant parcel for it, and seeking out farmers, such as sons working a too-small holding with their fathers, who wish to set themselves up in a new location.

The land must be sold rather than offered on a long-term lease, but, to help farmers lacking enough capital to buy, the SAFER can sell to a group of people[1] wishing to be corporate owner-lessors of a farm.

Sales are primarily but not exclusively to farmers. Old structures and poor land may be sold to non-farmers for second homes, for which there is an enormous demand in some parts of the country. Some land may be determined to be more suitable for forest use. Some land may be ceded to or exchanged with

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[1]Groupement Foncier Agricole, or Agricultural Landowning Group

land of public agencies for parks, reservoirs, roads, and other public uses. In most instances, however, the sale is to a farmer. Frequently, there is competition for the land.

Which farmer should be chosen as purchaser is a subject to which the SAFERs give considerable attention. The objective is to sell the land, not to the highest bidder, but to the person who will benefit most as a farmer by its acquisition. Favored by law are farmers with too little land, farmers willing to exchange their present tracts for more efficient holdings, farmers whose land had been condemed for a public purpose, and young farmers anxious to establish themselves.

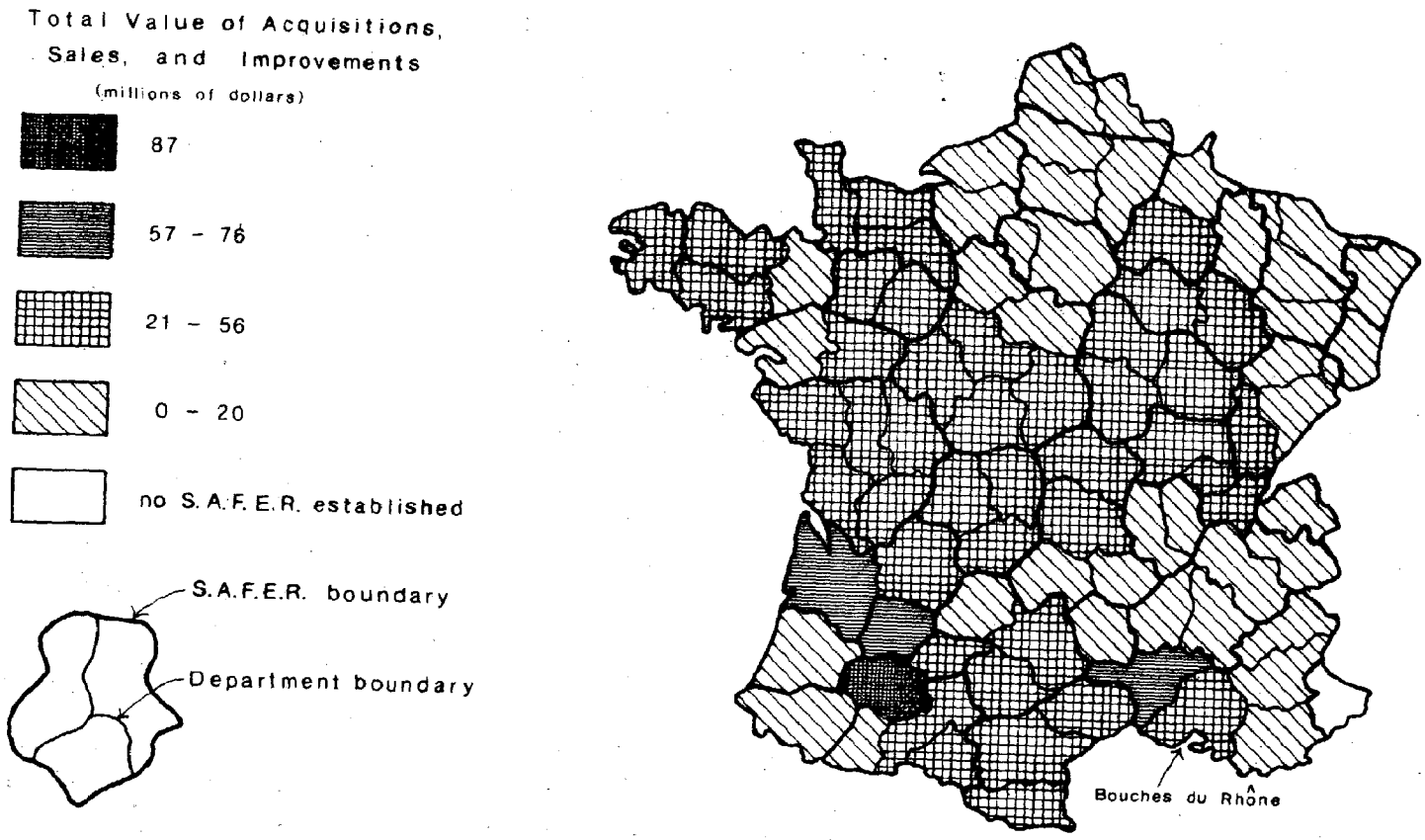
The SAFER must consult a land technical advisory committee of representatives of farm organizations and administrative agencies and obtain approval from the Government Commissioners prior to signing an agreement of sale.

The successful purchaser must agree to farm the land for 15 years, either personally or with his family. During this period the land may not be sold or subdivided, except under exceptional circumstances with the SAFER's approval.

Experience: The level of activity of SAFERs has varied considerably by region as can be seen in Figure 5-2. The north, northeast, and alpine regions have been relatively inactive. The north and northeast are level or gently rolling fertile areas

Figure 5-2

GROSS ACTIVITY LEVELS OF SAFER



SOURCE: Projet de Loi de finances pour 1977.

where tracts tend to be large, reallotment not needed, and farming is holding its own satisfactorily. In the alpine departments, on the other hand, little land is suited to farming. There, the government's concern is with providing help to prevent excessive depopulation. Bordeaux, Burgundy, Gascony, and the Languedoc-Roussillon regions all have had very high levels of SAFER land investment.

For the nation as a whole, SAFERs in 1970 brought 13 percent of farmland on the market and 21 percent of such farmland which was subject to preemption (O.C.E.D.). About one third of the purchases were from farmers who had accepted government retirement income. Purchases have been averaging a little under 200,000 acres per year, and sales by SAFERs in the last few years have caught up with this rate, as can be seen in Table 5-5.

The price paid by SAFERs runs less than the average price of farmland because the SAFERs tend to stretch their funds by avoiding the high priced urban fringe farmland. In 1970, for instance, SAFERs paid an average of $500 per acre for their purchases, while the national average farmland price was $640 (O.C.E.D.)

SAFER activity has led to very little litigation. In 1970, only 1.1 percent of all purchases involved litigation,

Table 5-5

SAFER AND IDV RETIREMENT PROGRAM
LAND ACTIVITY, 1964-1975
(in acres)[1]

Year	SAFER Purchases	SAFER Sales	Land "Liberated" from Retiring Farmers[2]
1964	155,000	52,500	237,500
1965	117,500	72,500	1,402,500
1966	145,000	100,000	1,772,500
1967	155,000	135,000	1,510,000
1968	182,500	145,000	1,457,500
1969	200,000	160,000	3,237,500
1970	182,500	157,500	3,037,500
1971	197,500	177,500	2,445,000
1972	207,500	202,500	2,080,000
1973	195,000	207,500	1,712,500
1974	182,500	180,000	1,552,500
1975	192,500	177,500	N.A.
	2,112,500	1,767,500	20,445,000

[1] SCEES, Ministry of Agriculture

[2] Land "liberated" under IDV (Indemnites viageres de depart) program may be disposed of in three ways. The title of the land may be transferred to a younger member of the family; the land my be rented, usually to a neighboring farmer; or the farm may be sold on the open market. In 1972 and 1973, approximately 51 and 59 percent of the land respectively was placed on sale in the open market.

and 60 percent of those actions were brought by the SAFERs. Over the years almost two-thirds of all judicial decisions supported the actions of the SAFERs.

The funds available to SAFERs, however, have been limited and as a result, they have not been able to have as much effect on stabilizing land use patterns as might be possible. For example, in the Bouches-du-Rhône SAFER, which has an average funding level, 54 percent of all agricultural land sold from 1972 to 1975 was for nonfarm purposes, 35 percent was to persons intending to continue farm use, and only 11 percent was to the SAFER. (Nationwide the figure was 13 percent.)

Since 1962, 16 percent of all land purchased by SAFERs throughout France has been by preemption. In Bouches-du-Rhône though, preemption was used for only 4 percent of all land purchased. In many other instances, sellers offer to sell to SAFERs voluntarily, knowing that a sales agreement with another purchaser can be preempted. Therefore, the existence of the power to preempt, whether or not it is used, has some effect on farmland sales.

2. Experience with Regulatory Methods

a. Exclusive Farm Zoning

i. A general survey

Exclusive farm use zoning is now employed or about to be employed in many California and Oregon counties. In addition, it is found in scattered counties and a few municipalities primarily in the western part of the country. Only two examples are known in the East, and these two programs (in Heidelberg Township Pennsylvania, and Frederick County, Maryland) were not enacted until 1977.

Large minimum lot sizes and a very limited number of permitted uses are typical characteristics of exclusive agricultural zoning ordinances. In addition, some employ additional types of restrictions on development, such as limits on building permits issued. The provisions of 17 exclusive agricultural zoning ordinances are summarized in Table 5-6.

For the purpose of this study we have adopted a strict definition of exclusive agricultural use zoning and include only ordinances which prohibit non-agricultural uses specifically or indirectly limit the feasibility of such uses by either requiring large minimum lot sizes or placing a limit on building permits issued. Each line on the table corresponds to a zoning classification with a given set of permitted uses. Sub-classifications can be distinguished by the minimum allowable lot

Table 5-6

PROVISIONS OF EXCLUSIVE AGRICULTURAL ZONING ORDINANCES

State	County or Township	Classification of Zones	Minimum Lot Area (Acres)	Based on Prime Soil Category	Permitted Uses*											Restrictions Other than Setback, Height, etc.
					Agricultural Commerce	Agricultural Processing	Farm Dwelling Dwellings	Recreation	Institutional	Transportation and Utilities	Mining	Home Occupations	Commerce	Single Family Non-Farm Dwellings		
California	Madera Co.	ARE	80,160,320,640	No	x		x			x		o				
		ARE	20,40	No	x o		x o	o	o	o				o		
	Marin Co.	AD	5,10,15,20,30,40,60	No	o	o	x o	x o		x o		o	o			
	Santa Clara Co.	A	10	No	x	x	x o	x o	o							
	Solana Co.	A	10,20,40,80,160	No	x o	x o	x o	o	o	o	x o					
	Tulare Co.	A-5	10,20,40,80	No	x o	x o	x o			o				x		No subdivisions
		A-1	5	No	x o	x o	x o	o		o				x		No subdivisions
	Yolo Co.	A-P	20	Yes	x		x o	x o		x o	x o	x				
		A-E	20	Yes	x o	o	x o	x o	o	x o	x o	x				
		A-1	5	Yes	x o	o	x o	x o	o	x o	x o	x			o	
Colorado	Pitkin Co.	RS	30	No			x	x o	o	x			o	x		Limit on bldg. permits
Hawaii	---	A	1	Yes	x	x	x	x	o	x o			o			
Iowa	Black Hawk Co.	A-1	3,35	Yes	x		x		x	x					o	
		A-2	3,35	Yes	x		x	x	x	x					o	
	Bremer Co.	A-1	3,35	Yes	x		x		x	x					o	
		A-2	3,35	Yes	x		x	x	x	x					o	
	Buchanan Co.	A-1	3,35	Yes	x		x		x	x					o	
		A-2	3,35	Yes	x		x	x	x	x					o	
Maryland	Frederick Co.	AD	5	No	o	o	x	x o	x o	o			o	x		Limit on bldg. permits
Minnesota	Marshan Twp.	A-I	5	Yes	x	o	x	x o	o	x	o	o		x		
		A-II	5,10	Yes	x	o	x	x o	o	x	o	o			o	
Oregon	---	A	10	Yes	x o		x	o	x	x o	o				o	
Penna.	Heidleberg Twp.	A-P	1,50	Yes	x o		x		o	o				x		
Wisconsin	Columbia Co.	A-D	½	No	x	o	x o	o	o	x o	x	x o	o			
	Walworth Co.	A-1	35	Yes	x o		x o	o	o	o						
		A-3	35	Yes	x o		x o	o	o	o						

* By right = x; Conditional = o.

size. Thus, for example, in Madera County, California, Zoning Classifications ARE-80, ARE-160, ARE-320, and ARE-640 all have exactly the same use restrictions, but their permitted minimum lot sizes range from 80 acres to 640 acres. Classifications ARE-20 and ARE-40, which are listed on the following line, allow somewhat different land uses than the first group.

The use classifications we have employed are set at a very gross level in order to summarize the bewildering number of very specific uses described in the ordinances. Consequently, it happens that certain gross uses are, at times, permitted both by right and on condition. Where this happens, it is to be understood that more specific uses within the gross classification are considered to be conflicting uses, and are accordingly restricted. For example, within the use classification "Farm dwellings" residences of the principal farm family are always permitted by right. In many jurisdictions, however, labor camps or mobile homes for migrant workers are allowed only upon issuance of a special permit given after a zoning board review of the proposal.

Since there is no widely-copied model in this area of land use control, there are numerous small but important differences in the ordinances. The simplification into tabular

form has undoubtedly created distortions. The table should be useful in determining such facts as the minimum lot areas, or the typical permitted uses, but it should not be used to draw fine comparisons.

The three major controlling elements common to exclusive agricultural zoning, as mentioned above, are large required minimum lot areas, restrictions on non-agricultural use of the land, and other restrictions on development, such as limits on building permits issued. In almost every jurisdiction surveyed, there is a gradation of the application of these controlling elements. This can happen within a primary zone by varying the required minimum lot areas of the sub-zones; or by adopting within the same jurisdiction more than one primary exclusive agricultural zone each of which can vary either in required minimum lot areas, the level of restrictiveness of permitted uses or the direct regulation of the amount of growth allowed.

A listing of the most restrictive required minimum lot areas for each jurisdiction is given in Table 5-7.

Two jurisdictions have very low minimum lot sizes: Columbia County with a ½-acre minimum and Hawaii with a 1-acre minimum. The reason we have included these jurisdictions is that each of them has coupled strong prohibitions on permitted non-agricultural uses to the apparently low required minimum lot areas.

Table 5-7

MINIMUM REQUIRED LOT AREAS IN THE MOST RESTRICTIVE AGRICULTURAL ZONES OF EACH JURISDICTION
(Acres)

Columbia County, Wisconsin	½
Hawaii	1
Frederick County, Maryland	5
Santa Clara County, California	10
Marshan Township, Minnesota	10
Oregon*	10*
Yolo County, California	20
Pitkin County, Colorado	30
Black Hawk County, Iowa	35
Bremer County, Iowa	35
Buchanan County, Iowa	35
Wolworth County, Wisconsin	35
Heidelberg Township, Pennsylvania	50
Marin County, California	60
Tulare County, California	80
Solano County, California	160
Madera County, California	640

* Minimum lot size not stated in zoning ordinance, but county must "review, approve, or disapprove" creation of any parcel of less than 10 acres.

In each of these programs, single family non-farm dwellings are not permitted, either by right or on condition. Thus, the primary controlling factors are the restrictions on permitted uses, and as these are strongly restrictive it is desirable to include these programs in our review.

In Oregon there is no formally required minimum lot area. However, it is mandated that "any proposed division of land... resulting in the creation of one or more parcels of land of less than 10 acres in size shall be reviewed and approved or disapproved by the governing body of the county."

A glance at Table 5-7 shows that the four most restrictive jurisdictions are the California counties of Madera, Solano, Tulare and Marin, with required minimum lot areas of 640 acres, 160 acres, 80 acres and 60 acres respectively. Two points should be made here. First, each of these very high minimum required lot areas represents the most restricted sub-zone of the primary exclusive agricultural zones and are negotiated voluntarily with farmers who contract with the State of California under the Williamson Act for tax relief and other benefits in return for a 10-year pledge to keep their land in agricultural use. Thus, these zones are not forced on unwilling owners, and consequently are not likely to face legal challenge. Also they tend to be

found in the more rural areas, which are not facing intense developmental pressures. Therefore, their usefulness in protecting agricultural land against the full spectrum of development pressure has not been tested. Pitkin County, Colorado, had a truer 160-acre minimum required lot area until May 1977, when under threat of a court challenge the ordinance was amended to allow for a 30-acre minimum required lot area.

Four of the zoning ordinances differentiate minimum lot areas according to the quality of agricultural soil. In the three Iowa counties, the 3-acre minimum lot area is applied only to those parcels of land where 75% of the soil is rated less than 80 on the Corn Suitability Rating Scale. This category includes less than ten percent of the soil in each of the three counties. A 35-acre minimum lot area is required for all lands of higher soil quality. In Heidelberg Township, agriculturally zoned land <u>not</u> designated Prime Agricultural Land (that is "all land containing soils which have been classified as having either a corn, oats, wheat, barley, potatoes or hay productivity rating equal to or greater than one hundred percent of the standard under improved management as described in the 'Soil Survey, Berks County') is subect to a 1-acre minimum lot area, whereas the minimum required lot area is 50 acres on land that <u>is</u> designated Prime Agricultural Land.

To summarize the table of the most restrictive required minimum lot areas, it can be said that while the list varies from ½ acre to 640 acres, the variance of the true level of restrictiveness of this controlling element is not nearly so great. This is both because of the nature and circumstances in which the minimum lot area regulations are implemented; and because this specific element is but one of three which can contribute to the overall restrictiveness of an exclusive agricultural zoning ordinance.

The second controlling element of exclusive agricultural zoning is the limitations on permitted uses of the land. In Table 5-6 the use classifications permitted in addition to general farming are arranged in a continuum which very generally represents potential impact on serious farming.

Typically special permits are to be issued only after a review by the zoning board to determine the proposal's consistency with the purpose of the zone. Each proposal for a non-agricultural use thus may be subject to conditions that limit its impact.

The most critical use affecting the viability of serious farm production is non-agricultural residential development. Multi-family dwellings are prohibited in all the exclusive agricultural zoning ordinances. Single family, non-agricultural

dwellings are allowed by right in only 5 jurisdictions: Tulare, Pitkin, and Frederick Counties and Marshan and Heidelberg Townships. They are allowed on condition in seven jurisdictions, usually in the less restrictive of several agricultural primary zones within that jurisdiction. The controlling element in these instances, then, are the minimum lot area requirements or "other restrictions."

Three jurisdictions rely on other restrictions. Tulare County prohibits subdivisions, defined as "any real property, improved or unimproved, in a unit or as contiguous units, which is divided for the purpose of sale, lease or financing, whether immediate or future, by any subdivider into five or more parcels." Both Pitkin and Frederick counties make use of limits on the number of building permits allowed within the agricultural zone. Frederick County allows but 3 building permits per 50-acre parcel. Pitkin County has developed a formula for calculation of the number of building permits allowed in each of its various zones. This formula weights the agricultural zone such that fewer building permits are allowed per unit of land than in other zones.

While it is not possible to combine the three major controlling elements of each ordinance to provide an overall index, it can be seen that jurisdictions have attempted to

combine these in a way balanced to meet their particular objectives and circumstances.

In several jurisdictions, lower minimum required lot areas are coupled with severe restrictions on permitted uses. This allows for greater freedom of development for those uses which are considered to be consistent with farm production. In other ordinances, many uses will be permitted, but a high required minimum lot area will be imposed to insure that the level of potential impact will not be sufficient to disturb agricultural activities.

Judged by the combined criteria of location in a standard Metropolitan Statistical Area, population density, and increase in population density (Table 5-8), only 5 of the 13 counties with exclusive agricultural zoning can be considered to be under significant urban pressure. These are Santa Clara, Marin, and Solano counties in California, Black Hawk County in Iowa, and Frederick County in Maryland. The performance of zoning in these counties especially will bear watching as development pressures continue to mount.

Although urban pressures are too light and the periods the ordinances have been in effect are too short to draw any formal conclusions, a survey we have conducted of local

Table 5-8

URBAN PRESSURE ON JURISDICTIONS
WITH EXCLUSIVE AGRICULTURAL ZONING

	Located In SMSA	Persons per Sq. Mile	
			Increase
		1974	1970-1974
Santa Clara Co.	yes	909	361
Marin Co.	yes	412	118
Black Hawk Co.	yes	222	16
Solano Co.	yes	151	42
Frederick Co.	no	142	22
Walworth Co.	no	118	20
Yolo Co.	yes	102	29
Heidelberg Twp.	yes	95	14
Bremer Co.	no	55	4
Columbia Co.	no	54	4
Marshan Twp.		45	4
Tulare	no	42	5
Buchanan Co.	no	39	-1
Madera Co.	no	21	1
Pitkin Co.	no	8	5

officials yields the following information (Table 5-9).

A rather small number of zoning changes have been requested.

Of the relatively few changes proposed, relatively large percentages were granted.

Only one significant court challenge to an agricultural zoning ordinance was reported.

The small number of changes requested might be ascribed either to a lack of demand for development, to the reluctance to commit the time and money necessary for the review process, or to the opinion of potential developers that there would be little hope of getting a requested change in zoning. The lack of demand for more development, which was noted above, seems to be the most likely explanation, although the expense and bother of attempting to obtain a zoning change may discourage potential developers particularly if demand is low or moderate and if alternative sites are available.

Some of the zoning changes reported were simply technicalities, as in Walworth County, where it was necessary to rezone the land on which a new highway was constructed. In other cases many of the changes were small in scale and probably did little to weaken the agricultural or rural character of the area. On the other hand, the small number and acreage

Table 5-9

CHANGES TO EXCLUSIVE AGRICULTURAL ZONING TO ACCOMODATE DEVELOPMENT

State	County or Township	Variances and changes of zone: Proposed Number	Proposed Acreage	Granted % of Number Proposed	Granted % of Acreage Proposed	Type of Develop. Allowed	Amendments to Provisions of Ordinance	Court Challenges
California	Madera Co.	25	1,300	76	92	industrial	None	Excl. agric. zoning with minimum 18-acre parcel size valid.
	Marin Co.	None	----	----	----	----	None	None
	Santa Clara Co.	None	----	----	----	----	None	None
	Solano Co.	14	1,282	71	88	housing		None
	Tulare	None	----	----	----	----	Larger minimum lot area adopted	None
	Yolo Co.	None	----	----	----	----	Subdivision below min. lot area may be approved by Planning Comm. if consistent with purposes of zoning ordinance.	
Colorado	Pitkin Co.	3	(NA)	0	0	----	Min. lot area 160 acres now 30	Pending
Hawaii		(NA)	14,206	(NA)	33	housing recreation	Administrative rules changed.	Adjoining permitted to challenge
Iowa	Black Hawk Co.	69	622	64	59	housing industrial	Classification of prime changed to add more acres.	None
	Bremer Co.	6	10	100	100	commercial	A-2 zone added.	None
	Buchanan Co.	49	602	84	66	mining	None	None
Maryland	Frederick Co.	None	----	----	----	housing	None	None
Minnesota	Marshan Twp.	12	(NA)	100	100	housing	Corrected ambiguous wording	Pending
Pennsylvania	Heidleberg Twp.	None	----	----	----	----	None	None
Wisconsin	Columbia Co.	118	1,438	47	11	----	None	None
	Walworth Co.	280	(NA)	70	(NA)	highway housing	None	None

of changes of zoning may not represent a complete picture of what is happening to agricultural lands in these counties. In Santa Clara County, for example, the strong development pressure has resulted in a "rash of 10-acre-lot subdivisions." The resulting estates or farmlets do not violate the 10-acre minimum lot size of the agricultural zoning ordinance but are clearly not effective in preserving large tracts of land suitable for commercial farming, or perhaps even not effective in preserving a bucolic landscape.

The constitutionality of the Madera, California agricultural zoning ordinance was challenged (Gisler v. County of Madera)[1] but the ordinance was upheld. The court said that prohibition of the sale of parcels less than 18 acres in area in order to protect agriculture was a reasonable use of the police power. No other significant court challenges of exclusive agricultural zoning ordinances were reported in the survey. The lack of challenges may seem surprising, given the novelty and degree of restriction of the ordinances. It is understandable, however, if in fact developers find it possible to get the zoning changes or adjustments without going to court or if there isn't a demand for higher yield uses.

[1] 38 Cal. App. 3d 305.

Despite this rather murky interpretation of our survey results, the local officials who completed the survey forms indicated a general optimism concerning the effectiveness of their agricultural zoning ordinances. Six of them answered that it "effectively prevents subdivision and development"; three answered that it "discourages developers from making plans for subdivision and development"; one answered that it "provides a format for negotiation with the developer making it possible to incorporate desirable features in the development plans before agreeing to the zoning change"; and one answered that it "has little effect". Three officials answered that there was not enough development pressure to tell. Except for the Santa Clara response (that the zoning has little effect), the responses do not appear to vary with development pressure on the jurisdiction. (See Table 5-10).

Table 5-10

ANSWERS BY LOCAL OFFICIALS TO QUESTION: HOW WOULD YOU EVALUATE YOUR EXPERIENCE WITH AGRICULTURAL ZONING SO FAR?

	Little Effect	Provides Format for Negotiation	Discourages Plans for Subdivision & Development	Effectively Prevents Subdivision & Development	Year Ag. Zoning Adopted
Santa Clara, Cal.	X				1973
Marin, Cal.				X	1972-74
Black Hawk, Ia.			X		1973
Solano, Cal.			X		1959
Walworth, Wis.				X	1974
Yolo, Cal.				X	1969
Bremer, Ia.		X			1975
Columbia, Wis.			X		1973
Tulare, Cal.				X	1976
Buchanan, Ia.					1974
Madera, Cal.			X		1965
Pitkin, Col.				X	1974

ii. The Oregon Land Use Act and Exclusive Agricultural Zoning.

Although Oregon's population densities are still very low in comparison to eastern states, the state has experienced substantial growth over the last couple of decades. Between 1960 and 1974 population increased by 28%. Much of the growth occurred in the western part of the state, along the coast and in the Willamette Valley, which includes Portland, Salem, and Eugene. This growth and its effects on agriculture and the landscape have become painfully evident to many Oregonians. Their reactions came to focus in the 1973 Land Use Act (Senate Bill 100, ORS Chapter 197).

A series of earlier acts provided precedents for the 1973 Land Use Act: a 1961 statute which introduced the concept of exclusive farm use zoning and tied the benefit of differential assessment to it; a 1963 differential assessment act whose sanctions for a change in use are among the strongest imposed by any state in the country; the 1969 Senate Bill 10 which required cities and counties to zone their land and begin work on comprehensive plans; and the Oregon Coastal and Development Commission Act of 1971.

The 1973 Land Use Act, and the goals and guidelines whose development it mandated, require that urban growth boundaries be established around all cities, and that all prime agricultural

land outside the boundaries be zoned for exclusive farm use. The comprehensive nature of the act itself, the subsequent guidelines, the state's statutory provisions for exclusive agricultural zoning which also provide for indirect measures to strengthen agriculture, and several favorable court decisions provide a mutually reinforcing framework for Oregon's efforts to preserve farmland.

The bill established the Department of Land Conservation and Development which consists of the Land Conservation and Development Commission (LCDC), its director and staff. The Commission is required to establish statewide planning goals consistent with regional, county, and city concerns. The goals are intended to carry the full force of authority of the State. LCDC is responsible for reviewing comprehensive plans of cities and counties for conformance with statewide planning goals. The planning efforts of state agencies are also to be coordinated by LCDC to assure conformance with the state-wide planning goals and also compatibility with city and county comprehensive plans. LCDC is also directed to prepare model zoning and other ordinances and regulations to guide state agencies, cities, counties and special districts in implementing state-wide planning goals, particularly for those activities of "state-wide

significance: such as transportation and utility systems, and in particular types of areas such as wetlands, flood plains, and agricultural lands.

Cities and counties, however, have the basic responsibility for preparing and adopting comprehensive plans, and counties must coordinate land use planning activities of all local governments within their boundaries (with the exception of cities of over 300,000 population).

The major substance of the act is derived from the Goals and Guidelines, which were adopted on December 27, 1974. "Goals are regulations and the basis for all land use decisions relating to that goal subject... [On the other hand,] ... Guidelines are suggested directions that would aid local governments in activating the mandated goals".[1]

The goals concerning agricultural lands, forest lands, and open spaces, scenic and historic areas, and natural resources, are of particular interest:

To preserve and maintain agricultural lands (Goal 3)

To conserve forest lands for forest uses (Goal 4)

To conserve open space and protect natural and scenic resources (Goal 5)

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[1]Land Conservation and Development Commission, Goals and Guidelines, Dec. 27, 1974.

The agricultural lands goal states:

> "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 adopting exclusive farm use zones pursuant to ORS Chapter 215." (emphasis added). The goal also defines agricultural land as land of predominantly Class I, II, III and IV soils, and in eastern Oregon Class V and VI soils in addition.

LCDC has clarified that the agricultural lands goal does require that all Class I through Class IV soils outside urban growth boundaries be zoned for exclusive farm use (EFU).[1]

The forest lands goal states that "Forest land shall be retained for the production of wood fibre and other forest uses." Neither Goals nor Guidelines, however, specify how forest lands are to be retained, although the goals do list seven different types of forest uses including production of trees, soil protection, recreation, grazing, maintenance of clean air and water, and open spaces, buffers from noise, and visual separation of conflicting uses.

The goal concerning open spaces, scenic and historic areas, and natural resources defines eleven different types of areas which are to be inventoried. It is not specific about how they are to be conserved, but it does state..."Where no conflicting uses for natural resources have been identified, such resources shall be managed so as to protect their natural character. Where conflicting uses for natural resources have

[1] Letter from Robert E. Stacey, Director, 1000 Friends of Oregon December 21, 1976.

been identified, the economic, social, environmental and energy consequences of the conflicting uses shall be determined and programs developed to achieve the goal."

Finally, the goal concerned with urbanization is of primary importance:

"To provide for an orderly and efficient transition from rural to urban land use." (Goal 14).

The Urbanization goal then states,

> "Urban growth boundaries shall be established to identify and separate urbanizable land from rural land." (emphasis added).

Essentially, all land is divided into four categories (Leeson):

Inside the urban growth boundary:

(1) Already urbanized land

(2) Urbanizable land. (Cities and counties are permitted to include agricultural land within the boundary to the extent needed for future development).

Outside the urban growth boundary:

(3) Agricultural, forest, and open space land, which is subject to the restrictions spelled out in the goals.

(4) Other rural land, which is suitable for sparse settlement, small farms, or acreage homesites with no or hardly any public services, and which are not suitable, necessary or intended for urban use.

The urban growth boundaries are guides to growth which are adopted after technical studies and public hearings, and which

may be amended in the future if public need is shown and if the standards for originally establishing the boundary are also considered.

The law states that land within farm zones shall be used exclusively for farm use except as specified (ORS 215.203, 215.213). Non-farm uses permitted as of right in farm zones include: dwellings and other buildings customarily provided in conjunction with the farm use, schools, churches, utility facilities excluding commercial power generation facilities, and mining exploration. Additional uses may be established subject to approval of the county: commercial activities in conjunction with farm use, public or private parks, playgrounds, hunting or fishing preserves and campgrounds, golf courses, power generation plants, mines, and personal-use airports. Finally, single family dwellings not provided in conjunction with farm use may be established with the approval of the county only if the proposed dwelling is "compatible with farm uses...does not interfere seriously with farm practices,...does not materially alter the stability of the overall land use pattern of the area,... and is situated upon generally unsuitable land for the production of farm crops".

In the exclusive farm use zone, any proposed division of land into parcels less than 10 acres in size must be reviewed for con-

sistency with Agricultural Land Use Policy (ORS 215.243) and approved or disapproved by the governing body of the county; division of land into larger tracts may be reviewed by the governing body if it wishes (ORS 215.263).

These stringent requirements are combined with a number of measures to improve the viability of farming in areas zoned for exclusive farm use: prohibition of local ordinances which would restrict or regulate accepted farming practices because of noise dust, or odor if such conditions do not interfere with the use of adjacent land (ORS 215.253); exemption from assessments and levies of sanitary and water supply districts (ORS 308.401); qualification for differential assessment (ORS 308.345); and valuation at farm use value rather than at market value for state inheritance tax purposes (ORS 118.155 and ORS 808.370(1)). (These provisions are compared with those of the New York Agricultural Districting Program in Section 2c below).

The Act stipulated that Oregon's 36 counties and 230 cities were to bring their comprehensive plans and zoning ordinances into conformance with the LCDC goals by January 1, 1976. LCDC is empowered to grant an extension beyond that date if the local jurisdiction has a comprehensive plan and is making satisfactory progress toward completion. If these minimal conditions are not met, LCDC is required to step in and adopt a plan and zoning for the the non-complying jurisdiction.

By November 1976, only two local jurisdictions had complied with the Goals and Guidelines. All others were seeking or had been granted extensions. When a compliance schedule is agreed to, a grant is typically made by the state to the local governmental unit to enable it to carry out the necessary analysis and work with citizens to develop plans consistent with the goals and guidelines. Under current schedules, it will be 3-5 years before most of the counties are in compliance.

In addition to the general failure to comply in accordance with the original deadline, there was considerable evidence during 1976 that some local jurisdictions were reluctant to comply fully with the requirements of the Goals and Guidelines. Two general types of responses have been observed: delineating an excessively large area for the growth zone, and failing to put into the EFU zone all land suitable for agriculture.

Primarily because of controversy concerning LCDC's role with regard to activities of statewide importance and corresponding power invested in LCDC over local units of government, a petition was filed calling for a statewide referendum to repeal the Act and was brought to a vote in November 1976. The measure was defeated 57 to 43 percent statewide, with the

Willamette Valley strongly in favor of the Act but with the coastal counties voting for repeal. The statewide vote on the referendum must be counted as a substantial victory for the Act. An expected effort to amend the act in 1977 also amounted to little. These votes probably have removed most remaining wishful thoughts that LCDC might be just a temporary phenomenon and that local jursidictions could soon go back to their own ways of dealing with planning and development.

The resolve with which the Act is now being carried out may be indicated by a recent Opinion and Order concerning Marion County (LCDC No. 75-006, 3-2-76) which was signed by Harold Brauner, Director of the Department of Land Conservation and Development on March 3, 1977. The order rejected Marion County's proposal not to confer exclusive agricultural zoning on 11,600 acres of good agricultural land. Land suitable for agriculture, which is undeveloped and uncommitted to other uses, states the order, is "not to be viewed generally as space, available for development but as the basic resource upon which a major segment of Oregon's economy rests. As the nonreplacable foundation for crops and livestock, it is to be viewed as a primary source of its own rights. The purpose of this resource must be weighed carefully ... Thus, if acres for acreage home-sites are determined to be needed in the Salem area, then all

areas suitable for such sites must be considered including West Salem, even though it is in another county...ORS 215.213 (3) is very clear that such homesites may be permitted in the EFU zones only under very strict conditions, so as to insure compatibility with the farm practices used in the exclusive farm use area and to keep the exclusive farm use area free from development."

Two recent Oregon court decisions indicate positions similar to that taken by the Order. (Multnomah County vs. Howell 9 Or App 374, 496 P2d 235 (1972), Supreme Court review denied (1973) and Joyce vs. City of Portland, 24 Or App 685, 546 P2d 1100 (1976)). In the first case, the county was upheld in enjoining quarrying on land zoned residential-agricultural and in the second the court upheld a rezoning of over 800 acres from low density residential to farm and forest use. In both cases it was stated that there is no taking without compensation merely because there is a reduction in property value, so long as a substantial beneficial use remains. These cases are consistent with the opinion of the Joint Legislative Committee on Land Use that "so long as the most restrictive portions of local plans and zoning ordinances center around farm use designations for prime agricultural land, the beneficial use test will be

complied with and the question of taking will not be successfully raised."[1]

There is not yet enough experience with the Oregon Land Use Act to be able to conclude whether it will be effective in protecting farmlands and environmentally valuable areas from development. The program has made a substantial beginning, however, and has withstood attempts to repeal or weaken it.

The promise of the program would appear to rest not only in the strong and explicit provisions of the exclusive farm use zone (which must be applied to all soils of SCS classes I through IV), but also in the comprehensive quality of the legislation. The Land Use Act requires that local jurisdictions prepare comprehensive plans and zoning ordinances consistent with them. Both planning and zoning must be consistent with the statewide Goals and Guidelines, which state that each local jurisdiction must establish an urban growth boundary to identify and separate urbanizable land from rural land. In order to strengthen the viability of agriculture in an EFU zone and to somewhat counterbalance the farmer's loss of ability to develop

[1] Final Report of the Joint Legislative Committee on Land Use, Nov. 1976, p. 32.

or sell for urban development many benefits similar to those of agricultural districting are provided.

b. Inverse Condemnation

The only known example of the use of inverse condemnation as a conscious element of a widespread program to protect land from development is in Massachusetts.

i. The Massachusetts Wetland Restriction Program.

In 1965 the Massachusetts legislature (known officially as the General Court) extended its protection of coastal wetlands through the adoption of Chapter 130, section 105, which restricts and regulates their use. Similar legislation (C. 131, S40A) was adopted for inland wetlands in 1968, and a 1972 amendment provided for the inclusion of flood plains in the inland restriction statute.

In brief, the legislation empowers the Commissioner of Environmental Management to adopt orders "regulating, restricting or prohibiting dredging, filling, removing or otherwise altering or polluting wetlands". The landowner "may petition the superior court in equity to determine whether such an order so restricts the use of his property as to deprive him of the practical uses thereof and therefore is an unreasonable use of the police power because the order constitutes the equivalent of a taking without compensation. If the court finds the order to be an unreasonable exercise of the police power...the court

shall enter a finding that the order shall not apply to the land of the petitioner." The Department of Environmental Management may then "take the fee or any lesser interest in such land in the name of the commonwealth by eminent domain."

The legislature's definition of wetlands is quite comprehensive. Inland wetlands, for example, are defined as including wet meadows, marshes, bogs, swamps, other areas inundated by ground water for significant periods of the year, and banks touching inland waters or wetlands.

The Department's standard order regulating and restricting inland wetlands in a city or town generally prohibits filling or dumping; draining, excavating, or dredging; or any act or use which would destroy the natural contours of water flow, or otherwise alter or permit the alteration of the natural and beneficial character of the wetland. Certain uses, however, are explicitly allowed in the restricted land: the construction or maintenance of roadways or driveways to unrestricted lands where there is no viable alternative; the installation of utilities; the excavation of boat channels, wildlife impoundments, and other excavations where no fill is placed on the wetland except that necessary for retention structures; the construction, maintenance and expansion of beaches; the construction and maintenance of catwalks, foot bridges, wharves, docks, piers, boathouses,

boat shelters, duck blinds, observation decks, and boat launching ramps; the use or improvement of land for agricultural purposes; the maintenance of drainage measements, ditches, watercourses, and artificial water conveyances; and outdoor recreational activity structures.

The Wetland Restrictions Division of the State's Department of Environmental Management maps the areas to be restricted, either wetlands or flood plains, on a town-by-town basis. Once this is done, formal notice of a public hearing is sent to all affected landowners, town selectmen, conservation commissioners, and assessors, as well as various state agencies. A hearing is held, after which any landowner who feels that his land does not come under the jurisdiction of the law and has been inappropriately restricted may make an appointment with program administrators to discuss the matter prior to the adoption of an order of restriction by the Department. In this manner, errors of inclusion and exclusion are corrected and the mapping of restricted areas is revised.

After the hearing, the town selectmen must approve or disapprove the inland wetland order of restriction within 30 days.[1] If no action is taken the order is considered approved.

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[1]Town approval is not a condition of the coastal wetland restriction act. (M.G.L.A.. Chapter 130, section 105).

If the town disapproves the order, six months must lapse before the Commissioner of Environmental Management may adopt the order or an amended order.

Once the order is adopted by the Commissioner, each landowner is notified by certified mail and a copy of the order is recorded in the Registry of Deeds for the district. This is a critical time, for once a landowner or any person having an interest in affected land is notified, he has only 90 days to petition the Superior Court to determine whether the order so resticts the use of his property as to deprive him of the practical uses of the land and is therefore the equivalent of a taking without compensation. This is the process of inverse condemnation -- the landowner appealing to the court to determine whether the restricted land has, in fact, been condemned. If so, the restriction is removed and the state is given the option to acquire the fee or lesser interest under powers of eminent domain.

There is no formal state-level staff to provide surveillance for the Wetland Restriction Program. Once wetlands are restricted, the immediate responsibility for maintaining lands in their protected state lies with local government agencies and individuals. An attempt has been made to extend the responsibilities of town Conservation Commissioners to the

protection of wetlands by asking them to maintain informal surveillance of town wetlands and report all violations to the Department of Environmental Management. Once a violation is reported, the Wetland Restriction Program and the Attorney General's office request compliance with the law.

Interpretation of the law and restriction order often varies from town to town, as do town needs and desires for development and resource protection. Therefore, the strength of the Wetland Restriction Program is, in part, determined by local needs, values, and priorities. In towns with currently restricted wetlands, development pressures and the desire to protect remaining town resources are higher than in many other parts of the state. A full assessment of local enforcement will not be possible until the program is applied to towns where the recognized ecological and public welfare and safety values of wetlands are less than the values of wetlands as defined by existing laws.

Since the enactment of the inland and coastal wetland protection laws, orders restricting the use of coastal wetlands and contiguous lands have been recorded for 24 coastal towns. Three of these towns have also had orders recorded which restrict their inland wetlands. Eight additional towns in the Charles River Basin have had orders recorded restricting the use of

their inland wetlands. In the 12 years since the adoption of the first wetland protection-restriction law, only 32 of Massachusetts' 351 towns have had any of their wetlands restricted under the Wetland Restriction Program. Data available for towns with restricted wetland indicate that 24,045 acres, involving 4,422 property owners in 22 towns have been restricted under the coastal wetland program, and 4,718 acres of wetland have been redistricted in 8 inland towns. The data, however, cover only 30 of the 32 towns in the program. While a cursory comparison of the surveyed (Mac Connelly) and restricted[1] wetland acreage would seem to indicate that at least a significant portion of participating towns' wetlands has been protected, it is not possible with present available information, to determine the size, development potential, value, or ecological significance of restricted wetlands.

Thus far, approximately 40 petitions have been filed with the Superior Court to determine whether the restriction is equivalent to a taking. Less than six of these have been settled, all out of court. In no case was there a decision on whether or not taking had occured. Instead, the cases were settled because the petitioner withdrew his appeal, an error on the

[1] In 22 coastal towns, 8.4 percent of the towns' land area is restricted coastal wetlands. In 8 inland towns, 6.5 percent of the towns' land area is restricted inland wetlands.

part of the program administrator was recognized, and corrected, etc.[1]

Whether restrictions and inverse condemnation could be applied to farmland as it has been to wetlands is an open question, at least in Massachusetts. Farmland is more readily developable than wetlands, and therefore, the loss in value because of restrictions would be greater than for farmland. This difference suggests both that there would be relatively less political support for passing a restriction and inverse condemnation bill applied to farmland and that if enacted and implemented, such a program would generate many more petitions by landowners to determine whether their land had indeed been taken without compensation.

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[1]Information provided May, 1977 by Paul Grongen, Legal Counsel, Wetlands Restriction Program.

c. Transfer of Development Rights

The concept of the transfer of development rights has produced a voluminous literature, but to date very few communities have instituted legislation on transferable development rights -- particularly for extensive semi-rural or developing areas -- and only a handful of transfers have yet occured.

Two basic types of TDR ordinances have been worked out so far with intermediate types occasionally introduced. One is a pure TDR arrangement with sale of development rights from land owners in the no-growth zone to developers in the growth zone in a market-type situation. Buckingham Township in Bucks County, Pa. has this sort of ordinance but there has only been one transfer so far.[1] The town of Southampton in Suffolk County, New York, has a similar ordinance but it has never been used.[2] Eden near Buffalo also has recently adopted a town-wide TDR system as part of its zoning ordinance.[3] And similarly, the Sunderland, Massachusetts Zoning bylaw allows for voluntary transfers of development rights from prime agricultural land

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[1]See Bennett; the appropriate sections of the Zoning Ordinance are Art II, Sec 216, Art III, Sec 304, Art V, Sec 502, and Art VI.

[2]See Bennett and the Southampton Building Zone Ordinance No. 26 Sec 2-10-20, and 2-40-50.

[3]Emanuel.

to an "Open Space Community," a planned unit development.[1]

The other type of ordinance is really a variation on planned unit development. In this case a land owner may transfer development rights from one parcel to another (he must own both), thereby preserving open space in one area and building at a higher density in another. Chesterfield Township in Burlington County, N.J.[2] and Hillsborough Township in Somerset County, N.J.[3] have this type of arrangement. Collier County, Florida[4] has an arrangement where land in protected ("special treatment") districts, suchas coastal areas and marshes,can have its development rights transferred to an adjacent parcel not in this special treatment district.

All examples of TDR ordinances in semi-rural areas which we have been able to find are voluntary: that is, the owner of land in the no-growth zone has the option of either developing at low density as allowed by the existing zoning or receiving and selling his development rights certificates and not developing his land. Few people have chosen the TDR option.

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[1]See Bennett, August, Gowen and MacKenzie and Sunderland Zoning by-law Sec 4400, especially subsections 4460-4463.

[2]See Bennett and Zoning Ord., subsections 329 and 701E.

[3]See Bennett and Ord. No. 75-13, 1075, Sec 333 and 801.

[4]See Bennett and Zoning Ord Sec 9 (1974).

The very newness of TDRs also means that there may need to be State enabling legislation before a local TDR ordinance can be adopted. Illinois' Historical Preservation Enabling Act[1] and New Jersey Assembly Bill No. 3192[2] are examples of this.

d. Development Permit Systems

Development permit systems have been instituted in California, Florida, and Vermont. Here we review briefly the California and Florida systems and report our own research, which was concentrated on the Vermont program.

i. California: Coastal Commissions

Since 1965, the Bay Area Conservation and Development Commission (BCDC) has regulated development along the shoreline of San Francisco Bay. In 1969 the Commission completed its conservation and development plan and was given permanent permit power by the legislature to implement it. Based on this model, six 12-to-16 member regional coastal commissions were set up in 1972 by the state. They were charged with preparing a plan by 1975 for the conservation of each coastal zone, which was broadly defined to extend from 3 miles out to sea to the

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[1] Ill. Rev. Stat. Chap. 24 sections 11-48. 2-1 et. seq., 1971.

[2] 1975. This bill failed to pass and will probably be reintroduced in 1977.

highest elevation of the nearest coastal mountain range. In some sections this distance extends 5 miles inland. During the period of plan preparation, the Commissions were given the power to veto or modify all forms of development in the water area of the zone and in the adjoining 1000-yard strip of land. Almost all construction, dredging, filling, and discharge are covered, with exemptions made only for maintenance of existing navigation channels and minor (less than $7500) improvements to single family houses (Healy).

"In deciding on permits, the commissions would have to find that a development would have no substantial adverse environmental effect" and would be consistent with "the maintenance, restoration, and enhancement of the overall quality of the coastal zone environment, including, but not limited to, its amenities. Developments must also be consistent with the "continued existence of optimum populations of all species of living organisms" and the avoidance of "irreversible and irretrievable commitments of coastal zone resources".[1] To make the permit process even more stringent, a two-thirds majority of a commission (membership not just attendance) would be required to approve dredging or filling of estuaries or bays, developments on agricultural land and those that would reduce

[1]California Public Resources Code Sections 27402 and 27302.

the size of a beach or interfere with access to the water, and certain other types of projects". (Healy, p. 71).

The members of the commissions were to be evenly divided between representatives of local (county and municipal) government and "public" members appointed equally by the governor, senate rules committee, and the speaker of the state assembly. A state commission was set up over the regional commissions as an appeal body.

In August 1976, the state legislature passed a bill aimed at preserving coastal ecology, concentrating development in existing urban areas, and guaranteeing public access to the coast. The bill made permanent the State Coastal Commission, and extended the lives of the regional commissions for two years, during which time local governments are to make their plans and zoning ordinances conform with the standards and policies prescribed in the state legislation. After local plans and ordinances are in conformance, regulation will be done by local governments which are to grant permits only to those projects that conform to state standards and policies.

ii. Florida: Developments of Regional Impact

In Florida, a permit system was set up at the level of local government by the 1972 Environmental Land and Water

Management Act (Healy pp. 102-138). "Developments of regional impact" must be approved by local government which issues a permit called a "development order." Only very major projects qualify as developments of regional impact. They include, for example, airports, power plants of over 100MW, hospitals serving more than one county, shopping centers of over 40 acres, manufacturing plants or industrial parks with more than 2500 parking places, housing developments of over 250 units (in the least populous counties or of over 3000 units in the most populous ones).

A developer planning a development of regional impact (DRI) must apply for permission to the local government. The application forms asks many questions about the environmental, economic, and fiscal impact of the proposed project and the completed application may run to hundreds of pages. The developer must also submit a copy of his application to the regional planning agency. The regional agency has 50 days (only 30 days up until 1974 when the requirement was changed) to review the application and make a recommendation. Local government must only "consider" the regional agency's findings and recommendation and can ignore them altogether. The developer may appeal the local government's decision. The regional planning agency

or the division of state planning has the right to appeal to the Florida Cabinet. If a local government objects to a project lying within another city or county, it cannot appeal itself but must persuade the regional planning council to carry, and pay for, an appeal. Private citizens have no right of appeal.

"Thus, Florida's DRI process is a mixture of regional evaluation, local control, and state review. The process takes place under rules drawn up by the state, and the division of state planning is kept informed of the progress of each DRI application. But until an issue comes to the cabinet on appeal, the state remains in the background. The regional council is directly involved from the start, but its power, except for the appeal power, is "one of persuasion rather than compulsion." (Healy p. 121).

iii. Vermont's Environmental Control Act (Act 250)

Vermont's Environmental Control Act (Act 250) was adopted in 1970 and amended in 1973. The law calls for a three-stage planning process and for a permit system to screen most subdivision and development with reference to criteria contained in the law. The law created an Environmental Board of nine members, to be appointed by the Governor, and charged the

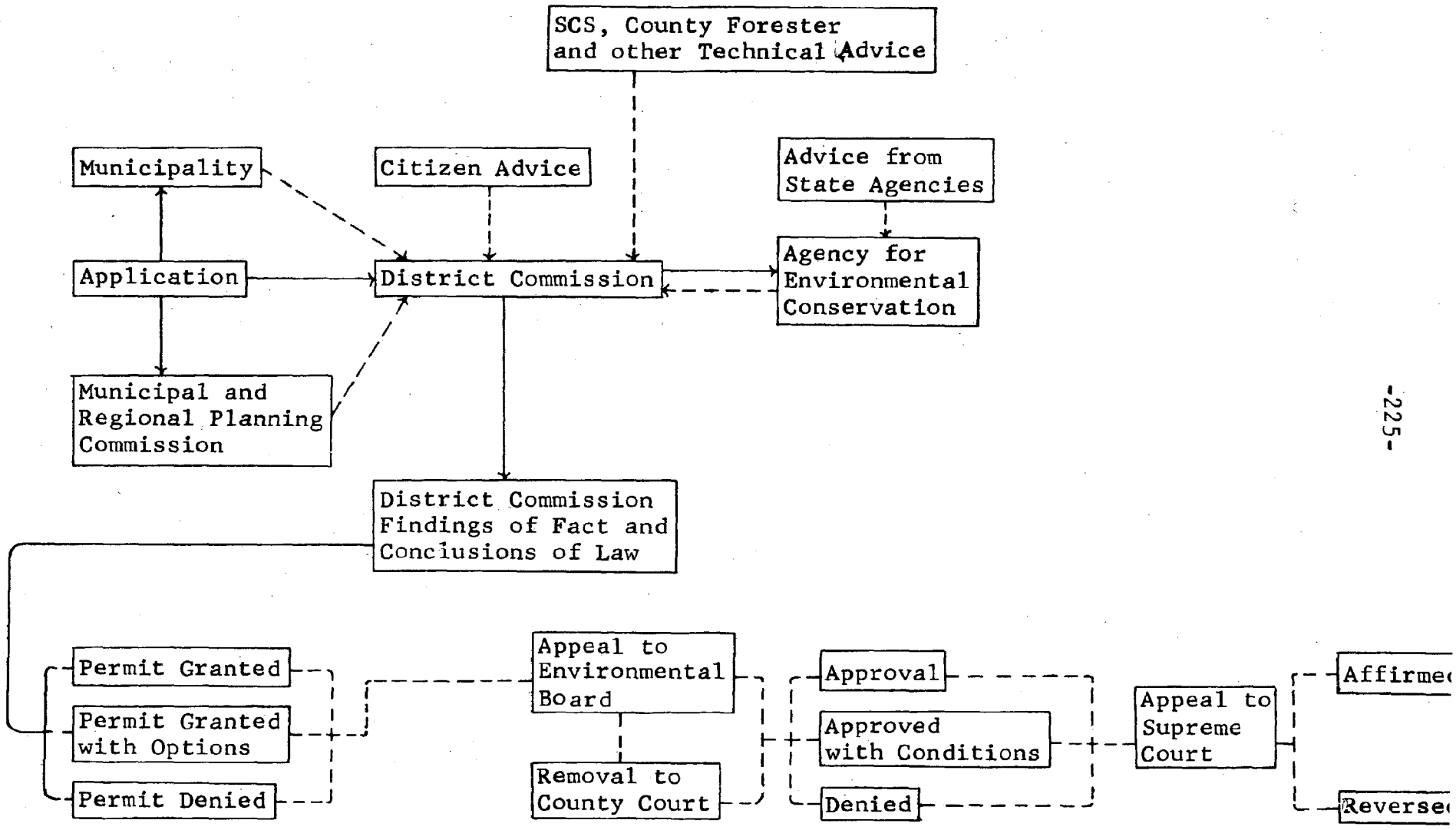
Board with adoption of the plans and administration of the permit system. Nine (later reduced to seven) district environmental commissions were established, whose members are appointed by the Governor.

The planning process was to be marked by adoption of (1) an interim land capability and development plan, (2) a capability and development plan, and (3) a land use plan. The first two plans were adopted by the Board, the Governor, and in 1972 and 1973 respectively, by the General Assembly. These two plans map and describe resource areas, including primary and secondary farmlands, but do not make specific use recommendations. The third pland, the land use plan, would have established five categories of use districts but was rejected by the General Assembly in 1974. The present administration has had legislation introduced which would repeal the state land use planning requirement of Act 250, and the people interviewed for this study agree that there is a widespread expectation that this repeal provision will pass.

The permit process (Figure 5-3) applies to subdivisions of more than 10 lots, construction of more than 10 housing units, development of commercial or industrial property of more than one acre, and all construction regardless of size at altitudes

Figure 5-3

THE VERMONT ACT 250 PERMIT PROCESS



of over 2500 feet. Application for permission to develop must be made to one of seven District Environmental Commissions, which must listen to recommendations by the state Agency for Environmental Conservation and the local municipal government and planning commission. The District Commission issues findings of fact and conclusions of law following a public hearing, and then grants a permit, grants a permit with conditions, or denies a permit. Appeal is to the state Environmental Board and beyond that to the Supreme Court.

Subsection 9(B) of section 6086 of the act states that a permit will be granted for the development or subdivision of primary agricultural soils only when (1) the development or subdivision will not significantly reduce the agricultural potential of the primary agricultural soils; or else (2) the applicant can realize a reasonable return on the fair market value of his land only by devoting the primary agricultural soils to uses which will significantly reduce their agricultural potential, and the applicant has no other land reasonably suited for the development. The development must be designed to minimize the reduction of agricultural potential (by using such devices as cluster planning) and it must not significantly interfere with or jeopardize the continuation of agriculture

on adjoining lands or reduce their agricultural or forestry potential.

The Environmental Board has interpreted the rather lengthy definition of primary soils found in the legislation (Section 6086) to "include lands suitable and economically viable for dairy farming and adaptive crops. Under the Soil Conservation Service land classification system, this definition would include Class I, Class II and Class III lands."[1]

As of January 1, 1977, 2,542 applications for permits had been filed with District Commissions under Act 250. Of these, 2,277, or 90 percent have been granted or granted with conditions. Only 66 were denied; of the remainder, 113 were withdrawn prior to a decision, and 86 were still pending. Most were settled by District Commissions, but 78 applications were appealed to the Environmental Board. Of the 41 appeals acted on by the Environmental Board, 36 were granted permits, usually with conditions, and 5 were denied permits.

In order to focus on the permit experience as it relates to prime farmland, all of the District Commission files were examined which were known by Kenneth Senecal, the Executive Officer of the Environmental Board to contain discussion

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[1]Memorandum of Environmental Board, June 14, 1973.

pertaining to agriculture.[1] Only eight files were known. Most files say nothing at all about the productivity of the soils, and contain no findings as to the primary soils criteria. Therefore, the eight cases are highly atypical in that the quality of the land was a subject of discussion at all.

Generally the decisions give little weight to the retention of agricultural land. In one case the tract was "not considered prime agricultural or forestry land due to its topography and the fact that it is broken up by a road and natural features"; in another, the "agricultural soils on the site do not constitute a major portion and could not be considered a viable farming unit;" and in a third "through having primary agricultural soils", the extent was not considered enough to outweigh the fact that the city of South

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[1] In the recollection of this officer, there are also only a few instances in which Act 250 has been applied specifically in order to preserve land of special environmental value. Conditions have been attached to a permit granted in Whitingham, which requires that development be designed to avoid Ryder Pond bog, and a permit granted in Cabot requires that a duck resting area be protected. In addition, there may be a dozen instances of relocating buildings from the skyline, redesigning architecture to fit the surroundings, or requiring tree planting.

Burlington had zoned the tract industrial as the highest and best use. In granting permits for three of the cases, a minimal condition was imposed requiring that the land be grazed or the hay mown annually (in one case until the last lots were sold and in another "to reduce the risk of fire").

In only one of the eight cases (Hillwinds case, File no. 2W0302) did the District Commission deny a permit for development, noting that the development would have an adverse effect on natural beauty and would cause a reduction in agricultural potential, and showing how the applicant failed to meet each of the criteria of subsection 9(B).

This sole effort by a District Commission to protect prime farmland was not destined to survive the appeal process, and for a reason which illustrates vividly the need for precision in the statutory definitions. The Environmental Board hearing is de novo as to any findings of fact challenged by any party. The Windham Regional Planning and Development Commission chose not to appear on the aesthetic issue, for which it had the burden of proof, so that aspect of the findings was not sustained. The applicant bore the burden of proof as to criteria of subsection 9(B), and the Agency of Environmental Conservation anticipated calling a soil technician of the U.S. Department of Agriculture's Soil Conservation Service (S.C.S.) in rebuttal.

Prior to the hearing, however, the State Soils Scientist of the S.C.S. notified the Chairman of the Environmental Board that he would not allow the soils map of the owner-cooperator's land to be used in the case because of potential inaccuracies. This stand by the S.C.S. caused the Agency of Environmental Conservation to withdraw and led to a granting of the permit. The Environmental Board's findings of fact stated: "Although the soils within the area may have some agricultural potential, the presence of rocks would make cultivation with modern farm equipment impractical. Removal of rocks for farming purposes would not be economically feasible."

The Environmental Board subsequently has requested the S.C.S. to specify which of its maps may present some problems. A partially responsive letter of July 14, 1976, describes the limits of testimony which S.C.S personnel may give at District Commission hearings but does not refer to map accuracy. It is apparent from the letter that the S.C.S. will limit its role to provision of basic soils data and is determined not to become involved in economic, political, or regulatory aspects of agricultural land use. One suspects that it was the absence of guidelines for its personnel at the time of the Hillwinds appeal that led the S.C.S. to bar reliance on

its maps. In the absence of other soils maps or of more specific statutory definitions, however, its action has hobbled the state.

These cases reflect two contrary circumstances. Except for Hillwinds, the sellers of lots or parcels for residential purposes appeared to be people who had been unable to earn a good living by farming and who proposed to sell off their principal and possibly sole substantial asset. The two industrial park cases reflect the desire to promote job opportunities where location makes it feasible. In both situations farm preservation did not warrant serious consideration when compared with economic imperatives. Unless the market for milk increases substantially or the price of land for rural residences declines, there would appear to be little reason to expect more than lip service to be paid to Act 250's goal of preserving high quality farmland.

None of the people interviewed believes that Act 250 has been or will be an effective means of preserving prime farmland. Senator Keith Wallace, former Director of the State Farm Bureau, noted that many people avoid Act 250 by subdividing a few lots at a time or by creating lots in excess of 10 acres. Neither Senator Wallace nor Darby Bradley of the Vermont Natural

Resources Council saw any prospect for passage of the state land use plan and commented that this forces the District Commissions to respond on a case-by-case basis. Kenneth Senecal sums up the problem as follows:

> "First of all, I believe that Act 250 is in a position to regulate such a small portion of the development that occurs on prime agricultural lands that it really does little to protect agricultural lands as a resource.
>
> Secondly, the present economic disparity between the value of lands for agriculture and other uses in Vermont makes it very difficult unless there is a comprehensive State program which would include incentives for farming and removing of disincentives, such as taxing farm lands at their fair market value.
>
> Thirdly, insofar as Vermont's commitment to save agricultural lands, there certainly is a substantial emotional commitment as demonstrated by the fact that Act 250 purports to regulate the uses of Agricultural lands. My use of the term commitment is probably inappropriate in that respect. Perhaps it should be more precise in pointing out that Vermont does not have any effective comprehensive program designed to save agricultural lands even though it has many individual programs which exist because of concern that agricultural lands are being diverted to other uses, and that in the long term this will be deterimental to the interest of the State of Vermont."

B. Experience with Indirect Controls

1. Experience with Tax Incentives

a. Differential assessment for property taxation

Differential assessment of farmland for property tax purposes has been adopted by at least 44 states, twenty of which also consider forest lands eligible for differential assessment and fifteen of which provide comparable treatment of lands with critical natural, scenic, and historic qualities. As noted in the general discussion in Chapter IV, there are three general types of differential assessment: Preferential assessment, with no sanctions for a participant who takes his land out of an eligible use, 2) deferred taxation, which requires that several years' worth of back taxes on the difference between market value and use value be paid if the land is taken out of an eligible use, and 3) restrictive agreements, in which the landowner must contract to keep his land in an eligible use. These are summarized in Table 5-11, which is updated from RSRI's detailed report on differential assessment, Untaxing Open Space.[1]

Because of the depth with which the previous RSRI study (and studies by Hady and Siebold and by Goudemans) have treated

[1]Note that some states are in more than one category since they have more than one differential assessment law.

Table 5-11

PROVISIONS OF STATE DIFFERENTIAL ASSESSMENT LAWS, 1977

Pure Preferential Assessment

Program Characteristics	Arizona	Arkansas	Colorado	Delaware	Florida 1	Idaho	Indiana	Iowa	Missouri	New Mexico	North Dakota	Oklahoma	South Dakota	Wyoming
Year of Enactment	67	69	67	68	59	71	61	67	75	67	73	74	67	73
Eligible Uses														
Agriculture	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Open Space, Envir. Protection	●											●		
Timber or Forest	●	●		●	●		●	●	●	●		●		
Recreation	●											●		
Additional Eligibility Requirements														
Min. Farm Income Required				●					●					
History of Eligible Use Required			●	●					●				●	●
Min. Length of Tenure w/in Family									●					
Land Must be Planned for Eligible Use														
Land Must be Zoned for Eligible Use														●
Sanctions on Conversion														
Rollback Taxes Collected (no. of yrs.)														
Interest on Deferred Taxes														
Penalty Based on Mkt. Val. in Yr. of Conversion														
Other Penalty														
Restrictive Agreements														
Min. Length of Term (no. of yrs.)														
Scope of Program														
Statewide	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Local Option														
Voluntary, Requires Application		●		●	●				●	●				
Automatic for Eligible Lands	●		●			●	●	●			●	●	●	●
State Subvention Payments Provided to Offset Revenue Loss														

Deferred Taxation

Program Characteristics	Alaska	Connecticut	Hawaii 1	Hawaii 2	Illinois	Kentucky	Louisiana	Maine	Maryland	Massachusetts	Minnesota 1	Minnesota 2	Montana	Nebraska	Nevada	New Hampshire 1	New Jersey	New York 1	New York 2	North Carolina	Ohio	Oregon	Pennsylvania 1	Pennsylvania 2	Rhode Island	South Carolina	Tennessee	Texas	Utah	Virginia	Washington
Year of Enactment	67	63	61	73	70	70	76	71	58	73	67	69	73	74	75	72	64	71	71	73	74	63	66	74	68	75	76	66	69	71	70
Eligible Uses																															
Agriculture	●	●	●	●	●	●	●	●	●	●	●		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Open Space, Envir. Protection		●	●				●	●							●	●							●		●		●			●	●
Timber or Forest		●					●									●	●			●			●	●	●	●	●			●	●
Recreation			●					●	●			●				●															
Additional Eligibility Requirements																															
Min. Farm Income Required	●					●	●	●		●	●		●		●			●	●	●	●			●				●	●		
History of Eligible Use Required			●		●	●	●	●		●							●	●	●	●	●	●		●				●	●		
Min. Length of Tenure w/in Family											●									●											
Land Must be Planned for Eligible Use			●	●														●					●							●	●
Land Must be Zoned for Eligible Use														●				●					●								●
Sanctions on Conversion																															
Rollback Taxes Collected (no. of yrs.)	7		*	10	3	2	4	10/15	2	4	3	7	4	5	7		2	5		5	4	10	5	7	2	5	3/5	3	5	5	7
Interest on Deferred Taxes	●		●	●	●			●						●	●					●		●	●	●						●	●
Penalty Based on Mkt. Val. in Yr. of Conversion		●						●		●						●			●												
Other Penalty																															●
Restrictive Agreements																															
Min. Length of Term (no. of yrs.)																															
Scope of Program																															
Statewide	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		●	●	●	●	●	●		●
Local Option																							●							●	
Voluntary, Requires Application	●	●	●		●	●	●	●		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Automatic for Eligible Lands				●					●																						
State Subvention Payments Provided to Offset Revenue Loss	●																		●												

Restrictive Agreements

Program Characteristics	California	Florida 2	Michigan	New Hampshire 2	Vermont
Year of Enactment	65	67	74	73	69
Eligible Uses					
Agriculture	●		●		●
Open Space, Envir. Protection			●	●	
Timber or Forest					
Recreation		●			
Additional Eligibility Requirements					
Min. Farm Income Required					
History of Eligible Use Required					
Min. Length of Tenure w/in Family					
Land Must be Planned for Eligible Use	●		●		
Land Must be Zoned for Eligible Use	●				
Sanctions on Conversion					
Rollback Taxes Collected (no. of yrs.)		*	7		
Interest on Deferred Taxes		●			
Penalty Based on Mkt. Val. in Yr. of Conversion	●			●	
Other Penalty	●				
Restrictive Agreements					
Min. Length of Term (no. of yrs.)	10	10	10	10	
Scope of Program					
Statewide					
Local Option	●	●	●	●	●
Voluntary, Requires Application	●	●	●	●	●
Automatic for Eligible Lands					
State Subvention Payments Provided to Offset Revenue Loss	●		●		

* indicates that there is a total roll-back of deferred taxes

SOURCE: Updated from Regional Science Research Institute, Untaxing Open Space, Washington, Council in Environmental Quality, 1976.

this topic we shall not attempt to report on experiences with differential assessment on a nationwide basis. Rather we will look at the application and use of differential assessment in two regions: the area around Chicago where farmers have participated in Illinois' deferred taxation program and the State of California which has a restrictive agreement type of program. These two regions are subject to substantial urban pressure and moreover, both have been the subject of detailed quantitative analyses of participation. However, no claim can be made that they are typical although the results of the studies of these regions are in agreement with the general findings in Untaxing Open Space and in Gloudeman's work.

i. Illinois' Differential Assessment Program: The Chicago Area.

Ingolf Vogeler of Northwestern University has completed a study of participation in Illinois' voluntary deferred taxation program in Cook, Du Page, Lake, and Kane counties near Chicago for the year 1973. There is substantial variation in the degree of urban pressure over the study area. By 1973, 2,676 individuals were enrolled in the program in these four counties accounting for a total of 359,074 acres of farmland

(35% of all land in the counties or 79% of all land in farms). The assessed valuation of this land at fair market value was $316,230,433 while, under differential assessment at agricultural use value, the land was assessed at $106,506,661, a reduction of some 64%. This resulted in a tax shift of $12,515,571 in 1973.

Of the land included in the program about 52% can be classified as "prime", defined by Vogeler using General Soil Maps of each county as those soils whose productivity index was at least 110 under high management. The landowners participating have the following characteristics: 75% owned farms smaller than the average size farm in their country, 79% operated cash grain farms (with 6% or less each operating livestock farms, dairy farms, specialty crop farms, or horse farms), 60% were farmers, and 72% resided in the same county that their land was located in. Thus, the beneficiaries of the program tend to be small cash grain farmers living in the same county that their farm is in.

Some understanding of factors affecting participation in these four counties can be gained by examining the correlation presented below based on 50 townships in the four study counties.

Table 5-12

CORRELATIONS BETWEEN ACRES OF DIFFERENTIALLY ASSESSED LAND PER SQUARE MILE (1973) AND VARIOUS CHARACTERISTICS OF TOWNSHIPS IN THE CHICAGO AREA*

Township Characteristic	Correlation Coefficient
Housing units per square mile	-.53
Land in farms per square mile	.82
Acreage of total crops harvested per square mile	.79
Ratio of fair cash value per differentially assessed acre to agricultural value per differentially assessed acre	-.03
Assessed fair market value as % of assessed agricultural value	-.05
Fair cash value per differentially assessed acre	-.16
Agricultural value per differentially assessed acre	-.16
Estimated travel time to downtown Chicago	-.03

* based on 50 townships
Source: Vogeler

The correlations indicate that townships with greater urban development tend to have a lower proportion of assessed land, as one might expect. There is less eligible farmland in these municipalities and there are stronger indirect effects of urbanization which discourage farming and encourage land speculation. Conversely, townships with a greater proportion of land in farms and with a greater proportion of land in cropland harvested tend to have higher participation in in the differential assessment program.

Measures of assessed fair cash value and agricultural use value are uncorrelated with acreage of differentially assessed land per square mile in 1973. This would suggest that participation is not primarily dependent upon a high fair cash value assessment but upon other reasons. And finally, there does not appear to be any relationship with participation and distance to downtown Chicago. This surprising result may be due to a discrete variation in the effect of distance on participation -- once one is beyond a certain distance from Chicago agriculture generally takes place extensively, but at distances closer to Chicago there is little or no agriculture at all. Unfortunately Vogeler did not give correlations of township characteristics and acreage of differentially assessed land per acre of farmland. Such a correlation analysis would allow us to draw stronger conclusions.

ii. California's Land Conservation Act.

The California Land Conservation Act of 1965 (also known as the Williamson Act) is a restrictive agreement type of differential assessment. Local governments may delineate agricultural preserves on their own initiative or by request from private landowners. An individual landowner of eligible farmland in a preserve can then voluntarily enter into a contract

with the local government in which the land owner agrees to keep his land in the eligible use[1] for ten years in return for differential assessment of the land. The contract is automatically renewed for an additional year every year unless the participant gives a notice of nonrenewal. Notice of nonrenewal is followed by a gradual increase in tax assessment over the next ten years from use value assessment to market value assessment. The contract may also be cancelled, but there is a fee equal to 12½% of the cash value of the land. Withdrawls account for less than ½ of 1% of the land enrolled, however.

A number of studies of California's restrictive agreement program have been carried out (Fellmeth, Gustafson and Wallace, Keene et al., and Hansen and Schwartz, for example). All tend to agree that the program, although including a great deal of land, is not especially successful at preventing urbanization of farmland.

Statewide participation is summarized in Table 5-13. Most of the participants are located in the Central Valley where most of the agricultural land is. However, no land is

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[1]Eligible uses are agriculture, recreation, open space, or a use compatible with these categories.

Table 5-13

PARTICIPATION IN CALIFORNIA'S LAND CONSERVATION ACT*

Year	Participating Counties	Total Acres in Program	Prime Acres in Program
1976-77	47	15,027,000	4,557,000
1975-76	46	14,427,000	4,371,000
1974-75	46	13,742,000	4,140,000
1973-74	45	12,719,000	3,915,000
1972-73	44	11,440,000	3,428,000
1971-72	42	9,563,000	2,620,000
1970-71	39	6,273,000	1,654,000
1969-70	37	4,252,000	573,000
1968-69	23	2,062,000	131,000

*Sources: Gustafson and Wallace, and Hansen and Schwartz, and Resources Agency, Department of Conservation, State of California.

enrolled in Merced County, which has no local program. In addition, Imperial County, which is a major agricultural county in the southern part of the state also has no program.

Gustafson and Wallace have observed that the pattern of participation is such that: 1) near urban areas there is little land enrolled in the program; 2) the coastal areas of the state exhibit very low participation rates; and 3) the lack of planning for agricultural preserves has led to scattered and non-contiguous inclusion of land in the program. The lack of participation around urban areas is due to over-optimistic expectations about the development potential of the land by landowners on the rural-urban fringe (Hansen and Schwartz). Hansen and Schwartz calculated that under more realistic views about land values and development potential it would be economically worthwhile for most landowners on the rural-urban fringe to participate and receive a tax reduction, even though they must enter a contract for at least ten years.

b. Experience with Differential Valuation for Federal Estate and State Inheritance Taxation.

It is less than a year since Congress approved the new procedures which allow farms to be taxed at farm use value and allow payment of estate taxes to be spread over a number of years. Therefore, it would seem to be too early to attempt

to assess the effectiveness of the new Federal provisions.

Because of the time and budgetary constraints of Phase I of this research, it has not been possible to determine which states now allow use valuation of farm or environmentally valuable lands for state inheritance taxation.

2. Experience with Tax Disincentives

a. Capital Gains Tax

Heavy capital gains taxes on real estate were introduced in England as part of the 1909 Housing and Town Planning Act, and were in effect until 1947 when development rights were nationalized. The British Land Commission Act of 1967 reintroduced the concept and distinguished between increases in existing use value, which were taxed at standard capital gains rates, and increases in development value, which were taxed at 40 percent. The tax was later repealed.

Somewhat similar taxes were instituted in other English speaking countries -- Australia, New Zealand, and Canada; the intent of the Australian tax was to return to the public some of the public costs of infrastructure which resulted in the rise in land values, while taxes in New Zealand and Canada (in Ontario) were specifically aimed at land speculators (Hagman and Misczynski, 1975).

The first tax of this sort to be enacted in the United States is the Vermont land gains tax of 1973 (Act 81) (Baker). A similar tax was proposed and narrowly defeated in Montana in 1974. In 1975 a bill (House Bill 502) providing for a 50% tax on sales of land held less than a year was introduced in the state of Washington. Under the proposed Washington legislation

the tax rate would drop slowly, declining to 25% for land owned for over four years. One novel feature of this bill is that a one percent increase in the cost basis would be allowed for each month the land was held. More important for the purposes of this study, is the provision that sales of land which had been actively farmed would be exempt from the proposed tax (Hagman and Misczynski).

The Vermont land gains tax is expressly designed to discourage land subdivision. It applies to land only, not to buildings. The site of a principal residence up to five acres (and up to 10 acres where local zoning requires) is exempt. The tax rate is based on a sliding schedule, with short term holders heavily taxed and those who hold land over six years not taxed at all. The tax rate also increases with the percentage gain. (Table 5-14). The highest tax rate is 60% on the capital gain for land held less than one year whose value increased by 200% or more. Taxes are due at the time of sale and are payable in installments if the sale is an installment sale. The constitutionality of the tax has been upheld by the Vermont Supreme Court (Andrews v. Lathrop, 132 Vt. 256, 315 A. 2nd 860 (1974)).

Since it has been instituted, the following amounts of revenue have been raised by the tax:

Table 5-14

TAX RATES ON CAPITAL GAIN: VERMONT
LAND GAINS TAX

Years Land Held by Seller	Gain, as a percentage of Cost Basis		
	0-99%	100-199%	200% or more
less than 1 year	30	45	60
1-2 years	25	37.5	50
2-3 years	20	30	40
3-4 years	15	22.5	30
4-5 years	10	15	20
5-6 years	5	7.5	10
6+ years	0	0	0

Fiscal Year	Revenue Raised
1973-1974	1.3 million
1974-1975	0.8 million
1975-1976	0.8 million
1976-1977 (est.)	0.8 million

In contrast, total property taxes raised in the state during fiscal 1973-1974 were $109.6 million.[1] The first $500,000 of land gains tax revenues are being used to finance a statewide mapping program, the rest is being used for local property tax relief.

Revenue raised by the tax has been considerably below expectations, but since the first year of the program, subdivision activity has slowed down considerably. Although one cannot be sure how much of this reduction in subdivision activity is due to the tax and how much to the recession, there are indications that the recession, which especially affected the second home market, was the major factor. Norris Hoyt, the original sponsor of the Land Tax Bill in the legislature stated "we thought the tax would result in sellers taking their land off the market, however, what has happened is the farmer cannot find a buyer for his land."

Despite its theoretical advantages, our basic feeling, supported by our interviews, is that the Vermont Land Gains Tax is not a very effective method for preserving farmland in developing areas. This is for three reasons:

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[1]From U.S. Bureau of the Census, State Government Finances.

1) Because of the declining rate schedule, the tax does not affect long-term investors in farmland. This kind of investment is very important since many persons consider investment in land as a long-term "hedge" against inflation.

2) The tax does not affect farmers selling split-offs, again because of the declining rate schedule. Selling split-offs is, of course, desirable to the farmer because it brings him needed cash. However, in the long-run urban activity in rural areas may create situations that interfere with the viability of farming.

3) The quick subdivision of farmland probably would not be significantly affected. This is because in a highly leveraged market the big profits are still left. A simple example will illustrate the last point. Suppose a speculator buys a farm for $100,000,subdivides it,and sells it in a year for $200,000. The sale will be subject to a 45 percent tax, leaving a $55,000 profit -- a 55 percent rate of profit instead of 100 percent. Now suppose the speculator put 29 percent down when buying the farm with interest payments only during the next five years, and a balloon payment for the balance of the principal at the end of the fifth year (a common practice, see Lindeman). In this case, the speculator would make a $55,000 profit (after taxes) on a $29,000 investment -- a 190 percent rate of profit.

3. Experience with Agricultural Districting

New York's Agricultural Districting Program is the best known example of agricultural districting. Under the New York law (Bryant and Conklin, 1975) an agricultural district is a legally bounded region of at least 500 acres in which agricultural land uses predominate. (It should be noted that not all the land in a district is necessarily farmland; non-conflicting uses may be incorporated to preserve continuity. Furthermore, the district boundaries are subject to review every eight years).

Within an agricultural district there are five types of benefits which can mitigate some of the spillover effects of urbanization and of non-agricultural neighbors. These are specified in the state's Agriculture and Markets Act.

1. The option to apply for differential (i.e. agricultural "use value") assessment if certain production requirements are met.

2. Prohibition of local regulations in agricultural districts which "would unreasonably restrict or regulate farm structures or farming practices...unless such restrictions or regulations bear a direct relationship to the public health or safety."

3. Encouragement of state policies oriented toward

"maintenance of viable farming in agricultural districts..."

4. Review by the State Commission on Environmental Conservation of a) local exercise of eminent domain which would acquire land or interest in land in agricultural districts, and b) the intention to advance public funds "for the construction of dwellings, commercial or industrial facilities, (or) water or sewer facilities to serve nonfarm structures..." This does not give the Commissioner power to veto such acts but only to ensure that alternatives are fully explored.

5. Prohibition of assessments or taxes on land used primarily for agricultural production in agricultural districts for special districts for sewer, water, lighting, or for nonfarm drainage, except on land on which a farm dwelling or nonfarm structure is located.

Thus within an agricultural district farmers are protected against some important spillover effects but are not prohibited from speculating in land or from converting their land to urban uses. The considerable cooperative effort involved in the process of forming a district, however, may lead to a strengthening of the corporate commitment to the continuation of farming and therefore to the effectiveness of the program.

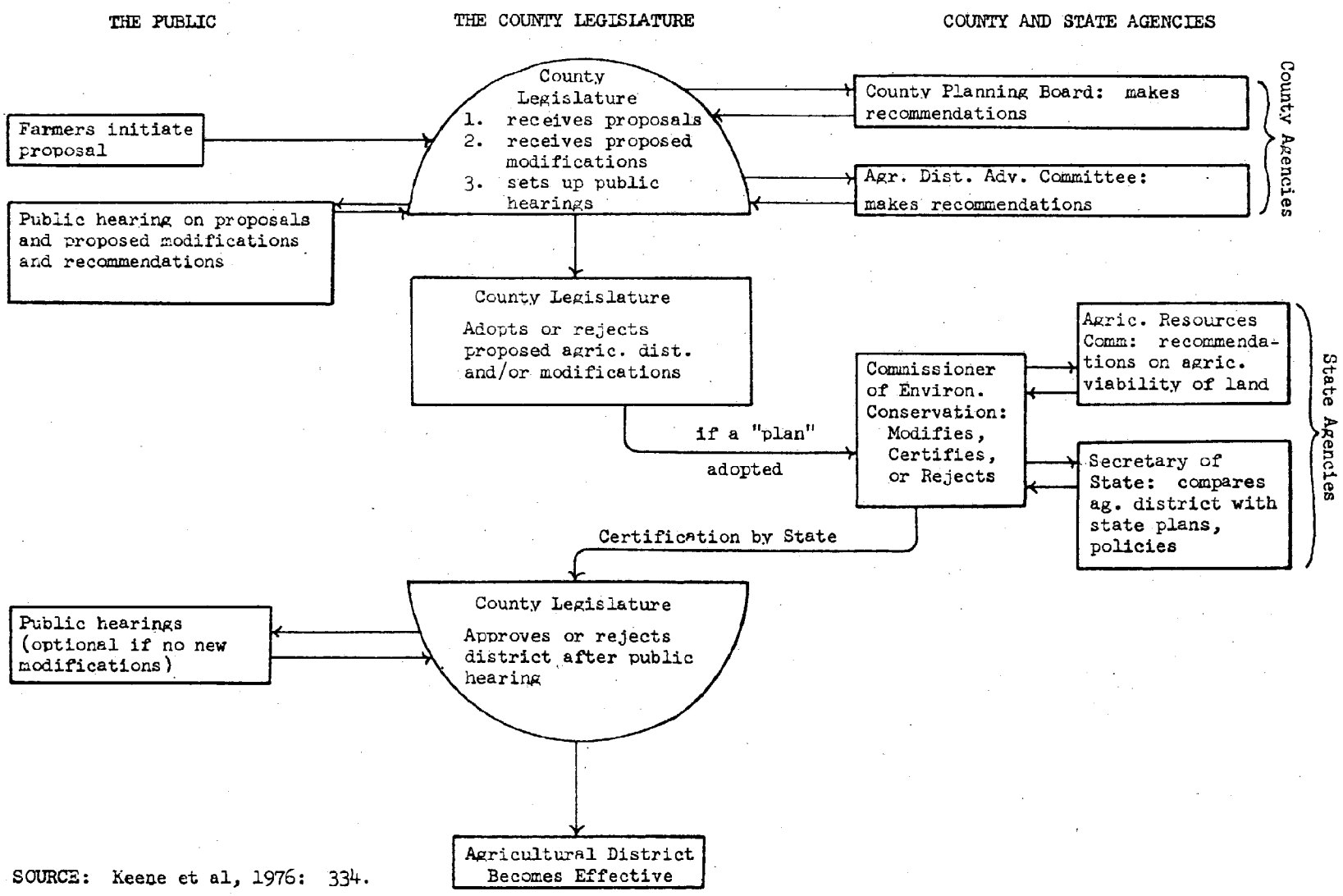
Participation in the Districting Program is voluntary and requires considerable initiative by farmers; the complexity of creating an agricultural district as prescribed by the law is

summarized in Figure 5-4. It is evident from the Figure that the law is designed to place responsibility for initiation of a proposed agricultural district in local hands and to incorporate as much public participation as possible through public hearings and actions of the County legislature. The State reviews all proposed districts and may take modifications if the intent of the law is not met by a proposed district. The process of forming a district takes from six months to a year and requires that maps of the district boundaries be prepared and that petitions be obtained from enough land owners in the proposed district so that the minimum size and land use requirements are met.

Participation in the program from its inception in late 1971 has been high. See Table 5-15 and Figure 5-5. Although there does appear to be a tendency for greater participation in rapidly growing non-metropolitan counties (Table 5-16) a Kruskal-Wallis analysis of variance is significant at only the .30 level. (There does not appear to be a significant relationship between participation and soil quality either -- the Kruskal-Wallis analysis of variance of the approximate proportion of farmland in districts across counties classified by proportion of land in SCS Classes I and II is not significant at the .20 level. See

Figure 5-4

PROCESS FOR FORMING AGRICULTURAL DISTRICTS IN NEW YORK



SOURCE: Keene et al, 1976: 334.

Table 5-15

FORMATION OF AGRICULTURAL DISTRICTS IN NEW YORK, 1973-1976

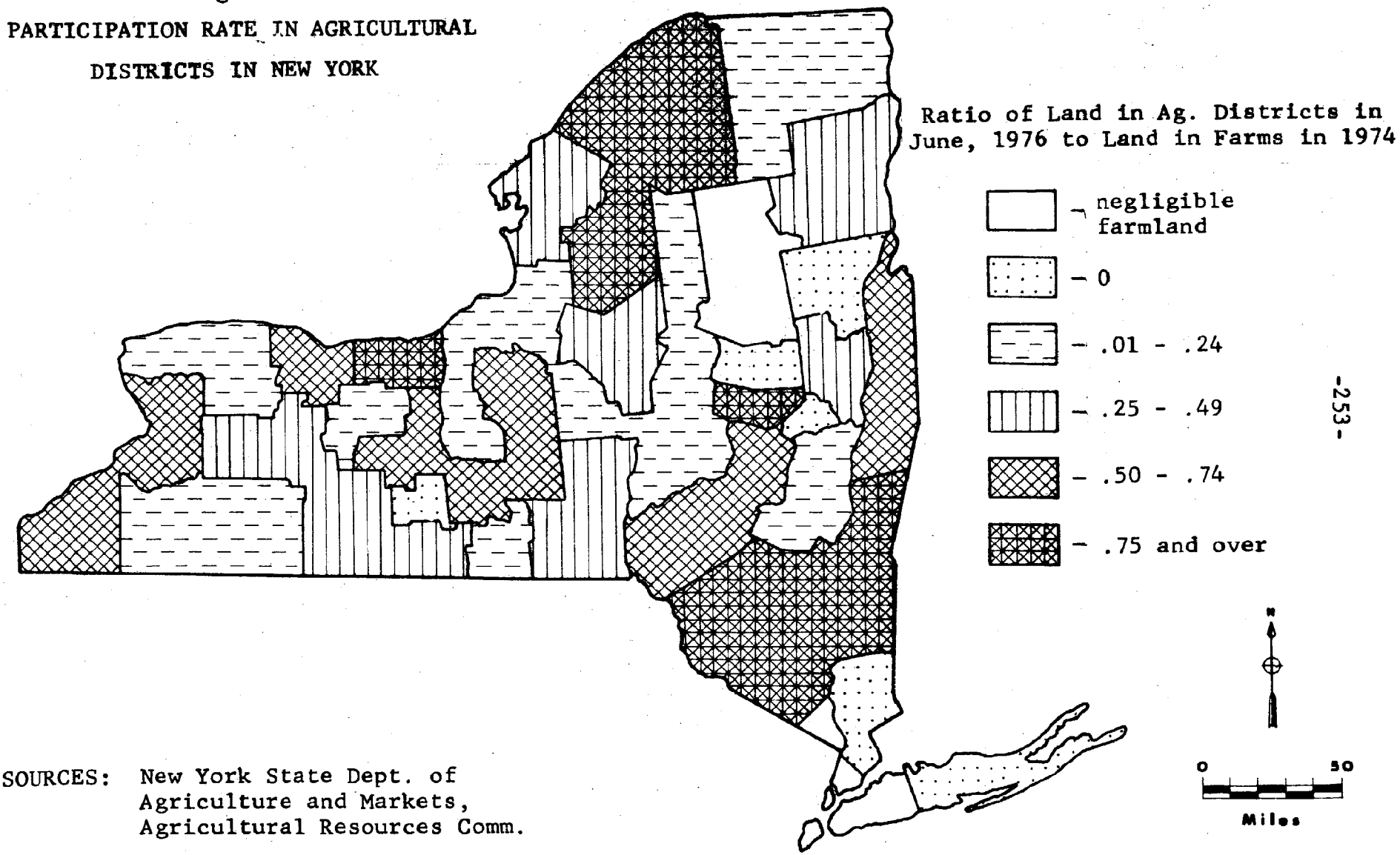
Date	Number of Districts*	Acreage in Districts*	Acreage in districts as a Proportion of 1974 Land in Farms
August 1973	78	612,496	.065
January 1974	120	1,079,054	.114
February 1975	210	2,436,547	.258
June 1975	233	2,954,279	.312
June 1976	286	3,941,675	.417

*Includes districts certified, reviewed by the State Agricultural Resources Commission, and under review by the Agricultural Resources Commission.

Sources: New York State Department of Agriculture and Markets, Agricultural Resources Commission, and 1974 Census of Agriculture.

Figure 5-5

PARTICIPATION RATE IN AGRICULTURAL DISTRICTS IN NEW YORK



SOURCES: New York State Dept. of Agriculture and Markets, Agricultural Resources Comm.

1974 Census of Agriculture

Table 5-16

PARTICIPATION IN NEW YORK'S AGRICULTURAL DISTRICTING PROGRAM

A. Median Participation Rates* in Counties Classified by Population Characteristics

	Median	Number of Counties
Metropolitan Counties		
Rapidly growing**	.301	9
Slowly growing**	.228	9
Nonmetropolitan Counties		
Rapidly growing**	.681	8
Slowly growing**	.351	25
All counties with Significant Agriculture	.351	51

B. Median Participation Rates* in Counties Classified by Soil Characteristics

Counties with less than 20% of land in SCS Classes I and II	.301	27
Counties with between 20% and 35% of land in SCS Classes I and II	.409	10
Counties with over 35% of land in SCS Classes I and II	.441	14

* Participation rate = (acres of land in agricultural districts in June 1976)/(land in farms in 1974).

** Rapidly growing counties experienced a population growth rate of 10% or more from 1960 to 1970; all other counties are slowly growing.

Sources: Same as Table 5-1 plus U.S.D.A. Soil Conservation Service Inventory of Soil and Water Conservation Needs, 1967.

Table 5-16(B)). Thus in general it appears that population characteristics and soil characteristics at the county level are not sufficient to explain the pattern of participation.

Interviews with ten cooperative extension service agents across the State and the study of minutes of fifteen public hearings on proposed districts have given us a better understanding of the pattern of participation, however. Any one of three generally overlapping situations appears conducive to the formation of agricultural districts:

1) Strong leadership. One or a few individuals may strongly favor the creation of a district because they wish to encourage farming or because they wish to block regulation of their farming operations. This leader, who is often a farmer but may also be a county legislator or cooperative extensive agent, will undertake most of the effort in persuading others to join the district, in carrying out the field work and in filling out the paperwork.

2) A crisis situation. In the semi-rural or remote regions of the State there are often proposed public projects or other public actions involving agricultural land which are sufficient to induce farmers and others to initiate a proposed district. Among the crises which have led to districts are a proposed airport (Erie County), a proposed reservoir (Schoharie County),

a proposed power line (Wayne County), proposed enactment of local zoning and building codes which would annoy some farmers (Wayne County), and upward reassessment of property taxes on farmland (Orange County).

3) Anticipated mild urban spillover effects. In some cases the proposed district is formed to help create an atmosphere of relative certainty in which farmers can make their investment decisions or to help mitigate possible future nuisances. Very often this situation occurs in towns relatively remote from strong urban pressures.

Several areas of the State are conspicuously lacking agricultural districts. Some remote areas, such as Schuyler County, have not experienced a crisis situation and have also lacked strong leadership to push the district through to completion. In addition, areas subject to rapid urbanization are either felt to be under pressures too strong to be ameliorated by agricultural districts or the prices being offered to landowners are too attractive for them to make the effort of forming a district. The area immediately surrounding New York City is an example large enough to show up at the county level. The fact that metropolitan counties do not in general show a higher participation rate in the program than nonmetropolitan counties suggests that the reluctance

to participate is fairly common in portions of counties in and near rapidly growing metropolitan area.

Although the New York Districting program is the oldest and best known program to mitigate urban spillover effects on agriculture, many states have one or more of the elements of the New York program. But only a few have a set of provisions that is in any way comprehensive. The Oregon program to create exclusive farm use zoning districts has perhaps the most complete set of provisions. Essentially it includes all of the provisions of the New York districting program, but is likely to be much stronger in that it is designed to prevent development through the use of zoning. It also includes a provision for valuing farm property at farm use value for state inheritance tax purposes. The New York Agricultural Districting approach is compared with the Oregon exclusive farm use zone approach in Table 5-17.

Table 5-17

COMPARISON OF NEW YORK AGRICULTURAL DISTRICTS AND OREGON EXCLUSIVE FARM USE ZONES IN MITIGATING PROBLEMS DUE TO NEARBY URBAN DEVELOPMENT

Problems	N.Y. Ag. Districts	Oregon EFU Zone
land speculation	community commitment to keep land agricultural	restriction of urban dev. to urban growth zones
increased property taxes to pay for suburban oriented services	differential assessment	differential assessment
estate & inheritance taxes rise because land value rises		valuation at farm value
damage of crops by nearby inhabitants	min. size district	EFU zoning for all good farmland outside urban growth zones
regulation of farming practices as nuisances to accomodate suburbanites	prohibition of "nuisance" ordinances unless a direct relationship to the public health or safety.	prohibition of nuisance ordinances if effects only within the EFU zone. EFU zoning restricts suburban development to urban growth zones.
loss of farmers' status in political affairs to new suburbanites	encouragement of state policies oriented towards maint. of viable farming in agric. districts.	Statewide Planning Goals and Guidelines, especially No. 3 (Agricultural) & No. 4 (Urbanization)
assessment on front-door basis for special utility districts	exemption in agric. districts except on land with farm dwellings or nonfarm structures	exemption in EFU zones except one area around farmhouse.
provision of urban institutions, facilities & infrastructure in rural areas by or with aid of state & local government	review by State Commissioner of Env. Conservation of a. local exercise of eminent domain b. public funds for non-farm construction	projects of "statewide significance" must get permit from LCDC
prevention of urban development		EFU zoning

Chapter VI

CHARACTERISTICS OF LAND USE CONTROLS AFFECTING THEIR ENACTMENT AND IMPLEMENTATION

A. Introduction and Overview

The variety of land use controls that we have described in the previous chapter may give the impression that there is little which can be said in general about land use controls. They exhibit a wide range of characteristics and can occur with numerous variations. However, the various controls can be described in terms of several underlying characteristics which provide points of reference for describing the potential results of a given program.

A most general and important characteristic, whether the control is direct or indirect, provided the organizing principle for the previous section. In addition, three other characteristics seem to account for much of the variation among land use controls, at least as far as effectiveness in preserving open space or retaining farmland is concerned: the complexity of the control, the magnitude and distribution of the costs of the control, and the degree of certainty with which the results of the control may be anticipated.

Broadly speaking, any land use program must first be enacted, then once it is authorized must be implemented. Finally, once it is implemented, it may or may not prove effective. The three characteristics relate in general to all of these phases, (and certainly a legislator will give some thought to problems of

implementation and questions of effectiveness when addressing the question of enactment) but since each phase is involved with different problems and is dominated by different actors (legislators, bureaucrats, individual land owners, etc.) the meaning and relevance of each characteristic differs at each phase. Therefore, we have specified characteristics as they relate to enactment in Table 6-1 and as they relate to implementation in Table 6-2. (Explicit consideration of effectiveness will be withheld until the following chapter). The row headings of Tables 6-1 and 6-2 include the ideas of complexity, costs, and certainty in a somewhat disaggregated form and in addition list a characteristic which has to do with limitations on the extent of application. The controls are again grouped as direct and indirect.

In general, it is reasonable to state that, assuming the general goal of preserving certain current land uses is agreed on, a proposed program is more likely to be enacted if it is intellectually simple or at least familiar from experience elsewhere, requires low costs of all interested parties, and if its results may be foreseen with reasonable certainty. Its prospects may be further enhanced if it protects current constituents at the expense of outsiders.

Correspondingly, a program is more likely to be implemented

if there is little doubt about its long term authorization, if it presents few novel or burdensome administrative procedures, and if, in the case of voluntary programs, the costs of participation are minimal.

It is difficult to come up with an ordinal rating for each land use control on each characteristic, but some general statements may be made which help explain the extent to which each type of control has been enacted and implemented.

Differential assessment for property taxes is the most widely adopted program. It makes some landowners better off, and it is difficult to identify the costs to other landowners. Although it does involve the somewhat novel and complex concept of use value, the determination of use value appears as a technical problem which is to be solved by the tax assessor's staff and the results evaluated by the landowner before he decides to participate. Sanctions on withdrawing from the program are usually minor as compared with gains to be made by development.

Like differential assessment for property taxation, differential valuation for Federal estate taxes provides a benefit for farmers, but its public costs are difficult to identify. This measure was enacted in 1976 by the Congress, and a number of states are likely to follow.

Exclusive farm use zoning has been enacted extensively in

Table 6-1

CHARACTERISTICS OF CONTROLS RELATING TO INITIAL ENACTMENT

	(A) DIRECT PURCHASE OF DEVELOPMENT RIGHTS	(B) PURCHASE & SALE WITH RESTRICTIONS	(C) PURCHASE & LEASE WITH RESTRICTIONS	(D) EXERCISE OF RIGHT TO PREEMPT & SALE OR LEASE WITH RESTRICTIONS	(E) EXCLUSIVE FARM USE ZONING	(F) INVERSE CONDEMNATION
Intellectual Complexity	Dev. rights an unfamiliar concept 10 yrs. ago, but now becoming quite well-known.	No unfamiliar concepts.	No unfamiliar concepts.	Concept similar to right of first refusal in private market.	Zoning a familiar concept.	Combines concept of regulation with possible payment for damages.
Public Costs a. Payments to Landowner	Relatively low in areas of little urban demand; approaches fee value in areas of high demand.	Net costs comparable to those for direct purchase of dev. rights. May need more "up front" money since must purchase full fee before selling restricted fee.	More capital needed than for direct purchase of dev. rights, or purch. & sale since lease makes possible only slow amortization.	Only purch. land which actually comes on market; therefore, less expend. than for direct purch. of dev. rights or purch. & sale or lease.	No payment to landowner.	Depends on extent to which landowners claim damages and level of awards made by court. Maximum possible cost similar to direct purchase of develop rights.
b. Administrative Costs	Appraisals must take into account current use value; otherwise admin. costs comparable to those of ordinary land acquisition program. Few continuing operating costs.	Appraisals need be made only of fee value; market will determine current use value at time of sale with restrictions. Few continuing operat. costs.	Costs of appraisal and acquisition similar to those of (B). Operating costs of "landlord" continue.	Minor administrative costs. Appraisal and other administrative costs similar to B or C.	Minor ordinary administrative costs.	Minor administrative costs.
	If eminent domain used, may be subject to suit, resulting in substantial legal costs.	If eminent domain used, may be subject to suit result. in substantial legal costs.	Same as purchase and sale.	Legal suits may lead to major costs.	Legal suit may lead to major costs.	Cost of legal suits.
Private Costs	Owner equally well-off: exchange asset of developable land for asset of money.	Original owner fully compensated; new owner pays market price.	Original owner fully compensated; lessor pays market rate.	Owner fully compensated at market price.	Owner suffers any loss in value; no compensation.	Owner suffers any loss in value unless he sues and wins.
Uncertainty	Assures sustained control once implemented.	Same as (A).	Same as (A).	Same as (A).	Zoning variances, changes possible. Courts may find unconstitutional.	Same as (A).

Table 6-1 - continued

	(G) PRIVATE TRANSFER OF DEVELOPMENT RIGHTS	(H) DEVELOPMENT PERMIT SYSTEMS	(I) DIFFERENTIAL ASSESSMENT FOR PROPERTY TAXES	(J) DIFFERENTIAL VALUATION FOR FEDERAL ESTATE AND STATE INHERITANCE TAXES	(K) CAPITAL GAINS TAX	(L) AGRICULTURAL DISTRICTING
Intellectual Complexity	Involves concept of dev. rights, zoning, initial distribution of rights, acquisition of rights, use of acquired rights, & market in TDRs.	Relatively simple to explain: development in certain areas requires permit in addition to existing requirements of zoning, building code, etc.	Requires explanation of what is meant by farm or other current use value.	Same as (I).	Concepts of capital gains tax (cost basis, selling price) familiar.	Concept of geographic district where certain protections are provided is not difficult to explain.
Public Costs a. Payments to Landowner	No public payments to landowner.	No public payments to landowner.	Tax expenditure only.	Tax expenditure only.	Payment by landowner to (not by) public.	No payment to landowner.
b. Administrative Costs	Planning analysis for distribution of rights costly. (If govt. acts as banker for rights, may have high costs.)	Admin. costs of an additional board, & staff or planning support for same.	Minor admin. costs: determine eligibility, appraise use value.	Minor admin. costs, audit only.	Minor.	Minor admin. cost: participants bear much of organizational cost.
Private Costs	Developer has to pay for TDRs, but is allowed higher density. Compensation to landowner in no-growth zone may range from none to full.	Loss of development value of land.	Tax benefit to participant; tax cost to others.	Tax benefit to participant; tax cost to others.	Significant cost to short-term owner, but not to long-term owner.	Benefits to participators, but participation takes substantial time and effort.
Uncertainty	Value of TDRs uncertain. Sustained control likely, but not as strong as deed restriction (i.e., as (A)).	Depends on decisions of board.	Tax benefit varies with composition of tax base; effect on land use depends on many factors.	Benefit to individual owner predictable, but effect on maint. of land use is not.	Effect on location of development not clear.	

Table 6-2

CHARACTERISTICS OF CONTROLS RELATING TO IMPLEMENTATION ONCE ENACTED

	(A) DIRECT PURCHASE OF DEVELOPMENT RIGHTS	(B) PURCHASE & SALE WITH RESTRICTIONS	(C) PURCHASE & LEASE WITH RESTRICTIONS	(D) EXERCISE OF RIGHT TO PREEMPT & SALE OR LEASE WITH RESTRICTIONS	(E) EXCLUSIVE FARM USE ZONING	(F) INVERSE CONDEMNATION
Administrative Complexity	Difficulty in determining fair value of development rights; little market experience.	Relatively simple; purchase fee, market sets value of resale.	Same as (B); market sets value of lease. Government assumes long-term landlord responsibilities.	Must decide which properties to purchase when they come on the market.	Usually specific mapping requires information on soil type, etc. Otherwise, admin. similar to that of ordinary zoning. May be subject to continuing applications for variances & changes & by legal suits.	Implemented simply by placing restriction on certain types of land; may need data on soil type, etc. Settlement of claims may be lengthy.
Uncertainty	Administrators skeptical whether saving over full fee purchase is sufficient to justify; also foresee problems of enforcement if not administered locally.	Resale depends on market, which may be uncertain.	Lease depends on market, which may be uncertain.	Rate of purchase uncertain, but only problem is if too many properties for given budget come on market.	Fear that courts may find unconstitutional.	Hard to predict how many landowners will claim damages.
Limitations on Extent of Application	Usually fixed budget and high costs; so application may be limited.	Same as (A).	Same as (A) but need more "front" capital.	No unnecessary purch. of properties which do not come on market; thus, effective participation rate greater than for (A), (B), or (C).	Participation limited only by political feasibility of designating (zoning) areas for very limited dev.	Similar to (E).

Table 6-2 - continued

	(G) PRIVATE TRANSFER OF DEVELOPMENT RIGHTS	(H) DEVELOPMENT PERMIT SYSTEMS	(I) DIFFERENTIAL ASSESSMENT FOR PROPERTY TAXES	(J) DIFFERENTIAL VALUATION FOR FEDERAL ESTATE AND STATE INHERITANCE TAXES	(K) CAPITAL GAINS TAX	(L) AGRICULTURAL DISTRICTING
Administrative Complexity	Difficult to determine no. of rights to be distributed so that price will be adequate. To effect a transfer, two private parties must come to an agreement.	Adds another level of govt. approval required of developer. Implementation is on a dev. proposal-by-proposal basis, so continuous staffing is necessary and continuing political pressure can be expected. Permit decisions difficult to make & defend unless land use plan has been approved.	Requires estimate of farm use value in addition to market value; also continued surveillance to see that eligibility requirements not breached. Otherwise like ordinary property tax admin.	Taxpayer prepares tax return based on estimate of use value; government must audit.	Data from property transfer tax system provided to determine who must pay capital gains tax. Audit of tax return must check years owned, cost basis, and selling price.	Substantial admin. burden on farmers in establishing district. Many farmers must come to joint agreement.
Uncertainty	No. of TDR transactions will depend on market price of TDRs, which is difficult to predict.	Procedures similar to zoning, but only applied case by case as dev. proposals are made.	No unusual uncertainties relevant.	No unusual uncertainties relevant.	No unusual uncertainties relevant.	Eligible landowner may consider admin. burden excessive given uncertainty of effectiveness.
Limitations on Extent of Application	Depends upon market for TDRs.	All land in designated areas must "participate"; issue is stringency of permits issued.	Widespread participation for preferential assessment & deferred taxation, but less widespread for restrictive agreements, which have stronger sanctions.	Widespread (100%) participation expected.	"Participation" complete except to extent limited by holding period.	Participation high in areas with little development pressure; limited participation in fringe or suburban areas.

several western states and in scattered other locations. In these locations, there has been relatively low development pressure and therefore potential losses to landowners because of zoning are relatively low. The general precedent of urban zoning is well known everywhere, but in some jurisdictions adopting exclusive farm use zoning there has been relatively little experience with the shortcomings of zoning under development pressure and a confidence and willingness to set up a system of comprehensive planning and other controls which will compensate for the inherent weaknesses of zoning.

None of the other types of programs has been enacted in more than a few instances. The cost of acquisition of development rights (by any of the methods outlined) has certainly been an important factor weighing against enacting programs relying on that method, as has been the concern that its introduction may throw in doubt the validity of existing uncompensated regulatory controls. The uncertainty and complexity of TDR has made it the delight of academics but has likewise caused it to be shunned by most politicians. The high private costs inflicted by capital gains taxes along with uncertainty concerning its effectiveness iin maintaining non-urban land uses have severely limited its application.

Elements of agricultural districting have been adopted one at a time in several states. Usually eligibility has been virtually automatic for farmers and has not entailed the organizational efforts which the New York program requires for farmers to participate.

With these general remarks we leave Tables 6-1 and 6-2 for persual by the reader and turn out attention to a more detailed examination of some of the aspects of complexity, costs, and certainty.

B. Complexity

Land use controls, since they do impose constraints upon or intervene in the land market, may require the adoption of ideas and concepts to accomplish their ends that are not reflected in people's common experiences. Thus, because of the intricacies involved in explaining basic concepts or new institutions involved in the program some controls may be considered intellectually complex; because of the difficulty of defining a basic concept operationally or establishing a new institution, some types of controls exhibit characteristics of administrative complexity. Intellectual complexity (or explainability) may be a particular problem for initial enactment, and administrative complexity may be of most importance for implementation once enacted, but either aspect of complexity may lead

to problems at either stage.

Intellectual and administrative complexity are not absolute qualities. Precedent and familiarity can make relatively complex phenomena seem simple, while lack of experience can imbue a simple concept with inhibiting complexity.[1] In that they have been observed by others, demonstration projects or experiences of any single jurisdiction are most valuable in dispelling or confirming the notion of complexity. We now examine the major aspects of complexity inherent in the definition and application of basic concepts and in the establishment of new institutions.

1. Definition and application of basic concepts

Implementation of land use controls often involves the definition and application of concepts which are instrumental to the whole scope of the program. These concepts may be basic to the justification of the program, to deciding which land is to be protected, or to determining the costs or compensation required by the program, for example. With respect to the land use controls under study here the working definitions of environmentally valuable land, prime agricultural land, and use value are the three most important concepts that are not given concrete meanings by existing institutions such as the land market on the rural-urban fringes. New, operationally useful procedures

[1]The idea of familiarity is also relevant to the third characteristic, certainty. It is discussed at greater length in the section on certainty.

are required to translate legislative intent into administrative action.

a. Environmentally valuable land & prime agricultural land

Protection of environmentally valuable land and prime agricultural land are the goals of many land use control programs. However, how does the planner know this land when he sees it? Planners typically need a solid definition of the concepts they work with so that the land that is supposed to be protected can be identified without endless arguments over what is meant by "environmentally valuable" or "prime". The definitions also have to be operational so that the criteria of environmentally valuable or prime can be easily applied to maps.

At the extreme it is possible to make up formulas involving weighted sums of various landscape characteristics so that if the formula produces an index greater than some (arbitrarily) specified value then the land qualifies as environmentally valuable or prime. The problem with this approach is that it is too stilted; its inflexibility cannot possible incorporate all aspects of environmental value or all the characteristics of prime agricultural land. The subjective judgments of the planners, legislators, and the public must be the ultimate arbiters of value or primeness.

That said, it is still possible to say generally what we mean by environmental values or prime lands, leaving the specifics to planners and others in each locale. Values (including the values of prime land) can be classified as follows [Berry, 1976b]:

Aesthetic values, which refer to beauty with respect to the properties of a landscape and the overall composition, unity, variety, and vividness of the landscape (Sircello, Litton).

Contemplative values, which refer to the recollection of past visits to an area, anticipation of future visits, nature study in an area or about an area, or the pastoral ideal associated with rural life styles.

Functional values, which refer to 1) taking advantage of the benefits produced by natural processes or natural conditions (such as aquifer recharge systems or prime soils) or 2) the avoidance of hazards inherent in natural process (such as in flood prone areas). With respect to prime soils in particular, Raup (1976) has emphasized that prime land must be defined taking into account hydrology, climate, physical soil conditions, consequences of land use for world food demand, access to markets, etc.

Recreational values, which refer, obviously, to passive and active recreational uses that could potentially be made of a particular area.

And Ecological values, which refer to the idea that locally representative or locally unique plant and animal communities or associations should be protected not because they are of any utility to people, but rather because non-human forms of life have a right to exist on the earth (Stone).

As a practical matter, actually identifying valuable areas on a map usually involves identifying key indicators of these values and mapping their locations. Overlay maps provide a simple means of accomplishing this. McHarg's work as exemplified in Design with Nature illustrates the idea. In addition the review by Belknap and Furtado of the work of Hills, McHarg, and Lewis further illustrates various approaches. A somewhat more explicit and more comprehensive methodolgy is outlined by Lyle and von Wodtke which takes into account fairly detailed interaction between human activities and natural processes. These approaches are more art than science, or at least it takes a skillful planner to use them well; it is not possible to make the identification of environmentally valuable lands subject to mindless application of rules by untrained and uninterested bureaucrats.

Identification of prime soils has generally not reached a very sophisticated state. Most common is simply the mapping from soil surveys of soil capability Classes I, II and possibly III and locally productive soils such as muck lands in New York. Of course, this can provide only a broad overview of soil conditions, but it is relatively easy to carry out. Some recent soil surveys also have included indices of productivity for soils farmed with average management and excellent management, indicating the yield of corn or other crops one could get under the two management situations. This probably comes closer to what most people mean by prime lands than susceptibility to erosion as reflected in soil capability classes. Most recently, the Soil Conservation Service has begun a pilot mapping program to identify prime soils on the basis of moisture, length of growing season, drainage, acidity or alkalinity, permeability, stoniness, and erodibility. In addition, they are including in their work important farmlands and nonprime soils of statewide or local importance (Dideriksen and Sampson). This more sophisticated approach to identify prime and other important soils will be, in theory, more useful than most other methods of identification of the best soils.

b. Use value

The entire realm of concepts associated with development

rights and use value as opposed to market value of land is an example of complexity arising from an abstract idea. This type of complexity is particularly critical for the purchase of development rights and transferable development rights, which involve the explicit separation of development rights from other rights and the sale of purchase of this somewhat artificial commodity. It presents less of a problem for purchase and subsequent resale or lease with restrictions because the rights are separated through the normal transactions of selling land restricted by easement. The widespread use of differential assessment in which use value is usually established administratively through use of an approved formulas has provided the educational benefit of the concept of use value and therefore, by extension, of development value.

Use value refers to the value of the land if it were to be used in the forseeable future for a given use, such as agriculture, forestry, or grazing. Particularly, it excludes any increment to value which might arise in anticipation of possible future urban development. The market exchange value of land in a rural use such as agriculture is equivalent to agricultural use value only if influences of urban pressure are lacking. In all other situations use value is not set by the land market.

The divergence between current use value of land and its market exchange value near urban areas forms a central feature of three types of land use controls. First, where rural land is differentially assessed it is necessary to be able to estimate current use value as well as market exchange value so that the land may be taxed only on its current use and not on some possible future use and so that any deferred taxes may be estimated accurately if the land is taken out of an eligible use. Second, where the development rights on rural land are to be purchased, it is necessary to be able to estimate the cost of those development rights which, by definition, are valued at the difference between market exchange value and current use value. And third, where land is zoned for rural uses it may be desirable to estimate the loss of value of land that is restricted in its development potential. How much of an economic opportunity cost is placed upon private land owners whose land is restricted to rural uses?

Even though the concepts of use value and the value of development rights are fairly straightforward, the actual application of the idea to specific situations is quite difficult. Direct measurement of use value on land near the rural-urban fringe is impossible ,since the exchange values of land that

one can observe include speculative components that reflect anticipated future development. There is no market experience at all to examine in order to determine the value of development rights, which are never sold by themselves. Thus, it is necessary to rely on indirect means of estimating the use value of land and the value of development rights where urban pressures have begun to be felt.

Basically, there are two methods for estimating use values: a comparable sales approach and a class of capitalization of income approaches. In the following paragraphs, we shall describe, rather generally, how these methods have been used in several different states in connection with their differential assessment laws assuming agriculture is the current use.[1] There is little experience with assessing the use value of land in other types of rural uses except for timber lands or other resource-producing sites which are only infrequently intruded upon by urbanization.

Where it is impossible to observe the use value of land in areas under urban pressures comparable sales may be used to establish a use value for agricultural land by observing the price farmers are willing to pay for similar land in areas which are not experiencing urban pressures. This approach is utilized

[1] A detailed analysis of the use value of New Jersey agricultural land by RSRI is contained in the Appendix.

in New York State, for example, to establish guidelines for use value assessment of agricultural land (Locken, pp. 56-59).

There are three serious problems with this method of estimating use values though. First, how is it possible to find exactly comparable agricultural land in areas which are not under urban pressures? For example, what land in the rest of New York is exactly comparable to the productive potato land which is found in Suffolk County (Long Island) -- all of which is under development and speculative pressures? Second, in many states it may be very difficult to find areas which are not subject to some degree of urban pressures; this is especially true in the Northeast. Third, the value of some land for farming is enhanced by proximity to urban markets -- how can this be estimated when comparable sales are far from urban areas?

As an alternative to the comparable sales approach it may be possible to estimate agricultural use values through the capitalization of the residual income accruing to land. In particular, the residual income (R) is defined as

$$R = Y - VC - FC - RM$$

where Y is the gross income derived from farming, VC is the variable costs of farm operations (such as seed, fertilizer, the operation of machinery, and labor), FC is the depreciation

of fixed farm investment in buildings and equipment, and RM is the return to farm management. It can be seen that the measurement of residual income requires a large amount of detailed information on the cash flows of farm operations. In addition, residual income will vary according to the type of farming, the productivity of the soil, and the efficiency of farm management. Finally, even if very detailed information on the cash flows of various farming operations were available, two costs in particular are very difficult to measure: the value of the farmer's own labor and the return to management. Usually the farmer's own labor is valued at the cost of obtaining outside help and the return to management is usually calculated as some fixed percent of the gross income from farming that can be expected from an "average" level of management.

Because of these difficulties the residual income accruing to land often cannot be estimated directly. Thus, some states attempt to approximate this value by looking at the cash rents paid by farmers for agricultural land. For example, in California, assessors must first look at cash rents in order to determine the agricultural use value of land (see Keene, et al., pp. 274-279). However, cash rents may not actually reflect the true agricultural productivity of the land, since some landlords

rent land just to cover taxes and other fixed costs or just to get the land under use value assessment. This is especially true in urbanizing areas.

Therefore, despite the large data requirements, a number of states have decided upon estimating the residual income by looking directly at the cash flows of farming operations. To this end, a simplified approach or broad guidelines are typically established in order for local assessors to estimate use values. For example, in New Jersey the net farm income for the State, as estimated by the Crop Reporting Service, is allocated to the various counties using gross farm income data from the U.S. Census of Agriculture. (See Locken, pp. 41-49). In Maryland, the residual income accruing to land is estimated according to the productivity of the land for growing corn (see Keene, et al., pp. 133-136). Because residual income tends to vary greatly from year to year, many states average the residual income for the last several years rather than rely on a single years's figure.

Once the residual income has been estimated it must be capitalized at the proper rate in order to establish the agricultural use of the land. In particular,

$$UV = R/CR \qquad (2)$$

where UV is the agricultural use value, R is the residual income accruing to land, and CR is the capitalization rate.[1] The capitalization rate is made up of several elements

$$CR = i + t + r$$

where i is the rate of interest or the cost of obtaining capital for farming operations, t is the effective real property tax rate, and r is the rate of risk associated with farming. Of these elements, r is the most difficult to estimate. For purposes of use value assessment most states use capitalization rates of around ten percent.

The formula for use value presented above is static; i.e. it neglects inflation. If the residual income is expected to grow at g percent per year (the rate of inflation), the use value of land is

$$UV = R/(1 + CR) + R(1 + g)/(1 + CR)^2 + R(1 + g)^2/(1 + CR)^3 + R(1 + g)^{\infty}/(1 + CR)^{\infty} \qquad (3)$$

which reduces to

$$UV = R/(CR - g)$$

Thus, if we wish to account for inflationary growth in the residual income the capitalization rate that should be applied is

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1 Using the equation we assume the residual income will continue in perpetuity.

(CR - g) (see Gaffney). Since inflation for the last ten or so years has averaged around six per cent per year, this suggests that the capitalization rate that should be applied to residual incomes is around four percent (ten per cent minus six per cent).

One more factor should be considered before leaving the subject of use value. In many areas farmers are paying prices for land (for purely agricultural purposes) far above what many would consider "reasonable" agricultural use values. For example, in Illinois during 1976 farmers were paying an average of $1345 per acre for agricultural land (Farm Real Estate Market Developments). The reason farmers are willing to pay so much for land is because they are expanding their holdings rather than starting anew. If a farmer has a large fixed investment in buildings and equipment he may consider only the additional costs of bringing more land into production when bidding for land. In addition, the risk and the cost of acquiring funds may be much lower for a farmer who is expanding his holdings rather than one who is just starting, which would in turn lead to a lower capitalization rate. Thus, we can show that because of a higher residual income and a lower capitalization rate, farmers who are expanding their holdings are willing to pay more for land than the "average" agricultural use value. This factor should be considered when estimating agricultural use values.

2. Establishment of New Institutions

The most obvious and most complicated example of new institutions required by a land use control is the (private) market in transferable development rights (TDRs). In order for the TDR idea to function with an on-going market in transferable development rights a market for these rights must first be established and the nature of this market will in turn affect the compensation received by land owners whose land is restricted to little or no development. There is virtually no experience with such a market since none of the enacted TDR programs has experienced any more than one actual transfer of development rights. Thus the implementation of a program that is going to provide compensation to restricted land owners will require careful forethought.

In order to implement a TDR program, the planner must determine the size of the growth and no growth zones, and the number of development rights must be awarded in such a way that the subsequent market in TDRs will be reasonably certain to result in adequate compensation to restricted land owners. In order

to make these decisions responsibly, it is necessary that attention be paid to the interrelationship between the supply of and demand for rights.[1]

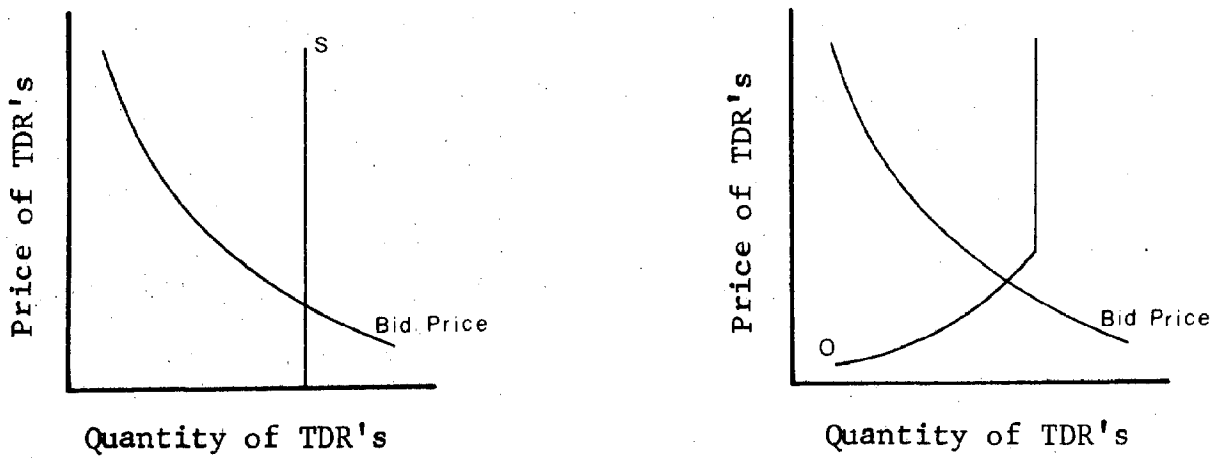
In a static situation, the supply of transferable development rights is simply the number created by law and allocated to land owners in the no-growth zone. The supply is then not at all responsive to the price of transferable development rights since there is no way to produce more (other than by printing more certificates which is a public function, not a private market decision). See curve "S" in Figure 6-1. However, when the supply side is analyzed in a dynamic framework (Field and Conrad), it can be seen that different TDR holders will have different reservation prices at which they will release their transferable development rights for sale in the TDR market. These differences might occur because some people are better bargainers than others, because some people want money right away and will take a lower price, because some people are speculating in TDRs in the belief that the demand for them is increasing and so on. This yields a "supply" curve that is sensitive to prices of TDRs, shown as the offer curve "O" in Figure 6-1.

The demand for transferable development rights by developers building houses, industrial, or commercial buildings in the growth

[1] We wish to emphasize that this discussion is about the establishment of a working market in TDRs, not about the establishment of a TDR bank type of program or a program characterized largely by government intervention in the TDR market.

Figure 6-1

SUPPLY AND DEMAND ASPECTS OF
TRANSFERABLE DEVELOPMENT RIGHTS



zone is the other side of the TDR market. A developer would want to buy such rights if the higher building densities they permit would yield him higher surplus.[1] Under competitive conditions, he would be willing to bid for transferable development rights until the amount bid equals the increment in his surplus from the development (i.e., until the bid equals marginal surplus). This is depicted as the bid price curves in Figure 6-1, whose downward slopes imply that each additional TDR provides less and less surplus to the builders.

The surplus from building residential floorspace depends upon the demand for floorspace, which in turn depends on the increase in number of households, the loss rate of existing stocks of housing, the number of families having children, the availability of mortgage money, income levels, etc. The demand for commercial and industrial floorspace is dependent upon general

[1]Surplus is defined as the difference between a) the revenues from the sale of floorspace and b) the material, labor, and managerial costs of producing that floorspace. The cost component, b, does not include land costs (for reasons to be explained later) or the costs of transferable development rights. It does include normal profits to the developer, though.

regional growth, taxes, and many other considerations. However, especially in the case of residential demand, the character of the floorspace may be changed by the TDR program in that some development may now be occuring at higher densitites than before. For example, single family residences on large lots might be replaced with row houses or garden apartments. And consequently those people desiring single family houses on large lots may drop out of the housing market in the growth zone. But, in addition, those households demanding higher density units (perhaps at a lower cost per unit) will be attracted into this housing market. At any rate the demand for floorspace, and hence the bidding for transferable development rights is difficult to predict without a detailed market analysis. Indeed, such an analysis should also include study of the production aspects of floorspace in order to determine substitution patterns of land, TDRs, materials, and labor and to determine economies of scale obtained at higher densities of development.

The market price of transferable development rights is the result of the supply and demand interrelationships. All development rights which are interchangeable (i.e. perfect substitutes) will receive the same bid price at any point in time in a competitive situation. This is indicated by the intersection of

the supply and demand curves as illustrated in Figure 6-1.[1]

In a market situation under an ongoing TDR program the surplus generated by building floorspace must be used to bid not only for transferable development rights but also for land. Hence, generally speaking, the price of land in the growth zone will not necessarily remain the same after the TDR program is implemented.[2] It is likely to go up as measured in dollars per acre, because surplus per acre of developed land may increase if the higher density allows total surplus to increase. (It may also be true that land prices in the growth zone per dwelling unit will go down as land is used more intensively in the growth zone.) A more detailed discussion can be found in the article by Berry and Steiker, but the important point to remember is that land prices and TDR prices are determined simultaneously in the marketplace -- the planner cannot assume that land prices will remain unchanged.

The supply and demand curves emerging in the market for transferable development rights will depend on the amount of land in the growth and no-growth zones. One must be careful to guard against issuing too many development rights which will depress their prices.

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[1] In economists' terms these prices of TDRs are rents, bid out of surplus. They are not like the costs of materials since TDRs are not manufactured or produced as such.

[2] Land prices, like TDR prices, are economic rents.

In addition, to the extent that too little developable land is included in the growth zone, bids for land will tend to be relatively high and bids for transferable development rights will tend to be relatively low (but not necessarily in all cases as is pointed out by Berry and Steiker).

As a consequence, the growth and no-growth zones must be delimited not only with an eye toward environmental considerations but also with an eye toward the marketability of transferable development rights. Much of the discussion by Nieswand, et al. of the South Brunswick Demonstration Project is devoted to this problem. As a first approximation to designing growth and no-growth zones so as to generate a strong demand for development rights, the South Brunswick growth zone was bounded so that it could accomodate 12% more TDRs than are to be created.

As can be seen from the preceding discussion, there is a very real possibility that the compensations derived by some landowners in the no-growth zone from the sale of their transferable development rights will be only a small fraction of what the market exchange value of the development rights associated with their land would have been prior to the TDR program. The supply of TDRs may be too great with respect to the demand schedule for the TDRs, with

the intersection of the supply and demand curves yielding a low price for the TDRs. The value of TDRs may also be especially uncertain when the program is first started and before the nature of the surplus function and its constituent components is well understood.

To circumvent these kinds of problems, government intervention in the TDR market may be necessary. The most commonly mentioned type of intervention is that of a development rights bank which would hold transferable development rights and pay the landowners in the no-growth zone the difference between the value of their land before and after the TDR program on the basis of appraisals.[1] The development rights bank would then sell the transferable development rights to developers in the growth zone, manipulating the supply of the TDRs so as to obtain favorable prices, thereby recouping some or all of the costs of purchasing the development rights at full market value from the landowners in the no-growth zone.

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[1]It is not clear that in order for the TDRs to be legally valid that compensation must be 100% of the difference between the value of the land before and after the TDR program, only that the compensation is to be "fair."

It may be desirable for the government to appoint a non-governmental agency to sell the transferable development rights since such an agent would probably be a better speculator and bargainer than the municipality in real estate markets. (The government would still pay land owners in the no-growth zone the value of their development rights prior to the TDR program.) Agents competing for the right to sell transferable development rights would then make bids to the municipality for the right to sell the TDRs. In this way the municipality would recoup some of the costs of acquiring the development rights on land designated for open space uses.

It is fairly apparent, even from this incomplete and non-technical discussion of the market mechanisms that must be established, that planning for a workable TDR program is a complicated business. It is not unlikely that such planning lies beyond the capabilities of most agencies.
As far as we have been able to determine, none of the municipalities passing TDR legislation has carried out anything but a seat-of-the-pants estimate of the demand for TDRs (although Nieswand, Chavooshian, and their colleagues have prepared a detailed demonstration program for a township that has not adopted TDR legislation). It, therefore, appears that there is

little assurance that any of the existing programs will actually succeed at retaining desired patterns of open space or farmland.

C. Magnitude and Distribution of Costs

Costs of a land use program may be public in that society in general pays for part or all of the program,or they may be private in that a particular segment of society bears some of the costs. Public costs may be direct, such as administrative costs and the costs of acquiring land or development rights from private land owners, or they may be indirect, such as those experienced when the tax burden is shifted from owners of differentially assessed land to all other land owners. Indeed, this latter has some aspects of private costs in that the shift in taxes may fall onto a rather small group of taxpayers. Private costs associated with land use controls are typically the diminution in land values brought about by restrictions on land use such as those of exclusive farm zoning. Here one group of people bears the economic costs of a land use program while society in general enjoys the benefits. Finally, the capital gains tax also involves private costs which directly penalize certain classes of owners who sell their land.

Direct public costs are usually a primary concern in the in the consideration of any land use legislation. Indirect

costs, or tax expenditures, are more difficult to identify and monitor and so usually receive less scrutiny than direct public outlays. They are typical characteristics of most direct controls. Perhaps one reason why indirect controls are favored by so many legislative bodies is that they appear to help the farmer "without costing anyone anything."

Table 6-2 summarizes the experiences or expected experiences of each land use control with respect to administrative, other public, and private costs. In general, we have been able to gather little information on the dollar costs of administering a program. As for acquisition costs, the magnitudes of public and private costs involved in development rights acquisition or land use restrictions respectively are of considerable importance to both the enactment or lack of enactment of a particular program and to the implementation of the program on a large scale. To study this, we have made estimates of the dollar value of development rights on farmland for five counties in New Jersey.[1] If development rights are purchased by a public agency then these will be public costs (as they are under the New Jersey Farmland Preservation Program Demonstration Project

[1]This is simply the difference between the market value of the land and its farm use value.

in Burlington County), but if development rights are in effect "cancelled" by zoning land for little or no further development then they will be private costs borne by the restricted land owners.

Figure 6-2 summarizes our estimates of the value of the development rights on farmland in five New Jersey Counties. Full details of the calculations may be found in the Appendix. The figure illustrates a number of points about the market exchange value of these development rights.

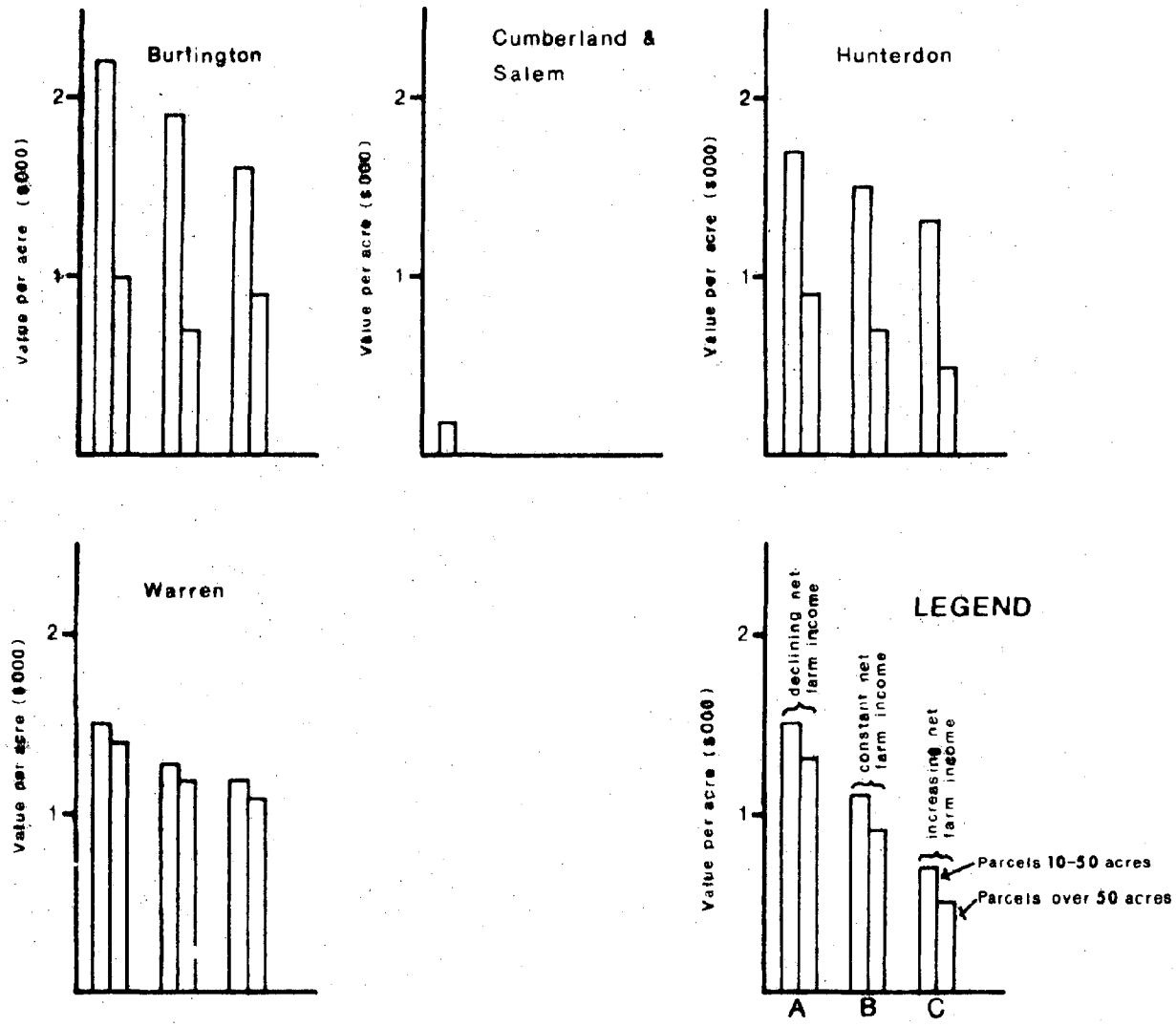
1) Generally speaking, development rights are worth more per acre on smaller parcels than on larger ones.

2) The average value of development rights ranges from around two thousand dollars per acre in the more urban counties such as Burlington to practically nothing in very rural parts of the state such as in Cumberland and Salem Counties. (See Figure 3-2 for a map locating these counties in the State.)

3) Since farm use value depends upon net farm income the portion of total exchange value which is ascribed to development rights also depends on net farm income. Thus, should net farm income remain the same in current dollars while inflation continued to erode the value of the dollar we would expect that, everything else remaining the same, the value of

Figure 6-2

ESTIMATED DEVELOPMENT VALUE OF FARMLAND
IN FIVE NEW JERSEY COUNTIES



NOTES: A. Assumes constant net farm income in current dollars and inflation rate of 6%.

B. Assumes net farm income increases at same rate as inflation.

C. Assumes 2% increase in net farm income over and above 6% general inflation.

SOURCE: estimated by authors, see Appendix.

development rights on farmland would be higher than if net farm income (in current dollars) increased at the same rate as inflation or increased at a higher rate than inflation.

4) Extrapolating from the value of development rights on a single parcel in an urbanizing county such as Burlington to several thousand acres of farmland in such a county we can immediately see the great magnitude of the costs involved in either purchasing those development rights or in zoning that land for exclusive farm use. In 1974 in Burlington County there were 148,000 acres of land in farms. If a modest land use control program were to put 20,000 acres of farmland into an exclusive farm use zone or to purchase the development rights on that land then the costs would be on the order of $30,000,000. Although this is not a large amount it still may be politically difficult to pass a bond issue for purchases of development rights when the costs of many other government services are rising so rapidly. In fact, the $30,000,000 figure is probably low for a program which concentrated on the most rapidly growing parts of the county.[1] Furthermore, of course, a larger program including more acreage would cost more, and it seems reasonable to

[1]The N.J. Farmland Preservation Demonstration Program will probably employ lower use values than we have estimated, thereby increasing the costs of acquiring farmland by as much as $800 an acre. The State's estimates will probably be based on the use values determined for their differential assessment program, about $200 per acre.

assume that in a large metropolitan area a larger program would be necessary. A 20,000 acre program would protect farmland in only about two townships.

Although we do not yet have the detailed bids made in Burlington County, the development rights appear there to be less expensive than Suffolk County's on Long Island, which averaged about $6,500 per acre in the bids offered by land owners to the County. Appraisals, which will actually determine the amounts to be paid, have not yet been made for the land offered for participation in either program. However, discussions with members of the New Jersey Department of Agriculture indicate that the estimates in Figure 6-2 might be low: hence, the costs of a program could exceed what we have estimated above. In fact, the first 100 offers by landowners averaged about $2,900 per acre thus doubling our cost estimate. (These are not the final agreed upon prices, however). Our estimates then, can be used only as a first approximation in need of further refinement as development rights are actually purchased from farmland owners.

In conclusion, the costs of a direct land use control in an urbanizing area can be quite large whether the program puts the costs on the public at large or puts them on owners of land

restricted from further development. This is a major limiting factor on the application of direct controls and was one impetus to the invention of transferable development rights, a direct control that has the potential for ultimately putting the costs for open space preservation and farmland retention on the people who buy or rent new homes in the "growth zone." Of course, even TDRs, if they adequately compensate land owners in the no-growth zone, still have a large cost associated with them -- the costs do not simply disappear but are rather redistributed.

The costs of indirect approaches are largely administrative and, for those which reduce some landowners' taxes, they may appear as significant tax shifts, a shifting of taxes away from participants in the program to the remainder of the property owners in the taxing jurisdiction. (Note that this shift can fall upon participants who have some property not in the program, such as their residences, as well as upon individuals who have no property enrolled in the program at all.) It is not so much the dollar amount of this shift that is important but its effect per non-participating taxpayer. Thus, it is useful to express the tax shift as a proportion: dollars of taxes shifted per dollar of assessed value of the property of non-participants in the program. This proportional shift then is

reflected in the difference between the tax rate before and after the implementation of the differential assessment necessary to keep tax revenues the same in the taxing jurisdiction.[1]

Looking at the proportional tax shift another way we see that its magnitude is dependent upon:

1) The ratio of the fair market assessed value of property enrolled in the differential assessment program to the fair market assessed value of all other property in the taxing jurisdiction. The larger this ratio the greater the tax shift.

2) The difference between the fair market assessed value of property enrolled in the differential assessment program and the assessed development value of property enrolled in the program (i.e. the use value of the enrolled property). The smaller the use value the greater the tax shift.

3) The tax rates before and after implementation of the differential assessment program necessary to make the tax revenues equal before and after the program is implemented. The greater the tax rate after the implementation of the program, the greater the tax shift.

It is difficult to say in general how large the tax shift will be in any taxing jurisdiction or for all taxing jurisdictions

[1]The mathematics of the tax shift is as follows:

[1] (footnote continued)

Let: T be the tax rate prior to differential assessment,

$\hat{T}$ be the tax rate after differential assessment,

V_1 be the fair market assessed value of property enrolled in the differential assessment program,

V_2 be the fair market assessed value of all other property,

D_1 be the assessed development value of property enrolled in the program,

and let Rev be the taxing jurisdiction's desired revenues.

Assuming Rev is the same before and after the differential assessment program, $\text{Rev} = TV_1 + TV_2 = \hat{T}(V_1 - D_1) + \hat{T}V_2$, (1)

where $T \neq \hat{T}$. (2)

The tax shift is $\hat{T}V_2 - TV_2$.

Rearranging the terms of (1) we find that

$$\hat{T}V_2 - TV_2 = TV_1 - [\hat{T}(V_1 - D_1] = \text{tax shift in dollar value.} \quad (3)$$

As a proportion of the assessed value on non-participating property, we divide both sides by V_2:

$$\hat{T} - T = T \cdot \frac{V_1}{V_2} - \frac{\hat{T}\,(V_1 - D_1)}{V_2} = \text{proportional tax shift} \quad (4)$$

taken together in a county or state. The problem is complicated by overlapping tax jurisdictions such as school tax districts and municipalities, by annual charges in tax revenue needs, and by revenue sharing and other intrastate and interstate expenditure flows (Hady and Sibold).

The empirical evidence that is available on tax shifts is spotty. From the work reviewed by Hady and Sibold and the discussion in the report by Keene, et al. it seems that most taxing jurisdictions experience only minor tax shifts. However, there are occasional situations where the increase in taxes on nonparticipants can be over $100 per capita per year.

D. Uncertainty

Undoubtedly, many legislators and planners are reluctant to sponsor, enact or attempt to implement a land use program which is filled with uncertainties as to how it is actually going to work out. These uncertainties are of two general kinds: those which result from unfamiliarity or lack of experience with a control, and those which result from the innate unpredictability of what will happen when certain types of controls are implemented.

1. Familiarity

The need for familiarity has made the evolution of land use controls a rather slow process, advancing by increments rather than by sudden leaps. Proposed and enacted programs are most likely to be modifications of existing programs or adoptions of programs successfully implemented elsewhere.

Incrementalism can be seen to work in adopting the long-familiar idea of zoning to rural areas for preservation of rural landscapes or in extending "tax expenditures" (i.e., tax breaks) to farmers and other rural land owners through the differential assessment of real property.

A slight leap from prededent is required to enact and implement large scale programs of public purchase of development rights. Although the use of easements is an old and time-honored method of public (and private) extension of specified rights

onto (another's) private property the concept may seem foreign to many landowners. In the nineteen-sixties when the Upper East Branch of the Brandywine demonstration project was underway, the concept of severing development rights from other rights in the land was unknown to most lay people (Strong, 1975). Unfamiliarity with the concept and the fears people harbor of the unknown constituted one of the major reasons that the demonstration project was unable to go forward with its plans for the purchase of conservation or open space easements on about one half of the watershed. By the mid-nineteen-seventies, in contrast, the separation of development rights from land seems less radical,as demonstrated by the willingness of land owners to participate in the Suffolk County Farmland Preservation Program.

A slightly bigger leap from precedent is required to enact or implement a program of preemption of rural land sales by the public, although again this idea is often used in private market transactions. Coupling it with resale strikes a more familiar and therefore acceptable chord than coupling it with leaseback. The public ownership of land with leases to private famrers is perhaps one of the more unfamiliar approaches, since the private ownership of land is a prominent aspect of American

history and culture. The rapid disposal of the public domain in part reflected the importance of putting the land in the hands of the individual and now the return of land ownership to the state may prove to be a difficult change of course. Nonetheless, it must be remembered that one third of the nation's land is still in the public domain, much of it leased to private individuals or firms for grazing, timber cutting, or mineral extraction. Hence public ownership with private leasing is not totally foreign, although it is more foreign to Easterners than to Westerners.

2. Permanence of the Control and Certainty of Outcome

Unfamiliarity is but one aspect of uncertainty. A land use control may be quite familiar and widely used but still subject to great uncertainty as to how effective it really is. Zoning is a prominent example of this. The permanence of zoning is often open to question as variances and more severe alterations are frequently made, especially when land values could appreciate rapidly with a zoning change. As noted in Chapter V, many planners felt that rural zoning would not be likely to withstand the pressures of land speculation in areas of heavy urban pressure: it is too profitable to change the zoning. Hence zoning may prove to be too uncertain with regard to permanence

to be a widely applied method of land use control that can effectively preserve open space and retain farmland.

The decisions of a development permit board like a zoning board may vary substantially from time to time, depending on the current composition of the board and the shifting pressures in support of development and environmental protection. In contrast, when rights in land are acquired by the public, there is much greater certainty that land use will be controlled permanently.

Uncertainty as to the extent and nature of participation in a land use program may also arise. If the program is voluntary as opposed to mandatory one cannot be sure how many land owners will enroll in the program or how much land that should be protected actually will be included in the program. A very spotty pattern of participation is more likely to undermine the effectiveness of a program than a pattern of participation that includes most of the land that is desired to be protected.

In particular, the pattern of enrollment in a voluntary program may be influenced by a number of program characteristics.

1) The type of application procedure necessary by eligible landowners may affect participation. Programs having easier application procedures will probably be less uncertain in their enrollment pattern than those having difficult or time

consuming requirements for participation. 2) A requirement that applicants apply collectively instead of individually (as for example the New York Agricultural Districting Program), may have mixed effects. Such a procedure may ensure that larger and more contiguous holdings of land be included in the program but may also reduce the probability that many individuals will go to the effort of trying to get together with their neighbors to enroll. And 3) there could be a great deal of uncertainty inherent in the effectiveness of the program if participation is not sufficiently limited. Restrictive requirements attempt to include only the most desirable land in the program and to exclude most of the people who might participate but whose land is not particularly valuable in terms of the program's goals. Programs with fairly vague or general goals may thus be more likely to have less restrictive limitations on who can participate, but one cannot be certain that the land included in the program will form any coherent pattern of agriculture or open space.

Probably the greatest degree of uncertainty inherent in any land use control is that generated by transfer of development rights. The effects of a TDR program result from complex and difficult-to-predict market interactions, as was described in the previous section. There is no experience with TDR transactions anywhere and so the degree of compensation that will be received by landowners

whose land is restricted from further development is currently an unknown. And since it is so difficult to establish a private market in TDRs that will yield adequate compensation with a high probability, transferable development rights programs may be very slow in materializing. To date no community has been bold enough to establish a mandatory TDR program which would establish the feasibility of TDRs.

The question of uncertainty pervades the only major legal decision to date on TDRs, that of Fred F. French Investing Co. vs. City of New York. This case involved the creation of a "Special Park District" in Tudor City in Manhattan. Tudor City is a privately owned set of buildings and small parks. A new owner, Fred F. French Investment Company, wanted to develop more intensively by erecting buildings in the park areas. The city, wishing to preserve the parks, gave French transferable development rights as compensation for not being able to put up the buildings. However, the location of the transferred development rights was not specified, and City approval of the transfer was required. French sued, and ultimately the TDR plan was rejected by the courts (350 NE 2nd 381).

In this case, Judge Breitel, Chief Justice of the New York Court of Appeals looked at the nature of the regulations

in the "no-growth zone" of the Tudor City TDR scheme, treating TDRs as lying within the police power, the power to regulate.

Justice Breitel examined three aspects of the reasonableness of the police power as applied in this instance. He found that the restriction of the land involved to use as a park served a legitimate governmental purpose, that is was not arbitrary in that the means to the ends (protecting a park) were reasonable, but that the owner of the land in the park was "frustrated" in his use of the property. That is, the property owner found his land rendered "unsuitable for any reasonable income productive or other private use for which it is adapted and thus its economic value or all but a bare residue of its value (was destroyed)" (p. 387). Hence the Court rejected the TDR plan. The reason for the diminution of value is that the transferable development rights awarded the property owner as compensation are of too uncertain an exchange value. Realization of their value would require finding land and a buyer to transfer them to and getting approval by the City of this transfer. That is, the severance of the development rights from the property "has rendered their value so uncertain and contingent as to deprive the property owner of their practical usefulness,

except under rare and perhaps coincidental circumstances." (p. 389)[1]

In his comments on the Fred French decision, John Costonis (1976) pointed out that a TDR program based upon voluntary participation would probably be acceptable in the judicial process. Mandatory participation as in the Fred French case may force land owners in the no-growth zone to suffer great diminution of the value of their property, but voluntary participation in a TDR program by a willing land owner cannot allow one to fall back on the argument of being forced to forego income from property. Of course, voluntary programs may result in a very limited or scattered pattern of protected land; currently all rural-urban fringe TDR programs are voluntary and there has been almost no participation at all.

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[1] Justice Breitel went on to point out that new land use control measures such as TDRs are needed by society and that making the compensation to the land owner in money averts the question of unreasonable use of the police power which would frustrate the land owner in his attempt to use his property gainfully. A development rights bank program for TDRs is explicitly suggested by Justice Breitel as an example of a type of TDR program which may be legally acceptable. However, he did not use the Fred French case as an opportunity to look at TDRs as a new legal entity. As Costonis, Rose, and others have taken pains to point out, the transferable development rights idea is not purely a problem of eminent domain or an example of the police power, but instead it is "sui generus: it is in a class by itself" (Rose 1975, p. 922). Attempts to analyze a TDR plan in either the police power or eminent domain framework may inordinately argue against TDRs because the regulatory aspects might be ignored at the expense of the compensatory or vice versa. This particular difficulty does not seem to have pervaded the Fred French case, though.

E. Conclusions

In this chapter, we have identified several characteristics of land use controls -- notably complexity, cost, and certainty -- and have examined them in relation to enactment and implementation. On the basis of this discussion of characteristics, it is tempting to go on and rate the various land use controls on how likely they are to be enacted and implemented.

Certainly we are safe in concluding that the indirect controls which provide tax or other benefits to landowners are by far the most acceptable. These controls make some landowners better off without obviously and explicitly making others worse off. Already differential assessment for property and differential assessment for federal estate taxation are almost universal within the United States. Legislatures are now becoming interested in differential assessment for state inheritance taxation. The elements of agricultural districting, which also provide certain benefits for participating farmers unaccompanied by demonstrable costs to others, also seem likely to become widely enacted and implemented.

It is much more difficult to rank the remaining controls, although the group least likely to achieve implementation probably includes TDR because of its complexity and uncertainty and the capital gains tax because of the high costs it imposes on

one group, a group which has traditionally had close alliances with government. Inverse condemnation also should probably be included in this group since it appears to have few advantages in addition to those of exclusive rural use zoning and is an unfamiliar hybrid which explicitly opens the door to suits for damages by affected land owners.

The remaining middle group contains land use controls whose characteristics lead to mixed prognostications at best. Exclusive rural use zoning and development permit systems involve administrative procedures which are familiar to legislators and bureaucrats, and their public costs are low. Their private costs, in contrast, can be quite high, and some uncertainty lingers about the constitutionality of exceedingly stringent regulatory measures. Methods which are concerned with the purchase of development rights are less beset with uncertainty, but require substantial public outlays.

A more precise classification would rest on insufficient evidence. In addition, any classification based solely on characteristics of land use controls should be tempered by consideration of local development pressure, quality of land for agriculture or other permitted use, regional political traditions, and the distribution of power within the jurisdiction.

Also of critical importance in the adoption of a new type of control is the existence of a strong leader (such as Gov. McCall of Oregon or Secretary of Agriculture Alampi of New Jersey) who is convinced of the value of a particular type of land use control and who is willing to make a long term commitment to see that it is established.

Chapter VII

POTENTIAL EFFECTIVENESS OF LAND USE CONTROLS

A. Considerations Related to Effectiveness

Even if a land use control has been successfully enacted and implemented, it will be of little use if it proves to be ineffective. Thus, the overriding question becomes how effective will a particular land use control be in achieving the goals of preserving agricultural or environmentally valuable land? The effectiveness of a program depends on three factors: (1) The extent to which the control prevents unwanted changes in land use, (2) The coverage of the control -- that is, the extent to which the program can be extended to cover all land designated for preservation, and (3) The permanence of the control -- that is, the extent to which restrictions imposed on particular properties be weakened, removed, or otherwise violated over time.

These three considerations constitute the basis of Table 7-1, which summarizes major findings concerning each of the aspects of effectiveness for each of the land use controls under study.

1. Extent to Which the Control Prevents Unwanted Land Use Changes

The focus of the land use program and the nature of the effects of urbanization together will determine the potential effectiveness of the control in preventing unwanted changes in

Table 7-1

CHARACTERISTICS OF CONTROLS RELATING TO EFFECTIVENESS

	(A) PURCHASE OF DEVELOPMENT RIGHTS	(B) PURCHASE & SUBSEQUENT SALE	(C) PURCHASE & SUBSEQUENT LEASE	(D) EXERCISE OF RIGHT OF PREEMPTION	(E) INVERSE CONDEMNATION	(F) EFU ZONING
Effectiveness						
Prevents unwanted change in use: Direct-Indirect	Direct; restrictions can be tailored to each parcel. Term, including in perpetuity, may be specified.	Direct; same as (A).	Direct; same as (A).	Direct; same as (A).	Direct. Restrictions similar to zoning.	Direct.
Coverage	Application limited by budget; especially in areas of high dev. value.	Same as (A).	Same as (A).	Can protect more land than (A), (B), or (C) because can select on basis of owner's intention as well as nature of land.		May be difficult to apply to env. valuable lands if they do not have some economically beneficial use.
Permanence: Susceptability of legal instrument to change	Difficult to change restrictions once rights are purchased.	Same as (A).	Same as (A).	Same as (A).		Subject to pressures for change as is all other zoning. May not withstand in areas of high development demand.
Permanence: Reduces landowner's economic need to develop	Original owner compensated for loss of dev. rights; subsequent buyers will pay only for rural use value.	Similar to (A).	Public holds fee; leases based on rural use value.	Similar to (B) or (C); in addition responds to market at earlier stage by only purchasing properties up for sale.	Similar to (F).	Original owners not compensated; subsequent owners will pay only for permitted use value if zoning is held rigidly; if not, speculation and resulting pressure to change zoning may occur.
Costs	Relatively low in areas of little urban demand; approaches fee value in areas of high demand. Few public operating costs. Owner still pays taxes on use value.	Same as (A), but a little more "front" money needed.	Same as (A), but much more "front" money needed. Lessee pays rent, but no explicit taxes.	Same as (B) or (C) depending on disposition of property.	Depends on extent to which landowners claim damages and level of awards made by court. Maximum costs similar to (A).	Public cost minimal; administrative cost only.
Equity	Compensates fully for removal of right to develop; cost shared widely.	Original owners compensated fully at market value; subsequent purchasers bid only value for allowed use. Difference in cost shared widely.	Similar to (B).	Same as (B) or (C).	Similar to (F); but landowner given opportunity to claim compensation.	No compensation for loss of right to develop.

Table 7-1 continued

	(G) TRANSFER OF DEVELOPMENT RIGHTS	(H) DEVELOPMENT PERMIT SYSTEMS	(I) DIFFERENTIAL ASSESSMENT	(J) DIFFERENTIAL VALUATION FOR FEDERAL ESTATE & STATE INHERITANCE TAXES	(K) CAPITAL GAINS TAX	AGRICULTURAL DISTRICTING
Effectiveness						
Prevents unwanted change in use: Direct-Indirect	Direct.	Direct.	Indirect. Mild sanctions on development.	Indirect. Mild sanctions on development.	Indirect. Reduces profit from development.	Indirect. Reduces urban disruption to farming. No sanctions on development.
Coverage	Zoning of "growth" and "no-growth" zones is public decision, but use of TDR is decision of individual owners and developers.	Greatest potential may be to shape development within small area; rather than to keep extensive areas undeveloped.	Usually up to owner; but unless sanctions extreme, most who are eligible will participate.	Nearly all eligible will participate.	Long term owners exempt, and these may tend to own land planned to be kept undeveloped.	Landowners in urbanizing areas tend not to form districts.
Permanence: Susceptability of legal instrument to change	Once dev. rights sold, may be difficult to change restrictions on property.	Like zoning; continuing pressure for change likely to be brought on permit board.	Tax saving increases as other properties in jurisdiction are built up, but owners wishing to develop not likely to be deterred by tax saving or sanctions.	A one-time avoidance of tax costs. Sanctions lessening deterrent to development as time passes.	Not applicable.	Does not prevent development. Economic advantages of continuing may be outweighed. May be significant social sanctions against development, however.
Permanence: Reduces Landowner's economic need to develop	Owners in no growth zone compensated when sell development rights. Owners who cannot sell development rights may press for changes.	No compensation to offset loss of development value.	Reduces current costs.	Lessens need of heirs to sell or develop.	Lessens incentive to develop.	Provides a more certain atmosphere for farming including preventing growth inducing facilities.
Costs	Administrative costs only, but may be substantial.	Administrative costs only. Usually additional board must be staffed.	Tax expenditures; minor administrative costs.	Tax expenditure.	Produces additional revenue. Public expenditure low, administrative costs only.	Minor administrative costs only.
Equity	Compensates partly-to-fully for removal of right to develop; costs borne by new-home buyers.	No compensation for loss of right to develop.	Shifts tax burden to other taxpayers.	Same as (I).	Cost falls on landowner, developer.	No equity issues.

land use. In areas subject to strong urban pressures (where controls are absent) conversion of substantial amounts of rural land to urban uses will occur as well as active land speculation. In these areas, the effects of urbanization are both direct (the conversion of land to urban uses) and indirect (the intense localized idling of farmland). In such areas, direct controls have the potential to prevent unwanted land use changes. They specifically forbid certain types of development on specified parcels of land. However, they are not a universal solution, since they are quite costly and may involve complexities and uncertainties which limit the possibility of their enactment or implementation. Indirect controls, in contrast, can not address the direct effects of urbanization nor can they adequately counter the forces of active land speculation; their potential in preventing unwanted land use changes in areas subject to strong urban pressures is minimal.

When combined with direct controls, however, indirect controls can alleviate some of the spillover effects and related indirect effects of urbanization in areas subject to strong urban pressures. Thus, indirect controls may be helpful in retaining farming activities in areas where the land base has been protected by direct controls. But if the indirect effects of urbanization remain unmitigated, farmers and other rural landowners may be forced to idle their land or to move to other areas even though conversion of land to urban uses has been controlled.

Where urban pressures are less intense, indirect controls can be potentially useful. In these areas farmers are bothered by the indirect effects of urbanization and the result may be a slow switchover to those types of agricultural activities not requiring a long time horizon. The uncertainty about the long run future of farming in the sphere of weak urban influences may be lessened by the provisions of an agricultural districting approach to land control and by differential assessment of farmland. We have not been able to observe such an improvement in the farmer's situation because comprehensive indirect controls, such as New York's Agricultural Districting Program, have not been in effect long enough, but at least the potential is there for preventing the relative decline of agricultural activities requiring long time horizons with large investments.

In brief, in areas characterized by strong direct effects of urbanization, direct land use controls complemented by indirect controls would probably be most effective in retaining open land. In areas subject to less intensive urban pressures, the indirect effects of urbanization (if unaccompanied by significant direct effects) can potentially be countered by indirect controls.

2. Coverage of the Control

In order for a land use program to be effective, it is necessary to include a large amount of desirable land (such as prime

farmland or aesthetically valuable landscapes) in the program. Difficulties in the coverage of the control may arise because of the uncertainties generated by low participation rates, problems in defining what land is desirable and what landowners should be eligible, and high costs that prohibit the application of the program to a large amount of land.

Voluntary programs may result in a scattered pattern of participation that may or may not include land that is most desired to be protected. California's Land Conservation Act (the Williamson Act) and New York's Agricultural Districting Program suggest that voluntary participation in a program may result in little inclusion of land in the most rapidly urbanizing areas. In contrast, initial indications from the offers received in the New Jersey Farmland Preservation Demonstration Program suggest that where the farmer can keep his farm and get paid for the development rights (unlike the milder benefits from an indirect program such as California's or New York's) voluntary participation may incorporate the desired pattern of land in the protection program.

Problems in defining desirable land may allow some landowners to include their land in the program and partake of its benefits even though their land may be of little value as far as the program's objectives are concerned. Conversely, aesthetically valuable land or other land that is hard to identify on a map may end

up being excluded in part from the program's goals. Also, in defining eligibility requirements for a program it is often very difficult to establish criteria that will systematically exclude some landowners and include others who will further the goals of the program. For example, Kolesar and Sholl reported that many land speculators participate in New Jersey's taxation program by renting their land to farmers until they can obtain a buyer for their property with no intention of keeping the land in farms.

The high public costs of some direct controls may severely limit the application of a program, resulting in very little rural land being protected from development, Given the many demands on government resources, it is difficult to see how the hundreds of millions of dollars necessary to buy the development rights on a substantial amount of farmland around Philadelphia or New York City could be raised. Thus, it seems likely that only small pockets of rural land can be protected through purchase of development rights programs in areas where land speculation has driven the price of land to a high level.

High private costs of other types of direct controls (such as agricultural zoning) may also prevent their widespread application. It appears, however, that the landowners and courts in Oregon may be more willing to accept exclusive farm use zoning than landowners and the courts in the Northeast. Hence, we may not

expect to find that a control that works on one region of the country would be acceptable in another.

3. Permanence of the Control

a. Effects of other public plans, policies, and programs.

Many public plans, policies, and programs affect the use of the land and may either undermine or strengthen a land use control program. The construction of urban infrastructure, such as highways, reservoirs, water and sewer trunk lines, and power lines not only consumes substantial rural areas, but also acts as a stimulus to further urbanization.

Through its Agricultural Districting Program, New York has taken a first step toward preventing government activity from interfering with agricultural production in its designated farming areas. The Program limits the local exercise of eminent domain to acquire farmland within agricultural districts. Oregon has gone one step further by embedding its exclusive agricultural zoning program in a comprehensive planning process and set of policies, which include the designation of urban growth boundaries, the designation of facilities whose planning and location is of statewide significance, and protections similar to that of the New York agricultural districts for all land that is included in exclusive agricultural use zones.

Such a comprehensive set of public plans and policies can greatly strengthen the effectiveness of any of the land use controls under study. Conversely, the construction of transportation and public facilities that is in conflict with the objectives of farmland and environmental preservation could put even the strongest controls under intense development pressure and lead to their failure.

b. Effect of the control in reducing the landowner's economic need to develop.

Landowners may be pushed into developing their land by the costs associated with holding it. They may also be pulled by the potential of making a speculative profit. In general, direct controls are designated to eliminate the possiblity of development and the pull of speculative profit that goes along with development.

Some direct controls, especially those involving acquisition of development rights, remove some of the costs associated with holding land in a quickly urbanizing area. To the extent that various cost pressures are reduced, the owner is less pushed to develop in order to solve his financial problems. Thus, programs in which the landowner is paid for his development rights can be expected to be somewhat less likely to be subject to pressure for change than programs such as exclusive agricultural zoning in which those rights are removed without compensation.

Indirect controls based on tax expenditures, such as differential assessment programs, help reduce the cost pressures on landowners and thereby may reduce efforts to circumvent restrictions imposed by direct controls.

c. Susceptibility of the legal instrument to change

No matter how consistent are the comprehensive planning and other government policies, and regardless of how well the land use controls reduce the private costs that force development, individual owners will still see opportunities to make large amounts of money by developing their land. Therefore, there will always be pressures to circumvent the restrictive provisions which govern the development of land or to change these provisions.

Although there has not been enough experience to make any conclusive statement, it is believed that controls involving the purchase of development rights would be more difficult to change than those involving regulation. If the restrictions on development were changed, the public payment to the landowner for acquiring the development rights would have to be returned or else overlooked. In addition, the restrictions on the deed would have to be removed and such a change would require the approval of all parties involved. In contrast, regulatory decisions are commonly modified. Variances and changes of zone boundaries are most common for ordinary zoning, and one cannot exclude the possibility

that that tradition would be carried over to the exclusive agricultural zoning.

Although it may be inherently difficult to change development rights easements, their enforcement is not necessarily automatic. The National Park Service has reported violations of their scenic easements along the Blue Ridge Parkway and the Natchez Trace. Primarily, these have been by "second generation" owners, who purchased the land years after the easements had been purchased. These violations were often a result of ignorance or misunderstanding of the restrictions imposed in the deed. However, no major difficulties have been reported in enforcing the easements acquired by private conservation organizations where the landowners are supportive of the goals of the program. In general, easements forbidding the construction of new buildings are more easily enforced than those forbidding the cutting of trees (Coughlin, Plaut, and Strong).

The management of any control program -- the acquisition of development rights or regulations -- requires clear communication about what kinds of development are allowable, a policing system which identifies incipient violations before they become irremediable, and support for the objectives of the program by local government. Without such conditions, of course, a regulatory program would also be most difficult to enforce.

B. Conclusions

In summary, it appears that direct land use controls are potentially more effective than indirect controls in preserving open land in areas subject to strong urban pressures. Among the direct controls those involving the acquisition of development rights are less likely to be changed or weakened than those involving regulation. But because of their high public costs, particularly in areas of rapid urban growth, it may not be possible to apply acquisition-of-development-rights methods nearly as widely as regulatory controls.

The cost of programs involving the acquisition of development rights could be spread out over many years by exercising the power of preemption, acquiring only those properties in the designated area which come on the market and subsequently selling them with restrictions. The extent to which this would help is not known, but research involving simulation of the land market could yield valuable insights.

In areas subject to strong urban pressures, it may be difficult to maintain rural use zoning because of the high costs it imposes on private landowners. There are signs, however, that the courts are coming to regard the change in the current use value (rather than in the market value) of the land as the proper measure of the diminution of land value resulting from regulatory

controls. If this is so, exclusive agricultural zoning would be based on a much firmer legal foundation. Some clues about the long-run effectiveness of exclusive farm use zoning will be provided by how Oregon, California, and Hawaii fare as areas zoned for rural use come under development pressure.

Over the short run, at least, we see the use of no single direct type of control clearly dominating the others. More likely the period of testing will continue and the costs and performance of various controls will be watched carefully by interested jurisdictions.

Indirect controls may be effective by themselves in areas subject to weak or moderate urban pressures where little land is being converted to urban use but where farmers may change the pattern of agricultural activities in response to uncertainties generated by urban spillovers and engage in passive land speculation. The major effect of the indirect controls will be to strengthen the viability of farming or other rural activities rather than make them more profitable than urban development. In areas of strong urban pressure, indirect controls can complement direct controls and alleviate financial burdens and other nuisances traceable to urbanization.

Any land use control program will be strengthened if it combines elements of direct and indirect controls. The most encouraging

programs we have examined have combined several types of controls with consistent overall policies and plans for development and preservation. If policies, plans and controls can be combined systematically and if sympathy for environmental objectives is maintained consistently by citizens and government leaders, there is some reason to be optimistic that the garden of a metropolitan area can be retained. Our history with the control of land use and the inherent difficulties and weaknesses of controls, which we have identified in the analysis, however, indicate that success is far from assured.

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