

MARION CLAWSON¹

Resources for the Future
Washington, D. C.

Potential Demand for Nonfarm Products and Services Provided by Agricultural Lands

THE AWKWARD TITLE of this chapter reflects the difficulty of finding a simple word or phrase to describe the subject. The other chapters will deal with agriculture (including grazing) and forestry. I shall single out for treatment three other kinds of land use: for urban purposes, for recreation and for transportation. These three uses are alike in that each is small in area compared to the large amount used for agriculture, grazing and forestry; each is alike in great importance, if measured in terms of the monetary values involved and numbers of people affected; and each is alike in that the area used has been growing rapidly in the past and will continue to grow in the future. Moreover, each of these land uses may have a significant indirect effect upon the larger uses for agriculture and forestry.

LAND FOR URBAN PURPOSES

The United States is an urban nation, and will become even more urbanized in the future. From less than 10 percent of the total population in cities during the first half century of the nation's existence, the cities have grown until they include two-thirds of the total population (Table 4.1). By the year 2000 they will include over 80 percent. Impressive as is this growth in terms of total population, the cities have grown in other and less easily measurable ways. Probably an equal proportion of physical wealth is situated in the cities, and likewise an equal proportion of gainful employment. In terms of economic and political power, the cities have grown also. Certainly cities are centers

¹The views expressed herein are entirely personal, not those of the author's organization. The analysis draws heavily on the publication, *Land for the Future*, by Marion Clawson, Burnell Held and C. H. Stoddard, published by the Johns Hopkins Press, 1960.

Table 4.1. Total and Urban Population, Number and Average Size of Cities, and Area of Cities, By Census Periods 1790 to 1950, and Projections to 1980 and 2000

Year	Population ^a			Cities ^a		
	Total (1,000)	Urban ^b (1,000)	Urban as percent of total ^c	Number	Average population ^c	Area in cities ^d (1,000 acres)
1790	3,929	202	5	24	8,420	54
1800	5,308	322	6	33	9,760	80
1810	7,240	525	7	46	11,400	116
1820	9,638	693	7	61	11,400	154
1830	12,866	1,127	9	90	12,300	241
1840	17,069	1,845	11	131	14,100	375
1850	23,192	3,544	15	236	15,000	720
1860	31,443	6,217	20	392	15,900	1,200
1870	39,818	9,902	25	663	15,000	1,958
1880	50,156	14,130	28	939	15,100	2,785
1890	62,948	22,106	35	1,348	16,400	4,190
1900	75,995	30,160	40	1,737	17,300	5,545
1910	91,972	41,400	45	2,262	18,300	7,450
1920	105,711	54,158	51	2,722	19,900	9,535
1930	122,775	68,955	56	3,165	21,800	11,780
1940	131,669	74,424	56	3,464	21,500	12,800
1950-						
old	150,697	88,927	59	4,023	22,100	15,040
new	150,697	96,468	64	4,741	20,300	16,750
1980	240,000	185,000	77	8,100	22,900	30,300
2000	310,000	255,000	82	10,400	24,500	41,000

^a Data from census publications. All data apply to the 48 continental states.

^b In towns and cities of 2,500 and over, except for the 1950 "new" which includes some smaller urban places.

^c Slide rule divisions.

^d Estimates made by author, described in *Land for the Future*, (in press) Johns Hopkins Press, 1960. These data are primarily for cities as political units; they exclude some land used for urban purposes outside of cities, but probably include some land inside of cities used for other purposes. Standard metropolitan areas are roughly 10 times larger, and include much farm, forest and other nonurban land. See discussion in book.

of finance, insurance, marketing and many other economic activities. In spite of a system of government which heavily overweights rural areas in political strength, both nationally and in most states, the greater population of the cities will shortly submerge the rural areas entirely, as far as political strength is concerned. Because we were so much more rural in the past, our society and even our economy is still rural value-oriented, but this, too, is changing. As one who grew up in rural and

small-town areas, and who yet dislikes large cities, I recite these facts without enthusiasm; but facts they are, nonetheless.

It is obvious to even the casual observer that cities and suburbs have taken much land. There has been much misunderstanding about this, some from agricultural people. Occasionally there has appeared some anti-city sentiment, as though the city were an enemy of the country. The fact is, it has been population growth, not city growth as such, which has taken so much land from agricultural production for site purposes. Had the increased population been spread mostly in open country, far more land would have been required for site uses. If we must have much larger populations, then cities are the most efficient place to put people, if we want to save land. There has been confusion in other directions also. Growth of city population has increased the market for farm commodities, and this in turn has stimulated agricultural output and, to some extent, development of land for agriculture. It should be recalled that one of the few serious studies of the withdrawal of land from farms to city use found that the area of land in farms actually increased for all metropolitan areas as a whole, from 1929 to 1954.² If the agricultural technological revolution of the first half of the 1900's had occurred while total national population was remaining constant, how much land would we have had in crops by 1960? The relations between urban growth and agricultural land use are more subtle than merely putting last year's field into this year's subdivision.

Over the decades, the number of cities has increased, and their average population has grown larger also. From an average population of slightly over 8,000 at the first census, the average city had grown to over 22,000 in 1950 (by the same definition). Small cities grew to middle sized ones, and the latter to large ones, while hamlets were becoming small cities, for this long period. The definition of urban population changed in 1950, and strict comparisons are not possible with earlier figures. Our calculations are that the average size of city will rise further in the future. As we shall see in a moment, this affects land use by cities.

When it comes to the area of land used for urban purposes, we are seriously handicapped by lack of accurate and relevant data. One reason why data are so deficient is that we lack useful

²Donald J. Bogue. *Metropolitan Growth and the Conversion of Land to Nonagricultural Uses*, published jointly by Scripps Foundation for Research in Population Problems, Miami University, and Population Research and Training Center, University of Chicago, 1956.

concepts or definitions of urban land use. Two ideas need distinguishing: (1) the city (or its inhabitants) use land, for private and public purposes of many kinds; and (2) they withdraw land from other uses, but do not use all of it. As nearly as I have been able to determine, the withdrawn but idle area is almost as large as the used area. That is, as far as other land uses are concerned, the total area withdrawn by the city is unavailable to their use, but only half or a little more of it is actually used for urban purposes. The rest consists of vacant lots, leap-frogged areas and idle fringes around cities, where mounting land values, taxes and other charges have driven agriculture out. A second difficulty is that we need data for cities as economic units, whereas most data are for cities as political units. Some cities, as legal political units, include farm or other non-urban land; but they also exclude much urban land.³

In Table 4.1 we find estimates of the area within cities, from the earliest census to the present, and projections for 1980 and 2000. These most nearly conform to withdrawn area, rather than to used area, and are for political rather than for economic cities. Some urban land is omitted and some non-urban land is included; thus to some extent errors or deficiencies in data balance each other off. The data probably are a good index as to changes in area, and a reasonably good estimate of the magnitude of the withdrawn area. The total area in cities was small during our early history, reaching a million acres only a few years before the Civil War. It has increased more rapidly in recent decades, and by 1960 stood at roughly 1 percent of the total land area of the nation. On the basis of the projected population increases, land in cities will nearly double between 1950 and 1980 and will increase further by 2000. Even at the latter date, the total area will be only a little more than 2 percent of the total land area.

If the data on urban population and city area were plotted on semilog paper, or converted to index numbers, it would be seen that the area has not risen as rapidly as the population. The average density of all cities rises as their population increases.⁴ This has been true since 1900, for all cities for which we have data on area as well as population, and the relationship has stayed remarkably constant. As a city grows, its density changes in its older parts, as well as spreading to new territory. Small cities

³The data problem is more complicated than there is space here to discuss in detail. The interested reader is referred to footnote 1.

⁴In 1950 the relationship between urban population density and city size can be expressed in the formula $Y = 3295 \log X - 10,500$, where Y is per persons per square mile of city area and X is total number of persons in the city.

are our most lavish users of land. In 1950 cities of less than 25,000 used half the total area in all cities, although they had only about a fourth of the urban population. Many observers have assumed that average city densities have declined because the suburbs, where population growth is most clearly evident, have a lower average density than older parts of the same cities. But this overlooks the increases in density of the older parts of cities, as old homes are converted to slum apartments, as new and larger apartment buildings rise, and as other changes occur. It also overlooks the fact that the population growth in suburbs to a large extent takes the place of growth which otherwise would occur in small towns and cities, where densities are still lower.

As we look to the future, we can be fairly sure that cities will take away from agriculture, and from most other land uses, just about any land they want. Urban use of land is so much more intensive than agricultural use, that city people can and will outbid farm people for land, whenever the land is in real demand for city use. Moreover, I think we must concede that the projected expansion of urban area does not pose any real threat to agriculture as a whole, nor does it suggest a shortage of food and fiber because of lack of land. Urban expansion will create agricultural disturbances in those areas where urban growth is rapid. But, in my opinion, attempts to stop urban expansion are doomed to failure; farmers themselves are too eager to get the higher prices for their land which urban expansion usually brings, to cite but one reason.

The real issues, it seems to me, are different. The real question is, what kind of cities are being built on the land taken from other uses? Few observers are satisfied with the kinds of cities we are building. They have been attacked as inefficient, unnecessarily costly, unaesthetic, subject to high obsolescence and otherwise less than they could be. We cannot get into a comprehensive critique of the modern city here, even were I capable of making it. But we can point to the inefficient use of land by the typical city. By careful land use planning and sound urban development, all of the projected increase in urban population could take place on 35 instead of 41 million acres by 2000; perhaps even on 30 million acres. A saving of 5 or 10 million acres of land, when we now have a farm surplus of perhaps 40 million acres, may not seem large, or important. But it should be borne in mind that this potential saving in urban land is located in some of the most important and strategic areas of the United States.

If agricultural people have a right to demand that city people make a more efficient use of the land they take, they also have a responsibility to help provide the institutional and legal

framework necessary for sound urban development. The modern city, as a political unit, lacks the legal powers necessary for it to assume its proper economic responsibilities. This is especially marked for the large metropolitan centers, typically made up of several cities. There is no legal entity with power to carry out planning and development for what is a single economic unit. By and large, our rural-dominated state legislatures have been unwilling to give cities the tools with which to use land efficiently, or otherwise to develop on sound lines. If we are really concerned about loss of farm land to suburban development, let us tackle the needed remedies.

LAND FOR RECREATION

In a modern high-income society, recreation may become as important as food, shelter, clothing or other so-called basic expenditure items. Moreover, it may be argued that the use of leisure has been as influential in forming a social structure and an economy as has been the form of work. Whatever we may think about the psychological or other need for recreation, by the average citizen, we can be sure that he will demand it, if allowed to spend his income as he chooses. Recreation includes many kinds of activities; I shall focus here on public outdoor recreation, as a user of land. We have very little data on use of private land for recreation; the area of land so used is likely to be included in statistics on forestry or on agriculture.

Four factors capable of statistical expression have together led to a greatly increased usage of outdoor recreation areas. First, total population has risen, as we all know. The trends toward greater urbanization and toward more older people in the population have also perhaps affected the demand for outdoor recreation. Secondly, increases in real income per capita have greatly increased the demand for recreation. Apparently a larger percentage of income is spent for recreation as income rises, and certainly a larger total sum is so spent. Thirdly, there has been a great increase in leisure as the average work week has declined so greatly over the past century. Fourth, improved travel facilities have led to greatly increased movement of people, much of which is for recreation purposes. The trend in each of these four factors has been upward for many years, and at something like the same general rates. Hence, it is almost impossible to separate the effects of each. The usually accepted outlook is for further upward trends for each — more people, higher real incomes per person, more leisure and greater

travel. Other factors perhaps have been or will be important also but are less readily capable of statistical expression.

It is helpful to separate all outdoor recreation into three general classes. First, there is user-oriented outdoor recreation. This must be located near where people live, so that it can be used after work or after school. City parks and playgrounds are the best example of such areas. Second, there are resource-based areas. Here, the superb quality of the scenery and other features is sufficient to draw people from long distances. The time and cost of getting to such areas means that they are usually used for vacations. National parks and seashore areas are illustrative of this class. Thirdly, there are intermediate areas — intermediate as to location, intermediate as to quality. Most such areas must be within two hours, and preferably within one-half hour, travel time of most users. They are mostly day outing areas. Many state parks fall into this category. These broad classes are not clearly separate and distinct, but represent major divisions on a continuum according to location, time of use, natural quality, cost of use and several other factors.

The trend in use of user-oriented areas has apparently been about 4 percent increase annually. (I say apparently because our data are poorer for this type of area than for others.) This is twice the rate of increase in total population, or about equal to the increase in total population times the increase in per capita income. The trend in usage of both other major types has been in the general magnitude of 10 percent annually. These rates of increase have prevailed for as long a period as we have data — since 1910 for the national parks and for shorter periods for other areas. The rates of increase have been remarkably constant on semi-log paper, except for the war when gasoline and other rationing reduced recreation travel greatly. Even major depressions have reduced the rate of growth comparatively little. There is no real evidence of a slowing down in rate of growth of usage of these areas.

The situation for 1956 and 2000 for each of the three major types of areas is shown in Table 4.2. The area available in 1956 in each case was less than specialists consider desirable, although no specific estimates of the latter have been made for resource-based areas. The projected increases in usage between 1956 and 2000 are large — an increase of 4 times for user-oriented areas, of 16 times for intermediate areas, and of 40 times for resource-based areas, or an over-all increase of 10 times. These may seem like very large increases. The reader should be warned that most recreation specialists think my estimates are too high; but they will also concede that all their past

Table 4.2. Recreation Use and Area, 1956 and 2000

Use and area	Type of recreation		
	User-oriented ^a	Intermediate ^b	Resource-based ^c
1956			
million visits	1,000 plus	312	116
actual area - million acres	0.7	9 ^d	45 ^{e,8}
adequate area - million acres	2.0	15 ^f	
2000			
million visits	3,750 plus	5,000	5,000
adequate area - million acres	5.0	70 ^h	60 ⁱ

^a Using city and county parks as an index of this type.

^b Using state parks and federal reservoirs as a measure of this type.

^c Using the national park system, national forests and federal wildlife refuges as a measure of this type.

^d State parks, 5.1 million acres; remainder, federal reservoirs.

^e Includes area of national park system, federal wildlife refuges and national forests used primarily for recreation; additional areas are available for recreation and add value to specialized recreation areas.

^f Assuming area of state parks doubled and of federal reservoirs unchanged.

⁸ No estimate made.

^h Assuming reservoir areas of 20 million acres and state parks of 50 million acres.

ⁱ Assuming some increase in federal areas used primarily or solely for recreation.

estimates have been too low, and that a mere projection of past trends will lead to much larger figures than these.

It is possible, though difficult, to estimate an "adequate" area of each type for 2000. Whether such an area will be provided or not is primarily a political rather than an economic question. Decisions about park and recreation areas in the past have not been decided primarily on economic grounds, and it seems unlikely that they will be in the future. If the area actually provided falls too seriously short of the adequate, then some of the demand will not eventuate, because over-crowding will reduce the attractiveness of the areas greatly. But there will be a demand, in at least some senses of the term, for much larger areas than now.

The user-oriented areas are now mostly included within the statistics for urban area, and this is true also of the increased area required. Hence no major additional drain on agricultural land will arise from this source. A large part of the additional resource-based areas will come from land not now in farms — much of it in federal ownership now, used for forestry or grazing, or not used at all.

Our attention thus focuses on the increases in intermediate

type areas. I have argued elsewhere that it is especially important that these areas expand, for that will go far toward taking the pressure off the national parks.⁵ The increase in federal reservoir area from about 4 million acres in 1960 to about 20 million in 2000 will be primarily for purposes other than recreation — municipal and industrial water, storage to maintain low flows for waste disposal, flood control and others. But such areas will have great value for outdoor recreation, especially for those kinds using water surfaces. I consider desirable a tenfold increase in state park area. It is possible to make good state parks. The recipe goes like this: Take a piece of rolling countryside, perhaps somewhat eroded, with a modest valley that has 10 to 50 square miles of drainage area; build a low, fixed-outlet dam to create an artificial lake of a few hundred acres with a constant shore line; plant trees on the surrounding areas, if necessary; add roads, picnic facilities and the like; and in 20 years you have a really nice outdoor recreation area. It will not rival Yosemite or Yellowstone or Grand Canyon, but it will provide good swimming, boating and fishing. Hiking and picnicking and camping will be possible and enjoyable. There are several such state parks in most states, and there could be scores more. Such areas, if located within an hour's travel time, or less, would fill a very real role in the outdoor recreation needs of this country.

If the increase estimated as desirable should take place in recreation areas, this would add about 75 million acres to public recreation (excluding the city parks, which are included in urban area also). Probably no more than two-thirds of this would be in farms, and perhaps less than half of the latter would be in crops. After all, the topographic and other qualities which often make for good parks frequently mean poor farmland. Thus, even at my estimates — considered large by most recreation specialists — something on the rough order of 25 million acres of cropland would be required. This would include the land flooded by reservoirs as well, if the latter have recreation values. In light of the total cropland situation, and the possibilities of substantial surplus areas, these requirements for recreation do not seem unattainable.

My estimates are for 2000. If they are to be realized, by and large a disproportionate percentage of the needed area should be reserved during the 1960 to 1980 period. The area of land owned primarily for private recreation may also increase; but in the future, as at present, such land is likely to be included in statistics on forest or other land use.

⁵Marion Clawson. "Our national parks in the year 2000," National Parks Magazine, July, 1959.

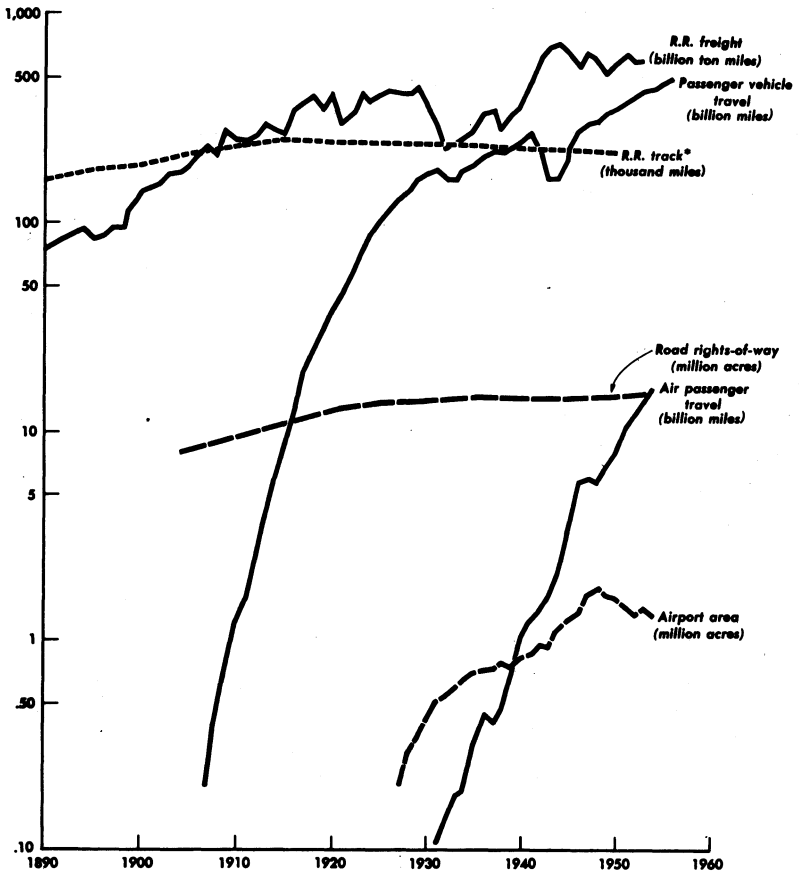
LAND FOR TRANSPORTATION

Transportation facilities are one major means whereby land is given productivity and value. In our commercial economy, products of the land must be transported to market if they are to have value; and production goods must be brought to the land from their place of manufacture. The land taken out of direct production for transportation purposes may thus be the most productive of all land.

In the United States, for as long a period as we have tolerably accurate records, the really significant trends have been toward modest increases in area of land for transportation purposes, combined with large increases in output of transportation facilities (Fig. 4.1). The area of land taken for railroad rights-of-way must have increased greatly from 1830, when railroads first began, until 1890, when the railroad network of the nation had about reached its present extent. After that date there was a modest increase in area of right-of-way, and then a still more modest decline in mileage and area as local railroads were abandoned. Railroad freight tonnage reflects changing business conditions to a major extent, but a strong over-all upward trend is evident. Passenger traffic on railroads has had a more erratic but more strongly downward trend, on the whole, since 1920.

The area of land in road rights-of-way increased from 1904, when the first data are available, to 1921. Since the latter date, the increase in area has been very modest indeed. This is contrary to a common impression. Another part of the story is that the quality of roads has increased vastly over this period. Roads have been widened, straightened and hard surfaced. This has taken some additional area. Not as obvious has been a reduction in unimproved road mileage, especially in areas which experienced major land use changes. In the Great Plains, northern Lake States and other areas where land once farmed has now become grazing or forest land, some roads have been abandoned. Never highly improved, their area has rather quickly reverted to grass or trees. These have offset in part the large increases for superhighways and other major roads. Roads often lie in valleys, where land is usually good for agriculture; but some rights-of-way include hilly areas of low productivity. In contrast, the volume of passenger traffic on roads has mounted steadily and rapidly, with only a modest interruption during the "great depression" and a larger one during the war when travel was rationed in various ways.

The area in airports increased considerably from 1930 to 1960, but is still small, relative to either road or railroad area,



*Railroad mileage "owned"; miles of trackage operated is greater due to double and triple trackage.

Fig. 4.1. Area and output of major transportation systems, 1890 to date.

and still smaller compared to other major land uses. The trend in air passenger travel has been steeply upward, roughly paralleling the trend in auto travel of 25 or 30 years earlier. While the rate of increase in auto travel has slackened off considerably, the rate of increase in air travel shows no such slackening.

There is good reason to believe that each major form of transportation has large excess capacity, as far as land area is concerned. By very modest additions to land area, and in some cases with none at all, capacity of the transportation system could be increased very greatly. In fact, there is often excess capacity, with existing physical facilities other than land; and by

investment of more capital on the present area, much larger capacity could be built in.

In 1960 the area used for railroads was about 8 million acres; for roads rights-of-way, about 16 million acres; and for airports, about $1\frac{1}{2}$ million acres; or about 25 million acres in total. It is difficult to estimate future needs, for the reasons outlined above. But I conclude that the area used for transportation will increase to about 28 million acres in 1980 and to about 30 million acres in 2000. While these increases are small, absolutely and relatively to any other land use, it should be emphasized that the increased areas will often be required in locations where competition for land is relatively intense. Moreover, the effect of this increase in area for transportation will be felt primarily on the lands adjacent to the transportation routes rather than directly by the shift of land to transportation use.