

FUTURE LAND USE IN THE APPALACHIAN PLATEAU AND ITS RELATION TO STRIP-MINE RECLAMATION

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The Appalachian Plateau includes the eastern and southeastern portion of Ohio, and contains all of the state's coal-bearing land. The strip-mine reclamation problem is endemic to this area.

Two questions must be answered before the relationship of land use in the Appalachian Plateau to strip-mine reclamation can be considered. The first question is: How far in the future are we to project our thinking on this topic? The second is: What will be the probable land-use pattern at that time?

The answer to the first question can have an important bearing on the answer to the second. Although changes in land use are occurring at an accelerating rate, it will be difficult for most of us to identify significant change in the short run of a few years. On the other hand, if we attempt to project several decades ahead, the uncertainties and probable errors are so great that our predictions have little value. For the purpose of this paper, I shall establish a horizon for projection at about two decades in the future. I shall also restrict the scope of the assignment to the Ohio segment of the Appalachian Plateau.

To be meaningful, a land-use projection for an area, although that area is only a segment of a state, must be made against a much broader background than the area itself, or the state in which it is situated. Does one dare stop with national boundaries or must he also consider developments beyond our borders? Ruling out a war of greater magnitude than the world is currently experiencing, there is still the important area of international trade and its influence on our land-use pattern. An effective foreign demand for any surplus agricultural production that might exist in this country would greatly alter our land-use pattern. But it does not exist today, and does not appear likely to develop in the foreseeable future. In the absence of such a demand, we must base our future land use on our expected domestic and foreign demand. More about this later.

Ultimately, land use adjusts itself to the three frameworks within which it takes place, namely: the physical, the economic, and the institutional. In other words, given time, the use of land in our society will adjust to the demands of the people insofar as the land is physically suitable and our institutions will permit. To a high degree, the way the consumer elects to spend his income will in time determine the uses made of the land. Today, people want many things in addition to food and fiber that are provided by land. Here I am using the term "land" in a broad sense.

Our present civilization moves forward on a great complex of resources, of which land for the production of food and fiber is only one. At an earlier stage in our development, and in the less industrially and technically developed areas of the world today, land for agricultural production was and is paramount.

For untold centuries, man's productive capacity was so limited even in a sparsely peopled world that, for the great masses of the people, wants beyond food, clothing, and shelter were unrealistic dreams. This is still true for a major portion of the world. However, for that part commonly referred to as the western world, man's productive capacity has made it possible for an effective demand to develop for items other than food, clothing, and shelter, that require land to satisfy, items

such as recreation and single-family residences with large lawns. In addition, the technological developments that have made it possible for man to afford and thus demand more than satisfaction of his first simple wants have also created new demands for the land: transportation, industry, business, residential and public services, for example.

Thus it appears that economic growth would result in an ever increasing pressure on land. Classical and neoclassical economists saw land playing an ever increasing role as economic growth occurred. It was expected that, once our frontiers were gone, the products of land would increase in price and in turn, the rent demanded for land would increase. This would result, they said, in an ever larger share of the gross product going to land. According to Professor Theodore W. Schultz, Chairman of the Department of Economics at the University of Chicago, this type of reasoning grew out of a static theoretical analysis and the implications of the variable proportions of factors under static conditions. In a paper on "Land and Economic Growth," presented at the Land Economic Institute held at the University of Illinois in 1958, Schultz points out that the exact opposite has occurred. Prices of products most dependent on land have tended to decline relative to other major prices. In his words, "As a factor of production, the economic importance of land has been declining." This reversal of the importance of land has occurred as the result of man's increased ability, through growth of education, research, technology, and management, to substitute other inputs for agricultural land.

Substitutes for agricultural land are in widespread use and increasing supply. With each new discovery, our capacity to generate and employ new ones expands. Some of the new developments—such as the replacement of animal power with mineral fuels, the partial substitution of nitrogen fertilizer for legume-produced nitrogen, and the employment of increasing amounts of chemicals for fertilizer, disease and insect control—place new demands on limited land resources. On the other hand, many of our output-expanding developments, such as improved strains of plants and animals and management techniques for achieving more efficient combinations of our resources, are arising from increased mental effort.

The investment that society has made and is making in research and education of both the specialist who develops new and improved production techniques and the masses who employ them in production, returns a product of greater marginal value than similar investments in land reclamation. If there is a shortage of resources appearing today, it is in trained personnel rather than land.

What does all of this have to do with the future land-use pattern in the Ohio segment of the Appalachian Plateau and its relation to strip-mine reclamation? Its purpose is to bring into better focus all of the forces that are influencing our present and future land use.

From the point of view of the consumer of the products and services of land by 1980, what will be the optimum use for land in the Appalachian Plateau? Because of the variability in this segment of the plateau, there can be no one answer to this question. In our effort to find possible answers, let us consider first the probable need for land for food and fiber in 1980.

In a recently published policy guide prepared by the Land and Water Policy Committee of the U.S.D.A. (1962), a section was devoted to our resource requirements and potentials. By employing research procedures and data that have been refined and improved constantly and a set of carefully prepared assumptions, a detailed estimate of land requirements for 1980 was made. The assumptions were based on the present situation, the past and prospective trends in population, the level of living, the results of research and progress on research under way, the prospects for world trade, and other factors. These reflected both our growing demand for land and our expanding ability to utilize more effectively our land resources.

In 1959 we had a total of 458 million acres of cropland in the U. S. A. This comprised:

317 million acres of cropland harvested
 11 million acres of cropland failure
 31 million acres of cultivated summer fallow
 33 million acres of soil improving crops and idle land
 66 million acres of cropland used for pasture

458 million acres

The cropland needed in 1980, on an optimum assumption as to the export of farm products, was estimated at 407 million acres—51 million acres less than in 1959. The predicted pattern of use was as follows:

291 million acres of cropland harvested
 11 million acres of cropland failure
 24 million acres of cultivated summer fallow
 11 million acres of soil-improvement and idle cropland
 70 million acres of cropland used for pasture

407 million acres

Earlier attempts at projecting future cropland requirements have tended to underestimate our production potential and to overestimate our total land requirements. As a safety margin for land-use planning, it is highly desirable that errors in projection be on the side of overestimation of requirements. Only time will tell how accurate the estimate for 1980 has been. On the basis of the estimate made, despite a much larger and better fed population, it appears that significantly less land will be needed to produce the food and fiber required in 1980 than today.

Through our present price system, the American consumer uses his dollar ballots to vote for less land in farms. Unless we are willing to continue to subsidize an overexpanded farm industry, some of our land now in farms will need to be shifted to other uses. If our society is to continue to enjoy an increasing standard of living, it will be necessary to retire the land with the lowest economic potential.

What is the nation's cropland potential? Based upon a recent comprehensive inventory of the nation's soil and water conservation needs, the acreage and use of land in each of the eight capability classes were determined by a scientifically drawn sample involving 160-acre blocks of land that were mapped by soil specialists. According to this, we have 638 million acres of land of capability classes I, II, and III in the United States. This is land considered best adapted for crop production; since it is nonfederal and nonurban, it is available for use. In 1958, 373 million of the 638 million acres were in crops and 113 million acres were in pasture and range.

Because land of the different capabilities is not in solid, contiguous blocks, but is intermingled with that of higher and lower capability, not all the land in classes I, II, and III is physically or economically available for use as cropland. However, there were 150 million acres of capability I, II, and III land in forest and other uses that, if need be, can be shifted in part to more intensive uses. The Soil and Water Conservation Needs Inventory disclosed that considerable acreages of classes I, II, and III throughout the Midwest are being shifted from pasture and forest into cropland. The land-use—capability classification is based upon the physical features of the land and does not reflect the economic features, such as location with respect to markets and existing capital improvements on the land.

What is the land-use—capability situation in the Ohio segment of the Appalachian Plateau? This information is available in the recently published report of Ohio's Soil and Water Conservation Needs Inventory.

As indicated earlier in this paper, the land in the plateau is not uniform in quality. There are two major groupings: the glaciated section in the north-

eastern part of the state and the unglaciated section in the middle eastern and southeastern section. The soil in both areas was for the most part formed from sandstone and shale. Topography, drainage, type of cover, and growing season, as well as economic location and amount of capital improvements already made in the land, are variable.

Soil resources measured in terms of capability classes is significantly higher in the glaciated section, which comprises approximately one-third of Ohio's part of the plateau. In this portion, land-use—capability classes I, II, and III make up a little more than 85 per cent of the total, with slow and imperfect drainage more of a problem than erosion.

In the unglaciated part of the plateau, classes I, II, and III make up about 45 per cent of the total. In the northern portion of this area, the proportion of the land suitable for cropping is somewhat higher than in the southern part. Erosion and droughtiness are the major problems.

A graduate student in the department made a detailed study to determine the soil type, land use, and capability class of the 521 quarter-section samples in the southern portion of the unglaciated area that had been selected by the Iowa Statistical Laboratory for the Soil and Water Conservation Needs Inventory project. He found that 160, or 30 per cent, of the 521 samples studied had less than 10 per cent of the land suitable for crop use according to its land-use—capability class and other selected criteria. Only 181 of the 521 quarter-sections contained 35 per cent or more land suitable for cropping.

In many of the quarter-sections with a low percentage of land suitable for cropping, the use of the land for crop production had already stopped. Forest, brush, and idle land occupied all or most of these sections.

What has been the history of land use in Ohio's sector of the plateau? With the opening of western land following the American Revolution, this region of Ohio was rapidly settled. Many of the townships recorded their maximum population by 1850 or earlier, while 9 of the 22 counties in the unglaciated sector had done so by 1900.

The plateau area offered numerous advantages to the early settler. An important advantage was location, with respect first to the eastern seaboard and soon thereafter to canals, roads, and railroads reaching rapidly growing markets in Ohio and states to the east.

The rolling to hilly topography and the small and irregular fields presented few problems to the pioneer farmer. The small machines and hand tools were as well adapted to such fields as to the level areas. The greater ease of clearing and draining of this land and greater freedom from malaria all added to the attractiveness of the plateau. As a result, the land was cleared and farms established rapidly.

In the unglaciated area, 16 counties recorded their peak farmland area by 1880 and the remaining 6 by 1900. Most of them recorded peak crop acreage in 1900.

In many of the less productive sections, the use of the land for farming was discontinued shortly after the Civil War. Improvement in transportation was rapidly opening up the less hilly and more productive lands to the west. Due to rapid improvements in farm machinery better adapted to the larger level fields of the corn belt and eastern great plains, the early economic advantage of the eastern Ohio area gave way to severe competition. Even before the turn of the century, numerous counties were experiencing a pronounced net loss of population. Since 1900, with the exception of the few brief years of high prices during the First World War and the extremely depressed years of the early 1930's, there has been a steady decrease in the area farmed in the Appalachian Plateau region. Between 1900 and 1960, the area in farms dropped from 6,154,000 to 3,775,556 acres—a 39 per cent decline—and the area in harvest crops from 1,938,328 to 867,033, or 55 per cent. For the remainder of the state, the decline in farms

amounted to 20 per cent and in cropland to 7 per cent. Forest has expanded and presently occupies 40 per cent of the unglaciated area.

Up to the close of the Civil War, the historical development in the glaciated segments of the plateau in northeastern Ohio was not unlike that in the unglaciated portion. The more favorable topography and somewhat better soil plus the growth of the dairy industry enabled the farmers to meet the competition from western lands fairly well. After 1900, the rapid growth of industry and the near-by market for perishable and bulky products gave them sufficient economic advantage to maintain farm numbers and acres well into the 1920's.

But by the mid-1920's, urban and industrial development, with its accompanying influence on land prices, taxes, and wages, began to leave its mark on the farming in that area. Land situated in the path of urban and industrial expansion became more valuable for nonfarm uses. The less productive farm lands, not well situated for such expansion, encountered a problem of farm-commodity competition from the better lands and areas of lower-cost operation farther away. Like the area to the south, the northeastern section of the plateau since 1900 has experienced sharp declines in the land in farms and crops.

Although the trends have been similar, the major reasons have been different and the resulting land-use patterns entirely different. The pattern of reforestation in the extreme northeast (Ashtabula, Geauga, and Trumbull counties), except for a fringe along the lake, has been similar to that in the southeast. In much of the remainder of the area, the pattern of change has been from full-time farming to part-time farming to rural residences to urban and industrial uses.

What will the next two decades bring with respect to land use in eastern Ohio? Will the competition for land from nonfarm sources continue in the northeast? Will it spread to the southeast sector? What about the demand for land for strip mining? Has the shift out of farming run its course? Is the area developing a market advantage for farm products as a result of the growing centers of consumption near-by? Will our national population growth result in higher farm-commodity prices during this period and thereby bring about a reversal in the trend in farming? These are some of the questions that are being asked today by people interested in eastern Ohio.

Our growing population, better and faster transportation, larger parking areas, and the trend toward one-story houses, supermarkets, and factories all point toward an increasing growth in nonfarm land in those areas with economic advantages for industry and business. Since northeastern Ohio is well provided with these advantages, we can expect a continued expansion in the acreage in such uses. Currently there is little to indicate that in the near future there will be any significant growth in the amount of land used for these purposes in the southern two-thirds of the plateau.

In regard to strip-mined land, we can expect a continual increase in the area mined. The acreage considered suitable for strip mining in eastern Ohio has been estimated at slightly more than one-half million acres. About one-fourth of this has already been mined. In view of our increasing power requirements and the economy of surface mining, there is nothing to indicate a decline in the rate.

Most of Ohio's section of the plateau is well located as regards proximity to large consuming centers. However, improvements in and lower cost of transportation, together with lower-cost production due to better land, are enabling farmers in western Ohio and states farther west to compete effectively with local producers.

The Malthusian specter of our rapidly growing population at present casts little or no shadow over our national economy. To express a view regarding the situation by the year 2,000 and beyond is extremely hazardous. Earlier in this paper, I have attempted to set forth our need for land for food production by 1980. On the basis of our current agricultural capacity and our potential for further

increases, there is little on the horizon to indicate that, by 1980, there will be an economic demand strong enough to reverse the present trend in farm acreage in either section of the plateau.

In the glaciated northern third of the plateau, farming will continue to be superseded by uses that can bid higher prices for the land. Such uses include highways, public service and reservoir areas, industrial plant sites, residential areas, and parks. As an indication of the extent of this shift that can be expected, I shall refer to the research that Dr Robert Reeser and I have been conducting on a desirable land-use pattern for Ohio. Our study is based on past trends and present and prospective shifts in nonfarm use of land and population projection to 1975. We find that, in the five most urbanized counties—Lake, Cuyahoga, Summit, Stark, and Mahoning—having a total acreage of 1.3 million and 444,000 acres in farms in 1959, the area in farms in 1975 will be 280,000 acres.

Much of the remainder of the northeastern quarter is expected to experience increasing competition from expansion in nonfarm uses. All of this area except a small segment comprising parts of Ashtabula and adjacent counties is expected to become increasingly urbanized with less and less land in farm use.

In the unglaciated section of the plateau, the trend towards less land in farms and in crops can be expected to continue for at least another two decades. Only a minor portion of this shift will be due to the movement of land into higher-income uses, such as industrial and urban. A major part of the change will be the continued retreat of the extensive margin of farming, growing out of its inability to compete with more productive farm land elsewhere in the nation. This appears likely to result in a further drop of approximately one million acres by 1980. Relatively few farms with less than 40 per cent of their area suitable for cropping will remain in operation in 1980. This will leave about 45 per cent of the land in farms.

It is highly doubtful if the trend towards less land in farms can be significantly checked or reversed by those interested in revitalizing the farm economy of this area. Those who would undertake this must not lose sight of our national capacity to produce farm products, the present farm-surplus, and most important of all, the fact that farming in the rest of the nation will not remain static while improvements are being made in the unglaciated counties of Ohio.

In summary, the land-use pattern in 1980 in the northern third of the Plateau will be increasingly that of a highly urbanized and suburbanized society with widely diffused and scattered nonfarm industries, shopping centers, and residential communities. Intermingled with these will be a large number of part-time farms and some full-time ones. These will not necessarily be situated on the best agricultural land, since non-farm users find the land that is good for farming is also desirable for their purposes.

To an increasing extent, surface mining will find itself in competition with other nonfarm uses of land. It will be faced also with a different local point of view with regard to the reclamation of spoil banks. While a strong factor today, the esthetic values will play an even greater role in influencing public opinion as people are subjected to the unsightly remains of strip mining.

The land-use pattern in 1980 in the southern two-thirds of the plateau will be characterized by less land in farms, more strip-mined land, and more land in reservoirs, highways, parks, and forest. In only a few areas is there likely to be an increased amount of land in industrial and urban uses. Thus it appears that the relationship of the land use in 1980 to strip-mine reclamation will be little different from what it is today. Any change that is likely to occur in the relationship between land use and the reclamation of strip-mined land will arise more from the need for watershed protection, pollution control, and recreation than from a need for agriculture.

REFERENCES

Land and Water Policy Committee. 1962. Land and water resources. U. S. D. A., Washington.