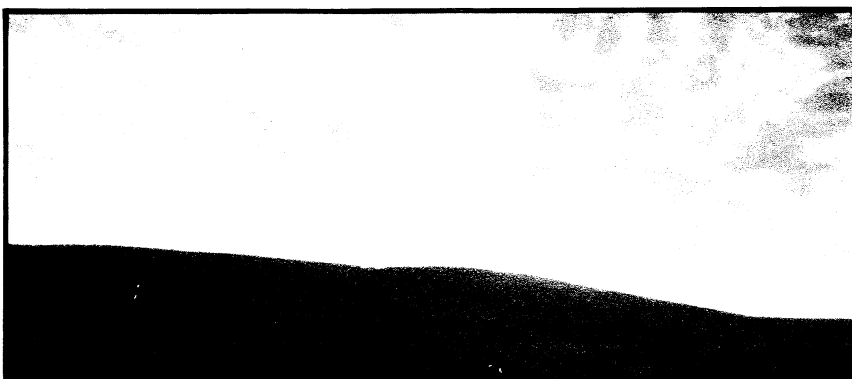
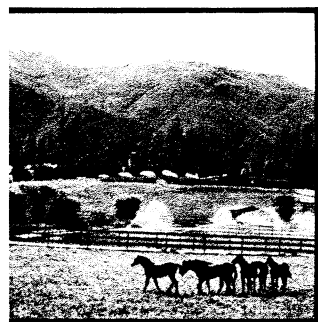
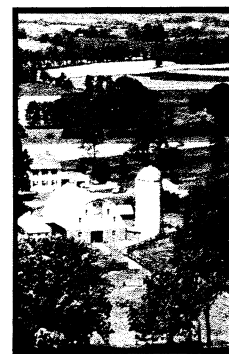
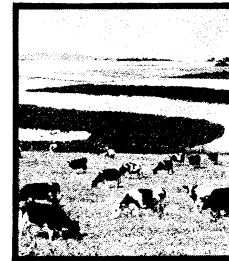
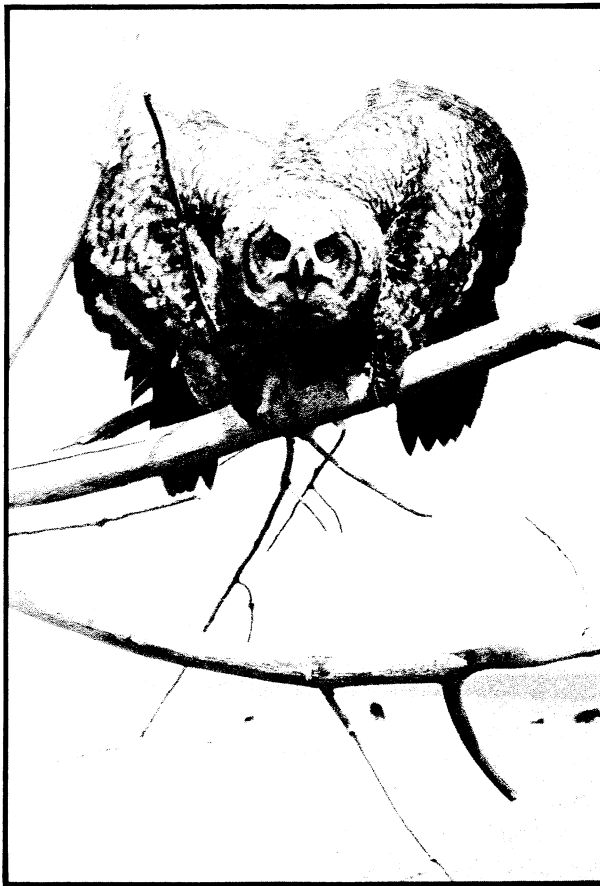
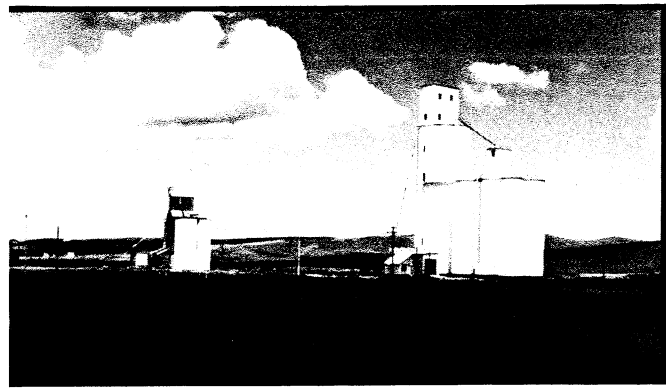




# National Agricultural Lands Study

Final Report  
1981







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## National Agricultural Lands Study

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# Final Report 1981

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## *PREFACE*

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Concern about the adequacy of America's agricultural land base to provide a continued supply of essential goods and services at reasonable cost are bipartisan and are shared by both the executive and legislative branches of the Federal Government. In a 1975 report, entitled "Perspectives on Prime Lands," Secretary of Agriculture Earl Butz emphasized the relationship between federal projects and the conversion of agricultural lands to nonagricultural uses. In its 1976 "Memorandum to Agency Heads," the President's Council on Environmental Quality directed government agencies to consider the effects of federal programs on agricultural land.

The Carter Administration sought to reduce the extent to which federal activities were causing the conversion of prime agricultural land. Executive agencies, including the U.S. Department of Agriculture and the Environmental Protection Agency, adopted specific agricultural land protection policies. In June 1979, the U.S. Department of Agriculture and the President's Council on Environmental Quality agreed to sponsor an inter-agency study of the availability of the nation's

agricultural lands, the extent and causes of their conversion to other uses, and ways in which these lands might be retained for agricultural purposes.

This effort, the National Agricultural Lands Study, was charged with:

- Determining the nature, rate, extent, and causes of conversion of agricultural land to nonagricultural uses.
- Evaluating the economic, environmental, and social consequences of agricultural land conversion and methods used to attempt to restrain and retard conversion.
- Recommending administrative and legislative actions, if found necessary, to reduce potential losses to the nation that might result from continued conversion of agricultural land to nonagricultural uses.
- Presenting a final report on findings and recommendations in January 1981.

To obtain the views of the public, the National Agricultural Lands Study conducted

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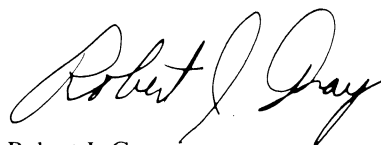
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17 workshops around the country. Comments and ideas about agricultural land conversion, its causes, and ways of retaining agricultural land were obtained from about 1,200 people, including farmers, ranchers, forest landowners, real estate developers, local and state growth management planners, environmentalists, and others. The NALS research staff investigated seven primary areas:

- Agricultural Lands in National and International Perspective;
- America's Agricultural Land Base;
- Demands on Agricultural Land;
- Allocation of Agricultural Land Among Competing Demands;
- Consequences on the Infrastructure of U.S. Agriculture When Agricultural Lands Are Converted to Non-Agricultural Uses.
- State and Local Actions Affecting Agricultural Land Availability for Agricultural Production;
- Influence of Federal Programs on the Availability of Agricultural Land.

The study's principal findings, conclusions, and recommendations are presented in this final report. Since our *Final Report* was released in January 1981, the Department of Agriculture has carried out an extensive review of the demand projections reported in Part IV. The tables and text in this Final Report have been updated to reflect the department's latest projections (dated March 1981) of the future demand for U.S. agricultural products. These differ from the earlier projections. We have made these changes in order to provide the most current and accurate projections available from USDA.

The study also produced several interim reports, technical papers, and a guidebook for use by state and local government officials. These publications are listed in an appendix to this report, along with information about how copies may be obtained.



January 1981

Robert J. Gray  
Executive Director  
National Agricultural Lands Study

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## EXECUTIVE SUMMARY

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U.S. agriculture is undergoing a major transition. For several previous decades the amount of land in cultivation had not changed significantly but during the 1970s cropland harvested increased by more than 60 million acres as American farmers responded to a dramatic rise in demand for U.S. agricultural exports. That demand is projected to grow larger still in the coming 20 years, and as it does, pressures on the U.S. agricultural land base will increase. By the year 2000, most if not all of the nation's 540 million acre cropland base is likely to be in cultivation. When seen from this perspective, continuing *nonagricultural* demands upon the agricultural land base become a matter for national concern.

The United States has been converting agricultural land to nonagricultural uses at the rate of about three million acres per year—of which about one million acres is from the cropland base. This land has been paved over, built on, or permanently flooded, i.e., converted to nonagricultural uses. For practical purposes, the loss of this resource to U.S. agriculture is irreversible.

The effects of agricultural land conversion have been felt locally, mainly in communities experiencing rapid growth; some citizens have grown concerned as they have seen their open spaces dwindle and the outlays for sewers, schools, and roads rise. States and local governments are experimenting with different means of keeping good agricultural land in farming.

Until quite recently, however, the conversion of agricultural land caused little concern at the national level. The land was being

used to meet genuine demand for new housing and other goods and services, and the overall productive capacity of U.S. agriculture seemed undiminished. There was plenty of unused and underused agricultural land remaining and the steady gain in crop yield per acre (productivity) more than made up for agricultural land converted to other uses. But in the last few years, rapid international and national changes involving food, energy, inflation, and economic instability have created uncertainties about the management of the nation's resources. The public is both concerned and uncertain about the capacity of the U.S. agricultural land base to supply food and fiber at the high levels of production that are likely to be demanded in the coming years.

This uncertainty has prompted a debate over the continued conversion of agricultural land. The National Agricultural Lands Study (NALS) was undertaken by the U.S. Department of Agriculture (USDA) and the President's Council on Environmental Quality (CEQ), with the support of 10 other federal agencies, to assess the future implications of agricultural land conversion.

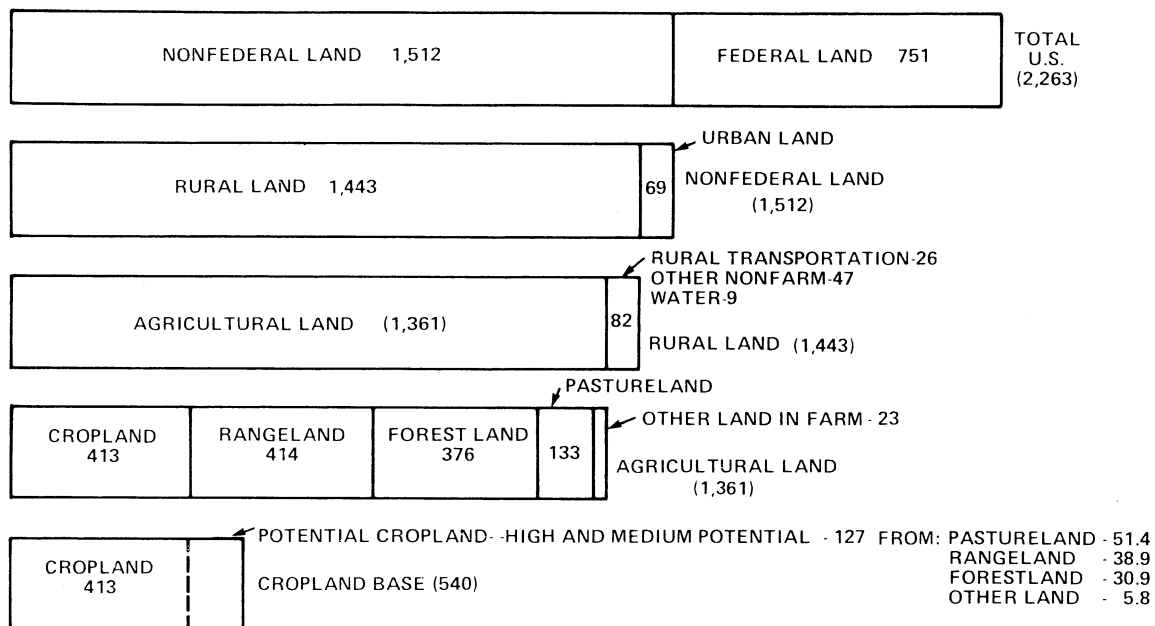
According to the data analyzed by NALS, the United States at present has approximately 413 million acres of cropland and about 127 million acres of potential cropland for a total of about 540 million acres. In addition, there are some 268 million acres of rural land with low potential for cultivated crops. (See Figure 1.)

From its research, NALS concludes that agricultural land is converted to other uses in an incremental piece-by-piece fashion. Many of the effects are local but continued conver-

**Figure 1.**

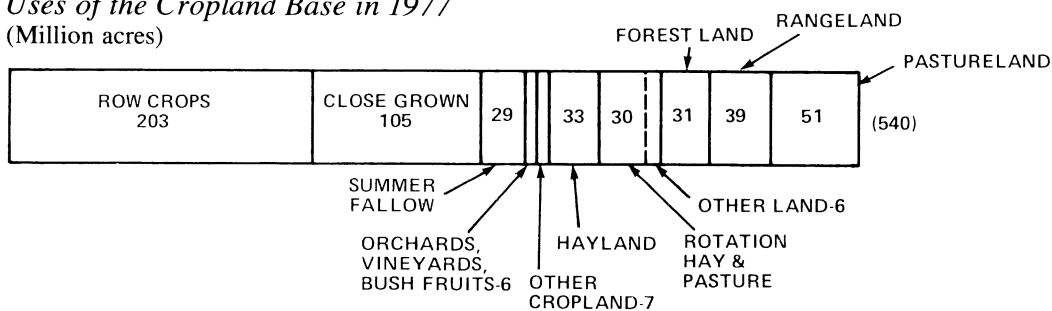
**America's Land Base in 1977**

(Million acres)



**Uses of the Cropland Base in 1977**

(Million acres)



*Note:* Unless otherwise specified, all data and references to the United States or to the "U.S. agricultural land base" in this report refer to the 50 states. In discussions based on Census of Agriculture and farm production regions, Alaska and Hawaii are excluded from the Western Region and U.S. totals.

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sion of agricultural land at the current rate could have noteworthy national implications. The cumulative loss of cropland, in conjunction with other stresses on the U.S. agricultural system such as the growing demand for exports and rising energy costs, could seriously increase the economic and environmental costs of producing food and fiber in the United States during the next 20 years.

### *Demographic and Economic Pressures*

**I**n the 1970s, there was an unmistakable migration of the U.S. population from urban to more rural areas and from the North to the less densely settled South and West. Moreover, there was a surge in economic activity in rural America during the decade, especially new industrial plants, commercial distribution centers and processing facilities.

Over 40 percent of the housing constructed during the 1970s was built on rural land. The highest rates of population growth occurred in the open country and in unincorporated areas. Many homes were built on scattered, relatively large-sized lots. The availability of mobile or prefabricated homes also contributed to the population growth in the countryside.

At the same time, the suburbs continued to spread into rural America. The demand for rural land was enhanced by the increase in households. The United States experienced a

22 percent increase in the number of households formed during the 1970s.

These recent demographic trends have disproportionately affected some of the nation's most productive agricultural land. In the top 100 counties ranked according to the value of their farm products, the population grew at nearly twice the national rate from 1970 to 1978.

Residential preference surveys repeatedly show that a higher percentage of urban dwellers would prefer to live in rural areas or small towns than in cities. NALS projects that almost 12 million new households will be added to nonmetropolitan areas between 1977 and 1995.

Population growth in rural areas not only affects agriculture directly by causing the conversion of agricultural land to other uses; it also has some serious indirect effects on agriculture. One of these effects is termed the "impermanence syndrome." As population increases in agricultural areas, land values rise and farms are broken into small parcels more suitable for housing than for farming. Looking beyond their fences to new developments, many farmers see the opportunity to sell their farms at a large profit for nonagricultural uses.

Depending on the intensity and proximity of the growth, farmers in such areas often believe that agriculture is no longer permanent. Investments in conservation practices may cease and building repairs may be neglected because many years of continued agricultural production would be required to justify such capital expenditures. Even if urban growth stops long before it reaches



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many farms, the perceived impermanence of agriculture in areas near expanding centers gives rise to a pattern of disinvestment in farmland, buildings, fences, and other farm property. In addition, agricultural equipment and supply stores lose business and may close if the number of farmers declines substantially.

Tensions between farming and nonfarming people often arise in rural areas with growing populations. The causes range from vandalism of crops and farm machinery to increased demands by new residents for public services, especially when the resulting tax increases to pay for those services fall heavily on the original residents.

Economic growth in rural America also outpaced growth in urban areas during the 1970s. Trade related jobs in nonmetropolitan areas rose about 27 percent between 1970 and 1976, compared with 16 percent in metropolitan areas. Manufacturing jobs during the same period increased 8 percent in nonmetropolitan areas, while declining 5 percent in metropolitan areas.

These economic changes influence rural land use. Economic establishments and supporting infrastructure require land. The amount of land actually converted to accommodate economic growth is not known precisely; however, the direct and indirect effects of economic growth appear significant. Economic development in rural areas contributes to the increasing demand for housing and public services, but it also provides new job opportunities for farmers as well as other rural residents. Many farm families now rely on off-farm work to supplement their incomes.

Although future rural settlement patterns are uncertain, the current economic growth and rural development trends are not expected to change substantially in the near future. This suggests that the conversion of highly productive agricultural land will continue unless there is a major shift of development onto rural land that is less productive for agriculture.

The impact of federal assistance programs on agricultural land is broad and far-reaching. NALS identified about 90 programs that contribute to the conversion of agricultural land. Programs with major impact are administered by the Department of Housing and Urban Development (HUD), Farmers Home Administration (FmHA), and Economic Development Administration (EDA).

Federal programs that result in loss of land for agriculture are generally ones that promote economic development, capital improvements, housing, environmental protection, or natural resources development. They encourage population growth in rural areas that either reduces farm profitability or directly results in conversion of agricultural land to nonagricultural use.

### *Sharp Regional Differences*

**T**here are wide regional variations in land resources and uses. Major shifts in agricultural land use among regions have occurred in the past, and factors that may contribute to additional shifts are underway to-

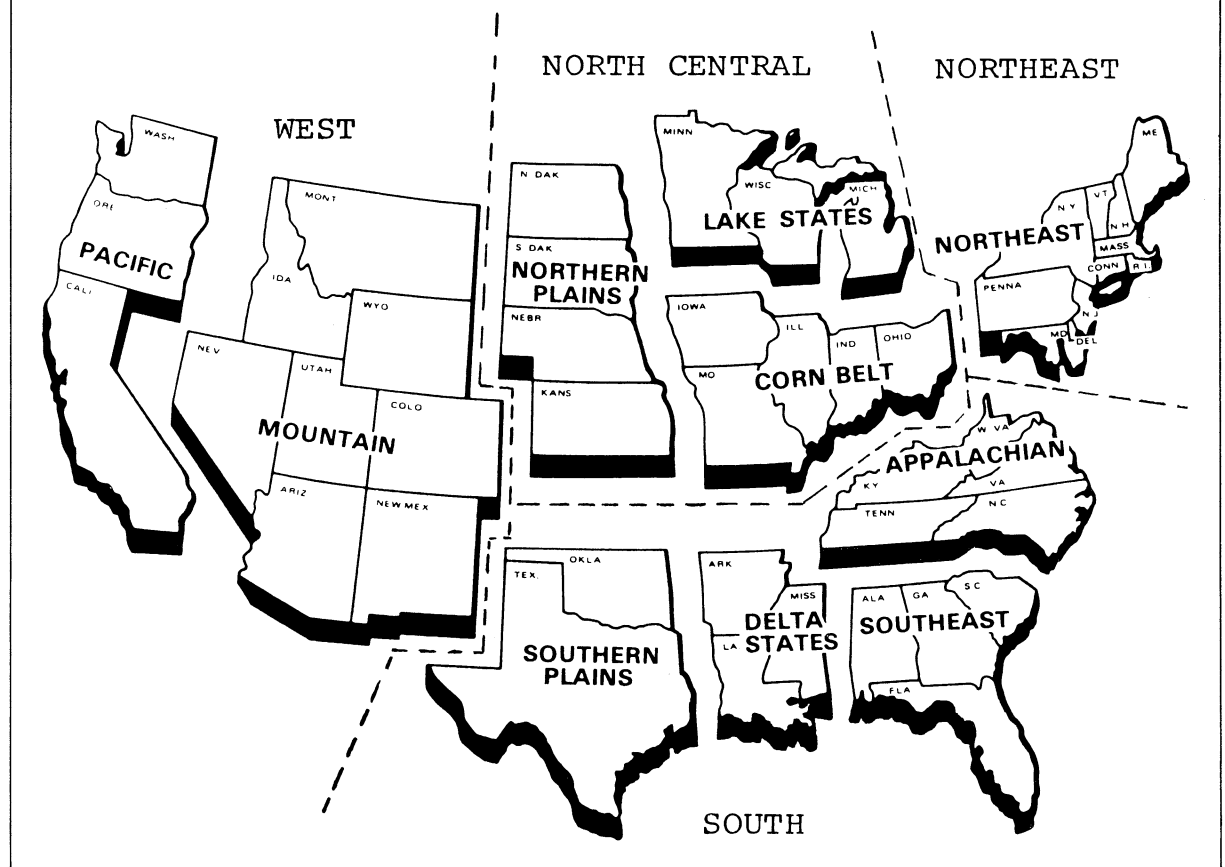
day. (See Figure 2.)

*The Western Region:* Due to this region's population growth, the conversion pressure on existing cropland here is probably the strongest in the nation. Future increases in production on existing and potential cropland in this region are uncertain because of limited water supplies (underground and surface) for

irrigation, and high energy costs for pumping. There are also new competing demands for limited water resources from new urban growth and energy development projects. The build-up of salts in the surface layer of the soil in some of the West's most productive valleys casts further doubt on the region's long-term agricultural productivity.

Figure 2.

*Census Regions—Farm Production Regions*



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*The North Central Region:* This region contains 55 percent of the nation's cropland and produces about 44 percent of its agricultural output in terms of the value of the products sold. Many communities in the region are surrounded by prime farmlands, so that any growth must occur at the expense of agriculture. Three major uncertainties in the region's agricultural outlook are (1) the decline of the underground water resources in some areas of the Northern Great Plains, especially in Kansas and Nebraska where irrigation has been so important to increasing productivity, (2) increased coal surface mining in the Corn Belt states such as Illinois, and (3) corn-based ethanol production in the Midwest.

*The South:* Agricultural economists look to the productive capability of potential cropland in the South to meet projected demands for food and fiber, while forest economists look to the productive capability of its forests to meet projected demands for lumber and paper. In some cases, they are both looking at the same land.

Existing reserves of land suitable for agricultural use are sizable here compared to acreages in other regions. Partially offsetting the region's climatic advantages and available cropland is its serious problem with soil erosion, caused by the high intensity rainstorms common to the area. As in the Corn Belt, expanded cropland usage here requires that additional precautions be taken against soil erosion. The prospects for increased agricultural production in this region are generally good except for certain areas such as Florida (extremely rapid population growth) and the Southern Great Plains (decline of ground-

water supplies).

States and local governments in the South have done less to protect agricultural land than any other region.

*The Northeast:* There are nearly 14 million acres of prime farmland in this region, more than in the eight Mountain states or in the five Pacific states, and agricultural analysts expect a revival of local farming as energy prices push up the costs of transporting food from other regions. Nonetheless, this region, which has about 25 percent of the nation's population, contains only 4 percent of its total cropland and 4 percent of its potential cropland.

## *A Fundamental Transition*

After four decades of agricultural surpluses, U.S. agriculture has moved away from underused production capacity. The principal underlying forces have been a gradual but marked overall decrease in the rate of annual productivity gains and a dramatic increase in foreign demand for U.S. agricultural products. The nation's continued conversion of cropland has to be evaluated within this context.

Over the next 20 years, USDA projects the volume of demand for U.S. agricultural products to increase by 55 to 80 percent over the 1980 level, assuming constant real prices. The three basic components of demand growth are exports, conventional domestic uses, and ethanol production.

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Exports are expected to dominate the growth in overall agricultural demand. The volume of U.S. agricultural exports increased an average of 10 percent annually during the 1970s. The harvest from one in every three acres of cropland in the United States is now exported. In 1979, the market value of U.S. agricultural exports reached a record \$40.5 billion. Agricultural exports now account for almost one-fifth of the nation's total exports and play a key role in the U.S. balance of payments. Over the next 20 years, USDA projects the volume of U.S. exports to grow by 140 to 250 percent above the 1980 level assuming constant real commodity prices. Rising real prices would dampen somewhat the expansion in export demand.

Domestic demand for food and fiber is projected to increase about one percent annually by volume during the 1980s and then slow to 0.9 percent annually during the 1990s. About one-third of this growth can be attributed to rising income and higher per capita consumption and the remainder to population growth.

**A**s OPEC oil prices continue to rise, the use of domestically-produced alcohol fuels from crops will increase. At present, ethanol (ethyl alcohol), distilled from corn, is being mixed in a 1 to 9 blend with gasoline and sold as gasohol. State and federal subsidies—totaling about \$1 per gallon of ethanol—have stimulated demand. Experts project the ethanol industry to reach an annual

production capacity of 4-6 billion gallons by 1990, although considerable uncertainty surrounds all alcohol fuel projections. The feedstock for this projected production level would require the corn grown on 15 to 23 million acres.

How much additional land will American farmers have to bring into cultivation to supply an average projected demand increase of about three-fourths over 1980 levels?

The answer to this crucial question depends heavily on the growth in yield per acre, a matter of considerable uncertainty. Agricultural experts disagree on how much the land's productivity will increase in the future. During the 1960s, nationally, crop yield per acre increased at an annual average rate of 1.6 percent and was by itself sufficient to meet increases in demand. In the 1970s, however, growth in yield per acre dropped to an average annual rate of 0.76 percent. During this time, about three-quarters of the gain in agricultural production came from newly cultivated acreage; only one-fourth came from increased yield per acre.

A number of factors apparently dampened productivity growth during the last decade, including:

- the rising costs of fuel, fertilizers, and other energy intensive inputs;
- less fertile agricultural land available for cropland uses;
- lack of reserve supplies of water to sustain past growth rates in irrigated agriculture; and
- the loss of natural soil fertility due to erosion or salinization.

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If the yield per acre growth rate of the 1970s continues through the next two decades, and projected demands also materialize, then American farmers would have to cultivate an additional 113 million acres of land for production of principal crops, an increase of about 50 percent. A higher rate of growth in yield per acre, one comparable to the 1960s, would require cultivation of an additional 77 million acres, an increase of nearly 30 percent, to meet the projected demand.

Shifts of land into cultivation of this magnitude are technically possible, but they will require some major adjustments in the U.S. agricultural system. There will have to be large-scale shifts of forage land into crops, for example. Less land will be available for livestock grazing. As a consequence, confinement feeding operations will become more prevalent and the real cost of meat production will probably rise.

**H**igher real crop production costs are probable as well because potential cropland now coming into cultivation is more costly to till, is subject to more crop failures and yield variability, and produces poorer quality crops than cropland already in cultivation. Moreover, this land is usually more susceptible to erosion, groundwater overdrafts, and other environmental problems, hence its cultivation results in higher social costs either through conservation expenditures or through environmental degradation.

To draw into agriculture sufficient re-

sources to meet the projected level of demand in the year 2000, farmers and ranchers will require incentives in the form of considerably higher real profits from their commodities, either through reduced production costs or increased prices. Protecting productive cropland that otherwise would be converted to nonagricultural use will help mitigate upward pressure on production costs, and indirectly, consumer prices, as the demand for food and fiber mounts throughout the remainder of the century.

### *Prime Movers—State and Local Governments*

**I**n its research, NALS found considerable grassroots interest in the protection of good agricultural land in widely different communities around the country. Citizens cite a variety of reasons for their interest. For some, their livelihood depends on the continued viability of the local agricultural economy. Others place a high value on open space or on access to fresh vegetables and fruits at reasonable prices. Still others believe strongly in the “stewardship” of the land. There are a growing number of Americans who, for whatever reasons, think good agricultural land has an intrinsic value to the community beyond its price in the market place.

State and local governments have responded by trying a remarkable number of different approaches to agricultural land

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protection. There are few widely imitated models. Each state, county and township seems to have tried its hand at creating a unique program to deal with one or more of the factors that threaten the continued vitality of farming and the rural quality of life.

A common thread running through these efforts is zoning. Some 104 counties and 166 municipalities have adopted agricultural zoning in the last 15 years. It is still too early to assess with certainty zoning's long-term effectiveness when it comes to protecting agricultural land. It does seem clear, though, that no one tool by itself, whether it be zoning, property tax relief, or purchase of development rights, is adequate.

NALS reviewed a wide variety of state and local programs designed to protect agricultural land. Most successful programs began very simply by involving citizens in studying the situation and identifying problems and policy alternatives. Among the key ingredients of an effective agricultural land protection effort are farmer participation from the beginning, adequate technical and often financial support; strong local leadership, patience, and good timing, i.e., getting started *before* development pressures become too strong. Successful programs make agricultural land protection a part of a comprehensive growth management program, providing room for development on less productive agricultural land. Local programs need active state support because the effects of development often spill over township and county lines.

The state and local work done to date on the protection of productive farmland is en-

couraging, but an enormous amount remains to be done. At present less than 20 million acres of existing or potential cropland are protected under comprehensive, multi-faceted state or local programs.

### *Federal Initiatives—NALS Recommendations*

*T*he federal government should begin by putting its own house in order. Of the 37 federal agencies reviewed by NALS whose programs sometimes encourage the conversion of productive agricultural land, only USDA and EPA have explicit policies designed to consider the effect of their programs on agricultural lands. And even in these two agencies, some program sub-units have not yet incorporated agricultural land reviews into their regulations and guidelines.

To remedy this situation, NALS recommends that the President or the Congress enunciate the national interest in the protection of productive agricultural land and direct the appropriate federal agencies to adopt an agricultural land policy to assure that they consider the potential negative effects of their activities on agricultural land.

The federal government should not finance or subsidize development projects that occur on good agricultural land. When a development project involves the conversion of agricultural land, the applicant for financial assistance should be required to demonstrate

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that there are no practical alternative sites on land less suited for agriculture.

In addition, federal loan programs should provide positive incentives in the form of lower interest rates to encourage development away from good agricultural land and onto land less suited for agricultural uses. Specifically, NALS recommends that the federal government offer preferential rates as part of the following ongoing programs:

- Federal direct loan and grant programs for housing, commercial and industrial development;
- Loan guarantee programs for development projects, community services, or infrastructure development;
- Home mortgage assistance; and
- Capital improvement loan programs for water, sewer, and electrification.

Federal action should address two separate problems with the estate tax. First, the use valuation provision for agricultural land should be revised so it no longer benefits large estates more than small ones. Secondly, on the administrative side, the Treasury Department should simplify estate tax provisions and clarify instructions and information to farmers, land owners, and tax advisors.

An overall review of the Federal Tax Code should be undertaken by the Departments of Treasury, Commerce, and Agriculture to determine the desirability and feasibility of offering positive incentives for retaining agricultural land in production.

The second major federal initiative should come in the area of supporting local

and state efforts to develop agricultural land protection programs by providing technical assistance, data, and, where appropriate, financial backing.

### *A Final Word*

As a resource problem, the conversion of agricultural land does not constitute a present-day “crisis,” and hence it lacks the equivalent of, say, a gasoline line for concentrating national attention. Nonetheless, it does pose some very serious long-term risks for the United States. In a sense, the issue of protecting agricultural land today is analogous to the energy conservation issue 10 years ago. Looking ahead, we can see a resource problem developing but the immediate incentives for conserving the resource are weak. NALS recommends that the federal government make the protection of good agricultural land a national policy. NALS bases this recommendation on the two basic conclusions of its analysis:

- (1) Given projected demand increases for U.S. agricultural products in the coming years, particularly for exports, and the uncertainty regarding future gains in crop yield per acre (productivity), the economic and environmental costs of continued conversion of the nation’s most productive agriculture into housing tracts, shopping centers, industrial sites, and reservoirs could be very high within 20 years.

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(2) Trend is not destiny. The population and economic growth trends now in progress in rural America can continue without disruption *and* without the loss of productive agricultural land at current rates. A concerted state and local government effort—buttressed with federal technical and financial support—combined with a redirection of federal loan programs could, if begun now and carried out energetically over the next two decades, channel much of the growth and development onto less productive agricultural land.

## RECOMMENDATIONS

**T**hese recommendations emphasize the primacy of state and local governments in the protection of agricultural land and the supporting roles which should be played by federal agencies. The recommendations are organized in five areas, and summarized below:

### *I. Characteristics of Successful Agricultural Land Protection Programs Offered for Consideration by States and Local Governments*

- The goals of protecting agricultural land and guiding urban growth are best achieved in combination with a comprehensive growth management system.

- State governments should assume an active leadership role in protecting agricultural land.
- Agricultural land protection programs should be established before development patterns foreclose options.
- Efforts to protect agricultural land should be based on accurate information about agriculture and future growth patterns.
- Agricultural land protection programs should have able political leadership.
- Agricultural land protection programs should support the economic viability of agriculture in an area.
- Agricultural land protection programs should be designed so that they are legally defensible.

### *II. National Policy and Federal Agency Initiatives*

- The national interest in agricultural land should be articulated by a Presidential or by a Congressional statement of policy.
- Positive incentives should be designed within federal programs to encourage development away from good agricultural land and onto land less suited for agricultural uses.
- The adoption of an agricultural land policy by each federal agency whose programs result in converting agricultural land to nonagricultural use should be required by an Executive Order or by Congressional action.



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- The coordination and implementation of agricultural land policies should be monitored across agency lines through an interagency group.
  - Single-purpose federal assistance programs should be coordinated at the state or local level to ensure that agricultural land issues are adequately addressed in state or local planning efforts.
  - Tax provisions that affect the agricultural sector should not favor purchasers of agricultural land who do not intend to retain the land in agricultural use. Periodic review of the Federal Tax Code should be made to determine the desirability and feasibility for offering positive incentives for retaining agricultural land in productive agricultural use.

### III. *Technical Assistance and Education*

- The Soil Conservation Service (SCS) and the Cooperative Extension Services should improve their capacity, within existing resources, to provide technical assistance to units of government seeking to develop agricultural land protection programs.
- USDA and other federal agencies should provide technical assistance to state governments which request help in developing land protection policies or programs.
- USDA should design an educational program describing the importance of agricultural land to the nation's well-being and distribute educational materials through the mass media, schools,

groups, and other federal agencies.

- USDA should establish an Agricultural Land Information Center to serve as a central depository and distribution point for information on agricultural land issues, policies, programs, and innovations.

### IV. *Financial Assistance*

- Appropriate federal assistance programs should be revised as needed to permit eligibility of local government units, including soil and water conservation districts, to receive financial aid in developing agricultural land protection programs.
- USDA should consider small matching grants for "capacity building" to state departments of agriculture (or other appropriate state agencies) that seek to manage agricultural land issues.
- The Soil Conservation Service should give higher priority to completion of Detailed Soil Surveys in counties with important land under conversion pressure, and should respond to information requests from those counties now in the process of developing agricultural land retention programs.

### V. *Information and Research Needs*

- The Federal Office of Statistical Policy and Standards, in consultation with other agencies, should develop a statistical protocol for federal agencies which collect and use natural resource data. Components of the protocol should

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cover standards for data collection techniques and requirements for appropriate statements of data limitations in connection with data publication or public release.

- USDA should develop a capacity for providing state or local governments with detailed statistical information on agricultural land use collected by federal agencies.

- A Data Advisory Group should be established in each state with membership of state and local officials. This group should advise agencies on how to make federal data collection programs more useful and accessible at the state and local level.
- The establishment of an agricultural land resource fund should be given serious consideration.



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## *DEFINITIONS—NATIONAL AGRICULTURAL LANDS STUDY*

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### *RURAL LAND:*

The National Agricultural Lands Study defines “rural land” as all nonfederal land except for urban and built-up land. There were 1.443 billion acres of rural land in 1977.

### *AGRICULTURAL LAND:*

“Agricultural lands” are lands currently used to produce agricultural commodities including forest products, or lands that have the potential for such production. These lands have a favorable combination of soil quality, growing season, moisture supply, size, and accessibility. This definition includes about 590 million acres of land that has no potential for cultivated crop use but is now in agricultural uses including range, pasture, or forestland. There were 1.361 billion acres of agricultural land in 1977.

### *CROPLAND:*

Land used to produce crops for harvest, either alone or in rotation with grasses and legumes. Cropland uses include row crops, close grown field crops, hay crops, rotation hay and pasture, nursery crops, orchard crops, other specialty crops, summer fallow, and other cropland temporarily idled or in conservation uses. There were 413 million acres inventoried as cropland in 1977.

### *POTENTIAL CROPLAND:*

“Potential Cropland” is land not currently in cropland use. Four “Potential Cropland” ratings reflect the relative ease and profitability of converting potential cropland to cropland use. There are high, medium, low, and zero ratings of the potential for conversion to cropland.

In 1977, there were 36 million acres of high potential cropland, 91 million acres of medium potential, 268 million acres of low potential, and 588 million acres with zero potential for conversion to cropland use.

### *CROPLAND BASE:*

The “cropland base” is defined as land currently used for cropland plus high or medium potential cropland. In 1977, there were 540 million acres in the cropland base.

### *PASTURELAND:*

Land producing forage plants for animal consumption. Vegetation on pastureland is primarily introduced grasses and legumes. Some native plants may also grow on pastureland. A number of management practices are carried out where appropriate on pastureland. These include grazing management, reseeding, renovation, reestablishment, mowing, weed or brush control, and liming or fertilization. In 1977, there were 133 million acres of pastureland.

### *RANGELAND:*

Land producing predominantly native grasses, grass-like plants, forbs, or shrubs. These native plants dominate the mix of the climax vegetation on rangeland. These lands may be revegetated either naturally or artificially and managed to preserve or enhance native vegetation. Rangelands include natural grasslands, savannahs, shrublands, most deserts, tundra, alpine communities, coastal marshes, and wet meadows. They include land with less than 10 percent stocking with forest trees of any size. In 1977, there were 414 million acres of rangeland.

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(All acreage estimates based on the 1977 National Resource Inventory, Soil Conservation Service)

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*FOREST LAND (WOODLAND):*

Land with at least a 25-percent tree canopy cover or land at least 10-percent stocked by forest trees of any size. Forestland includes land recently cleared by man or natural forces suitable for natural or artificial reforestation. There were 376 million acres of forestland in 1977.

*URBAN AND BUILT-UP:*

Land used for residences, industrial sites, commercial sites, construction sites, railroad yards, small parks of fewer than 10 acres within urban and built-up areas, cemeteries, airports, golf courses, sanitary land fills, sewage treatment plants, water control structures and spillways, shooting ranges and so forth. There were 69 million acres of urban and built-up land in 1977.

*RURAL TRANSPORTATION:*

Land used for roads and railroads in rural areas. Generally, this includes the entire right-of-way (26 million acres in 1977).

*WATER:*

Water bodies less than 40 acres in size and streams less than 1/8 mile wide (9 million acres in 1977).

*CONVERSION:*

“Conversion” is defined as a change between major land use categories such as cropland, pasture or range, or developed uses. The changes may be within agricultural uses or to nonagricultural uses.

Changes to urban, built-up, rural transportation, or water uses are considered by the NALS to be, for all practical purposes, irreversible. Changes within agricultural uses,

such as forestland to pasture or potential cropland to cropland, are considered generally reversible.

*FARMSTEADS:*

Land for dwellings, building, barns, pens, corrals, farmstead windbreaks, family gardens, and other uses connected with operating the farms and ranches (11 million acres in 1977).

*OTHER LAND IN FARMS:*

Land reserved for wildlife and windbreaks, not directly associated with farmsteads. Includes commercial feedlots, greenhouses, and nurseries (12 million acres in 1977).

*OTHER NONFARM:*

Land used for greenbelts, large unwooded parks, cropland idled prior to development, and other nonfarm uses not elsewhere defined, including land in strip mines, quarries, gravel pits, and borrow pits that have not been reclaimed for other uses (47 million acres in 1977).

*NONFEDERAL LAND:*

“Nonfederal land” is defined as all lands except those in federal ownership. Included are lands that are privately owned; corporation or partnership owned; state, county, or municipally owned; Indian tribal ownerships, etc. (1.512 billion acres in 1977).

*PRIME FARMLAND:*

“Prime farmland” has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops. It has the soil quality, growing

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season, and moisture supply needed to economically produce sustained high yields of crops when properly managed.

Prime farmland includes cropland, pastureland, rangeland, and forest land. It does not include land converted to urban, industrial, transportation, or water uses.



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## INTRODUCTION

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*I*n the last decade, concern has grown about the conversion of U.S. agricultural land to urban and other uses. At the national level, this concern focuses on whether continued conversion will seriously threaten the nation's future ability to satisfy the domestic and international needs for food and fiber at an affordable price. There is uncertainty about whether the nation's agricultural land base is adequate to meet demands for future agricultural products, housing, recreation, and energy without restricting open space, disrupting ecological systems, or posing long-run damage to the national interest. Finally, there is the concern that Americans today have the obligation to manage the nation's croplands, ranges, and forests for future generations.

Although these issues have received increasing attention since the early 1970s, interest in the status of U.S. agricultural land is by no means new. The dust bowl of the 1930s brought widespread recognition of the need for soil conservation. Since then, there have been many studies of both the quality and quantity of U.S. agricultural land.

Concerns about the future availability of agricultural land were not intense during the 1950s and 1960s largely because of the remarkable advances in agricultural technology. The U.S. agricultural system grew increasingly productive with the help of modern technology including synthetic organic pesticides, new seed varieties, more sophisticated machinery, and improved fertilizers. Because of excess productive capacity, the major concerns of farmers and government officials were surplus production, stabilizing

the agricultural economy, and supporting farm income.

Concern about meeting future desired levels of agricultural production for domestic and export needs increased after the 1973-1975 shortfall in world agricultural production. Since then, increased agricultural exports have largely eliminated the problem of U.S. agricultural surpluses. These developments coincided with shortages and rising prices of oil and other basic world commodities, further emphasizing the value of all natural resources, including agricultural land. These developments also led to conjecture and controversy about the need to substitute additional agricultural land for higher-priced capital inputs such as machinery, fertilizers, fuel, and chemicals. At the same time, U.S. agricultural products became increasingly important in international trade and diplomacy. Revenues from farm exports contributed significantly to the U.S. balance of payments and helped maintain the dollar's purchasing power overseas. Access to U.S. grain has also been used in support of U.S. foreign policy goals.

There is almost unanimous agreement among agricultural analysts that international export demands for U.S. agricultural products will continue to increase. In 1980, the production from 1 out of every 3 acres of U.S. cropland was exported. Exports comprise 25 percent of the total gross value of U.S. agricultural production, which was approximately \$40 billion in 1980. Agricultural exports are clearly a major contributor to the economic well-being of the nation's agricul-

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tural industry and its farmers and ranchers. Nevertheless, these increases in agricultural exports have encouraged some farmers to grow crops on marginal lands, thereby increasing the cost of production and often causing soil deterioration from wind and water erosion, soil compaction, and loss of water holding capacity.

In addition to the increasing domestic and international demand for U.S. agricultural products, recent human settlement patterns led to increased competition between agricultural and nonagricultural uses of land. This is particularly true in areas where agriculture is traditionally an important industry and where the current pace of urbanization is especially rapid. Hence, in many communities, commercial and other related nonagricultural activities came into direct competition with farming for rural land during the 1970s. Local conflicts and tensions persist and could grow in the fringe areas surrounding our larger and older cities, as well as small towns and rural areas.

As a result of these demographic trends, people are concerned about the changes in rural lifestyles, and in the availability of productive land, as well as changes in agricultural employment and related economic activity in their regions. Many communities hope to maintain the surrounding countryside in its current use and wish to avoid conflicts between urban and rural neighbors. Many argue that the groundswell to preserve farmland is not so much a concern about feeding the world as it is to preserve a lifestyle based on a viable agricultural economy.

The most recent available data show that about 3 million net acres of agricultural land are converted each year to urban and built-up uses — of this 3 million acres an estimated 675,000 acres are from the 413 million acres classified as existing cropland. In addition, other land converted to nonfarm uses is classified as potential cropland or drawn from a miscellaneous category of land referred to as “other.” While existing national agricultural land use inventories do not provide an adequate basis for estimating the annual conversion of cropland from these potential cropland and “other” land categories, the acreage is clearly significant. In addition, cropland in proximity to that actually converted is often idled because many farmers discontinue long-term investments in farming operations and move away from urbanizing areas. For all practical purposes, these acres on which farming has been abandoned because of nearby conversions to nonagricultural uses are considered unavailable for future agricultural production.

Some analysts state that the U.S. agricultural land base is adequate to meet domestic food and fiber needs for many generations and perhaps indefinitely. This perspective, however, does not adequately account for global interdependence in basic commodities and natural resources, including most notably, energy and food. Taking into account projected international food needs,

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the future adequacy of the nation's agricultural land resource base to satisfy all sources of demand without significantly higher public and private costs of production is uncertain. This uncertainty is reflected in the wide divergence of professional opinion as to whether steps should be taken to protect U.S. agricultural land for the future. Some have argued that science, technology, and better management will enable the volume of agricultural production to continue increasing at rates sufficient to render present and projected agricultural land losses irrelevant. Others have argued that local, state, or federal government action is needed now to assure that every acre of U.S. agricultural land will remain available for crop production, pasture, or forestry uses. A reasonable view of the situation and reasonable policy responses lie between these two extreme perspectives.

The fundamental questions about agriculture land availability are complex. They turn, for example, on whether the magnitude of land conversion is significant or fairly modest and on the criteria relevant in making this judgment. They also involve judgments as to whether the forces that have led to present land conversion rates will decrease or accelerate as the United States moves into the 21st century. No one is certain to what extent Americans will continue to move into rural areas. Higher gasoline prices and a change in public policies may discourage commuting while encouraging more compact growth

around metropolitan areas or small cities. On the other hand, the population shifts and other forces that have led to scattered growth on agricultural land could continue unabated.

The pressure on the agricultural land base to produce grain source gasohol also cannot be projected with certainty, nor can the rate of technological change. Weather and climate, which are always uncertain, will continue to influence the productivity and profitability of U.S. and world agricultural production. The costs of protecting the quantity and quality of agricultural land while meeting essential needs for food, fiber, and energy provide another major uncertainty.

Some argue that in an era of rising demand for food and fiber, market forces can be relied on altogether to allocate agricultural land to the best economic uses. Others argue that the land market cannot be expected to take into account all the social and environmental costs of agricultural land conversion particularly those which are associated with cumulative or long-term effects. Viewed from this latter perspective, many states and local governments are intensifying their efforts to discourage the avoidable and irreversible conversion of productive agricultural land.

The National Agricultural Lands Study has examined these complex issues. Our findings narrow the range of uncertainty and are intended to help private citizens and public officials evaluate the needs and opportunities for protecting our nation's agricultural lands.





# *One: THE U.S. AGRICULTURAL LAND BASE*

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## *Agricultural Data Base*

One of the basic tasks confronting the National Agricultural Lands Study (NALS) was to draw upon existing sources of data on the agricultural land base and more clearly identify changes in major land uses over the last several decades. In carrying out this task, NALS analyzed numerous available pertinent data series compiled by different agencies of the Federal Government. The most important sources of data on the agricultural land base are compiled by the U.S. Department of Agriculture (USDA). They are: the National Resource Inventory (NRI) series carried out by the Soil Conservation Service, the data generated in response to the Forest and Rangeland Renewable Resources Planning Act (RPA) by the Forest Service, the Census of Agriculture, and the Major Land Use Data Series prepared by the Economics and Statistics Service.<sup>1</sup>

Although no one data series fully met all the needs of NALS, much information on recent land use trends can be derived from these and other agricultural land data sources. The NRI series and the Census of Agriculture generally are in agreement on the direction of land use trends, although there are some significant differences in the magnitude of changes in several data elements. Most of these differences can largely be explained by inherent differences between data series. The most important sources of variation identified by NALS are:

- 1) The definition and coverage of data elements did not match precisely;
- 2) Geographic areas or types of land included in an inventory vary among series;
- 3) The time periods covered by the data series differed.

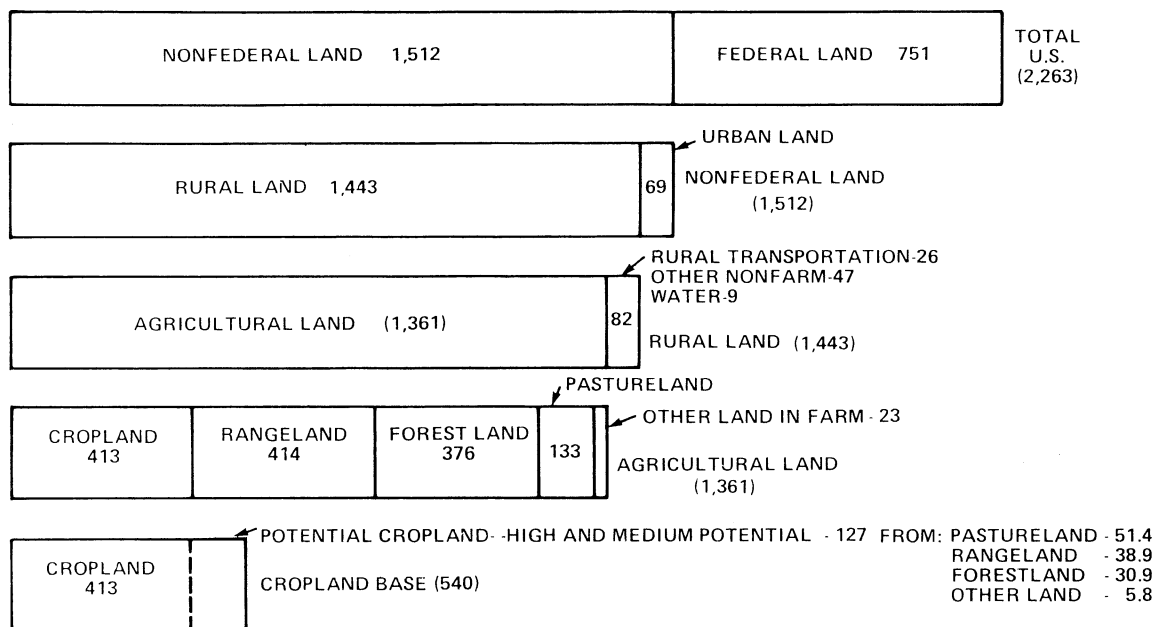
After examining and analyzing the various data and data sources, NALS decided to rely on the 1977 National Resources Inventory as the principal source of current data for determining the magnitude and uses of the agricultural land base. Changes in land use over time, including both agricultural and nonagricultural conversions, were calculated both from data in the NRI series (including the 1975 Potential Cropland Study, and the 1967 and 1958 Conservation Needs Inventory), and the Census of Agriculture for 1969, 1974, and 1978. Throughout this section, we report figures from both the NRI series and Census data wherever possible, and try to explain major differences between these two basic data sources.

### *The U.S. Agricultural Land Base*

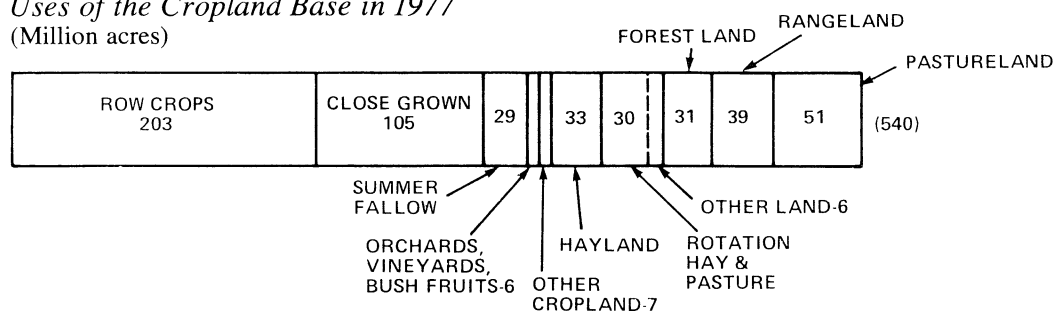
#### *Federally-Owned Agricultural Land*

There are about 500 million acres of federally-owned agricultural land. Managed by nine agencies, this acreage accounts for 66 percent of all federally-owned land. Although accurate figures are not available on uses of federal land, range and forestland are the two major ways federal land contributes to U.S. agricultural production. Of the approximately 500 million acres of federally-owned agricultural land, about 466,000 acres are cropland,

*Figure 1.1.*  
*America's Land Base in 1977*  
 (Million acres)



*Uses of the Cropland Base in 1977*  
 (Million acres)



*Note:* Unless otherwise specified, all data and references to the United States or to the "U.S. agricultural land base" in this report refer to the 50 states. In discussions based on Census of Agriculture and farm production regions, Alaska and Hawaii are excluded from the Western Region and U.S. totals.

almost 6 million acres have high or medium potential for conversion to cropland, 279 million acres are pastured and grazed (including some forest land) and 236 million acres are forest land (including grazed forestland).

#### *Nonfederally-Owned Land Base*

The United States had about 1.36 billion acres of agricultural land in this category in 1977. About 413 million acres were cropland; 414 million acres were rangeland; 133 million acres were pastureland; 376 million acres were forestland; 11 million acres were farmsteads, and there were 12 million acres of "other land in farms." Of the approximately 1,361 million acres of nonfederally-owned agricultural land, 413 million acres were classified as cropland in 1977 by the NRI. In addition, there were about 127 million acres that had high and medium cropland potential. Figure 1.1 shows these land use categories and gives a breakdown of land uses in 1977 within the cropland base.

Comparable data from the 1978 Census of Agriculture show that the acreage of "Land in Farms" was 1,050 million acres, including a total of 460 million acres of cropland. The Census and NRI definitions of cropland differ somewhat. The Census definition includes two categories: "cropland harvested" and "cropland pasture and other cropland." The two Census components of cropland are inventoried together in the NRI definition of cropland. The major difference in the total acres of cropland between the two data series is that some of the cropland pasture (Census definition) was judged to be potential cropland according to the definitions used in the NRI.

The division of U.S. land into four major Census Regions is shown in Figure 1.2. The distribution of the agricultural land base by census regions and land uses is shown in Table 1.1. As shown in the table, the North Central region has over 55 percent of the nation's

*Table 1.1.*

#### *Agricultural land uses in 1977 in selected census regions*

(Millions of Acres)

Census Regions	Crop Land	Pasture Land	Range Land	Forest Land	Other Lands in Farms	Total
West	65.8	12.6	229.3	63.2	1.4	372.3
North Central	228.6	41.6	71.1	69.1	7.2	417.6
South	101.6	72.7	113.6	181.7	2.0	471.6
Northeast	16.9	5.8	—	62.3	1.5	86.5
TOTALS	412.9	132.7	414.0	376.3	12.1	1,348.0*

\*Excludes 10.9 million acres of "Farmsteads".

Source: "Agricultural Land Data Sheet, America's Land Base In 1977," National Agricultural Lands Study, Interim Report 2, 1980.

cropland, the West has over 55 percent of the rangeland, and the South has about 48 percent of the forestland, 27 percent of the rangeland, and 25 percent of the cropland.

### *Potential Cropland*

**T**he NALS includes 127 million acres of high and medium potential cropland in its definition of the cropland base. As demand for U.S. agricultural products rises, additional land will be drawn into cultivated crop uses from this reserve of potential cropland. "High potential" cropland, some 36 million acres, is land that has favorable physical characteristics to support high yield crop

production. In addition, similar lands must have been converted to cropland during the last three years in a given area. Generally, high potential cropland requires minimal land preparation in order to be used for intensive crop production. A "medium potential" rating also requires favorable physical characteristics, but generally conversion costs and erosion potential are judged to be higher than for high potential lands.

A "low potential" rating indicates that conversion to cropland would be unlikely because of serious obstacles both in the initial conversion process and in the management of the land once it is put into crop use. While a low potential rating is based upon physical and economic criteria reflecting 1976 conditions, it is probable that most of these lands will remain poorly suited for intensive crop

*Table 1.2.*

*Agricultural land with high and medium potential for being converted to cropland, by selected census regions and by 1977 land uses.*

(Millions of acres)

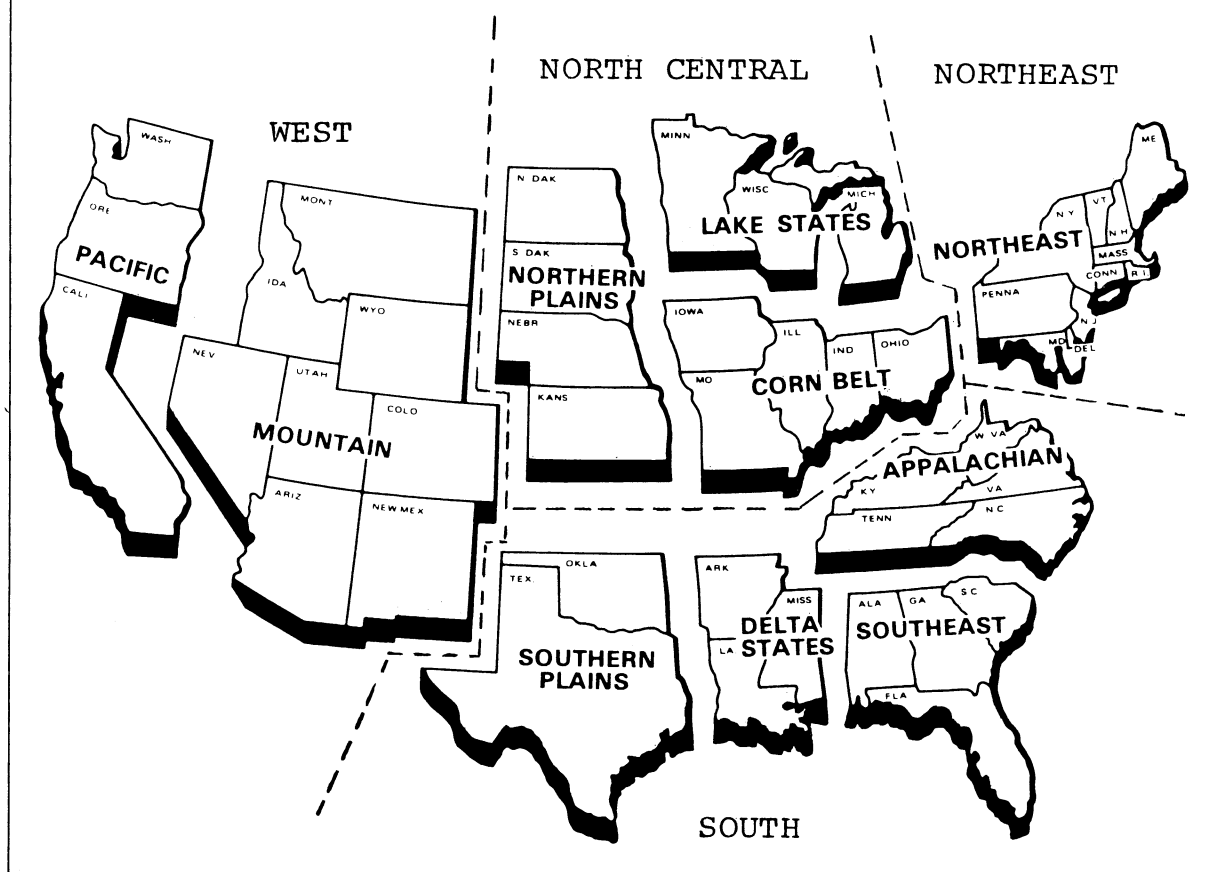
Census Region	1977 Land Uses				Total
	Pastureland	Rangeland	Forestland	Other	
West	4.0	14.2	1.1	0.3	19.6
North Central	18.8	12.5	7.0	2.0	40.3
South	26.6	12.2	20.6	0.7	60.1
North East	1.9	—	2.2	0.5	4.6
Total	51.3	38.9	30.9	3.5	124.6*

\*About 2 million acres of "Other Nonfarm" has potential for conversion to cropland.

Source: "Agricultural Land Data Sheet, America's Land Base in 1977," National Agricultural Lands Study.

Figure 1.2.

*Census Regions—Farm Production Regions*



uses. However, with improved forestry and range management practices, these lands are likely to become a more productive component of the nation's agricultural land resource base. A "zero" rating indicates severe development problems, climatic limitations, or physical features such as slope or altitude that preclude conversion to cropland.

In carrying out the 1977 NRI, determinations of cropland potential were made by a group representing numerous USDA agencies based on 1976 commodity prices, development and production costs, and physical soil characteristics. In 1977, potential cropland was primarily used for pasture, range, or forest production. Figure 1.3 shows the uses

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of potential cropland in 1977.

The distribution of the high and medium potential cropland within the agricultural land base is shown in Table 1.2 by the four major census regions and land use in 1977.

Among the inadequacies and inconsistencies in the available data series on agriculture land use trends, one particularly troubling unknown was the acreage of high and medium potential cropland that is converted to both agricultural and nonagricultural uses annually. Existing data sources provided no accurate figures of land use change within or from this portion of America's nonfederally-owned cropland base.

### *Changes Within The U.S. Agricultural Land Base*

**H**istorically, cropping has been the most profitable agricultural use for most agricultural lands capable of sustained high crop yields. Nevertheless, considerable shifting into and out of cropland is continually occurring within the agricultural land base. These shifts result from changes in the economics of crop production, technology, and farm programs.

Shifts within the agricultural land base have historically been of considerable magnitude and duration. The acreage of cropland harvested remained essentially stable at about 345 million acres between 1915 and 1955,<sup>2</sup> although regional shifts and cropland aban-

donment were common. Then in 1956 cropland harvested began a marked 17-year decline, falling to 289 million acres in 1972. Driven by expanding foreign demand, cropland harvested rose rapidly, reaching 353 million acres in 1980. Further substantial expansion in cropland harvested is expected.

During the 1967-1975 period, SCS data shows that about 74 million acres were moved out of cropland into pasture, range, forestry, and other agricultural uses. During this period, nearly 49 million acres of land in these uses were moved into cropland. Table 1.3 shows the magnitude and location of shifts within the agricultural land base between 1967 and 1975.

The relatively large magnitudes of land use shifts indicate considerable flexibility in how American farmers, ranchers, and foresters use the nation's agricultural land base. Over time, major land use changes have accompanied the changing structure and geographic distribution of agricultural enterprises. Some shifts in land use are caused by the depletion of soil fertility, changes in water availability, or technological innovations. For a host of reasons, some shifts of land from cropland uses are not considered readily reversible. In 1977, only one-third of the land that shifted out of cultivation between 1967-1975 was judged to have high or medium potential for cropland use.<sup>3</sup>

Looking ahead, there is much concern regarding the availability of land to expand the acreage planted to principal export crops. Between 1970 and 1980, cropland harvested increased by about 60 million acres. The pressure to increase cropland

Figure 1.3.

*Potential Cropland*

(Million Acres)

	H I G H	M E D I U M	L O W	Z E R O	
Pastureland	18	33	47	35	
Rangeland	9	30	97	271	
Forest land	7	24	109	230	
Other land	2	4	15	52	
Total	36	91	268	588	983

*Categories of Agricultural Land*

(Million Acres)

Cropland Base

Cropland	413	
High and medium potential	127	540
Low and zero potential for conversion to cropland	+ 856	
Subtotal	1396	
Less other rural lands that are in water and trans- portation uses given a potential cropland rating	- 35	
Agricultural land	<u>1361</u>	

*Table 1.3.*

*Agricultural land shifted into and out of cropland—by selected census regions, 1967-1975*

(Million acres)

Shift	West	North Central	South	Northeast	Total
Out of Cropland	11.4	28.4	27.6	6.8	74.2
Into-Cropland	8.2	18.7	18.1	3.7	48.7
Total Acres Shifted	19.6	47.1	45.7	10.5	122.9
Net Shift out of Cropland	3.2	9.7	9.7	3.1	25.5

Source: "Potential Cropland Study," USDA/SCS, 1977.

harvested will probably continue, or perhaps even accelerate, if projected future demands for agricultural products are to be met. Part 4 discusses prospects for future demand and production of agricultural commodities including the types and magnitude of cropland shifts which might be required to meet demand for food and fiber in 2000.

Preliminary data from the 1978 Census of Agriculture also demonstrates the significant magnitude of shifts out of and back into cropland between 1969 and 1978. In the decade, over 35 million acres shifted although there was only about a one million acre net gain in cropland. This information is shown in Table 1.4. In order to compare total cropland figures and other land use information reported in the last three Censuses of Agriculture, two types of adjust-

ments in Census data are necessary to achieve comparability. First, the definition of a farm used by the Census changed between the 1969 and later Censuses. In 1969, a farm was defined as a place selling \$250 in agricultural products while in 1974 and 1978 a minimum sales figure of \$1,000 was used.<sup>4</sup> (In monitoring agricultural land conversion, NALS prefers use of the 1969 definition because smaller farms are often prone to sale and development.)

A second type of adjustment is needed in Census data to correct for underenumeration in the 1974 and 1969 Censuses in contrast to the 1978. In the latest Census, a more complete list of farms and updated statistical procedures were used, resulting in more complete coverage of farms and ranches than in 1974 or 1969. The necessary adjustments for



Table 1.4.

*Shifts into and out of total cropland between 1969, 1974, and 1978 using the Census of Agriculture data series*  
(Million acres)

	1978*	Total Cropland 1974	1969
Published Census (new definition of farm)	461.8	440.0	459.0
Adjustment to 1969 Definition	+ 5.8	+ 1.9	—
	467.6	441.9	459.0
Adjustment for Over-enumeration in 1978	- 7.5	—	—
Total Cropland	460.1	441.9	459.0

*Change In Total Cropland:*

Time Period	Change	Annual Change
1974-1978 =	+18.2	+4.55
1969-1974 =	-17.1	-3.42
1969-1978 =	+ 1.1	+ .12

Sources: Census of Agriculture 1969, 1974. Preliminary data from 1978 Census of Agriculture, Bureau of Census. Adjustment factors from Census of Agriculture, Bureau of Census, 1981.

enumeration<sup>5</sup> and the change in definition are shown in Table 1.4.

## Conversion to Nonagricultural Uses

The NRI data series shows that about 23 million acres of agricultural land were converted to nonagricultural uses between 1967 and 1975. Annually, nearly three million acres of agricultural land were converted. The distribution of converted acreage

by Census regions is shown in Table 1.5. About 70 percent of this land was converted to urban, built-up, and transportation uses, and 30 percent to man-made reservoirs, lakes, and other water-impounding facilities. Of the average annual conversion of three million acres, 675,000 acres were from cropland; 537,000 acres were from range and pasture; 825,000 acres were from forest land; and 875,000 acres were from other land uses. The acreage of high and medium potential cropland converted is not known.

The Census of Agriculture data shows an even greater shift of agricultural land from farm and ranch uses. Census data can not be used to calculate actual agricultural land or

cropland conversions to urban, built-up, transportation, and water uses comparable to the NRI series. Nevertheless changes in "Land in Farms" from the Census series is roughly comparable to changes in agricultural land as measured using the NRI series. The major difference is that the 1.36 billion acres of agricultural land from the NRI contains more forestland than the one billion acre Census category "Land in Farms."<sup>6</sup> Table 1.6 shows the significant decrease in "Land in Farms" between 1969 and 1978. Necessary adjustments in the published Census data are also shown to correct for the change in definition and underenumeration.

The annual decline in "Land in Farms," averaging nearly 10 million acres between 1969 and 1979, exceeds by more than a factor of three the amount of acreage converted each year to urban, built-up, transportation, and

water uses from the NRI series. This significant difference, however, can largely be explained by the alternative definitions and land use categories used in the Census and NRI series. The Census's "Land in Farms" includes not only land actually converted to nonagricultural uses but also some land that has moved from farm or ranch ownership through purchase by a speculator, developer, or timber company. Land sold to a developer or speculator is often rented out and kept in agricultural uses for a period of time. Unless the new tenant fails to report the acreage or does not file a Census form, the land would remain part of "Land in Farms." Land sold to a speculator or developer that is idled but not actually converted would not be reported as part of a farm operation, and this would contribute to the decline in "Land in Farms."

In the NRI series, this movement of land

*Table 1.5.*

*Agricultural land converted to urban, built-up, transportation and water uses by selected census regions and former agricultural uses from the NRI data series, 1967 to 1975*

(Million acres)

Census Region	Cropland	Pastureland and Rangeland	Forestland	Other Agricultural Uses	Total
West	0.7	1.3	0.5	0.5	3.0
North Central	1.6	0.8	0.7	2.1	5.2
South	2.5	2.1	3.9	3.5	12.0
Northeast	0.6	0.1	1.4	0.9	3.0
Total	5.4	4.3	6.5	7.0	23.2

Source: "Potential Cropland Study" USDA-SCS, 1977.

Table 1.6.

Change in "Land in Farms" between 1969, 1974 and 1978 from the Census of Agriculture data series  
(Million acres)

	1978	Land in Farms 1974	1969
Published Census	1,030.9	1,017.0	1,063.3
Adjustment For Underenumeration	—	+ 58.0	+ 73.9
Adjustment For 1969 Definition	+ 18.2	+ 8.7	—
Adjusted Land in Farms Using 1969 Definition	1,049.1	1,083.7	1,137.2

*Change in Land in Farms*

Time Period	Change	Annual Change
1978-1974	= -34.6	- 8.65
1974-1969	= -53.5	-10.70
1978-1969	= -88.1	- 9.79

Source: Census of Agriculture 1969 and 1974. Preliminary data for 1978 Census Bureau. Underenumeration adjustments from Agricultural Division, Bureau of Census, 1981.

into speculative and development uses is included as changes in the categories "Other Non-Farm" and "Other Land in Farms." Between 1967 and 1975, the NRI series indicates that about 43 million acres of agricultural land shifted into these categories and about 20 million acres shifted out of these categories into agricultural uses. When the annual net shift of land in the NRI "other" categories (about 2.6 million acres) is added to the NRI total of agricultural land converted to urban, built-up, transportation, and water uses, the total annual shift of agricultural land from farm and ranch uses—based on the NRI series—was about 5.5 million acres between 1967 and 1975. The Census data shows a

higher rate (9.8 million acres annually) between 1969 and 1978. The change in time period may account for some of the remaining difference.

## Prime Farmland

The nation has about 345 million acres of prime farmland.<sup>7</sup> About 230 million acres of these were in cropland use in 1977. The remainder was in pasture, range, forest, and other land uses.

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Nearly one-half (50 million acres) of the prime farmland that was in pasture, range, forest and other agricultural uses had a high or medium potential for conversion to cropland in 1977. The remaining 65 million acres was rated as having either low or zero potential for conversion to cropland, because of such factors as field size, accessibility and commitment to other uses such as parks and private timber company holdings.

The NALS mandate covers the nation's

entire 1.36 billion acre agricultural land base, including pasture, range, and forestland as well as cropland. The NALS analysis thus is not focused solely on land use trends affecting prime farmland. Rather, the emphasis is on how conversion patterns are affecting high quality agricultural land—in particular, how the diversion of rural and urban development onto land less suited for agriculture could reduce the impacts of agricultural land conversions on U.S. agriculture.



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region, field crops and livestock are less important than elsewhere, while sales of poultry and dairy products make up over half the value of total farm output. While the Northeast has no rangeland, it has about as much forest land as the West.

Although adjacent to highly urbanized areas, agriculture in the Northeast is still important to the region's economy, and some analysts expect new growth in local farming, as energy prices push up food transportation costs. This region contains about 25 percent of the nation's population, only 4 percent of America's cropland (mostly on small farm parcels), and 4.1 percent of the country's high and medium potential cropland. There are nearly 14 million acres of prime land in the Northeast, more than in either the eight mountain states or five Pacific region states.

### *Specialty Crops in Various Regions*

**S**pecialty crops (fruits and vegetables, nuts, mushrooms, etc.) are grown throughout the nation. Traditionally, highly perishable produce has been grown near its consumer market. As a result, specialty crop production has frequently been located near urban areas. Some specialty crops often require particular combinations of geographic and climatic conditions, yet these locations are also attractive to people in their choices for settlement. Specialty crops make inten-

sive use of land, yielding higher economic returns per acre than most other kinds of agricultural land. Competition for specialty cropland by urban development remains strong, however.

As indicated in Table 2.1, concentration of specialty crop production in metropolitan counties is uniformly high everywhere, but particularly so in the East and West Coast regions, and in areas near the Great Lakes. Sixty-three percent of the value of all specialty crops sold in the 48 contiguous states in 1974 was produced in metropolitan counties. This reflects the urban orientation of many specialty crop areas.

Specialty crop production along the West Coast is particularly notable. Some 34 percent of the value of all farm production in California, Oregon, and Washington in 1974 was from specialty crops, and 70 percent of that was produced in metropolitan counties. Specialty crops produced in this region accounted for 50 percent of the value of all specialty crop production in the 48 continuous states.

According to a recent report published by People for Open Space, nine counties surrounding San Francisco Bay yield more value in foodstuffs each year than 13 states, including New Jersey, the "Garden State." The report also documents the loss of agricultural land in this area called the "Farmbelt." About 19,000 acres are converted annually; 708,000 acres have been lost to agricultural uses since 1949.

The continued supply to northern and eastern markets of West Coast specialty crop products, in either winter or summer, has be-

*Table 2.1.*

*Value of agricultural commodities produced in metropolitan counties*

United States and Farm Production Regions  
1974

Farm Production Regions	Percentage produced in metropolitan counties	
	of all commodities sold	of all specialty crops sold
NORTHEAST	46.1%	71.0%
NORTH CENTRAL		
Lake States	21.0	47.5
Corn Belt	21.3	61.5
Northern Plains	4.9	49.9
SOUTH		
Appalachian	16.5	22.5
Southeast	29.5	57.3
Delta States	9.4	31.7
Southern Plains	20.4	55.6
WEST		
Mountain	12.2	38.2
Pacific States*	56.1	70.5
48 STATES	23.8	63.2

\* Alaska and Hawaii excluded.

Source: U.S. Census of Agriculture; U.S. Census of Population

come jeopardized by a combination of regionally significant circumstances. These include: continued competing demands for land in West Coast valley areas and the dislocation of production within the region to areas re-

quiring greater use of irrigation; uncertainty about continued availability of water needed for irrigation; and the increasing costs of refrigeration and of transportation over long distances.



# *T*<sub>wo</sub>: REGIONAL PERSPECTIVES OF AGRICULTURAL LAND CONVERSION

As illustrated in Part 1, there are wide regional variations in land resources and uses. These region-specific effects of agricultural land conversion are felt directly in local communities. Major shifts in agricultural land use between regions have occurred in the past, and factors which may contribute to additional shifts appear underway today. Some of the influences on regional trends in agricultural land conversion that appear to be underway now are discussed here.

## *The Western Region*

In the West, about 3 million acres of agricultural land were converted to other uses between 1967 and 1975. The West has more than 14 million acres of rangeland with a medium or high potential for cropland, but its current use is valued for grazing and the production of livestock. Crop production in this region is highly dependent on water availability and the viability of irrigation. In 1977, more than half of the cropland in the Pacific Coast states, and one-third of the cropland in use in the Rocky Mountain states was irrigated.

The future productivity of this and other land with potential for irrigation is uncertain because water supplies, particularly from underground aquifers in the West, are being depleted. Water availability (both underground and surface) is affected by high energy costs for pumping, and competing demands for water from new urban growth and energy development activities. In addition to these supply and economic constraints, gradual impairment of the land's productivity caused by

a buildup of salt in the surface layer of the soil is a serious problem in some of the most productive agricultural valleys in the West. These valleys also prove attractive as sites for expanding communities in the West.

## *The North Central Region*

In the North Central region, about 5.2 million acres of agricultural land were converted to other uses between 1967 and 1975.

This highly specialized region produced almost half—about 44 percent—of the value of all agricultural products sold in the U.S. in 1977. Field crops make up about half of the region's total output, and livestock about a third.

Prosperity in the North Central region is dependent on worldwide weather, policy decisions in places such as Moscow and London, and a score of other uncontrollable factors. The production from about 1 in every 3 acres in the North Central region is exported. Since farm profitability closely reflects the strength and price of export demand, the actual rate of conversion of agricultural land to nonagricultural use depends on a complex set of domestic and international factors, including local pressures on agricultural land.

In the North Central region, many towns and cities are surrounded completely by prime farmland. This means that in these localities any urban growth must occur on this high quality land. Overall, the major ebbs and flows of conversion pressure on agricultural land in the North Central Region result from the interaction of the area's extensive land resources, the strength of foreign demand,

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domestic economic conditions such as interest rates and credit availability, and the profitability of farming relative to other sectors of the region's economy.

Potential conflicts are emerging between agriculture and energy production in the North Central region. One analysis projects that surface mining and land reclamation may disrupt about 358,000 acres annually in eastern and midwestern states between 1975 and 1999. Other studies indicate that valuable coal reserves underlie about 50 percent of Illinois cropland. The rapidly emerging ethyl alcohol (ethanol) industry — for which corn is the primary feedstock — may cause significant land use impacts in the midwest. This new industry may create pressures for fuller exploitation of agricultural land in the North Central region.

### *The South*

**M**ore than half of the U.S. agricultural land converted to other uses between 1967 and 1975 was in the South. About 12 million acres were converted in this region.

The South's existing reserves of land suitable for agricultural use are sizable compared to other regions, or even to areas of cropland now in production in the South. These southern land reserves are thus of exceptional importance to the country's agricultural capacity as a whole, and afford an opportunity for significant expansion of local

agricultural operations in the South. However, while agricultural economists look to the productive capability of potential cropland in the South to meet projected demands for food, forest economists look to the productive capability of southern forests to meet projected demands for lumber and paper. Future conflicts may emerge, because in some cases, they are both looking at the same lands. Of equal or greater significance, both population growth and low density community developments have recently been more predominant in the South than elsewhere in the country.

The warm and humid climate of the Southeast, together with generally ample water supplies for seasonal, supplemental irrigation, can provide for abundant and reliable crop production. These climatic advantages are offset, however, by higher rates of water-caused soil erosion in most of the South than elsewhere in the country. As in the Corn Belt, the likelihood of additional soil erosion would call for additional precautions on any expanded cropland used in the South.

Exceptional prospects thus appear to exist in the Southern region, particularly in the Southeast, for heightened demands on agricultural land for both agricultural and non-agricultural uses.

### *The Northeast*

In the Northeast, about 3 million acres of agricultural land were converted to other uses between 1967 and 1975. This trend was preceded by considerable land conversion as the region became increasingly urbanized. In this



# *Three: COMPETITION FOR AGRICULTURAL LANDS FROM OUTSIDE OF AGRICULTURE*

**T**he competition for land for other than agricultural purposes is the result of complex private and public decisions. Families decide where they want to live and work, or where to retire or buy vacation homes. Manufacturing and commercial companies decide whether to move, expand, or diminish operations, and developers choose locations for subdivisions and shopping centers.

It is impossible to trace all the transactions that in the aggregate result in 3 million acres of agricultural land being put to other uses in a year. Nevertheless, it is possible to examine the broad outlines—to look at the major shifts in U.S. population that have taken place in recent years, note some underlying factors, and discuss the implications for agricultural land conversion.

Decisions at all levels of government often contribute directly or indirectly to the competition for land. For example, some land is directly converted when roads and dams are built. Other government decisions have a powerful indirect effect by spurring the conversion of agricultural land. This may depend on where a highway is built, where the interchange is located, where a sewer line goes, whether government financing is available for housing or a subdivision, or whether government programs lead to new job opportunities in a rural area.

## *Recent Demographic Changes*

Over the last 10 years, the nation has experienced a significant population migration from urban areas into more rural areas. As a result, more than 40 percent of housing

constructed during the 1970s was built on rural land—some of it on highly-productive agricultural land. From 1970 to 1978, nonmetropolitan areas gained a net of 2.9 million people. At the same time, suburbs continued to grow and there was a pronounced migration of people from the densely populated North to the South and West. Between 1970 and 1979, the U.S. experienced a 22 percent increase in the number of households, which resulted in a substantial demand for more land. This high rate of household growth, coupled with the migration of population into rural areas, has been a major factor in the accelerated conversion of agricultural land to other uses.

This conversion demand for agricultural land is focused on some of the nation's most productive agricultural areas. In the top 100 counties in value of products sold from the farm, population grew 13.5 percent from 1970 to 1978, nearly twice the rate of national population growth in the same period. If Los Angeles County is excluded from the top 100 counties, population growth between 1970 and 1978 was a rapid 19.3 percent. Thirty-three of the top 100 counties are central counties of metropolitan areas. They include Los Angeles, Phoenix, Fresno, Monterey, Stockton, Riverside, San Bernardino, Bakersfield, and Lancaster, Pa. In a few cases farmland is in one part of the county and the urban population is in another part. But, in most cases, the two are not separated and the population is concentrated in the farming area in a manner that makes expansion automatically encroach on farms. This situation increases the pressure on agricultural land and creates a unique tension between those people

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who want to farm and those who want the land for housing or for other intensive uses.

Tensions between farming and non-farming people in rural areas with growing population are prompted by vandalism to crops and farm machinery, ordinances against normal farming practices, lawsuits against farmers over cropdusting, and a decline in the political power of farmers. The increased demands by new residents for costly public services (roads, schools, and other improvements) creates additional conflict in agricultural communities. The resulting property tax increases fall heavily on the original residents as the community tries to meet the increased fiscal and public service burdens that accompany rural development. Agricultural equipment and supply stores lose business and may close if the number of farmers declines substantially. Ordinances against normal farm practices may hinder profitable farming. Some farmers may turn to high-intensity crop production, forsaking the long-term conservation of their land for short-term profits. These farmers doubt the future of farming in that area and "mine" the soil with high-intensity crops, then sell the land for nonagricultural uses.

The increasing numbers of one and two-person households, high divorce rates, and an increased propensity for the young to leave the parental home before marriage have all contributed to a decline in household size and an increase in the number of households. In short, Americans are redistributing themselves into more and smaller households. This redistribution has been enhanced by the unprecedented number of young adults reaching

household formation age as a result of the post-World War II baby boom. A 22 percent increase in households occurred from 1970 to 1979 despite a growth of only 8 percent in total population. In many cases, communities with declining total population have experienced an increase in the number of households.

### *Growth Outside Urban Areas*

Population growth rates in suburbs, rural areas, and in the South and West have all exceeded population growth in more densely populated urban areas. In most cases, this lower-density growth is a break with past trends of urban growth and development.

The majority of U.S. cities began to experience lower population growth rates than their surrounding suburbs during the 1920s. Suburban growth has continued uninterrupted since then. Between 1970 and 1979, suburban population grew at an average annual rate of 1.6 percent, compared with a .7 percent decline in population in central cities. Suburban development was particularly high outside older and larger central cities, and in the Northeast and North Central regions. Smaller central cities experienced lower rates of decline around the nation. In some cases, especially in the West and South, smaller central cities actually grew.

Indications are that suburban growth and slow or declining growth in central cities will continue throughout this century. Suburban population is projected to increase between 62

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and 75 percent by the year 2000. Depending upon the region of the country, central city population is projected either to increase about 12 percent (sunbelt regions) or decrease (frostbelt regions) about 4 percent. Consequently, suburban land around central cities is projected to accommodate many new households by the year 2000.

The South and West acquired 90 percent of U.S. population growth since 1970, and now for the first time have more than half of the nation's population. The most dramatic migration has been from North to South. Between 1970 and 1975, the South gained 1.7 million people from the North, a 245 percent increase over the rate of North-to-South migration just five years earlier. North-to-West migration was lower than North to South migration. The West gained 740,000 persons from the North from 1970 to 1975, compared with 640,000 gained from the North in the previous five years.

The regional migration of population from North to the South and West has transferred population to lower-density areas. About three-fifths of northern urbanized areas had over-all densities of 3,000 or more persons per square mile. But in the South and West, three-fifths of urbanized areas have fewer than 3,000 persons per square mile.

Most nonmetropolitan counties reverted from decline to growth, or—if already growing—increased their rate of growth during the 1970s. The resurgence of nonmetropolitan population growth is not simply a revival of small towns. Small towns and cities have participated in the trend, but the highest rate of growth has occurred in the countryside and in

unincorporated areas. From 1970 to 1975, the nonmetropolitan population in incorporated places grew by 4.6 percent, whereas that in the countryside and unincorporated areas rose by 7.6 percent. Growth within incorporated places was moderately ahead of that of the 1960s, but growth outside of town limits from 1970 to 1975 was nearly five times as great as in the 1960s. In other words, population pressures on land were distinctly in the form of decentralization out of established towns—whether metropolitan or not—and much greater into rural areas.

### *Lower Density Development*

Since the mid-1960s, residential preference surveys have shown consistently that a higher percentage of urban people prefer rural or small-town living. The propensity of retired people to move to small communities, and the greatly increased number of retirees who have large enough pensions to be mobile, also are factors in recent population shifts to low-density areas.

Thus, people moving from urban areas to lower-density rural areas—both within groups of metropolitan counties, and between metropolitan and nonmetropolitan counties—points to continued nonagricultural demand for agricultural land. Almost 12 million new households are projected to be added to nonmetropolitan areas between 1977 and 1995. Demographic changes provide increased competition between agricultural and nonag-

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ricultural uses of agricultural land. That is particularly true in areas where agriculture is traditionally an important industry and where the current pace of urbanization is especially rapid. Hence, residential, commercial and other demographically-based nonagricultural activities have come into direct competition for agricultural land with farming during the seventies. Local conflicts and tensions persist and could grow in the suburbanizing fringe areas surrounding large and older cities, small towns, and open country rural areas.

Much of the recent housing development in rural America occurred in areas with low population density. A growing number of families have chosen to move farther out into the countryside, often because larger lots at a lower per acre cost are available. In those areas not serviced by municipal sewer systems, owners install septic tanks and drain field systems or aerobic ponds. In those cases where it is necessary to protect against well-water contamination, many counties require lot-sizes of several acres. However, central water systems are increasingly available for rural development—in these instances, lots can be considerably smaller without affecting water quality. On the other hand, the availability of sewer and water service could also encourage some purchases of 5-10 acre lots for residences, although lots of this size can also easily accommodate septic tank systems. Such “farmettes” draw sizeable amounts of agricultural land out of production.

In typical sewered subdivisions, the average lot size is about one-quarter of an acre. In contrast, at least two times the land area (and often more) is used per home site in rural

areas with septic systems. This larger lot size, characteristic of rural areas, will contribute to the conversion of agricultural land for housing, at least through the 1980s.

Other evidence points to a continuation of nonsewered housing. While rural residences made up about 25 percent of the nation's total stock of housing in 1970, about 43 percent of new housing starts between 1970 and 1977 were in rural areas. Two-thirds of this rural housing construction occurred on nonsewered lots. The capital costs of building and maintaining sewer systems have risen more rapidly than onsite septic systems, especially in small, older rural places. The availability and popularity of packaged and mobile homes has enabled many families to bypass conventional, sewered housing developments. This allows families to venture farther from urban areas and to purchase undeveloped lots directly from farmers or other owners of rural land. The rapid increase in the sales of packaged and mobile homes is evidence that many people find this housing alternative more appealing and at least equally affordable.

### *New Economic Opportunities*

**I**mproved rural and small town employment opportunities have encouraged rural residential growth. Between 1940 and 1970, heavy losses of farm and mine employment displaced many rural people and offset increases in other types of rural em-

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ployment. However, the 1970s saw less displacement of rural people from traditional mining industries. Even more important, employment in every major industry group increased at a more rapid rate in nonmetropolitan counties than in metropolitan areas in the 1970s. Rural jobs first grew in manufacturing in the 1960s, then spread to trade, services, construction, public administration, utilities, communications, real estate, and all other sections.

As a result, there has been a decentralization of employment, as well as population, during the 1970s. Nonmetropolitan employment grew by 12 percent between 1970 and 1976, compared with 8 percent employment growth in metropolitan areas. Nonmetropolitan areas had 25.5 percent of all jobs in 1976, but these areas accounted for 33.6 percent of all post-1970 job growth (2.7 million of 7.9 million new jobs).

Employment in nonmetropolitan America has undergone basic structural changes. Rural economic structure was primarily agricultural until World War II. However, the number of farms and farm people has declined dramatically. More than 23 million people lived on farms in 1950; today only 8 million live there—less than 4 percent of the nation's total population. Even within rural America, farm residents are a minority. Since 1920, farm residents dropped from more than 60 percent of the rural population to less than 20 percent in 1970, the last year for which this figure was available.

Post-1970 employment growth in nonmetropolitan areas has been especially great in trade, services and government. Trade-

related jobs in nonmetropolitan areas rose 26.5 percent between 1970 and 1976, while rising 15.6 percent in metropolitan areas. Manufacturing jobs in nonmetropolitan areas increased 7.5 percent between 1970 and 1976, while declining by 5 percent in metropolitan areas.

Today, the industrial structure of nonmetropolitan employment is more similar to that in cities. New industries have provided jobs for town and small-city residents, but farmers and their families have also benefited. Farm operators and their families are increasingly combining farm work with other full or part-time jobs. About 1.5 million farmers earn the majority of their income off the farm. This income supplement appears to be an effective way of maintaining a farming way of life for smaller farmers. As such, the growth of off-farm employment in rural areas may encourage the retention of many small farms in farm use.

The economic changes described here suggest several implications for rural land use. Most obviously, new commerce and industry and supporting infrastructure require land. The amount of land actually converted to accommodate economic growth is not known; however, the indirect effects of economic growth and development may well be much more substantial. An improving economic climate is one of the contributing factors in the resurgence of rural population growth. Economic opportunities attract people from other areas and help to maintain life-long residents who otherwise might have been forced to move to another community. Nevertheless, economic development in rural

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areas contributes to the increasing demand for housing and community development.

### *Federal Government Activities and Policies*

**P**rograms sponsored by the Federal Government often contribute to the loss of agricultural land. Directly or indirectly, these programs can provide financial support which leads to increased urbanized uses of land, inundation of agricultural land for water reservoirs, fragmentation and isolation of farm parcels by transportation corridors, and the idling of previously productive agricultural land.

The impact of federal assistance programs on agricultural land is broad and far-reaching. The National Agricultural Lands Study\* identified about 90 programs that reduce the availability of land for agricultural production. Agencies with major impact are the Department of Housing and Urban Development (HUD), Farmers Home Administration (FmHA), and Economic Development Administration (EDA). The Veterans Administration (VA), Water Power Resources Service (WPRS), Corps of Engineers (COE), Tennessee Valley Authority (TVA), Department of Energy (DOE), and Environmental Protection Agency (EPA) also have programs that reduce the availability of land for agricultural production.

Those programs that result in a loss of land for agriculture are generally ones that

promote economic development, capital improvements, housing, environmental protection, or natural resources development. They lead to urban and rural growth that either reduces farm profitability or directly results in conversion of agricultural land to nonagricultural use.

Economic development programs are dominant in EDA and FmHA; capital improvement programs are sponsored by numerous agencies, including Department of Transportation (DOT), EPA, FmHA, DOE, and Rural Electrification Administration (REA). Housing programs are administered largely in HUD and to a lesser extent in FmHA and VA. Environmental protection/natural resources development programs are administered predominantly by COE, EPA, and DOE.

Federal programs that acquire land or construct capital improvements have their greatest impact on agricultural land by encouraging subsequent nonagricultural development. Of the federal programs having substantial or moderate adverse impacts on the agricultural land base, about 15 percent were supported by budgets greater than \$1 billion and about 65 percent were supported by budget levels greater than \$100 million.

Federal planning programs that influence growth and development usually are directed toward only one purpose, such as highways or waste water treatment. Often these single-purpose planning programs conflict with, or ignore, agricultural land concerns. Currently, none of the federal planning programs provide financial or technical support to help local communities develop pro-

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\*See NALS Technical Paper X "Federal Programs Affecting Agricultural Lands"

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grams for protecting or conserving agricultural land.

Many federal assistance programs with single-purpose or narrowly-defined missions often fail to consider adverse effects on agricultural land. These adverse effects occur because federal program officials are often unaware or uninformed about agricultural land issues. Clearly, many federal assistance programs, such as those which provide housing and transportation services, are essential in accommodating normal and expected growth in communities. However, federal program managers often feel that the loss of agricultural land is not a problem or that it is the responsibility of another agency. Lack of this awareness inhibits a search for alternatives which may provide for growth while minimizing losses in the agricultural land base locally and nationally. Even where program managers see a problem, they often do not have the policy direction or authority to reduce the conversion of agricultural land to nonagricultural uses.

Only two (EPA and USDA) of the 37 federal agencies reviewed currently have explicit policies to consider the effect of their programs on agricultural land. Even in these two agencies, some program sub-units have not yet incorporated agricultural land reviews into their regulations and guidelines. The degree of consideration of agricultural land issues varies greatly among other federal agencies. The most frequently used tool is the Environmental Impact Statement (EIS) process. However, EISs are completed on only a few projects, and the EIS seldom assesses the incremental and cumulative adverse impacts

that a series of program decisions have on agricultural land. Until other review tools specifically include agricultural land considerations, effective identification of adverse agricultural land impacts will be limited.

In the absence of agricultural land protection policies, potentially reconcilable conflicts between many federal program objectives and the goal of protecting the nation's agricultural land base will continue.

Examples of impacts from federal assistance programs were noted in several NALS case studies. The effects of Federal Housing Administration (FHA) guaranteed home mortgage programs on subdivision developments were examined in Harris County, Texas. While not typical, Harris County—with 500,000 acres of agricultural land in one of the fastest-growing counties in the nation—is considered a dramatic example of the fate of agricultural land. NALS found that in Harris County, federal Housing and Urban Development programs contributed to the conversion of about 13,000 acres of mostly prime agricultural land in 1978, about 11,300 acres in 1979, and about 4,700 acres in 1980. While Harris County housing may have increased without HUD-administered FHA loan guarantees, NALS research suggests that HUD programs played an important role in facilitating that growth.

In another example, the Farmers Home Administration provided financing for rural housing in the Helena Valley of Lewis and Clark County, Montana. About 150 acres of agricultural land were converted to build 500 homes for low-to-moderate-income families. While the project was not substantial in size,

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the eligibility conditions influenced its placement. Subdivision developers had to locate the homes at least 5 miles from Helena's urban boundaries in order to qualify for the FmHA loan. The subdivision was built 7 miles from Helena in an agricultural area unlikely to have been developed without the loan guarantee.

Federal housing programs in these two examples had these effects:

- encouraged farmers to sell land valuable for agricultural production;
- reduced the customer support base of agricultural service businesses;
- created serious problems for the county government in meeting demands for urban-type services, including more school buses;
- required use of electricity for home heating, because the subdivisions were outside the service area for natural gas.

### *Future Rural Settlement*

As agricultural land is converted to nonagricultural uses, and as rural economies broaden and grow, farmers who want to remain in farming may become discouraged by a pattern of events called the "Impermanence Syndrome." As communities expand into agricultural areas, land values rise and farms are broken into small parcels more suitable for housing than for farming. Looking beyond their fences to new developments, many

farmers see that their farms could be sold for nonagricultural uses. Depending on the intensity and proximity of urban growth, farmers often believe that agriculture is no longer permanent. Investments in conservation practices may cease and building repairs may be neglected because many years of continued agricultural production would be required to justify conservation capital expenditure. Even if urban growth stops long before it reaches many farms, the perceived impermanence of agriculture in areas near expanding centers gives rise to a pattern of disinvestment in farmland, buildings, fences, and other farm property.

Aggravating the impermanence syndrome is the misinformation about land markets in urbanizing areas. NALS\* found that in the urban fringe areas, uncertainty about the potential for farmland conversion to housing and other nonagricultural uses affects far more land than can reasonably be developed efficiently. This uncertainty about farm parcel development potential results in the idling of much agricultural land, noncontiguous urban development, and the deterioration of the agricultural services infrastructure.

About 67 percent of U.S. agricultural land sold in 1979 was purchased by other farmers and retained in farm use. The balance of farmland sold each year is purchased by other interests who are able to outbid farmers. Although most of the balance of farmland is retained in agricultural use at least temporarily, much of the nation's urban fringe land does not, particularly in areas under strong nonagricultural development pressure. A recent survey showed that one-third of the land

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\*See NALS Technical Paper VIII, "The Allocation of Agricultural Lands Among Competing Demands."



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parcels in the urbanizing fringe of four U.S. cities were purchased by their present owner since 1970, and that nearly 60 percent were purchased since 1960. The majority of these parcels represented about two-thirds of the urban fringe land area and were owned by individuals. Partnerships and corporations owned about 7 percent of these parcels. The survey showed that nearly half of the urban fringe land was either used solely for residential purposes or left idle altogether. Only 18 percent of the land parcels were farmed.

Survey results showed that, in areas under strong urban development pressure, farmers made up only a small fraction of land owners or recent land buyers, and land holdings were split into smaller parcels. Fewer than 1 in 10 parcels were larger than 200 acres, and more than 40 percent were held in parcels of fewer than 10 acres. These smaller parcels were more valuable for urban development than for farming. In areas where urban development pressures were slight, more than a third of the parcels were 200 acres or more. The survey also showed that a large fraction of urban fringe land is for sale. About 40 percent of the land parcels under intense development pressure were for sale.

Recent changes in population settlement patterns indicate that continued conversion pressure will focus on the rural areas of the country. Indeed, the earlier discussion emphasizes that conversion demand for agricultural land is currently focused on some of the country's most productive agricultural areas. The point to be emphasized here is that the rural conversion process is inherently no different than the conversion process around metropolitan areas. As population pressures continue in rural areas, productive agricultural land is likely to be prematurely withdrawn from production in response to unrealistic expectations of future development.

In summary, sociodemographic factors and federal program activities will continue to bring farm and nonfarm uses of agricultural land into competition throughout this century. While the sociodemographic pressures on agricultural land will continue to increase over the next 20 years, they are not expected to increase quite as rapidly as they did during the late 1960s and early 1970s. Although future trends in rural settlement are uncertain, the process of economic growth and development in rural areas is not expected to change significantly in the near future.



## *Four: COMPETITION FOR AGRICULTURAL LANDS WITHIN AGRICULTURE*

*T*he direct causes of agricultural land conversion originate outside the agricultural sector. Population growth, migration to rural areas, and new employment opportunities in rural America contribute to the need to convert land to nonagricultural uses.

In the past, the effects of agricultural land conversion on farming were primarily local. Although land losses and local conflicts and tensions often led to the decline of farming in a particular area, the U.S. agricultural system as a whole could adjust easily to small changes in the availability of agricultural land. In fact, there was no difficulty in compensating for losses of productive land from conversion because productive capacity was growing more rapidly from rising crop yields than the rate of growth in overall demand. Attempts to manage recurrent surpluses of basic agricultural commodities dictated the ebb and flow of farm policy from the 1930s to the early 1970s. However, the last few years have witnessed a fundamental transition of the U.S. agricultural sector away from underutilized production capacity and surpluses. The underlying forces have been a gradual but marked overall decrease in the rate of annual productivity gains in agriculture, coupled with a dramatic increase in foreign demand for U.S. agricultural products.<sup>1</sup>

This transition of U.S. agriculture has set in motion a basic reappraisal of farm policy issues and programs within the U.S. Department of Agriculture. The Department's Structures Project has focused on those that affect farm size, the ownership and control of agricultural resources, and the economic and environmental consequences of alternative

farm management systems.<sup>2</sup>

The Resource Conservation Act (RCA) study has examined a broad array of resource issues including how the Department's conservation programs should be modified or augmented to assist the private efforts of farmers, ranchers, and foresters in conserving the nation's natural resource base.<sup>3</sup>

Complementing these broader USDA studies, the NALS has attempted to clarify the causes and effects of agricultural land conversion. This required an evaluation of the demand for, and supply of, U.S. agricultural commodities in light of projected future trends. This section examines these trends and prospects, and highlights a number of uncertain factors that could minimize or exacerbate the social consequences of agricultural land conversion.

The discussion focuses on supply-demand interactions in the next two decades, based on USDA's best estimates of demand for U.S. agricultural products during this period.<sup>4</sup> Because these near-term projections of trends in demand and productivity are much more reliable than long-run estimates, it is possible to avoid some of the uncertainty and disagreement about the longer-run prospects for supply and demand.

Given the dynamic and complex nature of the U.S. agricultural system, it is impossible to predict exactly what combinations of resources will be most profitable for producers in the next two decades as the agricultural system expands output to meet a given level of demand. However, it is possible to evaluate the general types of adjustments that will be required, the potential influence of agricul-

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tural land conversion, and some of the public and private costs that are likely to result.

## *Demands for Agricultural Products*

### *Domestic Demand*

**I**n addition to meeting the dietary requirements of the domestic population, agricultural products satisfy many other social needs. The forestry industry provides a range of building materials, pulp for paper and packaging, and the raw material for a broad variety of manufactured goods. Many medicines are derived directly or indirectly from agricultural products. The chemical industry also relies upon agricultural feedstocks to distill many special oils, fuel additives, polymers, and resins.

Domestic demand for agricultural products has risen with population growth and the gradual increase in the level of per capita consumption. Domestic population is expected to be about 232 million in 1985.<sup>5</sup> The rate of growth is then expected to slow to 0.6 percent annually, reaching 253 million by 2000.<sup>6</sup> Per capita food consumption in the United States has grown steadily for several decades, largely as the result of a gradual rise in per capita meat consumption. Domestic demand for paper, lumber, packaging, and other forest products has grown nearly one-third since the early 1950s. The demand for all wood-related products is expected to increase

60 percent by 2030.<sup>7</sup>

Experts in USDA project that domestic demand for food and fiber will increase by volume about 1.0 percent annually during the 1980s, slowing marginally to about .9 percent annually during the 1990s, based on the assumption that real food and fiber costs will remain constant.<sup>8</sup> About one-third of the projected growth in domestic demand can be attributed to rising income and higher per capita consumption. The remainder of projected growth in domestic demand is attributed to population growth.

### *Corn for Gasohol—A New Source of Domestic Demand*

One unconventional source of domestic demand included in the USDA projections is the production of ethyl alcohol (ethanol) from corn. The corn is converted to ethanol and mixed in a 1 to 9 blend with gasoline to form gasohol. With the prospect of this new industry, agricultural land in the Midwest becomes both a food and an energy resource.

Most ethanol plants now operating or on the drawing board will use corn as the principal feedstock and burn coal to operate the distilling process. For this reason, assessments of the prospects for rapid expansion of ethanol production capacity have focused on the availability of potential cropland in the Midwest. The most economical locations are those near major waterways on which barge transportation is available to move the corn and coal.

A detailed study commissioned by the U.S. National Alcohol Fuels Commission

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appraised the prospects for, and consequences of, expanding ethanol production capacity.<sup>9</sup> The analysts, Schnittker Associates, find that investments in ethanol production appear promising as long as the real price of energy rises faster than the real price of corn or other agricultural feedstocks.<sup>10</sup>

Given the present uncertainty surrounding the economic prospects and government involvement in the alcohol fuels industry, Schnittker Associates state: "Our best judgment is that production of 2-4 billion gallons of ethanol in 1985-1986 and 4-6 billion gallons in 1990-1991 may be feasible."<sup>11</sup>

The NALS has adopted similar projections of ethanol expansion based on analysis by the Department of Agriculture. According to these projections, ethanol production capacity would reach 2.6 billion gallons by 1985, 4.2 billion by 1990, and 5.7 billion by 2000.<sup>12</sup>

Estimates vary considerably regarding the acreage required to support a given level of ethanol production. The feedstock for the 4-6 billion gallon level projected for 1990 would require the corn grown on between 15 and 23 million acres.<sup>13</sup> As ethanol production capacity expands, experts project that some land in soybeans will shift into corn because protein supplements derived from ethanol byproducts will be readily available and less expensive than soybean-based livestock feed supplements. Taking into account this substitution and the higher yield of corn, the net acreage of additional row crops needed to support 4-6 billion gallons of ethanol production would be closer to 7-11 million acres.<sup>14</sup>

### *Export Demand*

**T**he volume of U.S. agricultural exports increased an average of 10 percent annually during the decade of the 1970s and is expected to continue growing rapidly for many years. This growing international demand for basic food and fiber products is a key factor to consider when projecting the social consequences of agricultural land conversion.

Worldwide demand for wheat, feedgrains, soybeans, cotton, and other agricultural commodities is increasing dramatically. Global population growth and greater purchasing power in developing nations both contribute to expanding demand for food. Global population is expected to reach some 6.35 billion by the year 2000, a 55 percent increase from 1980.<sup>15</sup> In the Third World, growing demand is primarily for staple food grains such as wheat and rice. In Europe, Japan, the Soviet Union, and other more developed countries, demand is growing most rapidly for feed grains and protein supplements needed to support expanding livestock herds.

The predominant role of the United States in global agricultural trade is expected to continue through the end of this century. Because projected foreign grain consumption exceeds foreign grain production by an additional 4 million tons each year, further growth in the volume of U.S. agricultural exports is

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assured, barring further depletion of domestic stocks.<sup>16</sup> The U.S. share of global agricultural trade is also expected to increase. Feed-grain exports from the U.S. now account for 72 percent of global trade in feedgrains, up from 42 percent a decade earlier. America's share of global trade in wheat rose from 36 percent in 1970 to 45 percent in 1980, and is projected to reach 57 percent by 2000.<sup>17</sup>

The increasing volume and value of worldwide agricultural trade and America's continued ability to supply needed export commodities demonstrates a growing international dependence on the U.S. agricultural system. Yet as a direct result, the economic fortunes of U.S. farmers and agribusiness have also become more dependent on climatic, political, and economic events affecting agricultural supply and demand around the globe. Already, the production from about one in every three acres of harvested cropland in America is exported. In 1979, the market value of U.S. agricultural exports reached a record \$40.5 billion—\$8 billion over the previous year. Five years earlier the value of exports was less than \$22 billion. Agricultural exports now account for about 25 percent of the gross value of agricultural products sold in America and comprise nearly 20 percent of total value of U.S. exports from all sectors of the economy.<sup>18</sup>

Worldwide population growth and economic development are expected to support substantial further expansion in the volume of U.S. agricultural exports. Agricultural exports in the year 2000 may total 390 to 575 million tons, a 140 to 250 percent rise above

the 1980 export volume of 164 million tons. The mid-range projection, which NALS considers most probable, shows that the volume of export demand could nearly triple over the next two decades, assuming constant real prices.<sup>19</sup>

High and low estimates of export demand are given because of uncertainties in many key demographic, economic, and political factors. Most of the variation is caused by different underlying assumptions regarding global population growth, changes in real energy prices and economic growth, the availability and use of fertilizer in foreign countries, foreign use of biomass, and the supply of land and technological inputs outside the U.S.

### *Growth in Volume of Overall Demand*

**G**rowth of demand for U.S. agricultural products is summarized in Table 4.1 based on scenarios developed by USDA analysts. The three basic components of demand growth are exports, conventional domestic uses, and biomass (ethanol) production. For the decade of the 1980s, the volume of total demand is projected to grow between 30 and 40 percent, assuming constant real prices. Over the full 20-year period, the volume of demand for U.S. agricultural products is projected to increase about 60 to 85 percent over the 1980 level.<sup>20</sup>

Table 4.1.

*Prospects for growth in the volume of demand for U.S. agricultural products 1980 to 2000 by source of demand: exports, conventional domestic uses, biomass feedstocks.*

	1980-84	1985-89	1990-94	1995-1999
	Percent compound annual growth rates			
Export Demand (% of Total Demand)	5-7 (27)	6-8 (31)	4-6 (39)	3-5 (43)
Conventional Domestic Demand (% of Total Demand)	.95-1.1 (73)	.9-1.05 (68)	.85-.95 (61)	.8-.9 (57)
Biomass Demand	.30	.20	.10	.05
Total Demand	2.35-3.0	2.75-3.45	2.15-3.00	1.80-2.70
Mid-range	2.75	3.1	2.60	2.25

Source: Calculations for NALS by USDA/ESS, 1981.

The anticipated steady increase in the volume of U.S. agricultural exports dominates the growth in overall demand. Exports account for about two-thirds of the projected growth in the volume of demand from 1980 to 2000. Domestic uses, including biomass for ethanol, account for the remaining third.<sup>21</sup>

#### *Satisfying Future Demand: Adjustments Within U.S. Agriculture*

**I**f U.S. farmers and ranchers are to satisfy the constant real price demand levels projected for 1980-2000, significant adjustments will be required within the U.S. agricultural sector. Rising demand from 1972 to the present has already set in motion the two types of adjustments within agriculture which

will proceed and accelerate as demand levels continue rising. Strong demand growth in the 1970s was met by a 3.1 percent annual increase in the volume of U.S. agricultural production.<sup>22</sup>

About three-quarters of the overall growth in output in the 1970s was accounted for by bringing additional land into cultivation; crop yield increases from better and more intensive management accounted for about one-quarter.<sup>23</sup> Looking farther back, the annual 1.4 percent growth in the volume of production in the 1960s came entirely from gains in crop yields. In that decade, the acreage planted to crops actually declined .2 percent annually. Table 4.2 reports the historic and projected increase in the total volume of demand. In addition, the magnitude of adjustments which could become necessary to meet future demand levels are presented. This

is done by dividing future adjustments within U.S. agriculture into an assumed rate of gain in crop yields and the implied planted acreage needed to meet projected demand. Historic rates of gain in crop yields and planted acreage are also reported in Table 4.2. Figure 4.1 is a graphic representation of the historical trends in harvested cropland between 1940 and 1980.

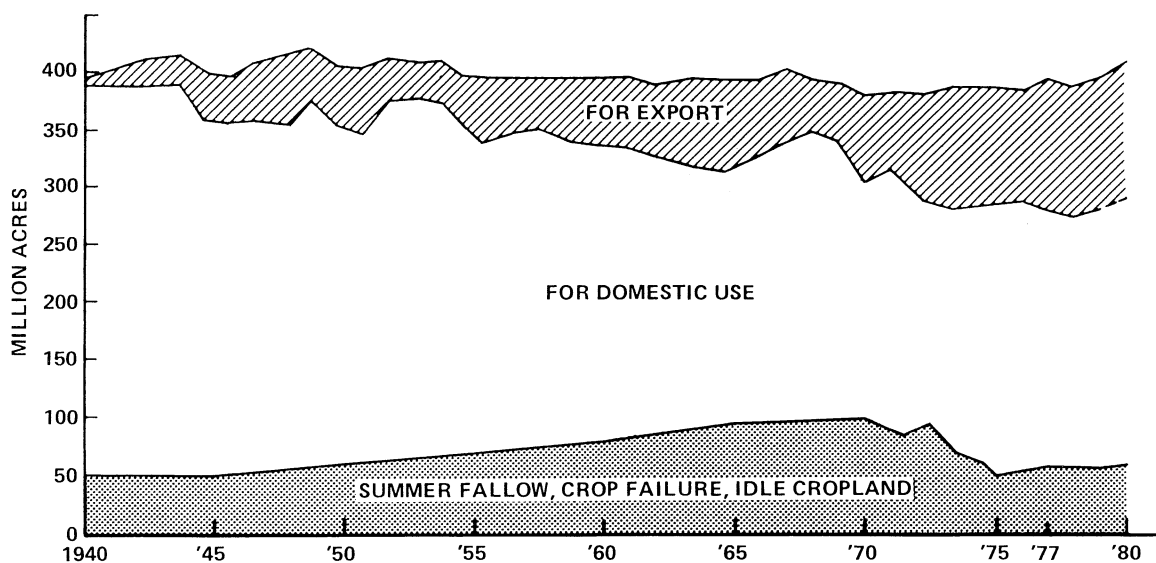
The annual rate of growth in planted acreage through 2000 is highly dependent on future trends in national average crop yields. Over the 20-year projection period, a .75 percent annual rate of gain in crop yields, com-

parable to the 1970s (Case A in Table 4.2), implies the need for about a 45 percent increase in planted acreage by 2000. Conversely, a 1.5 annual rate of growth comparable to the higher gains in crop yields during the 1960s (Case C) implies the need for about a 25 percent increase in planted acreage. A 1.25 annual growth rate in crop yields is included in Table 4.2 to show the necessary adjustments within U.S. agriculture if the actual rate of gain in crop yields falls mid-way between the high and low cases.

Some analysts are optimistic that future technological innovations will push eco-

Figure 4.1.

*Acreage of crops harvested, summer fallow, idle & crop failure U.S. 1940-1980*



Source: "Changes in Farm Production and Efficiency," USDA.  
Preliminary '78-80 Data—Economics and Statistics Service.

Table 4.2.

*Actual historic and projected future change in total agricultural production, crop yields, and area planted assuming constant real prices*

	1960-69	1970-79	1980-84	1985-89	1990-94	1995-99
	Percent compound annual growth rate					
	Historic		Projected Growth in Demand			
% Change in Output	1.40	3.10	2.75	3.10	2.60	2.25
	Assumed Rate of Increase in Crop Yields					
% Change in Crop Yields	1.60	.75	(A) .75	.75	.75	.75
			(B) 1.25	1.25	1.25	1.25
			(C) 1.50	1.50	1.50	1.50
	Implied Growth in Planted Acreage Needed To Satisfy Demand					
% Change in Planted Area	— .20	2.35	(A) 2.00	2.35	1.85	1.50
			(B) 1.50	1.80	1.35	1.00
			(C) 1.25	1.60	1.10	.75

Source: Calculations for NALS by USDA/ESS, 1981.

(See NALS Technical Papers IV and XIV for a more detailed discussion of trends in agricultural productivity and acreage planted).

nomically attainable national crop yield averages significantly higher in the coming decades. These analysts expect the rate of gain in productivity to return to the relatively high rates recorded in the 1960s.<sup>24</sup> Other analysts suspect that national average yields are already leveling off. They cite a number of factors that are likely to contribute to a dampening of future crop yield gains.<sup>25</sup> Key factors include the rising real prices of fertilizers and other energy-intensive inputs, less fertile agricultural land available for conversion to cropland uses, the lack of unutilized supplies of water to sustain past growth rates in irrigated agriculture, and the loss of natural soil

fertility from erosion, salinization, and other types of environmental side-effects.<sup>26</sup> Taking the impact of these factors into account, some analysts anticipate a more conservative growth rate in crop yields, often below the rate achieved in the 1970s.

Even those analysts most optimistic about future crop yield gains anticipate at least a decade's delay before there are widespread on-farm benefits from research and development work now in progress. Experts have repeatedly cited the level of public funding for basic research in the agricultural sciences as likely to cause a more sluggish pace of technological advance through the year



2000.<sup>27</sup> Because of the importance and complexity of technological change in studying future supply-demand interactions, NALS commissioned a special study on the topic. Technical Paper XV reports the results of this study, while Technical Papers IV and XIV draw upon the findings of other studies carried out by USDA and private analysts in describing the effects of different technological change rates on U.S. agricultural productivity.<sup>28</sup>

Uncertainty about future crop yield trends casts further uncertainty on estimates of the acreage of principal crops needed to satisfy a given level of demand. For the average projected levels of demand and the three rates of gain in crop yields shown in Table 4.2, planted acreages needed to meet demand for principal crops in the U.S. are reported in Table 4.3. Crops included in the acreage estimates in Table 4.3 include about 90 percent of the total historic planted acreage for all crops.

Again, the importance of crop yield gains is apparent.

Based on Table 4.3, between 77 and 113 million additional acres would need to be planted in principal crops by 2000 to meet the projected volume of demand at constant real prices. Farmers and ranchers have two basic stocks of land not now in cultivation to draw upon as demand rises. The first is land already classified as cropland but now used for hay or improved pasture. This is the land that can most easily be converted to cultivated cropland. According to the land use category definitions used in the NRI, there were about 60 million acres of cropland in hay and pasture uses plus about 36 million acres of high potential cropland in 1977.<sup>29</sup> Based on preliminary estimates from the 1978 Census of Agriculture, there were some 140 million acres of "cropland pasture and other cropland" (see Part 1).

A second major source of land to expand

*Table 4.3.*

*Planted acreage needed to meet projected demand\* for principal crops based on three rates of crop yield gains, 1980 to 2000*

(Million acres)	1980	1984	1989	1994	1999
<i>Case A: .75% gain in Crop Yields</i>	294	325	365	400	407
<i>Case B: 1.25% gain in Crop Yields</i>	294	317	346	370	389
<i>Case C; 1.5% gain in Crop Yields</i>	294	313	339	358	371

Source: Calculations for NALS by USDA/ESS, 1981.

\*Projected demand levels assume constant real prices.

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the planted acreage of principal crops requires some investment or physical alteration to bring into cultivation. The NRI showed 91 million acres of medium potential cropland available for shifting into cultivation in 1977, in addition to some 270 million acres with low potential for cultivated crop uses.<sup>30</sup> A portion of the 140 million acres of cropland pasture and other cropland using the Census definition is inventoried as potential cropland in the NRI series.

Shifts of land into cultivation of the magnitude suggested in Table 4.3 are technically possible. However, bringing more land and other resources into crop production to meet growing demand in the 1980s and 1990s will come at a substantially higher cost and only with significant higher real returns to farmers and ranchers.<sup>31</sup> The continued conversion of high quality agricultural land runs counter to the clear need to expand cultivated acreage and production of nearly all agricultural commodities in the next two decades. To compensate for past and future conversions, other land of medium and high potential will have to be moved into crop production to sustain necessary gains in productive capacity. The level of economic costs and the environmental consequences of conversion will depend over time on both the amount and the productivity of land converted from farm or ranch uses.

From an historical perspective, it is significant that the contribution to the expanding volume of agricultural production coming from additional land is expected to exceed by a significant margin the contribution to growth in output from rising crop yields.<sup>32</sup>

Unlike the decades of the 1960s and 1970s which are often associated with the emergence of scientific agriculture, it appears that the future may be much more dependent on full and efficient utilization of the agricultural land resource base.

### *Summary of Demand Implications*

USDA's most current projections indicate that demand pressure on the U.S. agricultural land base will build throughout the remainder of the century. Analysts predict that it will be most intense in the last few years of the 1980s. From the viewpoint of global food needs, the 1988-1990 period appears particularly critical because the gulf between the projected rates of growth in demand and supply is widest at that time.

These projections of total demand probably overstate the actual volume of demand in the future because of the constant real price assumption. In order to induce farmers to bring additional land into cultivation, rents will have to increase. This implies either a rise in product prices or a reduction in production costs; the former is more likely. Experts in USDA expect the domestic food component of total demand to be most sensitive to future real increases in production costs. However, export demand and demand for biomass would also be affected.

Most of the adjustment in the volume of domestic demand is likely to be brought about by a drop in per capita meat consumption. The

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growth in consumer demand for red meat is expected to taper off as the real prices of meat go up. Meat prices are expected to be particularly volatile in the next two decades because of the livestock feeding industry's growing reliance on key export commodities including corn, sorghum, soybeans, and high-protein feed supplements. As more pasture and range-land is shifted into crop production to meet export demand, the percentage of livestock production dependent on feedgrains and oilseeds is likely to continue rising.<sup>33</sup>

Although the nature of these factors is uncertain, the volume of U.S. agricultural production in 2000 is expected to increase nearly three-fourths over the 1980 level of output if projected demand is to be met. Even though there are at present substantial reserves of land available for expanding crop production, USDA analysts project significant real increases in the private and public costs of producing agricultural products in the next two decades.<sup>34</sup> Once the supply of land most easily shifted is brought into crop use, further expansion in planted acreage will entail relatively steep conversion and management costs. Higher real costs of production are probable since cropland now coming into cultivation is more costly to till, is subject to more crop failures and yield variability, and produces poorer crops on average than land already in cultivation.<sup>35</sup> In light of these additional costs of producing food and fiber, farmers and ranchers will require significantly higher real prices for their products.

Higher real prices associated with these agricultural resource adjustments could be expected to ease demand pressures somewhat

and result in a lower overall need for land expansion. However, it is also possible that, even with rising real crop prices, the volume of U.S. agricultural products demanded could continue growing at, or even above, the rates projected. Many domestic and global economic factors will play a role in determining the volume of agricultural products demanded in the future at a given price level. These include domestic and global economic growth rates, the geographical distribution of growth relative to demand for agricultural products, and developments in international monetary relations.<sup>36</sup>

No discussion of the demand for U.S. agricultural commodities would be complete without noting the food supply problems faced by developing countries in the Third World. Historically, the U.S. has been the major contributor to foreign aid and international food relief programs. Between 1967 and 1980, a little more than 9 million metric tons of grain were distributed annually through world aid programs.<sup>37</sup> This represents less than 5 percent of the volume of grain traded commercially. In recent years, the African Sahel has been one of the world's most seriously food-short regions and a major recipient of food aid. Because of two successive years of drought and internal strife, the 26 countries in this region will produce only some 18 million metric tons of cereals this year. To meet basic food needs, 5.6 million tons of commercial cereal imports plus 2.4 millions tons of food aid will be needed in 1980-1981.<sup>38</sup> Given the cost and tight supply of grain on world markets and the level of economic development in the Sahel, obtain-

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ing and paying for needed foodstuffs will be difficult. Rising production costs in America will further complicate solutions to global food problems.

Over the next 10 years the rapid expansion of the alcohol fuels industry could contribute to market forces that help keep agricultural land in farm and ranch use. Growing demand for exports and the alcohol fuels industry will both place upward pressure on the prices of basic farm commodities, although the probable impact of export demand is much greater than that expected from ethanol. Higher real crop prices would increase farm profits and raise the economic return to resources utilized in agriculture. As a result, farmers could become more successful participants in rural land markets when productive farm properties are placed for sale. While profitable farming is essential to any successful effort to control agricultural land conversion, farm and ranch properties near urbanizing areas will nevertheless continue to be more valuable for development than for agriculture in the foreseeable future.<sup>39</sup>

### *Benefits From Retaining Agricultural Land in Farm and Ranch Use*

Conversion of agricultural land to nonagricultural uses between now and 2000 will require additional adjustments within agriculture. For whatever level of demand and

rate of gain in agricultural production that materializes, the effects of conversion over time will depend both on the acreage and the productivity of land converted to nonagricultural uses each year. The public and private costs of conversion are cumulative and will persist unless there are significant changes in the demand for U.S. agricultural products or in the rate of gain in average crop yields attained in America and around the world.

A number of benefits from retaining agricultural land for agricultural uses can be anticipated. Preserving productive cropland that otherwise would be converted will help mitigate upward pressure on production costs, and indirectly, consumer food prices. Protecting high quality cropland will also provide farmers and ranchers greater flexibility in conserving soil fertility, strengthen the nation's economy and international standing, and provide greater stability to the annual level of production in the U.S. agricultural sector. Moreover, these benefits will grow as farmers and ranchers move closer toward full utilization of agricultural resources. All things considered, agricultural land protection can be thought of as an insurance policy, one that will provide American farmers and ranchers—and the nation—with broader options to respond to an uncertain future.

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The demand projections in Table 4.1 have been updated since the NALS *Final Report* was issued in January 1981. Tables 4.2 and 4.3 also reflect the adjusted demand projections. The new demand projections are identical to official USDA projections dated March 1981. A forthcoming USDA report will provide a detailed discussion and documentation of these projections.

## *Five: CURRENT EFFORTS TO PROTECT AGRICULTURAL LAND*

**B**eginning with Maryland's initial effort in 1956 to reduce tax burdens through differential property tax assessments on its farmers, state and local governments have undertaken 25 years of creative experimentation in ways to protect farmers and agricul-

tural land. Nearly all of the activity has taken place since 1970.

A remarkable variety and complexity of approaches have been tried. There were few widely imitated models: each state, each county, each township seemed to try its hand

*Table 5.1. Approaches used in protecting agricultural land*

*Comprehensive Planning*—A process leading to adoption of a set of policies regarding land use, transportation, housing, public facilities, and economic and social issues. It may include a land use plan designating particular uses and a program for providing transportation, sewers, and other public facilities. In most states the plan in itself is not legally binding on governments or individuals, but a few states require that zoning and major public facility plans be consistent with comprehensive plans.

*Agricultural Zoning*—A legally binding designation of the uses to which land may be put, including the type, amount, and location of development. Agricultural zoning restricts uses to agriculture and related uses such as a farmstead. Often a large minimum lot size (20-160 acres) is stipulated in an agricultural zone.

*Agricultural Districting*—The designation of specific tracts for long-term agricultural uses, usually coupled with benefits and assurances which improve the conditions for farming. Generally no legally binding controls are imposed on land use.

*Purchase of Development Rights*—Purchase of the right to develop from owners of specific parcels, leaving the owner all other rights of ownership. The price of the rights is the diminution in the market value of the land as a result of the removal of the development rights. The remaining value of the land is the "farm use" value.

*Purchase and Resale or Lease with Restrictions*—Purchase of land, imposition of restrictions on use and development, and resale at market price. The end result is equivalent to purchase of development rights.

*Transfer of Development Rights*—Development rights on land in a designated preservation area may be purchased by a developer and transferred to a designated development area where the equivalent amount of additional development can be constructed.

*Differential Assessment*—Assessment for property tax purposes based on the farm use value of the land rather than on its market value. There are three major types of differential assessment: pure preferential assessment with full abatement, deferred taxation with partial or with no abatement, and restrictive agreement, under which a farmland owner contracts to maintain his land in farm uses in return for a lower assessment.

*Development Permit System*—Requirement that a special permit be obtained for development from designated state or regional agency. Permit is in addition to normal local zoning and building permits.

*Right to Farm*—Legislation stating that local ordinances cannot be enacted which restrict normal farming practices unless they endanger public health or safety, and providing farmers with some protection against private nuisance lawsuits.

*Note:* NALS has prepared a detailed Reference Guidebook for State and Local Governments. Most of the material in this section is based on that work.

<i>Table 5.2. Numbers of existing programs to protect agricultural land</i>				
<i>Type of Program</i>	<i>State</i>	<i>County</i>	<i>Municipality</i>	<i>Total</i>
Differential Assessment for				
Property Tax				
Preferential Assessment	17			17
Deferred Taxation	28			28
Restrictive Agreement	2			2
Income Tax Credits	2			2
Farm Use Valuation for Death Tax				
Use IRC* rules	16			16
Use rules similar to IRC	8			8
Special rules	5			5
Capital Gains Tax on Land Sales	1			1
Agricultural Districts	6			6
Right to Farm Legislation	16			16
Agricultural Zoning	1	104	166	271
Purchase of Development Rights	4	4	1	9
Transfer of Development Rights		2	10	12
Development Permits	2			2

\*Internal Revenue Code

at creating a unique program that would deal with one or more of the factors that were threatening the continued vitality of farming and the rural quality of life.

The most important approaches are defined in Table 5.1 and their numbers are summarized in Table 5.2. These emerging developments show that our federal system provides a climate where legislators can experiment with novel approaches to problem solving and shape legislation to meet the varying economic, environmental, and political conditions in the different regions of the coun-

try. These developments also show that while local and state initiatives to protect agricultural land are numerous, federal level efforts have been few.

### *State-Level Efforts*

*U*ntil recently, agricultural land problems received a relatively low priority in most state government policy agendas. Often,

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farm problems and issues were seen primarily as national in scope, and thus a federal government responsibility. As a result, state agricultural programs were fragmented responses to individual problems.

These state attitudes are changing. A recent Council of State Governments report completed in 1979 acknowledges a growing realization that serious problems are developing, and that agriculture is a legitimate state, as well as federal, issue. While the federal role in agricultural policy remains significant, in other areas such as land use regulation and planning, taxation, farm financing, marketing, transportation, and rural community development, states share significant powers with the Federal Government.

A range of state programs have sought to minimize scattered nonagricultural development. This type of growth results in higher public service and utility costs, the impermanence syndrome discussed in Part 2, a declining number of family farms, and speculative investment in agricultural land. Approaches to protect agricultural land are discussed below.

### *Agricultural Districting*

State governments have recognized the need to encourage the development and improvement of agricultural land for productivity and environmental benefits, and to reduce conflicts between residential development and farm operations. Agricultural dis-

tricting programs are designed to address such problems as inflated market value and higher real property assessment for active agricultural land, enforcement of nuisance ordinances against farming operations, inadvertent inducement of growth and development from the expansion of public services and increased uncertainty felt by farmers over the future fate of farm enterprises in their area.

In each program, agricultural districts are formed as legally recognized areas designed for long-term agricultural use. They can be initiated by resident farmers and approved by state government agencies. The districts, with their benefits and obligations, are created for fixed but renewable periods of time ranging from four to ten years. In all programs except New York's, land cannot be included in an Agricultural District without the owner's written permission.

How effective the districts are in reducing the rate of conversion of agricultural land depends on the particular combination of elements they include. The programs reviewed by NALS vary considerably. At one extreme, the Illinois program provides only for right-to-farm protection, limitations on special assessments, and harmonizing of state agency regulations with agricultural land retention goals. The Twin Cities regional approach, by contrast, contains eleven elements and is embedded in a comprehensive growth management system. Both programs, however, are too new to be evaluated. The New York program set up in 1971 is the only one with sufficient longevity to permit evaluation. It has provided modest protection for farmers against special assessments and eminent do-

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main and has given them an enhanced sense of security, but it has been relatively ineffective in reducing the rate of conversion of agricultural land.

### *Zoning for Agricultural Protection at the State Level*

**T**he stated purpose of agricultural zoning usually attempt to limit the intrusion of new, nonagricultural uses (usually non-farm dwellings) into established agricultural areas. Many of the same problems addressed by agricultural districts are also addressed by agricultural zoning: saving agricultural land, protecting farm operations, reducing public service costs, and protecting the agricultural economic base.

As Table 5.2 shows, agricultural zoning is commonly used by counties and municipalities, but not by states. Hawaii is the only state that imposes agricultural zones directly. Oregon requires local agricultural zoning programs to conform to state standards, and in Wisconsin's Farmland Protection Program, landowners' tax credits will be continued after 1982 only if their counties adopt agricultural preservation plans or exclusive agricultural zoning ordinances.

### *Purchase of Development Rights (PDR)*

**P**DR programs are designed to protect agricultural land from development in situations where zoning approaches are not appropriate. In many areas, it may prove politically infeasible to enact an exclusive agricultural zoning ordinance in locations where development pressure is high and it is evident that the zoning restrictions would deprive landowners of substantial value. In addition, in many jurisdictions, experience has shown that existing zoning tends to be weakened in order to accommodate strong demands for development.

The purchase of development rights to a property is equivalent to acquiring an easement. The value of the development rights is defined as the difference between the market value of the land and its value solely for agricultural purposes. There are two basic approaches to acquiring development rights. One is to acquire them directly through purchase or donation. The other is to purchase the property in full fee, impose restrictions on its development, then sell or lease the land to a new user, subject to those restrictions.

PDR programs are underway in four northeastern states. Although the programs have generated high popular interest, they are expensive. A PDR program initiated in New Jersey was recently abandoned when it became clear that significant amounts of farmland could not be purchased within a \$5 mil-



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## *Effectiveness of Tax Relief Efforts*

Differential assessment and circuit breaker property tax credits were usually enacted to reduce the burden of farm property taxes and to reduce the rate of conversion of agricultural land to nonfarm uses. Generally these programs are effective in reducing farm property taxes but are not, in themselves, effective techniques for reducing the rate of conversion of agricultural land to nonfarm uses. Even when tax reductions may help a farmer to keep farming, they often only postpone the sale a few years until he retires or dies.

The effectiveness of estate tax reforms can be measured first by the number of farm estates that are enabled to reduce their federal estate tax liability, and second, by the tax savings enjoyed by those estates that are both able and willing to meet the highly restrictive eligibility requirements of the Internal Revenue Code. Only about 30 percent of farm estates are large enough to be subject to the estate tax. The remaining farms are not able to benefit from this provision. Further, only a few large farm estates have the liquidity problems which Congress sought to alleviate. In short, only a small percentage of farm estates will actually benefit from section 2032A.

*I*n summary, although many states have used property tax relief as a tool in protecting agricultural land, only a small fraction of farm estates or farms which enjoy the tax benefits of differential assessment meet all the conditions necessary to make this incentive effective. The benefits of reduced taxation, however, are conferred broadly, with no proof required of each recipient that the public policy of protecting farmland is being promoted. For this reason, tax policy is often viewed as a shotgun approach. Furthermore, unless differential assessment programs are combined with agricultural zoning, with agreements that restrict the land to agricultural use, or with purchase of development rights, there is no assurance that the beneficiaries of tax reduction or abatement will keep their land in agricultural use. Owners may simply enjoy reduced taxes until the time comes when they want to sell. In the case of death taxes, significant tax benefits are made available to large farm estates, even those that are not in serious jeopardy of being converted because of high death taxes.

In isolation, then, differential assessment is largely ineffective in reducing the rate of conversion of agricultural land. It does not discourage the incursion of nonfarm uses into stable agricultural areas; it simply enables owners of land under development pressure to postpone the sale of their land until they are ready to retire. The incentives are not keyed into actual need, except in the case of the tax credit programs of Wisconsin and Michigan.

Nevertheless, differential taxation is a valuable component of a comprehensive agricultural land protection program. As a mat-

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ter of equity, if a program prevents agricultural land from being developed, the owner should pay taxes only on its agricultural use value. Further, benefits such as these may serve as incentives to encourage farmers to participate in integrated farmland protection programs.

### *Right-To-Farm Legislation*

**T**here is a basic incompatibility between many types of agricultural activity and residential use. As city people begin to move into rural areas, they object to the smells, noises, dust, pesticides, and other by-products of operating a modern farm. These complaints can take several forms. Neighboring landowners may sue the farmer, claiming that certain routine farm activities are a nuisance. They may try to persuade the local government to pass an ordinance limiting various farm activities, or report the farmer to a county or state agency responsible for enforcing air or water pollution control laws and seek an order to end the offending farm practices.

Farmers find that defending themselves against such actions can be expensive, time consuming, and aggravating, even when successful. They have turned with increasing frequency to their state legislators for protection. The laws that have been passed in response have been called "right-to-farm" laws. At least sixteen states have adopted some form of right-to-farm legislation.

### *Capital Investment Management*

**M**any capital investments, such as water and sewer systems, highways, and utility extensions, have growth-inducing tendencies. When introduced into farming areas, they may act as a catalyst to alter land markets and community patterns in ways not always beneficial to farming. State governments can exercise a degree of control over such community services through careful monitoring of investment policy. In both Illinois and Vermont, State Executive Orders have been issued to create an oversight function to review such projects and ensure an evaluation of their impacts on agricultural land.

In Illinois, Executive Order No. 4 (1980) was promulgated as part of a general policy to protect and retain farmland. Vermont's Executive Order No. 52 (1980) followed closely on the heels of two major state-aided project proposals which would have stimulated the conversion of agricultural land. Both Executive Orders provide for scrutiny of state investment policy in accordance with land use goals.

States may also influence some federally-assisted projects through their control over the disbursement of "matching funds." Although the control of investments in capital facilities will not, by itself, secure an agricultural land base, it can be useful in mitigating some of the effects of these growth-inducing projects.

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lion budget. Maryland is proceeding more cautiously, using an approach whereby farmers submit bids for development rights to their land, rather than have the PDR program pay the difference in development potential.

The political costs of PDR programs may also be high. Where governments choose to finance purchasing through public bonds, they may be required to seek voter approval for the bonding.

Finally, even after development rights have been separated from a farm property with good soils, land may remain difficult and expensive to farm because of the influences of nearby urbanization. Therefore, as is the case with zoning and other single approaches, complementary programs may be necessary to help retain the land in production.

### *Property Tax Relief*

**P**roperty tax burdens often weigh heavily upon landowners. For farmers, this problem is compounded because the economic returns from agriculture seldom bear any relationship to property tax levies.

For tax purposes, the value of agricultural land may be determined in two ways: its current use value for agricultural production, and its exchange value for alternative uses. Many farmers have found that their real property taxes were going up because of the rising fair market value of their land and the increased fiscal and public service burdens that accompany suburbanization.

All states except Kansas and Georgia have laws that provide some form of real property tax relief for farmers that is intended to diminish conversions of farms to other uses as a result of tax motivated sales. These provisions come in the form of preferential assessment, deferred taxation, restrictive agreements, and circuit breaker tax credit.

Seventeen states authorize preferential assessment of eligible agricultural land. Such land is assessed for property tax purposes at its agricultural or current use value, instead of its fair market value. Eligibility conditions are usually minimal, and there is no penalty for the conversion of lands to other uses.

Twenty-eight states have adopted deferred taxation approaches. In addition to making current use value assessment available for eligible land, these programs require owners who convert participating land to ineligible uses to pay some or all of the taxes which had been deferred.

The six New England states and Maryland follow a somewhat different approach. They have enacted land use change taxes which simply make the deferred tax equal to a stated percentage of fair market value, or equal to the difference between fair market value and agricultural use assessed value in the year of sale or conversion. To deter rapid turnover of agricultural land, three states (Massachusetts, Rhode Island and Connecticut) impose higher taxes on land which has been preferentially assessed for short periods of time. By contrast, Maine imposes taxes at a higher rate on land held for longer periods of time. Vermont also has a capital gains tax which applies to all sales of land in an effort to

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dampen speculative activity in land transactions. Finally, several states charge an additional penalty if landowners fail to follow prescribed procedures.

New Hampshire and California have restrictive agreement programs for agricultural land. They differ from the other programs in that as a condition of eligibility, landowners wishing to secure differential assessment must enter into enforceable agreements to keep their land in eligible use. Owners are not released from contracts unless they meet certain stringent statutory criteria. Other states, such as Hawaii, Pennsylvania, and Washington, also require landowners to sign similar agreements but, in the event of a breach, only impose rollback taxes. Michigan and Wisconsin authorize an eligible owner of agricultural land to apply some or all the property taxes on his farmland and farm structures as a tax credit against his state income tax. These programs are called "circuit breakers," because they relieve the farmer from bearing the economic burden of real property taxes once these taxes exceed a given percentage of his income.

In Michigan, a farmer can credit the amount by which the real property taxes on his farm and farm buildings exceed 7% of his household income if he enters into a development rights agreement, restricting his land to agricultural use.

Wisconsin's program also uses a form of real property tax credit against the state income tax. It is closely integrated with planning and zoning, and the magnitude of the credit is related to the household income of the farmer, the level of his real property taxes,

and the extent of local zoning and planning activities.

### *Estate Tax Relief*

**P**rovisions of the Tax Reform Act of 1976 relating to estate taxes were enacted for two major reasons: 1) to reduce estate taxes for families generally and for farmers specifically; and 2) as a result, to lower the rate at which agricultural land is converted to non-agricultural uses.

The passage of this Act triggered a spate of activity across the nation as many state legislatures were pressed to make available to farmers and closely held businesses the kind of tax benefits provided in Sections 2032A (current use valuation) and 6166 (deferral of estate taxes and installment payments) of the Internal Revenue Code. Many states moved quickly to simplify the administration of estates by "piggy-backing" the state estate tax on federal estate tax provisions.

As of mid-1980, 29 states permit some form of preferential valuation of farm land for state death tax purposes. Six states (California, Kansas, Michigan, Minnesota, New York and Wisconsin) have incorporated provisions allowing the deferral of estate taxes.

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### *Voluntary State Programs*

**I**n California's Williamson Act program, use value assessment is the incentive for individuals to contract not to develop their farmland for 10 or more years. In Maryland, the possibility of selling development rights to the state along with right-to-farm protection are the major inducements for enrolling in an agricultural district and contracting not to subdivide or build for at least five years.

The Wisconsin Farmland Preservation Program, which went into effect in December 1977, provides annual tax credits to farmland owners who contract not to develop their land. Landowners' credits will be continued after 1982 only if their counties adopt agricultural preservation plans or exclusive agricultural zoning ordinances. The tax credits available to owners are based on a "circuit breaker" concept that provides a credit against state income tax to the extent that property taxes are deemed excessive in relation to the owner's household income. The state establishes criteria for agricultural zoning districts and works with counties to set standards for defining agricultural land.

By March 1980, 20 Wisconsin counties had adopted an agricultural zoning ordinance, an agricultural preservation plan, or both. Agricultural zoning covered 2,157,000 acres.

The Wisconsin program attempts to avoid the weaknesses of a voluntary program. The strategy followed is providing tax credits

to landowner participants in the first phase, and specifying that the credits will not be paid in the second phase unless the local government adopts exclusive agricultural zoning (or in rural areas at least an agricultural preservation plan). The step from individual contracts to areawide agricultural preservation plans and zoning ordinances not only increases the acreage protected but also reduces the potential for scattered development. The benefits of the Wisconsin program appear to be sufficient to result in widespread participation, and its costs are of no greater magnitude than the tax expenditures made by the other states to provide an incentive for farmers to keep farming.

### *Mandatory State Programs*

**F**our states (Vermont, California, Hawaii, and Oregon) have mandatory programs. The Vermont program requires that a permit be obtained from the state for certain types of development. The California Coastal Commission program, which is also a development permit program, requires local governments to adopt comprehensive plans and regulatory ordinances which meet criteria of the Commission. The Hawaii program involves zoning directly by the state.

The Oregon program is the most fully-integrated and comprehensive in the country. It requires local planning and zoning consistent with state goals, which are mandatory statewide planning standards. The Agricultural Goal requires that agricultural lands be

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preserved and maintained for farm use. All Class I-IV soils (and in eastern Oregon Class V and VI soils in addition) not committed to nonfarm use must be zoned for agriculture according to general criteria set by the state. Cities must establish urban boundaries, within which new development must be contained and encouraged. Public facilities and services are to be provided at levels suitable for urban uses within urban growth boundaries, but few, if any, public services are to be provided outside the boundaries. Land in farm use zones qualifies for use value assessment for property tax and state inheritance tax purposes, is exempt from special levies of utility districts, and enjoys right-to-farm protection. In the Willamette Valley, where population pressure is by far the highest, 84 percent of the anticipated ultimate acreage is already in agricultural zoning.

### *Local Government Efforts*

**I**t is at the local government level that changes in land use have immediate impact. Land under development pressure is not seen only in terms of its agricultural soil capability. Rather, it has a direct and personal meaning to the people in the community. Land in local communities is tied to the livelihood of farmers and ranchers, development aspirations, job needs, life style values, and the need to provide community services.

Agricultural land issues are often unique

for each locality, yet the types of tools available to address farmland protection needs fall into a few basic categories.

### *Local Zoning*

**O**f all the methods that local governments use to protect agricultural land, zoning is the most popular and common. In the last decade at least 271 jurisdictions (1 state, 104 counties, and 166 municipalities) have turned to agricultural zoning to protect their agricultural land. The agricultural zones are often combined with community plans, urban boundary agreements, or voluntary or mandated state programs that together are intended to protect farmland.

Until recently, however, most agricultural zones permitted small minimum lot sizes coupled with an open-ended list of permitted nonfarm uses. For example, until September 17, 1979, the Agricultural District of Washington County, Wisconsin, permitted nonfarm residences within the district on a minimum lot size of 40,000 square feet. The district also permitted a wide range of professional offices.

Obviously, this type of open-ended district allowed thousands of acres of agricultural land to be taken out of production. More recently, however, dozens of communities, spurred by the increased pressure on their agricultural land and the failure of existing controls, have amended their agricultural districts to offer increased protection for agricul-

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tural uses. For the most part, this has involved tightening ordinances to discourage nonagricultural uses in agricultural areas and to increase minimum lot sizes.

The new agricultural zoning ordinances have greatly decreased residential densities in agricultural zones. Also, for the most part, good agricultural land (good in the sense of field size, soil quality, and surrounding land use) is not being taken out of agricultural use in these districts. Rezoning is granted, but generally only to those lands which are no longer (or never were) well suited to agricultural use.

However, a majority of communities involved in restrictive agricultural zoning relied upon a large minimum lot size to protect agricultural land from nonagricultural development and in some cases the minimum may be smaller than the size necessary for continuation of the type of commercial farming enterprises found in the area. These communities may or may not allow nonfarm dwellings as a permitted use but, in practice, the minimum lot size defines a farm. This process, can result in the chopping up of good agricultural land into these minimum sized lots, and given sufficient volume, such practices may lead to the same frictions and nuisance suits that the programs are designed to curtail.

It is still too early to assess with certainty zoning's long term effectiveness for protecting agricultural land. On the one hand, there are strong indications that agricultural zones carefully laid out on the basis of accurate and complete data on soil productivity, land tenure patterns, and agricultural activity, can

significantly change the expectations of both farmers and potential developers regarding the development potential of agricultural land. On the other hand, zoning is vulnerable to change if there is a shift in political power. To add stability, several states have established state or metropolitan level planning review and approval requirements for decisions which threaten the continued stability of agriculture. Multiple measures appear both wise and necessary.

### *Local PDR Programs*

Several communities have considered purchasing the development rights to agricultural lands and a few programs are already underway. The first major local program to use development easements to protect agricultural land was instituted by Suffolk County, New York in 1974, and the most recent are the \$50 million program in King County, Washington, and the \$6 million program in Southampton, New York.

As in state programs the major disadvantage at the local level is the cost of PDR programs. Five PDR programs that have acquired easements on agricultural land have expended some \$18 million and have secured easements on nearly 10,000 acres at an average cost of \$1,848 per acre. Per acre costs of individual programs have ranged from \$3,120 for Suffolk County to \$311 for Burlington County, New Jersey.

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## *Metropolitan Growth Management Programs*

**I**n many parts of the country, the problem of agricultural land protection can be addressed realistically and effectively only by considering its relation to the entire system of land use and development within a given region. The need to incorporate agricultural protection into an overall strategy for dealing with growth is especially apparent in metropolitan areas, where there is often intense competition for limited land resources. A coordinated regional approach to growth management can minimize public investment costs and focus farmland preservation efforts on areas where agriculture is most likely to remain economically viable over the long run.

The NALS Guidebook examines comprehensive growth management programs in three metropolitan areas: the seven-county Twin Cities region, Minnesota; Lexington-Fayette Urban County, Kentucky; and Metropolitan Dade County, Florida.

The three plans share several specific objectives:

- to coordinate the provision of certain necessary public services and facilities, such as transportation, water, and sewers, so as to maximize efficiency in construction and operation.
- to protect environmentally sensitive or unique areas.
- to protect prime farmland and main-

tain the economic viability of agriculture.

Thus, agricultural land protection represents only one of a set of mutually reinforcing policies to achieve an overall goal of rational and efficient metropolitan growth.

## *Private Market Techniques*

**A** variety of approaches relying on individual private market initiatives have emerged to meet many of the same goals held by government-enacted programs. These private market techniques require active cooperation between governments and private landowners, however. To date, techniques for working within the private real estate market to protect agricultural land have not been used extensively.

Transfer of development rights (TDR) programs have been instituted by 10 municipalities and two counties, but developers have shown little inclination to participate in them. It is possible that the newer programs, which have been adopted by large suburban counties, may include development locations where the market will support higher densities and where the county government will provide sufficient facilities and public services so that developers will find it profitable to purchase and transfer rights. But so far, the right combination of factors has not been present.



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A number of private land trusts have received gifts of development rights of agricultural land. Trusts have also been able to move quickly to acquire easements on land (through ordinary purchase, bargain sale, or gift), hold title for an intermediate period, and then sell the easements to a public agency with a permanent responsibility for protecting the land resource. An expanded role for private land trusts, and possibly for semi-public farmland conservancies, appears to be valuable. Restrictions on the qualification of gifts of interests on agricultural land (in contrast to ecologically valuable land as charitable deductions) were recently debated in the Congress. Under the Tax Extension Act of 1980, charitable deductions are allowed for contributions for conservation purposes, such as the preservation of open space (including farmland and forestland) if this preservation is (1) for the scenic enjoyment of the public, or (2) pursuant to a clearly delineated federal, state, or local conservation policy and will yield a significant public benefit.

### *Summary*

**A**gricultural land issues vary widely among states and within communities in a given state. No one solution will work everywhere; each program needs to be designed carefully to meet local or state needs and be responsive to unique conditions. Most successful programs began very simply, by involving citizens in studying the situation to

identify the problems and the policy alternatives. The key ingredients seem to be the participation of farmers and other citizens from the beginning, obtaining technical and often financial help, strong local leadership, and patience.

### *Federal Actions Fostering Agricultural Land Protection*

Although fewer initiatives have been taken at the federal level than at the state and local level, federal attempts are being made to protect agricultural land. Efforts by the Executive Branch may be viewed from three perspectives: administration-wide policies, agency level policies, and specific projects or federal field-level decisions which are oriented to protect agricultural land. The Congress also has attempted — through the Tax Reform Act of 1976—to take steps to ease the burden on farmers and reduce tax-related pressures on farmers to sell their land.

#### *Administration-wide Policies*

**T**he President's Council on Environmental Quality (CEQ), has issued a Memorandum for Heads of Agencies (updating an earlier 1976 memo) which provides oversight, requests policy clarification, and identifies responsible officials concerned with federal program impacts on agricultural lands. Indirectly, the Presidential Memorandum on Community Conservation Guidance,

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and the President's Small Community and Rural Development Policy provide policy direction to protect agricultural lands by concentrating federal assistance for urban growth in urban centers, where no conversion of agricultural land would take place.

### *Agency-level Policies*

**O**f the 37 federal agencies reviewed by NALS staff, only USDA and EPA have explicit policy tools designed to ensure the consideration of program impacts on agricultural land. HUD and DOT have policies currently under development. However, many program sub-units and field elements within these organizations have yet to incorporate agricultural land reviews into their regulations and guidelines or in their day-to-day operations.

The degree of informal consideration given agricultural land in carrying out programs varies greatly among agencies. Based on interviews with various program officials, the type of review and impact assessment tool most frequently used is the Environmental Impact Statement (EIS) process. While this process itself is an important vehicle to consider effects on agricultural land, EISs are completed on only a small number of projects; moreover, the EIS tool alone nearly always fails to assess the incremental and cumulative adverse program impacts on agricultural land. Interviewed officials generally agreed that until agricultural land considerations are more

specifically included in this and other tools, such as the A-95 review process for reviewing federal assistance programs, effective identification of adverse agricultural land impacts will be limited. In addition, the NALS review identified about 30 federal assistance programs that directly or indirectly foster protection of agricultural lands. As expected, most of these are programs administered through USDA.

Specific decisions and actions taken to protect agricultural land vary widely among agencies and from region to region. For example, in California, the Environmental Protection Agency has worked closely with the city of Modesto in developing an environmental impact statement which outlines future water and sewer extensions and growth directions affecting prime agricultural land. The brokered development of this EIS review among EPA, the city of Modesto, and local development interests exemplifies how federal agencies can facilitate community consensus on future development and agricultural land protection.

In Illinois, the FmHA has provided support to the state department of agriculture to develop review criteria for determining the impact of selected federal programs on agricultural lands in the state. In this way, technical assistance funds support the development of a review capability for agricultural lands in the state's A-95 agency.

### *Field-level Actions*

At the field level, several EPA regional offices have adopted operating guidance for reviewing and mitigating program impacts on

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agricultural land, and several FmHA state directors have adopted policies to protect agricultural land from adverse impacts of FmHA programs and projects.

### *Federal Tax Reforms*

As discussed earlier, the Tax Reform Act of 1976, as supplemented by technical corrections contained in the Revenue Act of 1978, included provisions intended to soften the impact of taxes on farm families.

### *Program Design Considerations*

**B**ased on the NALS review of state and local agricultural land protection efforts, a series of program design considerations are offered as criteria for effective protection of agricultural land.

### *Agricultural Land Protection Programs Need To Be Part of Comprehensive Growth Management Programs*

One of the clear lessons that emerges from the evidence collected in the course of the NALS study is that protecting agricultural land is intimately related to managing urban growth. The two problems need to be solved together. The pressure to convert agricultural land often reflects the need to find housing and employment for the nation's expanding and increasingly affluent and mobile population. Unless growth can be managed so

that needed development is provided in locations which do not threaten agriculture, efforts to protect agricultural lands alone will not be effective for long.

Programs to protect land for its long-run resource value represent fundamental social decisions. Therefore, programs need to be developed in a comprehensive planning context, taking account of society's needs for land for industry and commerce, and for residences for people of all social and income classes. Programs also need to adequately address questions of justice and equity for land holders whose freedom to dispose of property is affected.

### *Farmland Protection Programs Need To Be Many-Faceted and Responsive to Local Conditions*

Many problems have been identified as specific causes which lead to the conversion of agricultural land. Generally, they can be classified as problems which weaken the desire and ability of farmers to continue farming, and problems which result directly in a change in land use, usually through sale for development. Correspondingly, there are two general types of solutions to protect agricultural land: those which offset the problems generated by nearby urbanization, and those which directly prevent the development of agricultural land.

Where development pressure is slight, incentives to farmers may be sufficient to maintain areas in agricultural use, but generally, controls on land use are also necessary. Where there is little pressure for develop-

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ment, agricultural zoning or other land use controls will prevent scattered development. In time, unchecked scattered development could set the stage for further development. Controls on land use protect those who want to remain in farming from development by their neighbors.

In areas under heavier development pressure, agricultural land protection is not effective without controls on land use. In such areas, incentives are necessary to offset the burdens and costs of nearby urbanization and thus to enable farmers to farm. In almost all situations, therefore, a combination of incentives and controls is needed for a farmland protection program to be successful.

The ability of agricultural land protection to incorporate both “carrot” and “stick” approaches is important for their success. The approaches taken in Wisconsin and Oregon offer a contrast in styles which attempt to achieve just such a mix.

The Wisconsin program makes a distinct effort to avoid the weaknesses of a voluntary program. By providing tax credits to landowner participants in a first phase, and specifying that the credits not be paid in a second phase, unless the local government adopts exclusive agricultural zoning, the program builds a constituency which is likely to favor controls on development of agricultural land. Tax credits serve as the catalyst for other local action, such as mapping and planning activity supported by state program grants.

Oregon’s land use act established a system of planning and regulation more comprehensive and integrated than in other states. Like many other agricultural protection pro-

grams, Oregon relies on the local zoning ordinance as the immediate tool to prevent development of good quality agricultural land. But while in other states the zoning ordinance is the only measure used, and it is applied at local government option, Oregon’s local zoning ordinances are only one element in an integrated set of statutorily-required policies and programs. Thus, Oregon’s mandatory approach with state-level enforcement of local plan initiatives treats all agricultural land owners uniformly, controlling development in a direct way, and avoiding the central weakness of a voluntary program which can lead to incremental development of agricultural areas.

### *Implementation of an Agricultural Land Protection Program Requires Dedicated Political Leadership*

NALS reviews found that most effective programs had community leaders who helped organize farmers, hammering out coalitions with urban and environmental interests, striking legislative compromises, and convening meetings. Usually one individual could be identified who provided leadership.

Because farmers may constitute a small percentage of a local population, those who want to protect agricultural land need to join forces with other groups with similar interest or convince political leaders of the importance of establishing strong programs. Some of the techniques, such as purchase or transfer of rights, involve unfamiliar concepts. Others, such as agricultural zoning, may involve restrictions on the use of prop-

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erty that are not popular, especially among farmers. Advocates need to convince people of their value and importance.

### *Agricultural Land Protection Programs Need to Recognize a Full Range of Economic Influences on Farming*

While land use controls, tax incentives, and comprehensive growth management programs are important for any agricultural land protection program, other measures are also necessary to maintain the economic viability of agriculture. Examples of these measures include credit for young farmers, special marketing systems for small urban farmers, and support for suppliers, owners of storage facilities, farm labor, and processors who might otherwise move out of urbanizing areas. While these programs are outside the scope of the NALS Guidebook, they are important elements of any strategy to strengthen the agricultural sector.

### *Future Roles State and Local Roles*

**T**he continued conversion of agricultural land on the fringes of metropolitan areas will undoubtedly continue. Establishing effective programs to deal with agricultural land conversion once the land is under intense pressure is difficult, and is usually more costly. This view of the problem suggests that opportunities to slow the rate of agricultural

land conversion need to be pursued actively in rural, less developed communities.

A growing number of Americans are moving from metropolitan centers into rural areas. People are drawn into the countryside by new job opportunities and a desire for a less-pressured life in rural surroundings. Commerce and other private and public developments inevitably follow an influx of people into once sparsely populated rural regions, leading to the conversion of more agricultural land.

State level action is a key to effective protection of agricultural land. States can provide programs and incentives to help local governments, with assistance from the Federal Government when needed and requested, in their efforts to manage nonagricultural development.

### *Federal Roles*

Other than providing technical, educational and/or financial assistance to states and local governments, the Federal Government can assume a leadership role by setting a nation-wide goal of agricultural land protection that will discourage and mitigate the adverse impacts of the Federal Government's own programs and policies (including tax provisions). The Federal Government through its many programs and activities clearly sets an example which both directly and indirectly has a significant influence on development patterns. By recognizing the impact it has on agricultural land and by establishing policies to effectively deal with these impacts, the Federal Government will not only be mutually supportive of the many state

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and local agricultural land protection programs already in place, but also will encourage states and local communities to focus more attention on agricultural land.

*Farmland Protection Programs Need To Be Actively Supported Statewide*

**T**he effects of development often spill over township and county boundaries. Areas of good agricultural land, and the agricultural economies they support, also usually encompass a number of counties. Coordinated programs to guide development and to protect agricultural land, therefore, need to be organized at higher levels of government. In some situations, it may be possible to mount an effective program for a metropolitan area or for a special sub-state geographic region. Generally, however, the state will be the most appropriate level of government for organizing an effective farmland protection effort to address broader than local problems.

A state program can generally strengthen local agricultural land protection programs. By declaring the state's commitment to protect good agricultural lands because they are a vital and irreplaceable resource, state programs can provide the policy and legal foundation on which local programs can be based. Even weak state programs can stimulate local programs and private initiatives to protect agricultural land. A stronger state program may require local governments to institute and enforce strict land use controls on agricultural

land. A state program can provide a framework of responsibility for local officials who otherwise may find it difficult to take restrictive actions, even though they share the desire to protect agricultural land resources.

*Programs Require Tactical Timing To Be Effective*

While strong state leadership is the ideal, local governments can decide not to wait for the state to take the first step. Many strong local programs have already been undertaken in the absence of state action. The inherent deficiencies of independent, scattered local programs can eventually be remedied when a state program is enacted.

Generally, programs should be created well before development pressures have become strong. By the time development pressures have risen, it may be more difficult politically to establish a program, and farm economies might be seriously weakened. Otherwise, a radical shift of expectations of both land owners and developers might be required, and land value losses to owners would be more substantial.

*Accurate Information Is a Prerequisite to A Successful Agricultural Land Protection Program*

**N**o matter what technique or combination of techniques a community is considering for its agricultural land protection

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program, local officials need accurate, up-to-date information about many aspects of the community's land resource and its agricul-

tural economy. If based on credible information, programs are more likely to be effective and to withstand legal challenges.



# SIX: *CONCLUSIONS AND RECOMMENDATIONS*

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## *Conclusions*

*E*ach year throughout the United States agricultural land is converted to meet a wide range of other important social and economic needs of the nation's growing population. In addition to these direct conversions from agricultural to commercial and residential land uses, other agricultural land often becomes idle or less productive. To date the effects, both positive and negative, of agricultural land conversion occurred mainly in those areas experiencing growth and development. Because of rapidly growing demand for U.S. agricultural products, the economic, social, and environmental impacts of continued agricultural land conversions are increasing. As a result, public concern is growing about the adequacy of the country's agricultural land base to provide a continued supply of food and fiber at reasonable cost.

Some 3 million acres of U.S. agricultural land were converted annually to other uses in recent years. Current land use trends and projections indicate that agricultural land conversion is likely to continue. However, consequences of future conversion on agriculture directly, and on the nation's well-being indirectly, are uncertain. This uncertainty is heightened by the unpredictable nature of future trends in:

- export levels of agricultural communities;
- agricultural productivity;
- climatic conditions;
- resource quality and conservation;

- energy resource needs and opportunities; and
- domestic food and fiber consumption.

One way to keep good agricultural land in production is to turn to more marginal rural land for housing and other essential needs. An optimistic view of the future is that a combination of market forces and public policies will encourage development to occur on land of relatively low productivity, thereby retaining the nation's more productive land resources for agricultural uses. If this happens, the national effects of conversion will probably not be severe or difficult to accommodate within the agricultural sector. However, it is more plausible that little change will occur in the present appeal and economic advantages of good agricultural land for the location of homes, businesses, or other development. In this case, the cumulative public and private costs of agricultural land conversion will increase.

## *Competition for Agricultural Land*

*M*uch of the recent conversion of U.S. agricultural land to other uses results from the following broad demographic and settlement patterns:

- a significant migration of people from urban into more rural areas;
- a pronounced migration from the North to the South and West;
- an increased rate of household formation;



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- lower density development on larger unsewered lots primarily in rural areas;
  - increased economic development in nonmetropolitan areas.

Most nonmetropolitan areas reverted from decline to growth, or if already growing, increased their rate of growth during the 1970s. Although small towns and cities participated in the trend, the highest rate of growth occurred in rural unincorporated areas. More than 40 percent of housing constructed during this period was built on rural land. Much development occurred on scattered lots of larger size to accommodate septic tank systems. The availability and popularity of packaged and mobile homes enabled many families to move into the countryside, buying undeveloped lots directly from farmers or other owners of rural land. In the top 100 counties in value of farm products, the population grew at nearly twice the national rate of growth from 1970 to 1978. These activities led to the conversion of agricultural land. NALS case studies show that scattered rural growth increases the costs of providing public services in expanding communities.

The 1970s were also a decade of increased commercial and industrial development in rural areas. Employment in every major industry group increased at a more rapid rate in nonmetropolitan counties than in metropolitan areas during that period. This economic growth is welcomed by many rural communities and is important to national goals of reindustrialization and increased productivity. The increased number of jobs has benefited farm operators and their families who are combining farm work with

other full or part-time work. The supplemental income may allow some families to continue farming instead of selling their land.

On the other hand, the rapid development of rural areas has mixed effects on farming, ranching, and other agricultural operations. As the value of agricultural land for residences and commerce goes up, beginning or expanding farmers find it more expensive to buy agricultural land. In developing areas, portions of farms often become isolated or divided into small parcels not suitable for farming. Conflicts sometimes develop between farmers and newcomers over farming operations, particularly those involving noise and odors not welcome in residential areas.

In rural areas undergoing new development, agricultural equipment and supply stores frequently lose business and may close if the number of farmers declines significantly. Even if development growth subsides long before it reaches many farms, the perceived impermanence of agriculture in areas near expanding centers may have led to disinvestment in farmland, buildings, fences, and other farm property.

Although future rural settlement patterns are uncertain, the current economic growth and development trend in rural areas is not expected to change significantly in the near future. This expected growth suggests that the conversion of highly productive agricultural land will continue unless there is a substantial shift of development onto land that is less productive for agriculture.

In seeking to meet essential national goals, federal government programs also have an important influence on agricultural land conversion, either through activities

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such as highways and water projects that directly use or disrupt agricultural land, or through economic development programs that have a powerful but indirect conversion effect. Development on rural land often is supported by various federal assistance programs that are designed to meet essential national goals. Federal agencies have recently begun to assess the impacts of their own programs and policies on agricultural land, but a much more constructive and coordinated approach is needed.

### *Implications of Agricultural Land Conversion*

When agricultural land is converted to a nonfarm use, other agricultural resources must be used more intensively if production is to be maintained. This can be done in two basic ways. Farmers can increase the per-acre yields on remaining land through yield-enhancing inputs such as fertilizers and pesticides. Alternatively, where the potential exists, forest, rangeland, or other non-cropland may be shifted into cultivated crop uses.

During the 1950s and 1960s there were readily available opportunities for increasing farm production. The rate of growth in crop yields during this period exceeded by a considerable margin the growth in demand for agricultural commodities. In the 1970s, however, a fundamental transition occurred. Pushed by the rapid expansion in exports, the

overall rate of growth in demand for U.S. agricultural commodities exceeded the rate of growth in agricultural productivity. In the last decade, the gradual decline since 1930 in the acreage planted to crops ended. Between 1972 and 1980, the acreage of crops harvested increased by about 60 million acres and included land that primarily had been in pasture and range use.

During the next two decades, domestic and international demand for U.S. agricultural products is expected to increase 60 to 85 percent from the 1980 level if real prices remain constant. Rising real prices would slow the rate of growth in demand and reduce somewhat the increases in planted acreage and crop yields needed by 2000. Although the future is uncertain, it is expected that the real costs of producing food and fiber in the U.S. will in fact rise.

Growing global interdependence for basic food, energy, and other resource needs will continue to add pressure on agricultural lands. To match anticipated growth in demand, more U.S. agricultural land—between 85 and 140 million acres—must be brought into cultivation by the year 2000. To make these adjustments, farmers and ranchers will need substantial economic incentives in the form of real profits for basic farm, ranch, and forest products. Society may also face greater costs related to environmental protection either in the form of increased public conservation expenditures or lost productivity and other costs resulting from degradation of the agricultural resource base. Driven by adjustments in the use of agricultural resources, higher food prices also may be anticipated.

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When the future is viewed from this perspective, the conversion of some 3 million acres annually of agricultural land is a cause for serious concern. Conversion of a small portion of a community's best agricultural land to nonagricultural uses may lower current development costs and appear insignificant in contrast to the nation's vast endowment of agricultural resources. Yet, the effects of such conversions are cumulative, and contribute over time to significant and avoidable reductions in agricultural potential and environmental quality.

Although the problem does not warrant a complete halt to the conversion of agricultural land, there are sensible actions that can be taken to slow the rate of land conversion. Equitable and affordable state and local government programs can be used to encourage development on land with relatively low agricultural potential. In response to widespread public interest and support, many localities and states have recently undertaken programs aimed at protecting agricultural land and farming operations.

There are sharp regional differences in the rate and pattern of agricultural land conversion and in the problems faced within these regions. Varying approaches will be needed as states and local governments cope with the challenges specific to their regions, and as federal agencies try to eliminate the adverse impacts of their programs and policies. The recommendations that follow suggest opportunities for reducing agricultural land conversion through actions at the local, state, and national levels. These recommendations build upon the many positive relationships

among our nation's economic, social, and environmental goals.

## *Recommendations*

*I*n developing its recommendations, NALS considered both short-term and long-term actions that could help minimize the adverse consequences of agricultural land conversion. Some recommendations therefore address short-term concerns and can be accomplished with modest efforts by USDA and other federal and state agencies. Other recommendations outline actions needed to address problems associated with agricultural land conversion over the long term. One of the key needs is the development of reliable, consistent data on agricultural land use and conversion trends. Improved data on land conversion will help analysts to better understand its causes and consequences as well as to assist in the development of more effective agricultural land protection programs. The current national data base for agricultural land is not entirely adequate for future use in determining policy needs. Nevertheless, the trends in agricultural land conversion, and findings regarding the forces that contribute to it, clearly support the recommendations offered. Overcoming information inadequacies is a fundamental long-term activity requiring greater attention and support. Understanding changing trends in the productivity and availability of agricultural land will become increasingly vital as growth in de-

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mand heightens pressure on the nation's resource base.

These recommendations emphasize the primary roles of states and local governments in conserving agricultural land and the supporting roles which can be played by agencies at the federal levels. Many programs inherently lead to development of land in the course of achieving important national goals. Nevertheless, NALS feels that federal agencies can assume a balanced and supportive role in agricultural land protection efforts by encouraging the development of less productive agricultural lands whenever possible. Also, federal agencies can help states and local governments involved in agricultural land programs by providing technical information, financial assistance, and educational programs.

In making these recommendations, NALS recognizes the budget constraints faced at all levels of government. For this reason, actions that redirect existing funds and manpower are favored whenever possible in lieu of creating new organizations or programs requiring major funding. Many recommendations addressing the need for educational and technical assistance to states and local governments rely upon USDA agencies with field staff currently available at the local level. This emphasis recognizes the need to minimize federal spending and to take full advantage of the skills and knowledge of federal employees now working throughout the country.

The recommendations are organized and directed toward five objectives:

- to share information on successful approaches for agricultural land protection by states and local governments;
- to articulate a national policy position on agricultural land and supporting actions by federal agencies;
- to support development of the capacity to effectively manage agricultural land issues at the state and local government level through technical and financial assistance, and educational efforts drawing on federal resources;
- to support the development and implementation of agricultural land protection programs through financial assistance; and,
- to improve the agricultural land information base by eliminating inconsistencies and inadequacies.

#### *A. Characteristics of Successful Agricultural Land Protection Programs in States and Local Governments*

NALS reviewed a wide range of state and local government programs designed to protect agricultural land. These programs use a variety of policy tools in addressing agricultural land conflicts. In evaluating the effectiveness of current programs and policy tools, NALS identified several characteristics shared by many successful agricultural land protection programs.

The following list of these characteristics is not intended to be prescriptive or mandatory. Rather, the list represents what NALS

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considers to be useful advice for state and local officials, or concerned citizens, who are trying to develop strategies for agricultural land protection.

*The goals of protecting agricultural land and guiding urban growth are best achieved in combination with a comprehensive growth management system.*

When a community seeks to protect surrounding agricultural land, ways should be found to encourage development away from good agricultural land and into areas where urban growth can occur without disrupting agriculture. Policy tools and program strategies should be many-faceted and designed in response to the unique factors that lead to conversion of agricultural land in each region. (See the NALS State and Local Reference Guide for a more detailed discussion.)

*State governments should assume an active leadership role in protecting agricultural land.*

States should declare their commitment to protect agricultural land. State agencies with land management responsibility or those having missions affecting agricultural land should avoid converting productive agricultural land when possible. These declarations and actions should complement the efforts of local governments to protect agricultural land.

*Agricultural land protection programs should be established before development patterns foreclose options.*

The costs and difficulties in gaining support for agricultural land protection programs can be minimized if rural communities act before development pressures become strong. Once the expectation of development drives up land values, it becomes much more difficult and costly to start an effective program.

*Efforts to protect agricultural land should be based on accurate information about agriculture and future growth patterns.*

Communities need accurate, up-to-date information on environmental conditions, the role and significance of agriculture in their economies, land use and ownership, and probable development trends. Sound information is important in developing an agricultural land protection program that is well-conceived and legally defensible.

*Agricultural land protection programs should have able political leadership.*

To tailor a program to local conditions, it may be necessary to apply concepts and planning techniques which are often unfamiliar and frequently complex. Astute, persuasive leaders can help overcome these obstacles by being involved in the design and implementation of agricultural land protection programs.

*Agricultural land protection programs should support the economic viability of agriculture in an area.*

While incentives, land use controls, and comprehensive growth management programs are important for any program, other measures are often necessary to maintain the economic viability of agriculture. Where pos-

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sible, programs should be designed to support the availability of farm credit, suppliers, equipment servicing, labor supply, marketing facilities, and storage and processing facilities.

*Agricultural land protection programs should be designed so that they are legally defensible.*

These programs should be based on sound enabling legislation. They should recognize other social and economic needs including the demands for low and moderate income housing, commercial and industrial development, and protection of the environment. At the same time, programs should recognize and respect the rights and responsibilities of private land holders and of states and local governments.

### *B. National Policy and Federal Agency Initiatives*

**M**any national and regional forces heighten the uncertainties associated with the location, timing, and intensity of local agricultural land conversion. These forces affecting agricultural land in local communities include suburban and rural settlement preferences, government programs and activities, and inflation and economic instability. They contribute to the deterioration of some local agricultural economies, premature and unnecessary conversion of agricultural land, and sprawling development. As a result, pub-

lic policy should enhance the capacity of local communities to cope with the uncertainties and conflicts influencing the availability of agricultural land.

*The national interest in agricultural land should be articulated by a presidential-level and/or by a Congressional statement of policy.*

This statement need not be long or complicated. It should acknowledge that agricultural land is an important natural resource because it provides:

- a livelihood for farm families and for those in agricultural-related industries;
- agricultural products for export and foreign exchange to improve the balance of payments; and,
- a strategic resource that ensures the nation's self-sufficiency for food and fiber at a reasonable cost.

A clear statement of the need to keep the nation's best quality agricultural land in production should emphasize the importance of agricultural land from the national perspective. It also would help states and local governments advance their own initiatives to protect agricultural land while supporting national interests. The statement also would signal federal agencies that adverse effects of their actions on farming and agricultural land must be considered, and mitigated wherever possible.

*Positive incentives should be designed within federal programs to encourage development*

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*away from good agricultural land and onto land less suited for agricultural uses.*

It is recommended that the federal government modify its development policies by removing direct and indirect subsidies that facilitate the conversion of the best agricultural land to other uses. In designing changes in federal programs, a basic goal should be encouraging the development and use of marginal, less productive agricultural lands whenever such lands are available to accommodate needed development.

Incentives to minimize conversion of agricultural land within ongoing federal assistance programs should be developed and implemented. A differential interest rate or matching formula could be offered to encourage the location of development projects on land relatively less suited to agricultural uses as part of the following programs:

- Federal direct loan and grant programs for housing, commercial, and industrial developments;
- Loan guarantee programs for development projects, community services, or infrastructure development;
- Home mortgage assistance; and
- Capital improvement loan programs for water, sewer, and electrification.

The effects of government policy on land are pervasive. Public policy generates a host of "extra-market" incentives that affect the conversion of agricultural land as well as the decisions of the buyers and sellers of that land. Public influence on the conversion pro-

cess occurs through a complex institutional configuration of federal, state, and local governments, credit rebates, preferential tax treatment, subsidies, sewer and water policies, and so forth. Although the effects of the Federal Government's economic role are not understood completely, certain public policies and activities promote the conversion of agricultural lands to developed or more intensive uses with little or no regard for future agricultural need, or for the current agricultural use of the land. The Federal Government should not finance or subsidize development projects that occur on good agricultural land. When a development project involves the conversion of agricultural land, the applicant for financial assistance should be required to demonstrate that there are no practical alternate sites on land less suited for agriculture. Preferential interest rates and other favorable terms should be used to subsidize development projects on marginal, less productive agricultural land.

*The adoption of an agricultural land policy by each federal agency whose programs result in converting agricultural land to nonagricultural use should be required by an Executive Order or by Congressional action.*

Formal agricultural land policies should assure that federal agencies consider the adverse (or supportive) effects of their activities on agricultural land and on farm or ranch operations. To both exploit assistance opportunities and avoid unnecessary conversion, federal agencies should be required to consider both direct and indirect effects of their

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activities on cropland and farming or ranching businesses.

A federal agency's agricultural land policy should provide the following:

- a cost-effectiveness procedure to assure that program evaluations include an analysis of effects on agricultural land.
- a process to ensure consideration of alternate sites that would cause less conversion of agricultural land, or conversion of land relatively less suited to agriculture; and,
- a contact point accessible to individual farmers, states, local government officials, and citizens having an interest in agricultural land affected by the federal agency.

The U.S. Department of Agriculture should coordinate agricultural land protection policies with its marketing, export, rural development, natural resources, and other policies.

*The coordination and implementation of agricultural land policies should be monitored across agency lines through an interagency group.*

Policies and guidelines developed by federal agencies need to be carefully monitored to reduce the adverse effects of their activities on agricultural land. Therefore, a monitoring and coordinating capability with policy jurisdiction over appropriate agencies should be established, in order to accomplish the following:

- to provide oversight and evaluation,

ensuring that all federal agencies comply with their agricultural land policies; and,

- to coordinate all agency agricultural land protection policies in order to avoid conflicts or inconsistencies between various federal programs.

*Single-purpose federal assistance programs should be coordinated at the state or local level to ensure that agricultural land issues are adequately addressed in state or local planning efforts.*

The Federal Government has several programs that provide planning assistance to states, local governments, and regional planning organizations. Most of these programs are oriented toward a single objective or problem, such as transportation needs, economic development, or sewer system construction. Generally they do not include consideration of agricultural land, even though many of them involve projects which directly affect such land. There are two specific actions that would improve coordination of these federal programs in addressing agricultural land issues:

- Federal agencies which provide planning assistance funds should sponsor pilot efforts to improve planning and coordination in states and local governments to ensure consideration of agricultural land conversion; and
- Directors of organizations receiving federal planning assistance should ensure that agricultural land issues receive adequate consideration in their activities at state and local levels.



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*Tax provisions that affect the agricultural sector should not favor purchasers of agricultural land who do not intend to retain the land in agricultural use. Periodic review of the Federal Tax Code should be made to determine the desirability and feasibility of offering positive incentives for retaining agricultural land in productive agricultural use.*

Federal action should address two separate problems with the estate tax. First, the use valuation provision for agricultural land benefits large estates more than small estates since the benefit is proportional to the size of the estate (up to a maximum \$500,000 reduction in the taxable estate). The benefits of use valuation could be reflected more equitably as a credit against the estate tax as opposed to a reduction from the value of the gross estate. This modification could help reduce tax related pressures on smaller estates. Secondly, on the administrative side, the Treasury Department should simplify estate tax provisions and clarify instructions and information to farmers, land owners, and tax advisors on these provisions, including use valuation. The present methods for calculating agricultural estate taxes are both confusing and complicated and require a highly sophisticated approach to estate planning.

The Departments of Treasury, Commerce, and Agriculture should cooperate in a comprehensive analysis of the real effects of the special tax provisions for agriculture. At a minimum the data and information required to empirically assess the relationships between the federal tax code and the retention of agricultural land should be developed. Cur-

rent data and information are inadequate. Analysis could determine whether additional investment tax credits should be offered for expenditures on agricultural structures, on the initiation of improved conservation practices, or on other expenditures that maintain or enhance the productive capacity of agricultural land. Analysis should also address whether other tax incentives should be considered for agricultural support industries and whether current landowners should qualify for tax benefits on the sale of their agricultural land if the new owners agree to enter into a legally enforceable restricted covenant which assures that the land will remain in agricultural uses. Additional inquiry could address the following:

- Whether the sale and conversion of agricultural land to a nonfarm use should be taxed at a higher rate than agricultural land sold and maintained in farm or ranch use;
- Whether farmers purchasing land could be offered a range of incentives in return for agreeing to keep the land in agricultural uses for a specified long run time period; and,
- Whether developers should be offered tax-related incentives for locating projects on land that is relatively less suited for farm or ranch uses.

### *C. Technical Assistance and Education*

*The Soil Conservation Service (SCS) and the Cooperative Extension Services should*

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*enlarge and enhance their capacity, within existing resources, to provide technical assistance to units of government seeking to develop agricultural land protection programs.*

**L**ocal governments often depend upon supplemental technical advice in planning for community development and developing agricultural land protection programs. Public officials and community leaders often rely upon such expertise to prepare technical background analyses. Local conservation and extension specialists can assist in the inventory of the productivity and suitability of agricultural soils for various development purposes. Information is also needed on growth and demands for agricultural businesses, housing, public services, and jobs which are generally supported through other federal programs. It is vital that states and local governments be well informed, and realistically identify the type and amount of development that is likely to occur.

The Secretary of Agriculture, through the Chief of the Soil Conservation Service, should direct field personnel to provide technical assistance to local groups or governments involving in developing agricultural land protection programs. This assistance can be accomplished with minimal budgetary increases. The Cooperative Extension Services also should provide educational materials and technical advice to local groups seeking assistance in protecting agricultural land.

*USDA and other federal agencies should provide technical assistance to state governments which request help in developing land protection policies or programs.*

Although some states have already adopted programs to protect agricultural land, many others are still seeking the most appropriate combination of economic incentives, tax relief, local planning, and other policies to protect agricultural land. USDA can assist states in developing programs in two specific ways:

- The Secretary of Agriculture could instruct the heads of USDA agencies in each state to provide appropriate technical assistance to state governments that want to develop agricultural land programs. The Secretary of HUD and the Administrator of the Environmental Protection Agency (EPA) could issue similar instructions to their regional or field staff. Other agencies could assist these efforts through cooperation and support by their regional or field staff.
- The Secretary of Agriculture could establish a special task force or technical assistance team to aid state governments, upon request, in developing state agricultural land protection programs. The team could be established within six months of this recommendation by USDA through its Land Use Committee, and could include several individuals with training and experience in agriculture and public policy.

Upon request, the team could draw upon

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agricultural land experts from cooperative extension staffs in Land Grant Universities, other federal departments, or other units of government. This team could work with state, regional, and local officials to help them identify alternatives and analyze the possible consequences of programs to protect agricultural land, or to help refine ideas already proposed. This group also might help officials identify and enlist the help of resource people within the state who could provide ongoing assistance to a state program.

*USDA should design an educational program describing the importance of agricultural land to the nation's well-being and distribute educational materials through the mass media, schools, groups, and other federal agencies.*

In the 17 NALS public workshops and other meetings throughout this study, the need for improved educational efforts was widely expressed. Workshop participants emphasized the failure of the general public to fully understand the importance of agricultural land in farming. This lack of understanding makes it difficult for local farm leaders and elected officials to balance the needs of a viable agricultural industry with the demands for community growth and development. A broad, nationwide educational effort is therefore needed. Because the agricultural land situation varies greatly from state to state, regionally specific educational materials should also be developed at the state or multi-state regional level, possibly through the USDA's Centers for Rural Development.

The Cooperative Extension Services in

cooperation with other public agencies or private organizations should design an educational program to respond to the following needs:

- a need for a better understanding of agriculture's contribution to society;
- the necessity of maintaining agricultural productivity through an adequate land base resource;
- the importance of the agricultural land base in the local economy; and
- the need for adequate soil conservation, and stewardship of the agricultural land base.

Federal program officials should be oriented to agricultural land problems, policies, and issues to prepare them to assess the effects of their actions on agricultural land. USDA should work with program and agency heads to develop a series of jointly sponsored workshops for project managers of physical development programs affecting agricultural land. The sessions might include:

- the significance of agricultural land issues at the federal level;
- discussions of case examples in which specific programs resulted in conversion of agricultural land or disrupted farm or ranch operations;
- examples and suggestions explaining how project managers could analyze the effects of their projects on agricultural lands, and how they might reduce any adverse impacts, yet still attain the goals of their program.

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*USDA should establish an Agricultural Land Information Center to serve as a central depository and distribution point for information on agricultural land issues, policies, programs, and innovations.*

Considerable literature on agricultural land is generated by federal agencies, state governments, universities, local governments, professional associations, the NALS, and others. There is a need for a cooperative program to collect and disseminate this information. Many state or local governments and others “reinvent the wheel” by sponsoring research, policy analysis, or educational materials that already are completed or underway elsewhere. An Information Center would help to avoid this unnecessary duplication of effort. With some initial help, the Center could set up the information system and establish contact with likely users. Over time, demand for the services of the center can establish staffing levels. Providing technical, financial, or educational assistance could also be combined with the information-sharing functions of such a center.

#### *D. Financial Assistance*

*Appropriate federal assistance programs should be revised as needed to permit eligibility of local government units, including soil and water conservation districts, to receive financial aid in developing agricultural land protection programs.*

**F**inancial assistance could be used to support one or two resource persons to carry out the more technical steps in developing a locally agreed upon program. In most of the 49 Wisconsin counties working to develop agricultural land protection plans, local governments have benefited from the availability of small state grants (averaging about \$23,000 per county) to complete certain tasks.

Several federal assistance programs could expand their current recipient eligibility, including Farmers Home Administration's Section III grants, HUD “701” small cities program grants, the Rural Development Program, or programs under the National Energy Act (Powerplant and Industrial Fuel Use Act of 1978, Section 601). The DOT could also expand the eligible uses of areawide transportation planning funds; this would permit Metropolitan Planning Organizations to plan transportation systems in conjunction with a program to protect agricultural land and existing farm operations. DOI's Land and Water Conservation Fund could also be revised to permit funding eligibility for agricultural lands planning. Some of the shifts of funds can occur under existing authority while others may require legislative amendment. Another alternative is for Congress to appropriate funds specifically for this purpose.

*USDA should assess the feasibility of providing small matching grants for “capacity building” to state departments of agriculture (or other appropriate state agencies) that seek to manage agricultural land issues.*

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Assessment should address the need for:

- helping to develop state programs to protect agricultural land;
- coordinating state efforts to monitor the effects of state and federal programs or projects on agricultural land (such as the effort in the Illinois agriculture department);
- providing technical and educational assistance to local governments;
- providing an “ombudsman” service to act as an advocate for farmers and agricultural land protection. This service would help farmers communicate with a state agency to minimize negative effects of development projects or policy changes on agricultural land or farm operations;
- working with farm organizations and soil conservation districts on state and local soil conservation policies.

These matching grants could be funded by congressional appropriation or by reallocation of existing USDA grant funds by the Secretary of Agriculture. Assistance levels should be modest, enough to hire one person for up to two years.

*The Soil Conservation Service should give higher priority to completion of Detailed Soil Surveys in counties with important land under conversion pressure, and should respond to information requests from those counties now in the process of developing agricultural land retention programs.*

The Detailed Soil Survey is one of the most important tools for program formulation available to local government and citizens. This survey describes and maps the soils of a county and can be used to identify which soils are best for agriculture, development, recreation, or other uses. Virtually every local program to protect agricultural land has relied on a soil survey for basic information.

### *E. Information and Research Needs*

**I**n the course of this study, several important gaps in the data base for agricultural land were identified. These gaps affect the ability of public officials and independent analysts to clearly and reliably measure the magnitude, causes, and consequences of conversion from shifts within the agricultural land base. Better data systems are also needed to monitor local trends affecting agricultural land. Research deficiencies occur partly because an adequate data base does not exist and partly because an adequate long-run research program in the area of land use has not yet been developed.

*A Statistical Protocol should be developed, led by the Office of Federal Statistical Policy and Standards. Federal agencies that collect and use natural resource data should participate in this effort. Components of the protocol should cover standards for data collection techniques and requirements for appropriate statements of data limitations in connection with data publication or public release.*

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Current agricultural land inventories have different measures and levels of reliability. These limit the usefulness of the data. Also, agencies sometimes do not follow inventory procedures that would maximize the applicability and usefulness of the data compiled. Agencies should be more timely in the release of data and should be more explicit in stating the limitations and appropriate uses of the data for various analytic applications. Important gaps in the data base on land use trends persist, most notably in identifying the acreage converted each year from the potential cropland base, information on the SCS land group labeled "other," and the long-run trends in resource productivity as affected by erosion, salinization, and other factors.

The Statistical Policy Coordinating Committee should appoint a subcommittee to determine the most appropriate methods of collecting, analyzing, reporting, and maintaining natural resource data.

Given the lack of consistency in the national level data made available to NALS, it is clear that various sources and agency approaches need to be better coordinated if a credible basis for policy analysis and research is to be achieved.

A consistent data base for agricultural land which incorporates conversion trends and shifts among various agricultural uses should be developed. This data base should draw from land use information from each federal agency collecting primary information on agricultural land use.

One effort towards developing needed standards, definitions, and procedures is already underway within the Federal Govern-

ment (BLM, F&WS, GS, FS, SCS). The Natural Resource Data Statistical Policy Subcommittee should take over guidance of this effort and involve other agencies that also collect and use resource data.

Additional data elements in existing inventory efforts should be used to gather data on conversion of agricultural land. Several data elements could be added to existing inventory efforts to produce a significant increase in knowledge of the conversion of agricultural land to nonagricultural uses. There is a need for data, over time, on:

- land that is involved in the development process (much of which was classified as "other" land in recent SCS inventories);
- density of urban and built-up uses;
- the extent of parcelization and its effects;
- land ownership and use in rural areas;
- land market information;
- cost and potential for shifting land from noncrop to crop use and vice versa;
- the dynamics of land use change; and,
- indicators of land conditions that can be easily monitored and that can provide objective data.

*USDA should develop a capacity for providing state or local governments with detailed statistical information collected by federal agencies.*

Several detailed natural resource inventories have been conducted and computerized

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by USDA, including the 1977 National Resource Inventory, the Conservation Needs Inventories, the Land Ownership Survey, and others. In addition, important and detailed information on local economic conditions and resources is available in the U.S. Census of Agriculture and other special federal data bases. In addition, other federal agencies, such as the Bureau of the Census, HUD, EPA, and others have detailed information on local conditions that would be useful to governmental units working to develop local agricultural land policies. USDA should develop a system for obtaining easy access to pertinent information, and assist in the distribution of information to local or state governments.

*A Data Users Advisory Group should be established in each state with membership of state and local officials. This group should advise agencies on how to make federal data collection programs more useful and accessible at the state and local level.*

In general, there is a critical need to make more data on agricultural land more readily available and useful at the county or local level. For example, it is impossible for most county officials to use federal data to tell

how much agricultural land was converted to nonfarm uses in their county. There are other cases where even slight modifications of existing data collection procedures could provide much more useful data at state and county levels.

*The establishment of an agricultural land resource fund should be given serious consideration.*

The fund could operate by providing small grants or loans on a reimbursable basis and could be self-sustaining. It would be used to help states and local governments develop agricultural land protection programs. It should not provide open ended funding for costly programs such as the purchase of development rights. Rather, it would serve to provide funds for the start-up costs required in developing local agricultural land protection programs.

In developing these recommendations, NALS recognized clearly the budgetary constraints faced by all levels of government. Nevertheless this recommendation is intended to provide an additional incentive for states and local governments to develop agricultural land protection programs.



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$$\begin{array}{r}
 1974: \quad 1017 \div 0.946 = 1075.0 \text{ (5.4\% underenumeration)} \\
 \quad \quad 1075.0 \\
 \quad - 1017.0 \\
 \hline
 \quad \quad 58.0 \text{ million acres}
 \end{array}$$

$$1969: (1063.3 \div 0.935) - 1063.3 = 73.9$$

(6.5% underenumeration)

6. "Lands in Farms" consists primarily of agricultural land used for crops, pasture and grazing. It also includes woodland and wasteland not actually under cultivation nor used for pasture or grazing, provided it was part of the farm operator's total operation. For more details, see Appendix A-3, Census of Agriculture.
7. Prime farmland definition and inventory procedures are given in the Federal Register, Vol. 43, No. 21, January 31, 1978.

### PART 4

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2. USDA. *A Time to Choose: Summary Report on the Structure of Agriculture*, January, 1981.
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4. USDA estimates of projected supply-demand interactions over the next two decades were obtained from the International Economics Division, Economics and Statistics Service. Similar projections for the period 1980-1985 and the methodological approach used in developing the longer-run NALS projections are described more fully in a paper by Patrick O'Brien, cited in Reference 5.
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6. The 0.6 percent population growth rate is from the Series II population projection by the U.S. Department of Commerce (1977).



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7. Forest Service, USDA. *The 1980 Report to Congress on the Nation's Renewable Resources (RPA)*, FS-347, 1980, p. 36.
  8. The constant real price assumption used in developing the demand projections for NALS covers the 1985-2000 period. The demand projections are based on population growth, expansion in foreign production, changes in the composition of diets in foreign countries, and many other factors. Because of the constant real price assumption, the projected volume of American agricultural exports are based on need and may not be affordable if real prices rise or if global economic conditions are unfavorable.
  9. Schnittker Associates, "Ethanol: Farm and Fuel Issues," prepared for the National Alcohol Fuels Commission. August, 1980.
  10. *Ibid*, p. v.
  11. *Ibid*, p. 68
  12. For a discussion of prospects for expanding the ethanol industry, see O'Brien, *op. cit.*; see also NALS Technical Paper XVI.
  13. Estimate based on 2.6 gallons of ethanol from a bushel of corn and an average corn yield of 101 bushels per acre.
  14. Ethanol acreage adjustment factor of .55 acres of soybeans replaced by the by-products from each acre of corn devoted to ethanol production is from Schnittker Assoc., *op. cit.*, p. 67.
  15. *The Global 2000 Report to the President: The Technical Report Volume Two*. A report prepared by the President's Council on Environmental Quality and the Department of State, 1980. See Chapter 2 on global population projections.
  16. J. Dawson Ahalt, Chairman, World Food and Agricultural Outlook and Situation Board, Speech *Outlook '81 Conference*, November 17, 1980.
  17. Year 2000 projection from *Global 2000*, *op. cit.*, Table 18-8, p. 557.
  18. Council of Economic Advisers, *Economic Report to the President*, January 1981. U.S. Government Printing Office, Washington, D.C.
  19. Projections of the growth in demand are from Table 4.1. Mid-range projections are "most probable" because the assumptions underlying the "high" and "low" scenarios are considered to reflect more extreme conditions.
  20. The mid-range value for growth in total demand in 2000 is 72.7 percent.
  21. The breakdown of growth in total demand to 2000 between growth in exports and domestic uses is comparable to that reported in O'Brien, *op. cit.*, for the 1980-1985 period.
  22. Historic percentage changes in total production from *Changes in Farm Production and Efficiency, 1978*. USDA/ESCS Statistical Bulletin 628, January 1980; historic changes in planted acreage of principal crops from the OASIS data base, ESS, 1981.
  23. For a detailed discussion of the sources of increasing productivity, see NALS Technical Paper XV. In the remainder of this section, "productivity" refers to national average crop yields.
  24. See Earl Heady, "Technical Change and the Demand for Land," paper prepared for a Resources for the Future Conference on the Adequacy of Agricultural Land, February 13, 1980.
  25. Neal F. Jensen, "Limits to Growth in World Food Production," *Science*, Vol. 201, July 28, 1978; see also L. T. Evans, "The Natural History of Crop Yields," *American Scientist*, Vol. 68, July-August 1980.
  26. See the RCA documents, *op. cit.*, for a discussion of environmental factors affecting agricultural productivity.
  27. Yao-Chi Lu, Phillip Cline, and Leroy Quance, "Prospects for Productivity Growth in U.S. Agriculture," USDA/ESS Agricultural Economics Report No. 435, 1979.
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29. See Part 1 for a discussion of uses of the agricultural land base in 1977.
  30. Soil Conservation Service. *National Resource Inventory, 1977*, Washington, D.C.
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  32. See O'Brien, *op. cit.*, Table 5 for historic values and contrast to change in planted acreage land and crop yields in Table 4.2.
  33. Lee, *op. cit.*
  34. O'Brien, *op. cit.*; see also *A Time to Choose, op. cit.* Chapter 3.
  35. For a discussion, see Chapter 5 of *A Time to Choose, op. cit.*; and the RCA documents, *op. cit.*
  36. See *Global 2000* report Chapter 6, *op. cit.* for a discussion.
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## APPENDIX

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### *NALS Publications*

NALS Final Report—1981

Executive Summary of the NALS Final Report—1981

Protecting Farm Land: A Guidebook for State and Local Governments

Executive Summary of Protecting Farm Land

Agricultural Land Retention and Availability: A Bibliographic Source Book

Zoning to Protect Farming

Where Have the Farm Lands Gone?

*Note:* Copies of the above publications can be ordered from:

U.S. Department of Agriculture  
Soil Conservation Service  
Room 6117, South Building  
Washington, D.C. 20250  
Attention: Mr. Howard C. Tankersley  
Chief, Land Use Staff  
(202) 447-7443—690-4047

### *NALS Interim Reports*

Interim Report Number One,  
The Program of Study

Interim Report Number Two,  
Agricultural Land Data Sheet

Interim Report Number Three,  
Farm Land and Energy: Conflicts in the Making

Interim Report Number Four,  
Soil Degradation: Effects on Agricultural Productivity

Interim Report Number Five,  
America's Agricultural Land Base in 1977

### *The Program of NALS Research*

The charge of NALS was to determine the nature, causes, and extent of reductions in the availability of U.S. agriculture land and to evaluate the consequences of conversion of agricultural lands to nonagricultural uses. The NALS research staff designed and undertook a program of investigation toward this end. Their work is reported in the set of working technical papers described below. When the NALS Final Report was released, many of these papers were in draft form. Final versions of those that have satisfactorily completed peer review will be available.

Technical Paper I: *The Role of Agricultural Land in National and Regional Economies*—by Benjamin Huffman

During the 1950s and 1960s, U.S. agriculture enjoyed an excess of productive land resources. Federal policy endeavored to limit the use of agricultural land through measures such as cropland set-aside programs. Dramatic increases in U.S. agricultural exports abruptly changed these circumstances during the 1970s. Over this decade grain exports tripled in volume. The dollar value of all agricultural exports increased nearly sixfold. Collectively these developments increased pressure on cropland and altered public perceptions about the adequacy of the agricultural land base.

Technical paper I investigates land as a fundamental factor of production. It examines the direct role of land in agricultural production, and the direct and indirect contributions of agriculture to the entire U.S. economy. Factors influencing the supply and demand for agricultural land are discussed in the context of often striking regional variations.

Technical Paper II: *Available Federal Data on Agricultural Land Use*—by Tom Frey, Allen Hidlebaugh, and Joseph Yovino

Information about the current status and recent use trends in the U.S. agricultural land base is required for federal, state, and local decisions and actions that affect land use. Insufficient data and definitions were often cited by participants in NALS public workshops as a major problem in resolving local land use con-

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troversies. A variety of federal agencies, mostly in the USDA, compile land use data. This paper examines the two most comprehensive data series that describe the agricultural land base (including forest land). They are compiled by the Soil Conservation Service and the Economics and Statistics Service (based mainly on agricultural census data). These two data series show similar trends in agricultural land use during the 1950s, 1960s, and 1970s; however, the absolute magnitudes of acreage in various use categories differ. The two data series are compared, their differences identified, and causes for these differences are examined.

Technical Paper III. *Adequacy of Land Use Information*—by Michael Caughlin

Decisions and activities of public agencies pertaining to the use of agricultural lands require reliable information about the physical, economic, and legal dimensions of this resource. This paper examines federal data and information systems that have become increasingly relied upon in operating existing federal programs and also for purposes of research and policy analysis. The examination shows that the supply and quality of information about agricultural lands has not progressed commensurate with the complexity and importance of policy issues under investigation. A variety of agencies produce overlapping data sets using neither common definitions nor comparable statistical procedures. Coordination of these data gathering efforts can improve the adequacy of agricultural land use information produced by federal agencies. "Relevance," "validity," and "accuracy" are advanced as criteria appropriate for gauging the value of data series.

Technical Paper IV: *Competing Demands for Agricultural Land to the Year 2000*—by Robert Boxley

Much concern with the conversion of agricultural lands to nonagricultural uses originates in the possibility that supplies of food and fiber will be insufficient to meet future demands, except at sharply higher prices. The likely magnitude of domestic and export demands for U.S. agricultural commodities through the end of the century is analyzed in this technical paper.

Agricultural exports have grown rapidly over the last decade and are expected to increase, but at a slower rate, over the next two decades. A review of a number of comprehensive studies, projection models, and research reports found agreement that additional resources, including land, will need to be brought into production to meet these higher export demands as well as the expected increase in domestic requirements for food, fiber, timber and energy. The amount and composition of these new resources depend, in turn, on future technological growth. Although uncertainty is inherent in projecting future agricultural productivity, the projections examined in this paper suggest that the country may be able to meet both domestic and export demands for food and fiber anticipated through the end of the century, although with increase in costs.

This paper examines adjustments that may need to be made among the crop, livestock, energy, and timber-producing sectors and assesses some possible trade-offs between the development of new cropland and higher commodity prices.

Technical Paper V: *Agricultural Land Use Shifts and Cropland Conversion Potential*—by Thomas Schenarts

The United States is endowed with a large base of productive agricultural land. A market system based on private ownership permits great flexibility in its use. There is considerable shifting of land among uses, both within the agricultural sector and between agricultural and nonagricultural uses. Between 1967 and 1975, for example, 74 million acres of cropland were shifted to pasture, range, forestry, and other (nonurban) uses, while nearly 49 million acres of land in these uses were shifted to crops. In that same period about 2.9 million acres of rural land was shifted annually to urban, built-up and transportation uses or were inundated by water impoundments. Of this, 675,000 acres were formerly cropland.

Technical Paper V reviews these land use shifts. It examines the process of land use change, whether as a result of natural succession or human intervention. It evaluates the stock of land not now in crop use but which has physical and economic potential for conver-

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sion to crop use. Opportunity, engineering, and environmental costs associated with these shifts are discussed.

Technical Paper VI: *Sociodemographic Context of Land Use in Nonmetropolitan America*—by David Brown and Calvin Beale

The increased rate of conversion of agricultural land to nonagricultural uses during the 1960s and early 1970s coincided with five major sociodemographic trends. These trends were the decentralization of economic activities, interregional population movement, suburbanization within metropolitan areas, increased rate of household formation, and the development of rural infrastructure such as the interstate highway system and the construction of numerous water development projects.

Consequences of these trends will continue to bring farm and nonfarm uses of rural land into competition throughout this century. This technical paper examines the effects of future population growth, economic activity, decentralization of settlements, and new household formation. It also identifies several factors that are expected to moderate past demographic and socioeconomic trends over the next few decades. The paper concludes that for the balance of this century, sociodemographic factors and federal program activities will continue to bring farm and nonfarm uses of agricultural land into competition. While the sociodemographic pressures on agricultural land will continue to increase over the next 20 years, they are not expected to increase quite as rapidly as they did during the late 1960s and early 1970s. Although future trends in rural settlement are uncertain, the process of economic growth and development in rural areas is not expected to change significantly in the near future.

Technical Paper VII: *The Conversion of Agricultural Land to Developed Uses*—by Tony De Vito

Underlying much of the concern about the adequacy of the nation's agricultural land base is the belief that excessive amounts of cropland are being converted to developed uses. This paper undertakes to identify and, as far as available data permit, to quantify the extent,

location, and nature of rural land conversion to urban and built-up uses.

Though rural units account for only 25 percent of the national housing stock, new housing in rural areas between 1970 and 1977 accounted for 43 percent of new housing construction nationally. This growth reflects both increased preference for rural living and increased economic opportunity in rural areas. Technical Paper VII investigates this housing growth and the circumstances that induce it on agricultural land. The paper describes factors including local government policies and programs, the availability of sewer and water services, and the feasibility of unsewered development. Differences between development in rural areas and on the urban periphery are examined. The effects of development on disinvestment in cropland, farm structures, and other aspects of agricultural production are noted.

Technical Paper VIII: *Markets for Agricultural Land and Their Performance*—by Michael Caughlin, Benjamin Huffman, and John Noble

This paper describes the processes through which privately-owned agricultural land becomes available for nonagricultural uses. It describes the characteristics of agricultural land markets and applies economic criteria to evaluate market performance from a national perspective. In addition to criteria that reflect economic efficiency, market performance is discussed in terms of such normative criteria as equity and fairness, income distribution, and the extent to which local priorities and preferences are reflected in market performance.

Several inadequacies, such as limited information about available land, were identified that can be ameliorated by measures that would supplement private land markets. More important shortcomings, however, such as widespread participation of nonfarmer land speculators and high levels of uncertainty about price, appear to arise from such factors as inflation and the high levels of export necessitated by U.S. dependency on foreign energy resources. These factors underlie the operation of land markets, however, and they cannot be eliminated by modifying market institutions.

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Technical Paper IX: *Demographic, Social, and Economic Conditions in Farm Production Regions of the U.S.*—by David Brown

Technical Paper IX examines the structures of rural communities and economies by U.S. farm production regions. Regional differences provide a necessary context for understanding the competition between agriculture and other social and economic activities for the use of rural land. For example, metropolitan influences on rural land are particularly great in the Northeast, Southeast, Corn Belt, Southern Plains, and Pacific regions. Migration to rural areas of nonagricultural population is characteristic of the Northeast, Appalachian, Southeast, Lake States, Mountain States, and Southern Plains while migration in other regions is stagnant or continues to be cityward. Agriculture continues to be a principal rural employer in the leading agricultural regions, but manufacturing is the principal source of rural jobs throughout most of the United States. Recreation and retirement communities provide important new sources of jobs in most rural regions.

Metropolitan (SMSA) counties account for one-third of agricultural employment, one-sixth of harvested cropland, and one-fifth of the gross value of farm products sold. Only one-fifth of Corn Belt agriculture is in metropolitan counties; however, one quarter of all SMSA agricultural activity in the country occurs in that region.

Technical Paper X: *Federal Activity Affecting Agricultural Land Availability*—by Tom Mierzwa and Hal Hiemstra

Technical Paper X examines actions and processes of 131 federal assistance programs that have major influence on the use of agricultural land. The paper looks at program characteristics that determine the extent and pattern of impacts on agricultural land conversion. The location and types of areas affected by these programs are analyzed. The paper analyzes agency missions and the extent to which those missions are consistent with other public actions designed to maintain the availability of agricultural land. Interviews were conducted with officials of federal assistance programs. Case studies were made on specific

programs; environmental impact statements were used to verify findings. Additional information was assembled on planning support, budget levels, and the awareness of federal program officials to agricultural land issues. The extent and quality of assessment and review tools were also investigated.

Technical Paper XI: *Consequences of Federal Tax Provisions on Agricultural Land Availability*—by John B. Noble and Michael Caughlin

Technical Paper XI examines federal tax law as it affects the conversion of agricultural land to nonagricultural uses. Illustrative calculations, a review of legal analyses, and professional opinion are used as the basis for this investigation. The paper assesses the impact of federal income tax, which is regarded by many to be more onerous on farmers than others. It also looks at estate and gift tax provisions and how they affect the transfer of wealth between generations. It concludes that from a national perspective, federal taxes do not systematically encourage the conversion of agricultural land to nonagricultural uses.

More specifically, the paper finds that the agricultural sector has been the beneficiary of congressional tax concessions since the early days of the federal income tax. A wide variety of expenses and income items incurred in agricultural enterprises receive more favorable federal tax treatment than they do in nonagricultural businesses. Federal taxation of capital gains with respect to agricultural property gives an advantage to farmers over other small businesses and increases the opportunity to sell to the farmer's advantage. Federal estate tax provisions offer unique opportunities for farmers to reduce the estate tax, and the benefits of these provisions increase with the value of the farm land holdings.

Technical Paper XII: *Global Consequences of Maintaining U.S. Cropland*—by David McClintock

This paper examines the consequences of U.S. agriculture's increasing orientation toward international trade. The proportion of farmers' cash earnings arising from exports has increased from 10 percent in the early 1950s to 25 percent in 1979. Net agricultural exports provided a positive trade balance of over 20 billion

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dollars in 1980. In addition to these domestic economic benefits, U.S. exports, which include 60 percent of the grain crossing international boundaries, are depended upon for food by both developed and developing countries.

The U.S. agricultural productive capacity may afford some political or diplomatic leverage under circumstances of scarcity. This paper discusses these possibilities but also notes the domestic resource costs, such as soil erosion and degradation, that accompany expanded production for export.

Technical Paper XIII. *Findings of the NALS Public Participation Workshops*—by Nancy Bushwick with Elwood Shafer

NALS held seventeen public involvement workshops throughout the country. Over 1,200 people attended and stated their perceptions of agricultural lands availability issues, of appropriate ways to resolve conflicts about the uses of agricultural land, and of the values they believe would be jeopardized should those issues or conflicts remain unresolved. This paper examines and summarizes the views articulated in these workshops.

Three problem areas were emphasized in all workshops. These were: 1) loss of agricultural lands to nonagricultural uses; 2) inappropriate government policy objectives affecting agricultural land; and 3) energy impacts on agricultural productivity.

Priorities on other problems differed by region. For example, participants from the Northeast stressed the lack of public awareness about the importance of agricultural land. In the North Central region soil erosion and conservation were accorded high importance. Onerous tax burdens were asserted in the South. Western participants identified property rights conflicts and the high cost of acquiring land for farming or ranching as particularly pressing problems.

Technical Paper XIV: *The Economic and Environmental Consequences of Agricultural Land Conversion*—by Charles Benbrook and Allen Hidlebaugh

The economic and environmental consequences of adjustments necessary to meet projected demands are explored in this paper. It begins with a detailed descrip-

tion of the U.S. agricultural land base. Soil characteristics of agricultural land are presented, including the thickness of the “A” soil horizon, the “B” horizon, and projected corn yields. Significant regional differences in soil characteristics are pointed out. The effects of erosion on productivity are also described. Factors affecting the productive capacity of the U.S. agricultural sector are then discussed. A number of sources of uncertainty are outlined, with emphasis on the pace of future technology development and environmental degradation of productive capacity. The land requirements to meet projected demand are then estimated, and the economic and environmental consequences of expanding cultivated acreage are discussed.

Technical Paper XV: *Forecasting and Projecting Technological Change in U.S. Agriculture*—by Robert Weaver

Theoretical and empirical considerations in forecasting technological change are discussed. The range of statistical error in current forecasting techniques is outlined.

Different types of technological change are formally defined and contrasted. Evidence of the trend toward energy intensive inputs in recent technological change is presented. A critique is offered of the total factor productivity series compiled by the U.S. Department of Agriculture. The key assumptions and validity of productivity indices are discussed with special emphasis on separability, homogeneity, elasticity implications, and the treatment of changing price levels.

A basic finding is that empirical measurement of technological change—and therefore forecasts of future productivity—should be grounded in an economic model of decisionmaking at the farm level. An alternative methodological approach to the measurement and projection of technological change is outlined in which several of the restrictive assumptions underlying current productivity indices are relaxed. A simple planning model is developed which includes treatment of various uncertainties and costs associated with technological change.

Technical Paper XVI: *Balancing Energy Needs With Agricultural Land Availability*—National Agricultural Lands Study Staff and Fred Hart Associates

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“Energy access routes” or “energy corridors” have and will continue to affect the availability of agricultural land. Estimates of the land required to accommodate electrical transmission line and pipeline rights-of-way are presented. The presence and maintenance of these corridors place various restrictions on agricultural operations.

Expansion of the ethanol industry and other biomass conversion processes are expected to become a significant source of demand for agricultural feedstuffs including corn, wood, food processing wastes, sugarcane, and other crops and residues. Production of 4 billion gallons or more of ethanol by 1990 appears to be

feasible and likely unless economic conditions or other factors change materially. The economic, physical, and environmental factors associated with projected expansion of ethanol production capacity are discussed.

The potential impacts of coal and synthetic fuel development are also outlined. Estimates of the land area disturbed for coal mining and reclamation are presented. The prospects and difficulties in reclaiming stripmined land are outlined. Conflicts between synfuel development and agricultural uses of U.S. land and water resources are summarized.





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In the past few years, many excellent reports and studies addressing agricultural land issues have been published. A few of these reports, as well as citations to more comprehensive bibliographies, are here to aid in seeking further information.

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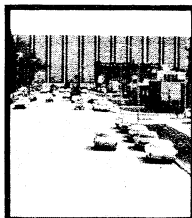
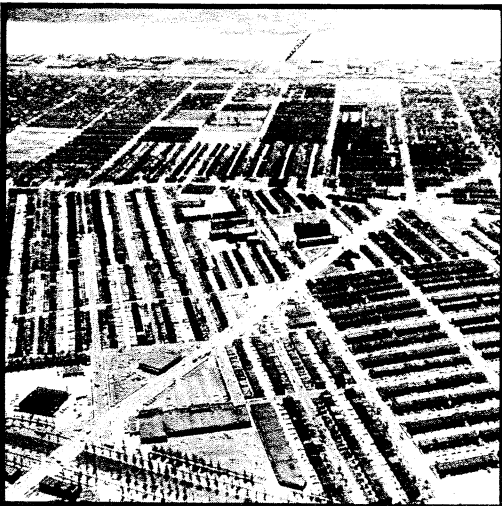
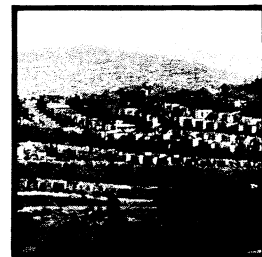
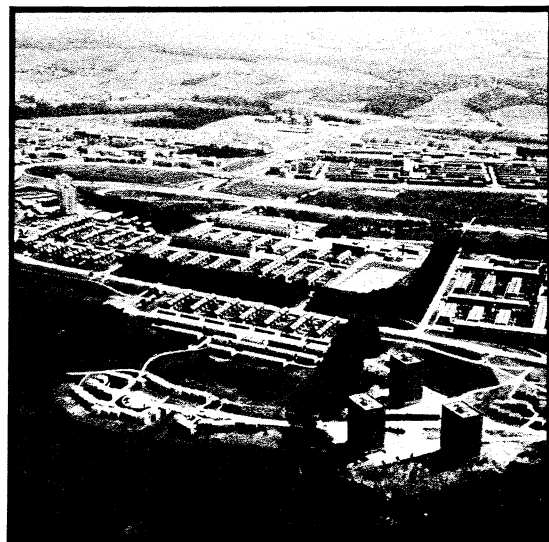
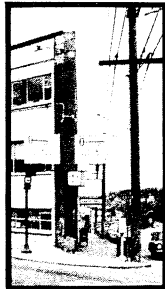
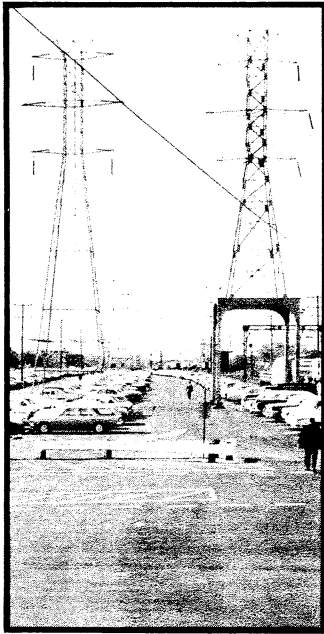
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Department of Commerce  
Department of Defense  
Department of Energy  
Department of Housing and Urban Development  
Department of the Interior  
Department of State  
Department of Transportation  
Department of the Treasury  
Environmental Protection Agency  
Water Resources Council

