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AMONG the land owners in this country are the Federal Government and the States. Extensive acreages are included in the public domain of the West, in the national forests with their range land, and in State-owned land. These areas are subject to erosion and to misuse just as private lands are. What are the outlines of wise policy for the conservation and best use of their soil? How and under what circumstances should public purchases of land be made in the future? These questions are considered here.

The Remedies: Policies for Public Lands

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THE PUBLIC DOMAIN

THE PUBLIC DOMAIN ² of the western United States is a paradox. It consists of land with values so low that, despite the many generous land laws of the Federal Government, it could not be sold or given away or otherwise disposed of over a period of 75 years. But despite this the public domain is of great social and economic importance to the West and hence to the entire United States. This is because its 162 million acres contain nearly 130 million acres usable for range-forage production. On this area the equivalent of no less than 1½ million horses and cattle and 6½ million sheep and goats have been grazed during recent years for an average grazing season of 7 months a year.

The public domain also makes up a substantial part of the watersheds of many of the major western streams and those of innumerable smaller ones. From these watersheds may come benefits in water supplies where scanty rainfall makes water the limiting factor in all development, or from them may come destruction and disaster in floods and silt-burdened streams.

Before suggesting ways to insure proper use of the soils of the public domain, it is logical first to inquire what the condition of these soils is now.

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²The public domain as here used includes land that was unappropriated, unreserved Federal land, exclusive of Alaska, prior to the approval of the Taylor Grazing Act.

Only about 2 percent of the usable range area, according to the best information available, is free from erosion. Of the 98 percent that is eroded—that is, over 19 acres of every 20—nearly half is severely eroded. More than one-third is contributing soil to streams at an alarming rate.

On the range, as everywhere, erosion first removes the fertile topsoil. For the range soils this means that the moisture-holding capacity and the fertility for plant production has been greatly reduced. While the great volume of erosion takes place as a relatively slow, insidious, little-recognized process, its most spectacular form occurs in floods and mud flows. And unfortunately, practically all the evidence at hand indicates that the rate of erosion has been increasing and that floods are becoming more and more destructive.

The why of this practically universal and accelerating erosion may in itself suggest the means for control.

From the earliest settlement until recently, public-domain ranges have been a no man's land open for the use and abuse of any and all who could take and hold them. All the incentives were for overuse and none was for range conservation. Long-continued overuse and mismanagement could have only one result—range depletion. And the best information available indicates that the range cover has been depleted nearly 70 percent as compared with its original or normal condition. Drought and other factors have of course contributed, but the primary cause of the depletion is overuse together with the lack of better forms of management.

Sparse though it may usually have been, the normal range cover afforded great protection to the soil from erosion, and the depletion of the cover has been the primary cause of the serious increase in erosion of the last few decades.

The obvious and, in fact, the only way to rebuild and protect the soil of the public domain is to restore the range cover. Any other means of restoration and form of control would involve expenditures so great that they would make the undertaking questionable and even though carried out would undoubtedly prove ineffective in the long run without reestablishment of a range cover.

One means to restore the range would be to give it a complete rest. But to give complete rest during rehabilitation would uproot over a period of years the long-established livestock industry. This is unthinkable because of the social and economic distress it would cause.

The alternative is the managed use of the range, which should include such things as:

1. Confining the numbers of livestock to those safely within the limits that the range can carry through the years. Even this will require some drastic readjustments.
2. The regulation of seasons of use by livestock so that the worth-while range plants can reoccupy the land.
3. Use by the class of livestock for which on specific areas the range forage is best suited.
4. Reseeding where the original cover is so far gone that it cannot replace itself naturally.
5. Fencing, water development, and other improvements and forms of management incidental to regulated or controlled use.

The opportunity for such management is afforded by the Taylor Grazing Act, probably, as experience will show, in amended form. A large-scale test on public lands extending over many years has proved that the task of putting the public domain under administration is not insurmountable.

The magnitude and the difficulties of placing the enormous area of public domain under management should not be minimized. Depletion of the range and deterioration of the basic soil have gone so far that restoration will probably require at least as many years as did depletion and deterioration to the present condition.

Climatic conditions, rarely good, may for years on end be adverse. The often exceedingly complex land-ownership pattern can probably be remedied only very slowly. Serious existing economic maladjustments cannot be corrected overnight, and in fact may require years. Changes in the form of range use must necessarily take into account and ramify all through other interrelated forms of agriculture. Long-range planning that takes all agriculture into account must try to prevent a repetition of a long series of past mistakes in both public policy and private action. Some social hardships will undoubtedly result from the social readjustments that will necessarily follow the substitution of ordered management for indiscriminate use. A more or less radical psychological change among range users will be necessary. Although ample for great improvement, the scientific basis for sound range management and soil use exists as yet only in part.

But all of these things are merely indications of the price that must be paid for the disregard of nature's laws over half a century or more. Unless the price is paid a substantial part of the public domain area will become a desert, in fact if not in name, and will be incapable of any service whatever to human life and welfare.

THE NATIONAL FORESTS

In the administration of the forest reserves [called national forests since March 4, 1907] it must be clearly borne in mind that all land is to be devoted to its most productive use for the permanent good of the whole people, and not for the temporary benefit of individuals or companies. . . . where conflicting interests must be reconciled, the question will always be decided from the standpoint of the greatest good for the greatest number in the long run.

This policy, adopted on February 1, 1905, by the Secretary of Agriculture, guides the use and development of 175,000,000 acres of forest and range land in the national forests. It remains today the soundest policy of soil use yet formulated, broad in concept, simple and direct in language, flexible, creative, and permanent in concept.

But these very qualities raise problems of relationship, of methods and technique, of priorities, of time and trends, of human values, of social and economic interaction. To the extent that these problems are correctly solved and the solutions applied in administration of the resources, the objectives of the policy will be met.

To carry out the policy adequately requires (1) factual knowledge and (2) wisdom in the application of that knowledge. Two broad classes of problems are presented, one involving the what, how, and why of biological, pedological, social, and economic phenomena, and the other involving the application of the solutions obtained for the first.

Technique of Soil Use and Vegetation Management

The national forests were established primarily to furnish supplies of wood for the Nation and to control stream flow. When the first national forests were set aside in the West, range land interspersed with forest was included to round out administrative units. Recently, eastern submarginal farm land in need of reforestation has been acquired. Areas suited to permanent agriculture have been avoided. Soil use, therefore, is limited to natural vegetation—trees, brush, and wild forage plants. Climatic factors largely dictate the choice between these three for any given locality.

The extent of the national forests and the low-unit value of the timber and forage produced preclude intensive cultivation and care. Management methods, to be useful, must simulate natural processes, maintain natural conditions, be comparatively inexpensive, and be applicable over large areas; to be safe, they must be based on fundamental relations and reactions of soil, plants, animals, and climate.

Forest Lands

All of the major soil groups representative of the humid regions of the country are found on the national forests. Moreover, practically all of the 500 species of trees native to the United States are present in different associations or types of forest. The number of situations available for study is further increased by gradations in condition of the forest cover due to past treatment. Altogether, there are probably hundreds of combinations of soil, forest type, and condition that merit study.

European investigators have done much to clarify concepts of forest soils and to provide a satisfactory basis for classifying them. Good and bad conditions have been pointed out and some advance has been made in explaining the course of development or deterioration associated with different forest types. There is need, however, to extend much of this work to cover climatic and forest conditions of importance in this country but not represented in Europe. The studies should be extended also to yield more satisfactory answers as to cause and effect in the relationships recognized.

In this direction, more intensive study of the flora and fauna of the litter and soil should be fruitful. Exploratory work indicates that fungi, bacteria, protozoa, and minute animals are present in tremendous numbers, that they conserve vital elements of fertility, contribute to soil porosity, are indispensable in maintaining the supply of colloidal organic matter in the soil, and that different species probably have specialized environmental requirements.

At present, studies in the fauna of forest soils are still in the stage where taxonomy and classification of the organisms are incomplete. Functional relationships of the species and genera are largely a matter of surmise, and the technique of extracting the smaller, near-microscopic forms from the soil is still a matter of dispute among the half dozen or so workers in the field. Requirements and tolerances of the species and their reactions to major environmental changes are matters of conjecture.

A clear understanding of the role of the soil and litter organisms might go far toward indicating the way in which silviculture can con-

tribute to soil improvement through control of density and composition of the stand. The evidence is fairly clear now that certain species of trees are soil improvers and that mixed stands are also beneficial. The causal relations involved are less well understood.

The degree of success attained in reforestation will depend in large part on the accuracy with which the fertility level of the soil is judged. Tree species, like other plants, are known to have different fertility requirements, both for survival and for maximum growth rate. There is urgent need to determine the minimum and optimum fertility and moisture levels for the more important tree species, and it is equally important to devise simple, reliable indices for both fertility and moisture conditions of soils now barren or with herbaceous or shrub cover.

Many difficulties have arisen in reforestation programs because soil has not been adequately considered. Thus there have been costly efforts to remedy mistakes; in a few cases established nurseries have had to be abandoned because the soil was not suited to the species.

The part that soils play in the success or failure of planting programs has not been adequately recognized. The fact that climatic conditions make a region suitable for the growth of a valuable species or that a given type of forest once grew in a given locality is not a sound reason for believing that such species or types would generally succeed. Efforts to plant walnuts and other valuable hardwoods on eroded sub-marginal lands signally failed until it was realized that the soil had changed materially since the land was first cleared. The problem of eroded land is closely linked with that of heavily burned lands. Thus efforts are being made to plant trees on the sand plains of Michigan, which were once covered with magnificent white pine but now, after repeated fires, carry only scattered scrub oak. The aim is to restore the original forest of white pine in a single generation, but research is needed to determine whether the fires have resulted in such soil depletion that soil building under inferior species is necessary before the more valuable species can succeed.

European foresters have gone to considerable lengths to fertilize poor soils and thereby to increase forest yields. It is believed that under American conditions such practices are not needed, but so little information is available as to the requirements of American forest trees that it is impossible to foretell what may be done. In the prairie and plains region especially the problem of growing trees is so closely related to soil conditions and species requirements that until considerable research has been conducted the degree of ultimate success will be constantly in doubt.

Problems equally great face the forester in his silvicultural operations. In efforts now being made to maintain forest types in a static condition on a basis of reproduction alone, soil type or changes in the soil due to cuttings are not being considered. Notable failures have occurred for no apparent reason but with indications that soil might have been the important factor. Soil deterioration takes place even under forest, and investigations are needed to determine what species will aid in building up the soil and in preventing the formation of raw humus or podsol.

Range Land

In general, knowledge of the soils of the range lands is deficient along the same lines as knowledge of forest soils. In the broad sense, on range as well as in forest, sound soil use must be based on results of studies not only of the soil itself and its relations to the plant cover, but of the growth habits, physiology, requirements, and responses to treatment of the plants. Without this fundamental background, range management, as well as silviculture, is likely to involve a larger measure of art than of science.

In one respect, correct use of range forage plants, and hence of soil, is more difficult to achieve than the correct use of timber species. Forage crops are harvested by domestic or game animals and a technique for control of this use is necessary. Here again fundamental studies seemingly independent of the soil are required—studies of the life history, behavior, nutrition, food preferences, habitat requirements, etc., of animals.

On the range lands within the national forests, efforts have been made to reduce the numbers of livestock down to a point where overgrazing ceases. On many areas badly depleted and eroding, such negative action is not enough. Positive action must take its place. Reseeding the ranges to desirable grasses is therefore a prime consideration and is essential on some 13½ percent of the entire national-forest range. The question arises of what species to use, and as in the case of forest planting, there is need for information on the suitability of plants to soil type and soil fertility. Although reseeding programs are not as extensive as in the case of forest planting and reseeding on a large scale has not yet been attempted, failures and successes emphasize the necessity for investigations that take soil definitely into account. The great diversity in the soils of the semiarid regions, the extent to which alkali is present, and the degree to which soils of the western ranges have been eroded all combine to make soil an all-important consideration in range-management operations. On many sites attempts at revegetation with native species have failed, indicating the need for more drought-resistant strains, species, or hybrids of forage plants.

Water Control

Improvement of stream flow and yield of usable water is a major objective of national-forest management, yet quantitative data on the magnitude of the influence exerted by forest and range cover are meager. There are strong indications that soil conditions associated with full stands of climax vegetative types are also associated with highest infiltration of water and greatest soil stability. There is urgent need, however, to evaluate the effect on water yield of different treatments of the cover, of transpiration losses, and of temporary cover types. The effect of cover can seldom be dissociated from soil porosity, structure, fertility, humus content, and moisture relations. Fundamental studies of soil conditions are therefore essential to the proper management of the 160 or more million acres of watershed lands in the national forests that provide water for hundreds of communities and millions of acres of irrigated lands throughout the country.

Limitations to Application of Improved Technique

Timber and range management on the national forests are carried on within a framework of legal, fiscal, economic, and areal limitations and social objectives that determine the feasibility of measures to improve either the soil or its use. The more important problems of administration and local policy arise in connection with the application of biological principles within this framework.

As an example, recognition of widespread maladjustment in use of agricultural soil has led in the East to the acquisition of considerable areas of submarginal farm land. The areas doubtless should eventually be reforested, but many of the farms are occupied when acquired and the resettlement and rehabilitation of the residents constitutes a social problem. Its solution must integrate such widely divergent factors as the opportunities for part-time employment created by the national-forest purchase and development program; the condition of the soil and the possibility of continuing it in agriculture, either with or without measures for erosion control and soil rehabilitation; the income to be expected from agricultural use; the quantity of agricultural soil locally available; cost of maintaining governmental and social functions and facilities; and the presence of agricultural soil elsewhere to which the population can move.

Under existing regulations, the national forests have had to depend primarily on timber sales for silvicultural treatment of stands. The consequences of different treatments in terms of trees and soil had to be weighed against cost of logging, markets and prices, labor supply and wages, and requirements of local populations. Until the advent of the Civilian Conservation Corps, every operation had to be not only desirable silviculturally, but profitable to the timber purchaser as well.

Trends entirely separate from soil use may cause radical changes in silviculture. For example: In the White Mountains, removal of overmature, decadent, unmerchantable hardwoods to make room for thrifty young growth is good silviculture and can be done cheaply by girdling. The unsightly snags remaining, however, detract seriously from the recreational value of the area, and recent increases in recreational use justify modification of the silvicultural practice. Similar situations are likely to develop in the future, particularly in the eastern national forests.

Elsewhere, serious objection is being raised to the planting of solid blocks of coniferous species because of the poor environment for game that results. Discontinuous plantations, mixtures of species, and, occasionally, relinquishment of large areas to brush and weeds are indicated as desirable. Soil use, therefore, may depend on the proximity of heavy populations, the amount of leisure they have, and the demand for particular types of recreation.

In the tension zones between forest and grassland, analysis of the use situation must be more thorough than for either type of vegetation alone. The trend of succession of plant associations is subject to some control through cutting, grazing, and fire. The type of vegetation to be favored can be selected in the light of soil use and con-

dition on adjacent land, and the local and regional social and economic structure.

When the national forests were established, the carrying capacity of the range included had been reduced to little more than half that of its virgin condition. It has improved since, but is still 30 percent below potential productivity. Recovery could be hastened by reducing the number of livestock grazed, but heavy reduction would place an extra burden on an already sorely pressed industry. In many instances, reduction of present numbers would bring the size of the herds and flocks below the minimum economic limit. The stock, moreover, spends only the summer on the national-forest lands. For the most part, the spring, fall, and winter range is not under Forest Service control and is overgrazed. The demand for increases in number of livestock on the forests is constant, to accommodate the increased numbers put on adjacent ranges during periods or cycles of good rainfall, and to relieve pressure on this same area in dry periods.

The range should be stocked conservatively enough to avoid injury from droughts of short duration which may be expected to occur frequently. More severe droughts may require further reductions in numbers of livestock to prevent serious depletion. As numbers of livestock on the national forests are reduced, there is often increased use of outside ranges and accelerated abuse of the land. How to attain the desirable stocking on national-forest ranges without causing more severe depletion of adjacent ranges is a problem for which a satisfactory answer has not been found.

The increasing public demand for hunting and other recreation has affected range use as well as silviculture. Its influence on use of range land has been chiefly in the direction of reduction of livestock numbers to share forage with game and setting aside areas for the exclusive use of game species. There is a natural tendency among range users to direct the establishment of refuges and preserves toward the inaccessible and less favorable areas. To follow such a policy, however, tends to defeat the very purpose of game management by making hunting unavailable to a large portion of the population. Trends in hunting demand should be carefully studied to provide a sound basis for modification of range use in the future.

No clearly defined changes in present vegetative cover types are needed to increase the yield of usable water from national-forest areas. Pending the outcome of detailed studies of forest and range influences, therefore, effort should be directed toward increasing the density of existing cover and soil porosity.

The distribution and use of water, particularly in the West, is governed and controlled by very complex laws and rights with which the national forests are not concerned. Insofar as the use of water, particularly for irrigation, is involved, however, it is an element in the problems of national-forest soil use. Expansion of irrigation on land adjoining the forests may create new demands for grazing use as well as new markets for timber products, increase demand for recreational use of the forests, and attract additional dependent population. Existing timber- and range-management plans must be scrutinized in the light of the new situation.

How the Problems Can Be Solved

The body of factual knowledge upon which national-forest soil use should be based can be acquired in two ways—by carrying on studies through the Forest Service research branch, or by depending on piecemeal contributions from workers in other agencies. Much valuable information has already been contributed by outside workers, but progress in the solution of national-forest soil problems is slow and uncertain.

Intensive research on forest soils could easily employ a very considerable corps of workers, for only exploratory phases have been dealt with. Viewing expansion of Forest Service research realistically, however, it is unlikely that proposals for more than two or three soils men in each major forest region could be justified. Such a staff could be adequately financed for one-tenth of a cent per year per acre of national forests. The directed effort of this group when coordinated with the soils studies of other agencies could provide the basic data needed for rational and effective soil-use planning within a reasonable period. Concurrent studies in silviculture, forest and range management, utilization, economics, and forest and range influences are already under way at the regional forest experiment stations. The close tie between research and administration of the national forests, moreover, facilitates the adoption of improved practices as developed.

The function of the Forest Service as a land-use planning agency has long been recognized. Its organization includes divisions dealing with various land uses such as timber management, range management, recreation, wildlife management, and research, and definite provision for adequate coordination and integration of use. Supervisors of the individual forests are responsible for the solution of local problems of integration, regional foresters for State and regional ones, and the Bureau chief for those of national scope. The mechanism for close cooperation with other land-use planning agencies and with other bureaus of the Department of Agriculture interested in soil use is thus provided. What is needed, therefore, is intensification of cooperation rather than new methods or organization.

MANAGEMENT OF STATE-OWNED LANDS ³

States are landowners because of original ownership, as in the case of the 13 colonies or Texas, or because of direct grants from the Federal Government. Land was donated to the States to be sold for the benefit of schools, colleges, and universities, for internal improvements, and for drainage of swamp lands. In most cases the land so granted lay within the boundaries of the State, but in other cases where no Federal lands existed within the State, scrip was issued which the State could locate anywhere on the public domain or sell to individuals. The area granted to States is approximately 221 million acres plus about 8 million acres of scrip land.

The purpose of these grants was not to make a landowner out of the State, but to give the new commonwealth a source of revenue. Some of the land was sold very cheaply, for States with a sparse population

³ The following publications are cited in connection with this subject: (92, 181, 255, 436, 444).⁴

⁴ Italic numbers in parentheses refer to Literature Cited, p. 1181.

and a meager tax base were hungry for revenue and used their lands as a means of attracting settlers. However, in some cases the Federal Government prescribed a minimum price below which lands could not be sold. This price ranged from \$3 to \$25 per acre, with \$10 the usual amount, but in many cases it proved to be too high. Because of this and the stipulation that the land must be sold, which prevented the granting of land free under a homestead or similar policy, many States still owned enormous areas.

The administration, or rather the sale, of the donated lands has been entrusted to various offices or commissions by the States, some of them designated by the constitution. Except where minimum prices were excessive, the lands of agricultural value have been sold long ago, and these organizations are still holding the remainder for sale though the more reasonable thing to do would be to turn it over to the State for forestry or recreation, its best use. However, legal and constitutional provisions stand in the way of surrender or sale to another State department.

A new form of publicly owned land is the property reverting for taxes. This "new public domain" becomes State property in 19 States, county property in 23, and in the six New England States it reverts to the towns. There is no accurate record of the area owned by these units of government because of tax delinquency, but it probably amounts to 50 million acres. In addition to the area actually in public ownership there are many millions of acres delinquent long enough so that the State, county, or town could take title, but they refuse or hesitate to do so. Even though no taxes have been paid for many years, there is always the hope that someone will buy the outstanding certificates or the owner will redeem his property and restore the land to the tax roll. Apparently there is still a deep-seated feeling that there is something unnatural about the public ownership of land, particularly land which some private owner has lost. Every effort has been made in the tax laws to make redemption easy and the taking of title by the public difficult. Another reason for the reluctance to take title is the fact that property taxes are the chief sources of revenue for local governments, and public ownership of any kind permanently removes the land from the tax roll. This is overcome in part by granting some form of State subsidy in lieu of the former taxes whenever the State becomes the owner of the land.

However, public ownership of certain types of land is inevitable. Where prices have been reasonable all of the better agricultural land granted to the States has become private property, leaving the sub-marginal soil areas in the possession of the States. Land found by private owners to be unsuitable for farming, forestry, or private recreation finally reverts to public ownership because the owners do not, or cannot, pay the taxes even in States with the tax rate limited by law. The time has come when public bodies must expect to own land and administer large tracts of land unsuited to private ownership.

Before the question of proper administration can be considered it is important that the State or county obtain a valid title to tax-reverted land. This is still a moot question in most States, because tax laws are still so drawn that the owner retains rights of repossession for many years after he has ceased to pay taxes. Michigan is one of the few

States which have fixed a definite time beyond which the State's title becomes absolute. Six months after the deed is made to the State and recorded in the county where the land is situated, the title to the land becomes absolute and no suit or proceeding to set aside, vacate, or annul the deed can be instituted. New York also has set a fixed date after which the State's title cannot be contested.

Even though the property rights of private individuals are cancelled, there is still the claim of the other units of government to the same land, insofar as taxes due to them have not been paid. In Wisconsin this problem does not arise because the county bears the entire burden of tax delinquency and the property reverts exclusively to the county with no claims of the State, towns, or schools against the land except when the county sells it. In Michigan, tax-delinquent lands revert to the State, and the interests of the local units of government are extinguished by the payment of 25 cents an acre to the county, township, and school district in which the reverted lands lie. This holds for all lands definitely reserved for State administration for parks, public hunting grounds, forests, etc., but the money received from the sale of tax-reverted land is deposited in the State treasury to the credit of the respective taxing units in proportion to their tax equities in the land sold.

After the lands are securely in the hands of the county or State, a definite policy of administration is imperative. Michigan tried a program of getting the land back on the tax roll by a homestead policy similar to that of the United States, but much of the homesteaded land came back via the tax-delinquency route. Submarginal land is submarginal even if given away. The homestead plan was repealed in 1935. Millions of acres were also sold, which induced extensive speculation, but sale was not mandatory and gradually a policy of reserving riparian and other land for forests, public game preserves, and parks has replaced wholesale disposal. Land reserved for conservation uses is deeded to the director of conservation. New York also has placed tax-reverted lands under adequate administration as forests and parks, but in recent years has acquired practically all of its forest and recreational lands by direct purchase.

Because the best use for tax-reverted land is for forests and recreation, requiring, as a rule, large areas, administrative talent, and costs beyond the means of small units of government, it is generally considered the best policy to have lands revert to the State rather than to the county or town. If the arguments for this are valid, drastic changes will have to be made in the legal set-up of some 29 States. On the other hand, Wisconsin has started on a program of zoning the land of the problem areas through county ordinances and administering tax-reverted lands through county action. Counties can take tax title after 5 years of delinquency, block up the lands into county forests by exchange with private landowners or public agencies, and enter the land capable of forest development under the forest crop law. County forest land approved by the State conservation department assures a distribution of 10 cents an acre to local units of government (40 percent to towns, 40 percent to school districts, and 20 percent to the county) and an additional 10 cents an acre to the county directly for forest administration. Forestry work is done in

close cooperation with the State conservation department. The State is to receive 50 percent of the stumpage value when the timber is harvested. Zoning by merely prohibiting agriculture and allowing forestry in restricted districts is negative, but the forest crop law actively stimulates the development of both private and county forests in the areas set aside for this land use. In September 1937 there were 156,000 acres of privately owned land and 1,700,000 acres of county-owned land entered under the forest crop law in Wisconsin, and over 5,000,000 acres closed to agriculture by rural zoning ordinances in 24 northern and central counties.

Proper State administration requires that the land be placed under the jurisdiction of a capable branch of the State government, such as the usual conservation department, with power to dispose and administer all State-owned lands. Price limitations should be removed so that land capable of private ownership can be placed in such ownership. On the other hand, there is nothing to prevent States from adopting the leasehold and leasing land to individuals or corporations. This is preferable in oil and mineral lands, certain types of recreational land, and grazing land. Where public and private holdings are intermingled, administration can be facilitated by exchanges, and the State should cooperate with public and private owners in such worthy enterprises as grazing districts. For purposes of proper administration the "donated land" now under the jurisdiction of various commissions, etc., should be turned over to the conservation department to be blocked up with other land for various uses. If direct transfer is not desired, the land may be sold to the administering agency at a reasonable price and the money placed in the school fund.

When land comes to the administrative body through tax delinquency it should be classified either through a general economic land survey of the entire problem area or parcel by parcel as the title of the State becomes complete. Tax-reverted land, however, may range from city lots or platted lots on lake shores to farms and cut-over areas. Those parcels situated in organized municipalities can either be sold or perhaps turned over to the city or village for administration with payment to the State to extinguish the State's interest in the property. Some of the lands not in municipalities may be sold, but the remainder should be deeded to the administering body upon classification. One difficulty is the scattered nature of tax-reverted land, with parcels too small for forests or parks and difficult to administer. This calls for exchanges with public and private owners or sale. Sometimes a piece of tree-covered land can be sold to a farmer for a wood lot. Once blocked up, the area should be dedicated to the most efficient use and expenditures for administration and maintenance gaged accordingly. The final step, and by no means the easiest, is the reorganization and readjustment of local governments to meet the new situation.

PUBLIC PURCHASE OF LAND

In recent years the purchase of land by public agencies has come to be regarded as an effective means for correcting maladjustments in land use. It is only one means, however, and the question arises as to the nature and extent of the contribution that a program of public

acquisition of land might reasonably be expected to make to the solution of our national land-utilization problems, including the restoration and conservation of soil and the rehabilitation of rural families. Measures of the kind enumerated in this and the following articles should be fully utilized, and their availability should be one of the first considerations in delimiting the scope and character of a public acquisition program.

Starting from the premise that public purchase should be utilized to effectuate adjustments in and control of land use only to the extent that alternative measures cannot be effectively utilized, the problem remains as to what further limitation can be made in the conditions under which public purchase of land may be regarded as a desirable procedure.

Perhaps an answer to this question may best be sought by an examination of the scope and character of the Federal purchase program initiated in 1934 by the Land Policy Section of the Agricultural Adjustment Administration, which involved the establishment of 98 agricultural land-use adjustment projects.

Seventeen of these projects are located in the northeastern part of the United States and in Ohio and Indiana. Within the area embraced by these projects approximately 278,000 acres will be acquired. These areas, although different in many respects, present in common a history of occupation and gradual abandonment extending over a considerable period. Rough topography, poor soil, and shifts in type of agriculture have contributed to this abandonment. Within these areas are stranded families, and into these areas, in periods of depression, families in distress naturally gravitate, thus tending to reestablish or perpetuate conditions that contribute to the deterioration of the lands and the families that occupy them. At the same time, these isolated families place upon the general community an unnecessary burden of public cost for the maintenance of roads, schools, and other public facilities and services.

The question presented by areas of this type is the extent to which the public purchase of land may be effectively utilized to bring about desirable adjustments. Attention has already been called to the principle that public acquisition should be supplemented by corollary programs if the best results are to be achieved. For example, unless the establishment of a national forest, a national park, a national game refuge, or some other special objective is involved, it may well be questioned whether it is desirable for the Federal Government to undertake extensive purchases of abandoned and semiabandoned lands of the type under consideration, particularly with a view to blocking in large areas. As an alternative, a program of Federal acquisition might be inaugurated involving the acquisition of occupied holdings, primarily those occupied by destitute or isolated families, with a view to assisting in the reorientation of the population and the conversion of the lands involved either to a less intensive type of agriculture or to appropriate nonagricultural use or uses. The feasibility of such a program would obviously rest largely upon the extent to which it is supplemented by a State zoning program under which, with proper limitations, all lands within the area would be reserved for the particular type of use for which they are adapted, excluding

such lands from occupancy for other purposes. Equally essential is the recognition of the importance of a parallel program to effect the relocation and rehabilitation of families displaced by Federal purchase of the lands they occupy. Thus there emerges a threefold program embracing public purchase and conversion of lands to uses for which they are best adapted, State or county zoning of lands against occupancy for uses for which they are physically and economically unadapted, and the relocation and rehabilitation of the population involved.

Eighteen of the agricultural land-use adjustment projects, involving the purchase of approximately 1,357,000 acres, are located in the cut-over regions of the Lakes States and in Florida, Washington, and Oregon. Farm and squatter families are thinly dispersed over these second-growth, cut-over, and burned-over areas. These families occupy the more level lands and remote spots along the streams in the hilly sections, which give deceptive promise of fertility and adaptability to cultivation. The soils are generally poor. The isolation of the families and the poverty of the soil reproduce the familiar conditions—low family income and correspondingly low standards of living, and inadequate public facilities and services combined with high costs of the services provided.

In the projects located in the Lakes States and in the Northwest, it has been possible to acquire tracts occupied by families in relatively small acreages, since the adjacent lands are generally in Federal or State ownership. Thus it has been possible to bring under public control large areas of land unsuited to agricultural use merely by acquiring the lands necessary to permit relocation and rehabilitation of isolated families. In Florida, on the other hand, most of the land is in private ownership. In the absence of a zoning program in that State, it has been necessary to buy a considerably larger proportion of unoccupied land than has been the case with projects located in the other areas. This situation invites consideration of the desirability of requiring States to enact zoning and other types of appropriate legislation as a condition prerequisite to the establishment of Federal purchase projects for the purpose of effecting adjustments in the use of land for agricultural purposes.

East of the Great Plains States there are 40 additional agricultural land-use adjustment projects, including projects established in eastern Oklahoma and Texas. These involve the purchase of approximately 1,147,000 acres. Sheet and gully erosion, consequent upon improper farm practices or the cultivation of lands either too steep or too dry for the production of cultivated crops, is characteristic of the lands embraced by these projects. Generally speaking, housing and sanitary conditions are poor and social and public facilities are inadequate. Family incomes are low. The family diet often falls below the minimum requirements of dietary adequacy. The population in these areas is relatively denser than in areas previously discussed. Consequently, adjustments to effect the conservation of the land and the relocation and rehabilitation of the population are more difficult to achieve.

It is entirely possible that a program of farm reorganization effectuated through the purchase and lease of the lands necessary for the

establishment of farms of appropriate size may represent the best approach to the solution of problems presented in areas of this type. It is not essential to such a program that lands be acquired by the Federal Government for lease to farm operators. If the adjustment program is properly planned, it might well be effectuated by providing long-term credit on terms which would permit individual operators to acquire the lands necessary for the efficient organization and operation of their farms. Essential to any such program, whether effectuated through Federal purchase and lease or through Federal credit extended to individuals, is a Federal program for the relocation and rehabilitation of families displaced from the area. The carrying out of such a program of relocation and rehabilitation will obviously involve the use of Federal funds, either for the direct purchase of the lands required or for the extension of the necessary credit to the displaced families.

In the Great Plains States and in States west of the Great Plains, excluding Washington and Oregon, there are 23 land-use adjustment projects in which approximately 4,013,000 acres are being acquired. These projects are located in areas of insufficient rainfall. Conservation of water and its proper distribution are primary requirements of these lands. A basic problem of land-use adjustment is the need of bringing the use of range land for grazing under adequate control with a view to adjusting use to carrying capacity under present conditions of range depletion. In some areas the situation is so critical as to present the alternative of continuing the livestock industry on a reduced scale or completely depleting the range, with consequent destruction of the cattle and sheep industry. In such areas it has proved possible, through these projects, to carry out a program for the control of the range that involves a minimum of Federal purchase. Such a program is facilitated through the integration of the Federal purchase program with the program for the utilization of the public domain. Private lands, interspersed with Federal lands, may then be brought under control by encouraging the leasing of privately owned and State-owned lands by cooperative grazing associations. These associations, in turn, secure the use of Federal lands by agreeing to sound principles of range management and utilization under a program of conservation supervised and controlled through the Federal and State Governments.

The projects described above and the problems of adjustment involved suggest the major principles upon which a Federal program of purchase should be based:

(1) The purchase of land should be projected as a long-time program.

Both the magnitude of the problems and the character of the adjustments involved require a program extending over a period of years. The magnitude of the program is illustrated by the fact that there are 454,000 farms that should be retired from arable farming, according to a report of the National Resources Board (*433, p. 181*). These farms comprise 75,000,000 acres. The retirement of land from arable farming involves detailed and careful planning in order to effect adjustments in the pattern of land use that will, in fact, improve the economy of the area. Changes in the pattern of land occupancy, the organization of farms that are not retired, the location of roads, the distribution of schools, adjustments in the tax base, and so on, must be worked out as a basis of the

purchase program. The adjustments to be effectuated by public purchase must be integrated, moreover, with the adjustments in use and management of other lands already in public ownership, and of lands remaining in private ownership.

(2) The purchase program should be directed to the correction of maladjustments in the use of land for agricultural purposes, including grazing.

The program should be restricted largely to the purchase of land employed in agriculture and occupied at the time the land is acquired. The purchase of intervening or adjoining tracts not falling within these categories should be held to a minimum. Such tracts should be acquired only when their purchase will definitely facilitate the efficient operation and conservation of the area as a whole.

Tracts should not be acquired simply because they are "submarginal for agricultural use" or "not primarily suitable for cultivation." For example, forest, cut-over, and swamp lands, and lands of a similar type, would not generally fall within the scope of the purchase program.

(3) The purchase program to effectuate agricultural land-use adjustments should be differentiated from other programs involving the public acquisition of land.

There are various public benefits to be attained by the acquisition of land for specific purposes, such as forest, recreational areas, game refuges, parkways, etc. Programs of purchase directed to these specific ends, while amply justified from the standpoint of public welfare, should be clearly differentiated from a program designed to correct maladjustments in the use of land for agricultural purposes.

(4) The Federal program of purchase to effect adjustments in the use of land for agricultural purposes should be closely integrated with other Federal and State programs of land conservation.

As has been pointed out, there are numerous spheres of action within which reliance must be placed upon the States to effectuate desirable adjustments in the use of land. Passage of enabling legislation for the establishment of cooperative grazing associations and zoning of lands against uses for which they are unadapted are illustrative of lines along which a Federal purchase program should be integrated with State programs.

At the same time, the agricultural adjustment purchase program should obviously be integrated with Federal programs for flood control, for erosion control, and for the regulation or control of agricultural surpluses.

Within and adjacent to national forests, also, the purchase of occupied land in connection with an agricultural adjustment purchase program should provide a basis for integrating the national-forest program with the agricultural adjustment program, particularly in those areas in which there exists an intermediate zone between forestry and farming that provides a basis for the development of a farm-forest economy for the area.

(5) The purchase program should not include the acquisition of land for the purpose of blocking up large areas merely to secure organized control of the land.

By integrating the Federal purchase program with related Federal and State programs of conservation, securing the enactment of appropriate State legislation, and encouraging the adoption of appropriate credit policies on the part of Federal and State agencies, desirable regulation of land use may be effected without resort to the procedure of blocking up large areas in Federal ownership.

(6) The purchase program should be supplemented by a program for the development of lands acquired.

The development undertaken should be with specific reference to the plan of management and use of the lands and to the specific requirements of the agency undertaking their administration. Expenditures for development prior to the assignment of projects to an agency for continuing administration should be

restricted to improvements of a relatively permanent nature as distinguished from expenditures for operation or maintenance.

(7) The program of purchase should be supplemented by a program for the relocation and rehabilitation of displaced families.

A program directed primarily to the acquisition of lands in agricultural use and occupied at the time of purchase will encounter almost insurmountable obstacles unless supplemented by a program to give guidance and assistance in the relocation and rehabilitation of the families occupying the lands acquired.

(8) In areas not primarily employed in agriculture, including grazing, Federal purchase of scattered tracts utilized for agricultural purposes should be undertaken only when the lands not acquired are wholly of a physical character that would exclude them from any reasonable probability of settlement or where the lands not acquired are subject to control by other agencies or measures.

Under title III of the Bankhead-Jones Farm Tenant Act, passed by the first session of the Seventy-fifth Congress, and approved by the President July 22, 1937, provision is made for a program for the retirement of submarginal land. This program provides a basis for effecting adjustments in the use of land for agricultural purposes in conformity with the principles outlined above. Under title III of the act the Secretary of Agriculture—

is authorized and directed to develop a program of land conservation and land utilization, including the retirement of lands which are submarginal or not primarily suitable for cultivation, in order thereby to correct maladjustments in land use, and thus assist in controlling soil erosion, reforestation, preserving natural resources, mitigating floods, preventing impairment of dams and reservoirs, conserving surface and subsurface moisture, protecting the watersheds of navigable streams, and protecting the public lands, health, safety, and welfare.

To carry out the provisions of title III there is authorized to be appropriated "not to exceed \$10,000,000 for the fiscal year ending June 30, 1938, and not to exceed \$20,000,000 for each of the two fiscal years thereafter." Under this program projects have been established involving the acquisition of approximately 1,600,000 acres of land during the fiscal year ended June 30, 1938. These purchases are confined to the Great Plains region where problems of land conservation and conditions of distress among the dependent population are especially critical because of recurrent drought in the affected areas. Purchases in the Great Plains region are to be supplemented during the fiscal year 1938 by the acquisition of a limited number of tracts, essential for the efficient use and administration of lands already acquired in the projects previously established under the program inaugurated by the Land Policy Section of the Agricultural Adjustment Administration in 1934.

The foregoing principles have been outlined with reference to a program of Federal acquisition. Because of the broad geographic character and complexity of a purchase program designed to effect adjustments in the use of land for agricultural purposes, it is believed that State programs of purchase will, of necessity, be too limited in scope to meet the problems involved. On the other hand, as has been pointed out, there is a broad field of State action that is essential to effecting and perpetuating the adjustments sought through Federal purchase. The success of a Federal purchase program is, therefore,

contingent upon the cooperation and collaboration of the State in which the purchase program is carried out. State purchase programs are likely to achieve their most effective results through the acquisition of land for specific uses such as game refuges, forests, and recreational areas. The development of strong conservational agencies within the various States should also contribute to the effective administration of lands acquired by the Federal Government that may subsequently be transferred to the States for administration.