

## *Conservation and Change*

WE HAVE SEEN many changes. We shall see more changes soon. Farms will become larger. There will be fewer farmers. The farm business will become more competitive. Land values will increase. Lands not well adapted to low-cost production will shift to other uses. Yields will grow with the use of new technology. The changes are due not only to the technological changes in agriculture itself. Important also are the changes associated with nonagricultural uses of land. Greatly expanded requirements for recreation, transportation, and urban development already are bidding land away from agriculture. The trend will accelerate. Cities will continue to extend themselves across the landscape. More and more nonfarm families will take up residence in the country. The traditional division between city and farm will tend to disappear.

One thing is certain. Productive land will remain the basis of an efficient agriculture and a prosperous economy. The care of our soil and water will be as important tomorrow as it is today. The current and emerging trends in agriculture will lead to the need for more, not less, specialized services in the management of soil and water, whether private or public. As investments in land and outlays of capital mount, knowledge of the kinds of soil will become more necessary. Farm operators will have to give more attention to the fertility and moisture relationships of soils. They cannot afford to permit soils to erode and deteriorate. A higher level of technical competence thus will be needed by farm managers and from the conservationists and technicians who advise them.

Conservation has been an important part of the revolution in agriculture. Conservation itself has undergone a revolution. Modern science has changed its goals and methods in a generation. The fear of ultimate exhaustion of our natural resources, which prompted early efforts of conservation, largely has been removed by new knowledge. Instead of simple preservation, the goal today is to use and manage resources in ways to get the greatest benefit from them, now and in the future. Wise use, rather than restraint of use, is the keynote. Preservation, as such, is the primary concern only with those resources valued mainly for esthetic reasons. Today the practice of soil and water conservation consists mainly of applying the new technology in ways to keep land resources permanently productive and useful. The Department of Agriculture estimates



*Poor drainage is manifest in this subdivision in Cook County in Illinois.*

*This round barn near New Lenox, Ill., which once housed 56 cows and is one of the few of its kind still standing, will soon give way to urbanization.*



that by the year 2000 we may need more than twice the agricultural production we have today to supply an expected population of 329 million. This would equal the production from 400 million acres of additional cropland at present yields. We do not have 400 million more acres of land suitable for cultivation. The anticipated demand for farm products obviously will have to be met mainly from the land already in agricultural use.

We think this can be done. The acreage of harvested cropland has remained fairly constant in the past 50 years, yet farm production has climbed steadily. Very likely it will continue to do so. Gross farm output has nearly doubled in the past 50 years. Per-acre crop yields have increased by nearly one-half. The application of science to farming has made these gains possible with little net increase in cultivated acreage. Increased inputs of capital and the substitution of indirect labor in the form of machines, chemicals, and services for direct labor on farms have greatly intensified the use of cropland. For example, the number of tractors, virtually unknown on farms 50 years ago, has quadrupled in the past 25 years and now exceeds the number of farms. The use of other types of farm machines, chemicals, and electrical power has increased similarly. Moreover, the land used for crops today obviously is more productive than that cultivated a quarter or a half century ago. During this time there has been much shifting of crop production, both between regions and within single farms. These changes have tended to concentrate crop production on the more productive acres.

A national soil conservation program began in the 1930's to encourage adjustments in land use in accordance with the capabilities that soil surveys revealed. By 1960, more than half of the Nation's farmland had been covered by soil surveys, and a third of the farms had basic conservation plans based on the surveys. Several million acres of cropland, largely of inferior quality, had been converted to other uses and replaced in cultivation by better land taken from pastures and woodlands. Nearly 25 million acres of wet soils had been improved by farm drainage in soil conservation districts. Scientifically designed irrigation systems had been installed on nearly 4 million acres. More than 6 million acres of land had been leveled. More than a million miles of terraces had been constructed to control runoff water and conserve moisture in fields. Equally important improvements were made in methods of soil management. The conservation of soil and water traditionally has been primarily the concern of farmers. That, too, is changing, because land and water will be needed for other purposes besides the production of food and fiber. Additional millions of people must have space for homes, recreational areas, roads, airports, and industries. Extensive rural acreages will be taken over for their use.

Much land needing conservation treatment is no longer farmland. The intermingling in rural areas of nonfarm residents and nonagricultural enterprises creates new conservation problems. Conversion of open country to urban uses leads to many complex problems, such as finding stable soils to support structures, controlling floods and sedimentation, providing drainage and sewage disposal, and adjusting taxes. The new owners and users of the urbanized areas will have to cope with these problems, for the responsibility for conservation goes with the use of the land. In the years ahead, more and more nonfarmers will be deciding how land resources are used. Their decisions, like those of farmers, will determine whether resources are wastefully or wisely and beneficially used.

In order to plan intelligently, people need to know how soil and water resources are being used. The National Inventory of Soil and Water Conservation Needs, conducted by the Department of Agriculture in cooperation with other Federal, State, and local agencies during 1957-1959 in more than 3 thousand counties containing non-Federal agricultural land, supplies this kind of information. The inventory shows that our land-resource base is adequate, in combination with new technological developments, to meet the needs of our people in the foreseeable future. We are now (in 1958, the base date of the inventory) using about 450 million acres as cropland. The 1959 Census of Agriculture showed 311 million acres of cropland harvested. Other cropland is used for tame pasture, is idle or fallow, or is used for soil-conserving crops. Another 245 million acres of land in pasture and woodland are physically capable of sustained cultivation (class I to III). Still another 100 million acres of marginal quality (class IV) could be cultivated under intensive management. This does not mean that we can afford to let any of our farmland waste away or deteriorate in productivity, but it does mean that we have the physical resources for much greater agricultural output if and when economic conditions require it.

The inventory indicates that the acreage devoted to each of the major agricultural uses—cropland, grazing, and woodland—will change little in the years ahead. County-by-county projections of changes in land use to the year 1975 indicate that the amount of cropland will decline 2 percent, pasture and range will increase 2 percent, and forest and woodland will decline 2 percent. Cropland acreage in 1975 is expected to be about 11 million acres less than in 1958, pasture and range about 12 million more, and forest and woodland about 10 million less. These projections are based on the assumption that population will increase to 210 million, requiring about 30 percent more farm output than in 1953.

The greatest net change will be in land going into urban or other nonagricultural uses. The inventory indicates that by 1975 nearly 21 million acres will go out of agricultural use. This will be

offset in part by about 5 million acres, mainly in the Western States, of new land from Federal ownership to be devoted to agriculture. Net conversion from agriculture to other uses will be 15.3 million acres, or an average of about 1 million acres a year. As population pressures increase, this trend may be expected to accelerate rather than slow down. Although the proportions of agricultural land devoted to each of the major uses are not expected to change greatly, there will be much shifting from one area to another as farmers adjust their operations to the capabilities of the land and as agriculture accommodates itself to the economic development of the country. The area of cropland will become smaller in the East and will increase slightly in the West. Pasture will increase sharply in the Southeast and decrease in the Northeast. Woodland acreage will decline in all regions except the Northeast. The total acreage involved in these changes will be much greater than the net effect on the allocation of land resources to the different uses. For example, we expect that 41 million acres of cropland will go into other uses by 1975; 30 million acres in other uses will be converted to cropland. Thus the use of 71 million acres will change, with a net reduction in cropland of 11 million acres. Shifts between other uses will also occur. Some 113 million acres, or nearly a tenth of our agricultural land, are expected to be in a different use in 1975 than they were in 1958.

These land conversions present one of the major conservation problems of the next few decades. Landowners will need reliable soil surveys and information on land capability to make wise selections of the areas to be shifted from one use to another. Each acre converted to a different use—from cropland to pasture, for example—will require the establishment of new types of vegetation or new crops and the installation of new soil and water conservation measures to protect and maintain it under the new use. The basic soils data of the inventory indicate the major conservation problems associated with the use of each class of land for agricultural purposes. Assuming the changes projected for 1975, about two-thirds of the land used for cropland, pasture, or woodland will need some kind of conservation treatment. About 270 million acres, or nearly two-thirds of the cropland, need conservation treatment and continuing attention to maintain and improve the soil. Erosion is the most prevalent problem. About 161 million acres, more than two-thirds of the cropland, still need treatment to protect them from erosion as the dominant problem. Removal, or control, of excess water is the major need on 60 million acres. Irrigation is needed on about 14 million acres. Corrective treatment for unfavorable soil conditions is needed on 36 million acres.

The acreage in non-Federal pasture and range will remain about the same or increase slightly, except possibly when a sudden need



*Three-year-old spruce transplants are planted in soybean stubble on Dennis Frandsen's farm near Rush City, Minn.*

*On Henry Shephard's farm near Alford, Mass., trees were planted on a hillside retired from crop production.*



arises to convert some arable pastureland temporarily to the production of crops. About 364 million acres, or nearly three-fourths of the non-Federal pasture and range, need conservation treatment, improvement, or protection. New stands of grass need to be established on about 72 million acres, largely land converted from other uses. Improvement of the existing vegetative cover is needed on about 107 million acres or about a third of the grazing land. The remaining 185 million acres need protection from overgrazing, fire, encroachment of brush and weeds, or other hazards. The acreage of non-Federal forest and woodland is likely to decline slightly. About 40 percent of it is on land suitable for the production of crops. Some of it will be brought into cultivation in response to mounting economic pressure.

The Timber Resources Review, conducted by the Forest Service in 1952-1955, projected a need for 83 percent more timber by the year 2000. That review also showed that the National Forests contain only 21 percent of commercial forest land. In view of the prospect of a smaller acreage of non-Federal forest and woodland, it is apparent that any increase in production of wood must come from increasing the yield of acreage devoted to this purpose. Most of the privately owned woodland needs some kind of conservation treatment or protection. About a sixth, 70 million acres, requires the establishment of new timber stands. A third, 160 million acres, needs improvement of existing stands. Protection from various hazards that threaten the timber stand itself, rather than the soil, is a major factor in conservation of woodlands. About 252 million acres need better protection from fire, 207 million acres need improved protection from insects and diseases, and 12 million acres need protection from rodents or other animals. This inventory does not include the 165 million acres on the United States mainland under the direct administration of the Forest Service.

The dual problems of water conservation—of correcting conditions of excess and shortage—will command greater attention. Withdrawals of water for agriculture, industry, and municipal use are expected to double by 1980 and triple by 2000. Although the expected total national requirement of 888 billion gallons a day in 2000 is somewhat less than the longtime average streamflow, many communities already are feeling the pinch of local water shortages. Industrial development in any area is contingent on a reliable water supply. The limit already has been reached in many places, and further development depends on making more efficient use of existing sources of water—especially in western river valleys where normal streamflow is already completely allocated under water appropriation laws.

Extension of irrigation will be important in increasing crop production to meet future food and fiber needs. In many places this

will create a demand for additional water from sources that are already too small. Much of the additional water needed for irrigation—and, in some instances, for other purposes, too—can be met by more efficient practices by present users of water. For example, it is estimated that with expected improvements in conservation technology it would be feasible to irrigate 85 percent more land in 2000 with only 2 percent more water than was used in 1954. Unimproved irrigation methods sometimes make beneficial use of no more than 25 percent of the water withdrawn, although modern conservation practices with present technology can raise that level to 70 to 75 percent. Similar improvements can be made by water conservation practices in industry. Mounting competition and economic pressures will force increasing efficiency in water use in the years ahead.

*Watershed protection on Ralph Holtung's farm near Elsberry, Mo., includes an inlet-type stabilization structure, a wildlife area, and plantings of hedges.*





The need for more intensive use of agricultural land will also make prevention of flood damages and removal of excess water of increasing importance. Facilities for water control and water supply are being provided through community projects involving Federal, State, and local cooperation, such as those authorized under the Watershed Protection and Flood Prevention Act and the Small Reclamation Projects Act. The Conservation Needs Inventory delineated approximately 13 thousand small watersheds in the United States mainland. It found that about 8,300 of these need project action to deal with water management problems that are beyond the reasonable scope of individual action. The needed projects would embrace more than a billion acres, or half the land area of the United States. The prevention of floods is the worst watershed problem. About half the watersheds need projects for reducing floodwater and sediment damages that affect more than 62.5 million acres of flood plain lands. More than 4 thousand watersheds need projects to deal with critical erosion areas totaling 23 million acres. Agricultural water management for drainage or irrigation is a problem that requires project action in about a third of the watersheds. The inventory also revealed the need for recreation facilities on 2 million acres in nearly 2 thousand watersheds. More than 800 of the watersheds need to include provisions for municipal and industrial development of water supplies. The interest and initiative shown by local organizations since the Watershed Protection and Flood Prevention Act was passed in 1954 indicate that these projects will be a big factor in the development of water resources.

In summary: The public interest necessitates conservation of soil and water irrespective of the needs for agricultural production. The growing density of industrial, commercial, and residential improvements on flood plains gives further reason to manage the water in conjunction with the soil so as to minimize water damages to the agricultural and nonagricultural economy. This, too, points the direction of soil and water conservation. Soils must be kept in place in the fields and forests; water must be "banked" in the soil or in useful ground or surface reservoirs; and streamflows must be regulated by proper land use and man-made devices. Planning for expansion in nonagricultural uses of land and water is a task for the owners and users of land and for local, State, and Federal Governments. One of the big challenges of the next century is to make wise choices between the land and water areas to be devoted to producing material goods and others committed to urban and industrial uses or preserved for esthetic and recreational purposes. With the prospect of tremendous competition for land and water, the conservation and development of resources must be given high priority in national policy in the coming century. (*Donald A. Williams, Gladwin E. Young, and Ben Osborn*)