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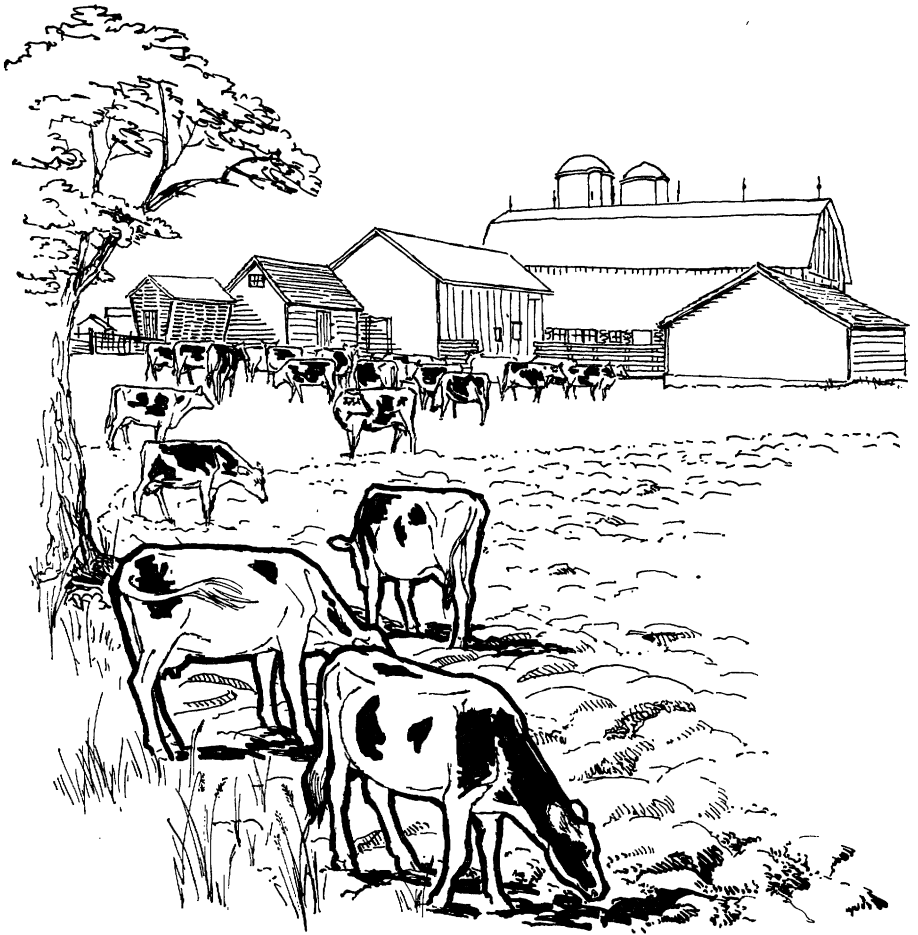
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Our heritage of land

—Land and the growth of the Nation—Our wealth of land resources—How we acquired our landed estate—Land and our economic development—The heritage of our public lands—The uses to which we put our land

Land and the growth of the Nation.

We have two main problems with respect to land: How should it be used? How should rights in land be distributed? Our success in answering them will reflect our success in anticipating the changing conditions of the future. But the voice of the future is heard only feebly over the din of the market place, and the public has a responsibility to speak on behalf of future citizens. By *Walter E. Chryst* and *William C. Pendleton, Jr.*, Farm Economics Research Division.

LAND IS MANY THINGS to many persons—to the farmer, livelihood; to the townsman, space or a place to build his house; to the child, a playground; to the poet, a theme; to the patriot, a symbol.

To the economist, land is the soil under his feet, the materials in that soil, the slope that determines the ease of cultivation, the rain and sunlight that plants need.

To him, land also is the bays and inlets along the coasts; the fall of the streams, which permits the hydraulic generation of electricity; the rivers on which are carried grain and industrial products to the seaports.

It is the deposits of iron ore in Minnesota, the coal in West Virginia, the oil in Texas.

It is the soil and climate that make timber in the Pacific Northwest, corn in Iowa and Illinois, wheat in the Great Plains, cotton in the South, citrus fruits in Florida, pastures in Wisconsin and New York.

Land, in the economic sense, is our entire natural environment—all the forces or the opportunities that exist independently of man's activity.

LAND has much to do with our needs and the way we fulfill them.

Much of our activity we devote to getting the basic items of food, shelter,

and clothing; other items—furniture, telephones, automobiles, highways, washing machines, bathtubs, refrigerators, picture windows, soap, newspapers—that make life more comfortable; and items that make life more stimulating—recreation, movies, and radio, concerts, education, books, libraries.

We want many things. It is likely that if we had all that we could list, new wants would arise tomorrow, and again we would be faced with the problem of how to satisfy them.

Four types of resources are available to each generation of Americans.

First, each generation has some legacy of capital goods from previous generations—tools, factories, railroads, canals, buildings, livestock, fences, wells, and so on. Some of them, such as canals and wells, are durable; they may serve for a century with little attention. Others require considerable maintenance and early replacement.

Second, each generation has energy and the ability to do physical labor, to plant, shape, and mold.

Third, each has some ingenuity—to plan, measure, evaluate, and direct.

Fourth, all generations have the natural environment—the fertility of the soil, the iron ore in the mountains, the fall of the rivers, the water of the bays, the deposits of petroleum, and the variations in climate.

Our success in providing a good level of living, educating the young, preserving freedom and liberty, and leaving a physical and cultural legacy for our children depends fundamentally on how well we use the four factors of inherited capital, human energy, ingenuity, and natural resources.

It is not meaningful to discuss which of them is most important.

Some progress in the satisfaction of wants conceivably would be possible without tools inherited from the previous generation. No progress can be made if no labor is applied, if labor is applied without intelligence, or if natural resources with which to work do not exist. Each of these items can limit the goods produced to satisfy wants. In time, however, the restrictive effect of many of these limitations can be lessened: Labor can become skilled; tools can be accumulated; better methods of combining labor, tools, and land can be devised; and land can be utilized more fully. But the area of land, as we think of it here, cannot be increased. Land remains the final restricting factor.

We learn more about the importance of land by looking at the economic development of other countries. Farmers elsewhere have applied their energies with as much diligence as American farmers. Industrial laborers have skills equal to those of American laborers. Inventors in other countries also have developed new, ingenious techniques. In terms of total production, however, the results have not been the same. The difference may be attributed largely to the more generous physical environment in which American economic life is conducted.

The United States has been fortunate in its endowment of natural resources, but this fact is apparent: In terms of what we want, we do not have as much of some types of land as we could use. We do not have, for instance, as much Class I farmland as we could use, or it would not sell for more than 400 dollars an acre in Indiana; not as much petroleum as we

could use, or crude oil would not command a price while lying beneath the waters of the Gulf of Mexico; and not as much space as we want, or land on Chicago's Michigan Avenue and New York's Fifth Avenue would not be priced at thousands of dollars a foot.

If we had as much farmland as we could use, it would have no price—like air and sunlight, it would be free for the asking. But land is not free. The value of agricultural land (including buildings) is estimated at 10 times the annual net income of agriculture. We have no satisfactory estimates of the value of nonagricultural land, but it can be expected to exceed the value of farmland severalfold. Most of the types of land that we want are in scarce supply. It is this scarcity that creates the economic problem of land.

MUCH OF OUR LAND can contribute in more than one way to the satisfaction of our wants.

When we approach a familiar city after a year's absence, we now expect to see suburban housing developments on land that may have been farmed for a century.

We observe that old but serviceable buildings are being demolished to permit construction of expressways in Chicago and in Baltimore, turnpikes and interchanges are being built on the fertile farmlands of New Jersey, new railroad sidings and chemical industries are filling valleys in West Virginia and Tennessee, and bottom land is inundated as dams are made so that power can be generated in Arkansas. Ranchers in Oklahoma, Kansas, and Nebraska can use their land to produce wheat or to pasture beef cattle; farmers in Iowa can substitute soybeans for corn; producers in Minnesota can raise oats or flax; and farmers in Georgia can grow cotton or peanuts.

Little of our land is limited to the output of one commodity or service.

If we had unlimited land, we could devote land to every use in such quantity that an additional acre in

any use would not increase the output by a single pound, bushel, or kilowatt.

Because we are not that wealthy, we must apportion our limited resources among the different uses in which they may be employed. We must decide whether to use a tract for a homesite or for crops; whether to use a valley to produce corn or to produce electricity; whether to use the Missouri River bottom land between Kansas City, Mo., and Kansas City, Kans., for tomatoes and cabbage or for an airport.

Determining which acreages to employ in each use and whether the land should be used now or later are the basic economic problems that are associated with the use of natural resources.

How can we determine how much land to use for wheat, pasture, homesites, or any other of the services that land can supply? Of the land that can be used to grow wheat or to grow grass for beef—how much should be used for wheat and how much for beef? In order to decide, we must know something of the ability of the land to satisfy wants when it is used for wheat and when it is used for pasture, or its productivity in each use.

To determine the productivity of land, we have to distinguish between physical productivity and economic productivity and between the productivity of the land itself and that of the labor, capital, and other resources combined with it.

Consider an acre of wheatland that yields 30 bushels. Those 30 bushels measure the total physical productivity of all the resources used in producing wheat on that acre.

In order to get the idea of the economic productivity, however, we must make use of an economic measure—the price the wheat will bring when it is sold. If the price is 2 dollars a bushel, the economic productivity of all the inputs used is 60 dollars an acre. But before we can measure the contribution of land to this total, we must make allowance for the costs of labor, gasoline, fertilizer, wear and tear on ma-

chinery, and so on. If these other costs amount to 55 dollars an acre, the economic productivity of the acre is 5 dollars.

That is quite different from the 30 bushels we started with, but it is a more useful figure. This 5-dollar measure of productivity takes account of the values consumers place on flour, bread, macaroni, cake mixes, and other products made from wheat, because these valuations have a big part in determining the 2-dollar price of wheat. It also takes into account the efficiency of the grower, as reflected in his choice of machinery, seeding rates, amount of fertilizer, and so on. Finally it takes into account the amounts and costs of the resources that must be combined with land in the production of wheat.

We need a figure like this if we are to use our land resources most effectively. The farmer needs it when he decides to sow his land to wheat or when he decides to buy or sell land. The economist needs it when he tries to appraise patterns of land use. The legislator needs it when he works on farm programs and legislation that affect land use. They need it because an efficient use of land can be achieved only through comparisons of the economic productivity of land in its various uses.

If this particular acre would yield a net return of 6 dollars when it is devoted to the production of beef, it should be grazed, rather than planted to wheat. Likewise, when hilly, eroded land would yield 2 dollars' worth of timber an acre a year, as compared to the dollar it yields in farming, a shift to trees is indicated. The same forces operate when highly productive dairy farms in New York are sold to builders because the economic productivity of the land as building lots is higher than when it is producing butter, milk, and cream.

The general principle is this: Each acre should be devoted to the use in which its economic productivity is highest. Only by allocating land (or

any other resource) according to productivity can we expect it to reach its highest efficiency in the satisfying of our wants.

ANOTHER PRINCIPLE of land use that is implicit in the examples we have given is that all land with any economic productivity should be used. The validity of this principle is clearer when we observe that a given output may be obtained from several different combinations of land, labor, and capital.

Let us say, for example, that 1 million bushels of wheat can be obtained from 70 thousand acres of land, 200 man-years of labor, and 500 thousand dollars' worth of equipment, seed, and fertilizer. Let us say also that 1 million bushels of wheat could be had from 100 thousand acres of land, 150 man-years of labor, and 400 thousand dollars' worth of equipment, seed, and fertilizer. In this example, 30 thousand acres can be substituted to some degree for 50 man-years of labor and 100 thousand dollars in capital.

The implication of this principle is clear—to the extent that land can be used to free labor and capital for other types of production, land should be used. The failure to use land (when it is available) as a substitute for labor and capital results in a waste of human energy and the tools of production or in an output of the national economy that is less than the one that might be achieved if all resources were used.

The allocation of land and other resources is accomplished in an enterprise system such as ours largely in response to changes in relative prices—prices of the products and services the land can help produce, prices of the resources combined with the land, and the price of land itself.

When the price of beef goes up relative to the price of wheat, for example, some farmers who have a choice will shift into beef. When the wages of hired labor rise rapidly, the signal is given to farmers to mechanize. When paper companies can offer 30 dollars an acre for land that is worth no more

than 20 dollars to farmers, a shift is indicated. Many other examples might be listed to underscore the principle: Relative prices and changes in relative prices are major factors in our decisions as to the use of land.

The responsibility for the decisions rests mostly with individual citizens.

The decisions involve a tremendous number of possibilities, for there are dozens of basic types of land and millions of farms. If only three decisions as to the use of land were made on each farm, more than 10 million decisions that affect land use would have to be made in agriculture each year.

The framework of the decisions is a tenure system which is based on the principle of private property and through which the control of the various tracts of land and their earnings are identified with individuals.

THUS THE RESPONSIBILITY for the decisions is tied to the consequences of the decisions.

If the person in control of land decides to use it to produce the items the consuming public prefers, his income is increased.

If he insists on not using the land or on using it to produce something the public does not want, he can expect little or no income from the land.

If a piece of land has a higher economic productivity in pasture than in wheat, he will be able to claim more of the total output of commodities and services if he devotes the land to pasture.

If the land has a higher economic productivity when it supports three-bedroom houses than when it is in corn or watermelons, the landowner's economic welfare will be improved if he permits the land to be used for building sites.

If he insists on growing watermelons in the center of a big subdivision, he will pay a price in terms of the goods and services that he must forego. The same incentive is applicable for each pair of crops, each pair of business uses, each pair of livestock enter-

prises—in general, each pair of uses in which land can be employed.

The land-tenure system also determines the distribution of the income the land earns. People receive income, in general, because the resources they control contribute to production.

Some people receive income for the physical or mental work they perform; some from the use of their tools, machines, livestock, and other instruments of production; some from the natural resources they control; and some from various combinations of the three.

The size of a person's income depends on the worth of the resources he contributes; it measures the value society places on the things his labor, land, and capital produce.

Because land can contribute in so many ways to the satisfaction of wants, it earns an income—often extraordinarily high—and therefore ownership of land is instrumental in determining how the output of the national economy is distributed.

If the landownership is unequal, the distribution of income from land is correspondingly unequal. If a policy of encouraging small holdings is followed, the distribution of income presents a different picture.

How much inequality in the distribution of income is desirable and how this distribution affects efficiency in production are questions that have been the subject of debate and public concern for centuries.

Those are questions that we cannot try to answer here. But it is clear that our economic system operates on the assumption that an individual who uses his land to get from it the maximum income uses it as efficiently as possible and that in this way his land makes the largest possible contribution to the output of the economy. Thus individuals, while acting in their own best interests, are assumed to act in the best interests of the public.

BUT THE INTERESTS of the individual are not necessarily the interests of the

public, and the mechanism of leaving decisions as to the use of land to the individual does not always result in the use the public wants.

The individual is concerned with how to use his own resources within the span of his lifetime and the lifetime of his immediate heirs. The public is concerned with the use of all resources over a longer period. These differences in expectations and orientation give rise to public intervention in decisions involving the use of land.

The need for public intervention will be observed when it is noted that each landowner uses his land within a much larger physical environment. The cost of cropping practices that increase the rate of runoff in the upper Mississippi Valley, for example, is not borne entirely by those who use those practices; it is borne partly by those downstream whose properties might be flooded by the practices. Similarly, the cost of producing wheat on land susceptible to wind erosion is borne partly by those who must live and work in areas affected by duststorms. The cost of chemical production may not be paid entirely by the producer who dumps his waste into a stream; it is paid partly by the downstream users of water who must install a more elaborate purification mechanism to eliminate the health hazard created by the presence of the waste.

Conversely, the least expensive way of eliminating a flood or erosion hazard on one farm may be to erect a dam on a farm higher up the slope. But the first farmer has no right to use the land of the other for this purpose, and the second has no incentive to provide this protection, as he does not participate in the benefits. Many similar examples might be cited, but it is evident that frequently, when there is an off-site benefit or cost for any land-use activity, there is need for public intervention if all of the land is to be used most effectively.

The foregoing examples pertain to the separation of benefits and costs of land-use practices in space.

A similar situation exists when the benefits and costs of a land-use practice are separated in time. The present landowner gets the benefit of a cropping system that leaves the land impaired in terms of its future ability to produce, but the cost must be borne by later generations, who either must have fewer agricultural products or must substitute labor and capital for the wasted land resource—labor and capital that could be used to produce something else. So, also, the use of timber, coal, oil, gas, or subsurface water can be excessive at one point in time if future needs are not taken properly into account.

The voice of the future is heard only feebly over the din of the market place, and the public has a responsibility to speak on behalf of future citizens.

MANY USES OF LAND are socially desirable, but they cannot be left to individual decision. We need land for parks, playgrounds, roads, streets, airports, schools, hospitals, military encampments, and testing grounds. This land is needed for long periods and may require elaborate structures. Decisions with respect to the use of such land must be made by the public, if long tenures are to be achieved and the facilities are to be located to provide a maximum advantage to the population.

The public also has an interest in developments that are too large or too risky for individuals to attempt or that must be coordinated with other activities. A levee along the Ohio River is economically feasible if the increased productivity resulting from its construction is greater than the expected productivity of the needed labor and capital in any other use.

The variability in income from such a project, however, might place any private group or corporation in too dangerous a financial position, but the public, with its command over large quantities of resources, would be able to absorb the risk.

The public has a greater ability to absorb risks, can command more re-

sources, and can wait longer for results than an individual can. When an economically feasible project cannot be handled by an individual or group of individuals because they cannot assemble the resources, cannot stand the risk, or want an early return, the public must act if the best use of our resources is to be achieved.

SUPPLEMENTING these public actions in the interest of more efficient land use are a number of policies that deal with the question of distribution. In general, as a Nation we have favored a policy of widespread distribution of rights in land. This policy has been shown in several ways, such as the sale of the public domain in small tracts at prices within the means of small farmers, recognition of the claims of the small farmer who had "preempted" unregistered public lands, and the 160-acre limitation on homestead lands.

Several measures have been used to insure the position of the family farm in agriculture. The agricultural experiment stations, the State agricultural colleges, and the State extension services have contributed to the development and dissemination of the scientific knowledge needed to keep the family farmer in a competitive position. The Federal Land Bank System and the Farmers Home Administration were established to provide credit on favorable terms to the operators of small farms.

Two basic problems, however, continue to exist with respect to the distribution of the rights to land.

First, means must be devised so that qualified youths, regardless of the circumstances of birth, have opportunity to compete for the use of our natural resources.

Second, tenure must not result in a distribution of income that contributes to economic and political instability.

The first problem must be solved if our resources are to be controlled by the most competent farm operators and used efficiently. Progress has been made toward this end through voca-

tional training and by making necessary credit available.

The second problem rarely has been serious in the United States, largely because of the availability of land during our early history, the more recent developments in techniques and communication, and constant attention to land policies designed to foster a widespread distribution of rights to natural resources.

THUS WE HAVE TWO main problems with respect to land—how land should be used and how rights to land should be distributed. Both problems are met in the first instance by individuals who make decisions through the price and tenure systems. Both demand more or less public action. They cannot be solved once and for all. Their solutions change with the changing times—as the population swells or recedes, as new skills are developed, as we change the values we attach to the things we consume. We must find solutions that can be adapted to changing conditions. Our success in doing so will reflect largely our success in anticipating the changing conditions of the future.

THE IMPORTANCE OF LAND in the future will reflect three factors: What we want; the extent to which we create additional machines, factories, buildings, transportation, and similar tools to facilitate production; and our ability to devise new techniques of increasing output.

What we will want will depend upon how many of us there will be and our tastes with respect to the items we consume. If we may look to the past to see the shape of coming events, we anticipate that many more people will want many more things in the year 2000. A century ago there were 31 million people in the United States. There are about 175 million in 1958. Population experts predict that the number of our fellow citizens will reach 300 million by 2000. Thus, on the basis of numbers alone, assuming no change in the quantities of goods and services the

individual desires, our wants will increase nearly twofold in this period.

The magnitudes of the wants of the population, however, cannot be predicted on the basis of increasing numbers only. As we cannot say today that we would exchange our present comforts and conveniences for the world of 1913—the magnetotelephone; the cereal-heavy diet; the unreliable but expensive automobile; the drafty frame-house; the 60-hour week; the one-room country school; the limited medical and health facilities; the horse-drawn, wheat-shocking, corn-shucking, kerosene-lighted farm life of that day—so will our son's son utter a small prayer of appreciation that he did not have to survive the hardships of life in the 1950's. He will want to eat and dress better than we do today. He will want more spacious housing, more travel, and more recreation. He will spend a larger part of his life in school preparing for his vocation or profession. He will probably drive larger automobiles that go faster and take more room to park than those we use today. We want more than our grandfathers, and Americans four decades hence will want more than we want now.

What are the prospects that the increasing wants of this increasing population will be met? It depends partly on what we accumulate in the way of tools of production—ships, warehouses, office buildings, railroads, planting and harvesting machinery—devices that multiply the effectiveness of labor. It also depends partly on what we learn about the way the things that we want go together—production processes in factories; the feeding, care, and mating of plants and animals; and the ways they come apart, such as developments in mining and earth-moving techniques, the conversion of sea water, and atomic fission, for example. If the wants of the 300 million citizens of the United States in the year 2000 are to be fulfilled reasonably successfully, we are going to have to know a great deal more about the technical aspects of production than is known now, when our economy

is functioning reasonably well and the wants of 175 million persons are not fully satisfied.

GAINS in techniques will be essential, but the uses made of natural resources will continue to be of paramount importance. The 31 million people of a century ago were served by about 1.9 billion acres of land. The 175 million people today have about 1.9 billion acres. The 300 million in 2000 will probably still be living on the same 1.9 billion acres. The fall of our streams will not change, and it is unlikely that rainfall will increase. Therefore our potential hydroelectric capacity will remain unchanged. We will have less coal, less topsoil, less iron ore, less petroleum, and probably less timber. Any failure of technological development to keep pace with the expanding population will result in greater demands on our natural resources, with a corresponding increase in the care that must be exercised in determining their use and rate of exploitation.

It is likely that the gains in technology will not be important enough to eliminate the vital place of land in determining how well the wants of the population are satisfied in decades to come.

Great gains in the arts of production have been achieved in the past century, but our welfare today depends partly upon how well we allocate our land resources among its alternative uses and how well we substitute land for labor and capital wherever such a substitution is economically feasible.

Great gains in the arts of production can be expected in the next century, but the basic question of land use will remain, and the welfare of generations to come will depend upon how well they succeed in getting each acre of land into its most economic use and how successful they are in arriving at the most economic combinations of land and other productive resources. To the extent that future generations fail to allocate and substitute resources properly in the production process,

they must pay a cost for this failure by accepting a level of living lower than the highest attainable.

As the future appears to hold for us an increasing population, increasing wants on the part of individuals, unknown advances in the techniques of production, and new and competing uses for many of our land resources, we anticipate that our land problems will be with us for many years to come.

Constant surveillance of the way we use our natural resources will be needed. As the way land is used affects our welfare in a general way through its effect on the level of output of the economy, the distribution of claims to land affects our welfare in a specific way by determining our individual claims to that output. As laws bearing upon this use and these claims are passed or modified with regularity, it is in the interest of each of us to be in a position to vote intelligently on questions that involve land.

Land has served us well in the past. It was virtually the only resource available to our ancestors at the end of the Revolutionary War. Proceeds from the sale of land were used to provide funds to launch the fledgling Nation. More importantly, our land was productive enough so that through the release of labor and the sale of agricultural products abroad, extensive capital formation was made possible which facilitated the rapid industrialization of our economy. Sales of land have financed some of our communications—canals, railroads, and the National Pike. The setting aside of public lands has been particularly helpful in educating the young—for example, the land-grant college system. In a larger but immeasurable sense, land may have been responsible for much of our political and economic freedom.

LAND CAN MAKE the contribution to our welfare in the future that it has made in the past only if we have full knowledge of its potential capacity and if we take thought about its best use and how we can achieve it.