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MALADJUSTMENTS IN LAND USE IN THE UNITED STATES

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PART VI OF THE SUPPLEMENTARY REPORT OF THE LAND PLANNING COMMITTEE TO THE NATIONAL RESOURCES BOARD

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SUPPLEMENTARY REPORT OF THE LAND PLANNING COMMITTEE TO THE NATIONAL RESOURCES BOARD

Published in eleven separate parts

PART I. General Conditions and Tendencies Influencing the Nation's Land Requirements

PART II. Agricultural Exports in Relation to Land Policy

PART III. Agricultural Land Requirements and Available Resources

PART IV. Land Available for Agriculture Through Reclamation

PART V. The Problem of Soil Erosion

PART VI. Maladjustments in Land Use

PART VII. Certain Aspects of Land Problems and Government Land Policies

PART VIII. Forest Land Resources, Requirements, Problems, and Policy

PART IX. Planning for Wildlife in the United States

PART X. Indian Land Tenure, Economic Status, and Population Trends

PART XI. Recreational Use of Land in the United States

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MALADJUSTMENTS IN LAND USE IN THE UNITED STATES

PART VI OF THE REPORT ON LAND PLANNING

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THIS PART WAS PREPARED BY THE LAND POLICY SECTION, AGRICULTURAL ADJUSTMENT ADMINISTRATION;
THE BUREAU OF AGRICULTURAL ECONOMICS AND THE WEATHER BUREAU,
DEPARTMENT OF AGRICULTURE

FOR THE
LAND PLANNING COMMITTEE OF THE NATIONAL RESOURCES BOARD

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*The National Resources Board assumes no responsibility for the views
and opinions expressed herein*

P R E F A C E

On November 28, 1934, the National Resources Board submitted to the President, in accordance with an Executive order, its report on National Planning and Public Works in Relation to Natural Resources and Including Land Use and Water Resources. Part II of that report was the Report of the Land Planning Committee. In the course of preparing part II of the above report a large volume of basic data and information was collected which could not then be included. The publication of the present report is for the purpose of making such data and information available to interested persons and organizations.

The present land report has been organized into 11 parts according to subject matter and the contributing agencies. These 11 parts are made available as 11 separate publications. Organization and publication on this basis was done because many persons and agencies are interested only in certain parts of the present report, and the necessity of purchasing the whole report in order to obtain the desired part or parts is thereby eliminated.

The present land report, when conceived as a whole, does not purport to be a complete work on the subject of land utilization, or of its related problems and proposed lines of action; neither is it designed to be a thoroughly integrated piece of work. The primary aim here has been to set forth the facts, analyses, and the recommended lines of action as developed by each of the various contributing governmental bureaus, divisions, sections, or individuals, on the problems with which each of such agencies or persons is concerned. The points of view are, therefore, those of the contributing agencies or individuals themselves. The Land Planning Committee presents the report as

information, but assumes no responsibility for the opinions expressed in it.

This report was prepared under the direction of Dr. L. C. Gray, director of the Land Section of the National Resources Board, aided by John B. Bennett, who served as administrative assistant and as secretary to the Land Planning Committee. Editing and preparation of the report for publication were under the direction of Mr. H. H. Erdmann, agricultural economist of the Land Section, National Resources Board.

Authorship by agencies and individuals is acknowledged in their respective contributions. The following governmental agencies have contributed to the whole report: The Geological Survey, the Division of Grazing Control, the Office of Indian Affairs, the National Park Service, and the Bureau of Reclamation, in the United States Department of the Interior; and the Bureau of Agricultural Engineering, the Biological Survey, the Bureau of Chemistry and Soils, the Forest Service, the Soil Conservation Service, the Weather Bureau, the Divisions of Land Economics, of Farm Management and Costs, and of Farm Finance in the Bureau of Agricultural Economics, and the Land Policy Section, the Production Planning Section, the Import-Export Section, and the Agricultural-Industrial Relations Section of the Division of Program Planning of the Agricultural Adjustment Administration in the United States Department of Agriculture. Credit also is due to the State agricultural experiment stations and extension services, State planning boards, commissions, and other State organizations and individuals for aid in preparation of several sections of the report.

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MALADJUSTMENTS IN LAND USE

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FIGURE 1.—Within these areas some of the crop farms (arable farms) should ultimately be replaced by stock ranches, forests, or other properties, mainly because experience has demonstrated the land on them to be too poor to provide, through crop farming, adequate family living, and support the public institutions and services that are required by farm communities.

SECTION I

DESIRABLE MAJOR LAND USE ADJUSTMENTS AND THEIR REGIONAL DISTRIBUTION¹

Introduction

Rural distress must of course in some measure be attributed to external economic factors which influence price. The so-called farm problem insofar as it is a problem common to agriculture generally, is correctly associated with such price influencing factors as shrinkage in demand through loss of export markets and domestic depression or with a credit structure poorly suited to agriculture. It is apparent, however, that the poverty and destitution prevailing in certain sections of the country as well as the capital losses suffered through the use of land irrespective of national prosperity or depression, must be assigned to factors of another sort, which lie within the process of land utilization itself.

Such factors may consist of institutions which directly or indirectly influence the use of land, or they may consist of the improper adjustment of the use of specific bodies or areas of land to the character of that land. In very many cases, however, the immediate maladjustment in use is controlled or influenced by an institutional factor. Thus, the uneconomically small farm units found in parts of the semiarid West are in a measure attributable to the homestead laws, which limited the amount of land an individual could preempt. Again, use of land in such a way as to facilitate erosion is aided by tenancy, because tenant operators have had less urge to conserve the soil resources than owner operators. In devising measures for attaining economically and socially desirable uses of our land, both the institutional factors and the areal maladjustments must be understood and dealt with.

The institutional adjustments necessary to facilitate the best use of lands of the United States have been discussed elsewhere. Considered here are the maladjustments in land use itself, leading to human destitution, losses in capital and dissipation of the land resource. These are markedly regional in their distribution, whether or not they are traceable to institutional conditions. No single problem of land-use adjustment is common to all parts of the United States. In the region where they occur, some problems are general in their distribution, while others are local.

Even where local, their aggregate effect may be considerable.

Geographic Investigation of Desirable Land-Use Adjustments

The proper consideration of land-use adjustments needed to effect the most desirable use of land, necessarily involves understanding the areal extent and character of the different types of land-use problems.

The National Resources Board appointed an investigator in each State, who, under the title of land-planning consultant, was attached to the State Planning Board, and who was assigned, under the direction of the Land Policy Section of the Agricultural Adjustment Administration to study and report on the distribution of land-use problems and desirable adjustments. In most instances these investigators were stationed at the State agricultural colleges, in order to work more closely with staff members of those institutions, and to have more immediately at hand the information which had been accumulated on land utilization. After examination of the best available evidence, and after consultation with well-informed individuals within their States, particularly in the agricultural colleges, agricultural experiment stations, and extension services, they undertook to delimit all areas or districts in which some readjustment or reorganization of the major uses of land seemed desirable, to characterize the problems in each, and to indicate the nature of the desirable adjustment.

In order to secure uniformity throughout the country, the land-planning consultants were asked to report maladjustments according to a definite classification which was supplied them. While this treatment did not permit as wide a latitude in designating the different types of adjustment as was desirable from certain points of view, it was wholly necessary if a systematic and comparable delimitation of areas throughout the country were to be secured.

In designating land-use adjustment areas, the minor civil division was taken as the unit of consideration, not because the necessity for improved land-use bore any important relationship to these divisions, but because it was necessary to compel each consultant to consider individual areas at least as small as minor civil divisions, if a broad generalized treatment were

¹ Prepared by C. P. Barnes and W. W. Wilcox of the Land Policy Section of the Agricultural Adjustment Administration and G. T. Renner of the National Resources Board.

to be avoided. In many instances, however, local information made it possible to follow the natural boundaries of actual land-use areas.

On the basis of the information submitted by the land-planning consultants, a map was prepared showing the areas in which farm problems appear to warrant encouragement of a change from crop farming to stock ranching or to forestry or to some other conservation use for all the land in some farms or on all of the farms in some localities (see fig. 1).²

The land-use readjustments reported as being desirable did not include changes toward more efficient management of individual properties in the interest of greater profit, this being considered a matter for individual solution. The measures proposed were confined to land-use adjustments needed to overcome maladjustment leading to collective or community misfortune not readily corrected by individual action. Land conservation may, of course, be effected by individual action, but the likelihood of individual initiative achieving it in the absence of some fairly direct and tangible incentive is probably remote. Furthermore, failure to effect it will ultimately result in widespread community misfortune. Its achievement is therefore quite clearly a matter calling for public action, through the provision of specific incentives, through legal control of land use, or through the removal of impediments by means of institutional changes. Hence, the bringing about of land-use adjustments in the interest of land conservation is regarded as a matter requiring public action, rather than one to be effected by the initiative of individual owners.

Land-planning consultants were asked to report land-use problem areas according to the kind of adjustment that appeared to be desirable. Many of the adjustments recommended must be regarded as ultimately, rather than immediately desirable, because of the economic dislocations which would arise as a result of their rapid execution. However, there are some situations calling for action of an emergency nature. In some areas of serious soil erosion, for example, immediate measures to retard the rate of soil loss are necessary.

Adjustments in major land use reported as desirable, including adjustments in both type and size of operating unit, fall into six major categories, each of which is listed and discussed below.

1. *Replacement of Crop Farming by Less Intensive Types of Use.*—The presence of crop farming³ on

² Because of the controversial character of many of the questions of land-use adjustment, and because of the danger of injustices that might arise from errors in the preliminary designation of problem areas, publication of maps showing the detailed location of problem areas is not desirable at this time.

³ A crop farm is defined as one which has, west of the 100th meridian, at least one-tenth as much crop land as pasture, and east of the 100th meridian, at least one-fifth as much crop land as pasture. A stock ranch, as reported by the census is therefore not a crop farm, although it may properly be called a farm.

land poorly suited to it has given rise to a train of undesirable social and economic circumstances described at some length elsewhere in this volume. The problems created are widely referred to as those of submarginal farm land.

Estimates made in connection with this study indicate that there are probably not less than 450,000 farms, covering about 75,000,000 acres, and containing 20,000,000 acres of crop land and 35,000,000 acres of pasture, too poor for people to support themselves by crop farming.

Areas where the replacement of crop farming on land poorly suited to it, by less intensive uses, such as stock ranching, forestry, and/or recreation is called for, are widespread, but are found mainly in a few important regions. The presence of crop farming on land poorly adapted to it is attributable to several factors which vary greatly in importance among the regions of occurrence. The more important among these factors are:

(1) Shifts in comparative advantage through the settlement of new and more productive areas, and through the development of mechanized production, which favors certain areas at the expense of others in lowering production costs. This factor is particularly important in the long-settled hilly and stony parts of many Eastern States.

(2) Shifts in comparative advantage through the differential deterioration of lands by erosion. This factor is especially noteworthy in parts of the Cotton Belt, particularly in some of the old plantation areas.

(3) Inadequate understanding of the character and productive capacity of the land in advance of settlement, and consequently, settlement without proper discrimination between lands of different quality. This factor has been notably important in the Great Plains, and in the cut-over forest regions of the northern Lake States, the South, and the Far West.

(4) The stimulus of exceptional prices for certain products as a result of wartime demand, causing expansion of crop production onto lands which, without exceptional prices, cannot sustain economic farming. This factor has been most significant in some of the semiarid dry-farming areas of the Great Plains and the Columbia Basin.

(5) The availability of low-priced land as a means of providing subsistence to those without the means, resourcefulness, or inclination to live elsewhere. The availability of poor land to poor people has been a powerful influence toward the cultivation of land which is submarginal and undesirable for commercial farming. Its affect is most pronounced in the southern Appalachian, Ozark, and Ouachita highlands, where opportunities for employment of labor in industry have been small, where communication facilities

have been poor, and where shelter and clothing requirements are moderate. Its influence is felt in all regions having poor but tillable land, but is more powerful in those regions where the land is better able to supply direct subsistence, and less important in the semiarid or subhumid regions. It leads to the repeated reoccupancy of abandoned farms so long as habitable buildings remain. Whereas the ability of certain types of poor land to provide subsistence has been demonstrated, their inability to provide facilities for education, communication, and health in the measure needed for a socially satisfactory life, has been equally well demonstrated. The desirability of undertaking withdrawal of subsistence farming from poor lands therefore is in large measure a social problem. Because of its complex and manifold human implications, it is controversial. It is held by some that the haven of refuge offered by the poor lands to destitute families in time of stress should not be closed, and that the provision of subsistence by such lands to these, and to families of limited capabilities, is an alternative superior to support by public relief. On the other hand, it is recognized that the occupants of such lands are quite commonly the recipients of public relief or other forms of subsidy, despite their association with the land, and that in such cases the public may be justified in insisting that the recipients live in places where the burden of public subsidy is least.

The replacement of crop farming by some other major land use has been indicated as desirable on the hillier and stonier parts of the Northeastern States, in the rougher and less productive parts of the southern Appalachian, Ozark, and Ouachita Highlands, and of the intervening uplands, in the hillier and more badly eroded portions of the southeastern cotton and tobacco regions, in the cut-over forest regions of the Great Lakes States, the South Atlantic and Gulf Coast States, and the Pacific Coast States, in the semiarid portions of the western Great Plains, the Columbia Basin, and in the central valley and foothills of California. Excepting the Southern Highlands, these are all regions of sparse agricultural settlement, so that in many areas relatively few farms are involved.

In the poorer agricultural areas, characterized by inadequate land resources and many destitute rural people, it is thought that the interest of both individuals and communities would be best served if a part, ranging from one-fifth to most of the farmers, could be relocated ultimately on better land or in other occupations, and the poor land retired from farming and devoted to some other productive use. However, in very many cases this relocation would consist in the transfer of settlers from isolated locations on poor land to more compact agricultural communities nearby, where they could

receive the benefits of community services, such as roads and schools, at a cost which they could bear.

In each of the areas of this kind it is recommended that measures to prevent agricultural occupancy of poor land, not now in farms, and not agriculturally desirable, be instituted. Such measures would involve establishing constructive nonfarm uses for these lands.

The desirability of retiring crop farms from agricultural use in any area is contingent upon finding some alternative occupation or situation for the displaced population which would bring about greater well-being. The apparent lack of such alternatives at the present time has occasioned reluctance in some States in designating areas where this adjustment should take place. In most proposed retirement areas a gradual elimination of crop farming should take place as opportunities arise, although certain areas of acute distress may require wholesale action of an emergency nature.

2. *Instituting Constructive Use and Management of Forest and Cut-over Lands.*—The problem of instituting constructive use of forest land was reported in all those parts of the country where large bodies of forest or cut-over land are found in private ownership. The problem was not widely reported in those parts of the Intermountain and Pacific States, where the forest is principally in public ownership.

The United States Forest Service recently undertook a survey of desirable modifications in ownership, use, and management of forest land. In reporting desirable adjustments in forest-land use, particular attention was given by the land-planning consultants to those situations where the development of constructive management of forest land would facilitate the continuance of agriculture which would otherwise be decadent. Situations of this sort were reported in the forest regions of each of the Pacific Coast States, and in many of the forest regions of the Southern, the Appalachian, and the Northeastern States.

The problems of forest land-use adjustment center around the failure of forest land to contribute very effectively to the support of communities, and around the inadequacy of the forest resource near large consuming regions despite abundance of forest land. To overcome these deficiencies, adjustments in management and use of forest land must be facilitated, in most instances by institutional adjustments, notably in public fiscal policy.

3. *Increasing the Size of Farms in Order to Provide Adequate Family Living and Permit Soil Maintenance.*—In certain regions an important percentage of the farms, while they are on land capable of supporting crop farming, are too small to provide an adequate family

living under the type of farming or cropping system to which the land is best suited.

In nearly all areas an increase in the size of farms would result in a decrease in the number of farms and therefore in displacement of some farm families. Estimates made in connection with this study place the number of families which would need to be relocated as a result of desirable enlargement of farm units at about 80,000.

Two general kinds of situation call for larger farms:

(1) Where the type of farming and cropping systems are adapted to the land, but the unit does not contain enough acres to return the operator a fair living. (A variation of this situation is found in certain irrigated sections of the West, in which the water supply is insufficient to provide a fair living for each unit. Here larger farms may signify primarily more water per unit, although increase in both land and water may be involved.)

(2) Where the type of farming, or the cropping system needs to be made less intensive in the interest of soil conservation, or otherwise in the interest of better adaption to the character of the land, thereby requiring a larger acreage, to provide an equivalent return. This change in the type of farming or cropping system would consist of (a) the use of grass or legumes for longer periods in the rotation, (b) the replacement of parts of the crop land by permanent pasture, or (c) increasing the proportion of forage crops on land where grain yields are too low and unreliable to provide reasonably adequate living. (A variation of this situation is found in certain irrigated sections in which the water supply is inadequate, or is being progressively depleted, and in which fewer, and therefore larger units, accompanied by an increase in the proportion of less intensive uses, is needed.)

A general increase in the size of farms in many agricultural areas would doubtless result in more efficient operation and larger returns per farm. The displacement of many farmers, however, to permit already productive farms to yield a higher return is difficult to defend under present conditions. The recommendation that farms be made larger is therefore limited to those cases in which the small size of unit leads to destitution because of the small volume of business, or contributed to soil depletion because family support requires too heavy cropping.

Increasing the size of farms usually involves the annexation or consolidation of adjoining operating units. The redundancy of farm families created by this process must find land or a means of subsistence elsewhere. Obviously the availability of better opportunities elsewhere will influence the rate at which this adjustment can be made.

Although adjustments in size of farms have occurred and will probably continue to occur through individual action alone, a general movement toward larger farms in many areas cannot be effected easily by such individual action. To the extent that this difficulty prevails, the acquisition of adjoining operating units to bring about farms of most desirable size in an orderly manner requires collective or cooperative action.

The problem of undesirably small farms is distinctly regional in importance. There are doubtless a few uneconomically small farms in every area, but the problem is much more pronounced in certain regions. On the whole, farms tend to be too small in the relatively less-productive areas; that is, in areas where more acres are required to return a living under a conservative cropping system. Important areas where this adjustment is recommended are the western Great Plains, the erosive areas of the western and southern Corn Belt, the general farming areas of the Ohio Valley and southern Illinois, certain erosive parts of the Cotton Belt, and numerous irrigated areas of the West.

In the Great Plains, one encounters increasingly dry country, with increasingly low and irregular yields of dry-farmed crops as one travels westward. To compensate for this lower productivity per acre, more acres per unit are required to provide an equivalent living. Farms therefore average larger in the western than in the eastern and more humid portion of the Great Plains. The difference, however, in many cases is not as great as is warranted by the greater aridity of the western portion. Failure properly to modify the homestead laws so that the size of homestead unit was in accordance with the productivity of the country, resulted in 160- and 320-acre farms being preempted in areas where at least 640 acres were needed to support a family. The low and unreliable rainfall dictates, in many places, the use of summer fallowing to conserve moisture, thus increasing greatly the requirement for land per operation unit. The marked unreliability of wheat yields due to an erratic climate suggest the need of combining a range-livestock enterprise with grain growing to help tide operators over poor grain years. To accommodate the addition of a range-livestock enterprise to a farm, a larger acreage will generally be needed. Attempts at grain farming on acreages that are too small have resulted in outright abandonment of farms after every extended period of low rainfall.

Soil and erosion specialists have found soil erosion and soil depletion to be a serious problem as a result of overcropping in the loess hills of central Nebraska, on the dissected plains of southern Nebraska and northern Kansas, and in the hilly areas of southern Iowa, northern Missouri, and western Illinois. A continua-

tion of overcropping on these erosive lands will progressively lower their productivity. Low yields per acre in the western areas and small acreages per farm in the southern and eastern areas make it desirable, if not necessary, to maintain or even increase present production per farm in these areas in an effort to maintain incomes. Thus the introduction of more grass and hay production for the region as a whole ideally should be accompanied by proportionate consolidation and enlargement of farms. The present demand for land on the part of large numbers of young rural people unable to migrate to urban centers, as well as on the part of urban people wishing to move to the country, limits the possibilities of obtaining better opportunities elsewhere for families who would be displaced by a process of farm enlargement. Further investigations may find a solution to this problem in the readjustment of farm organizations without increasing size of units. The introduction of more labor-using enterprises, such as dairying and poultry raising, would effect the decreased acreage of crops if conditions were favorable for the marketing of increased quantities of these products.

Farmers in the general farming areas of the Ohio Valley and southern Illinois are not only handicapped by less productive soil but have less total land and less tillable crop land per farm than Corn Belt farmers. Larger farms with a higher proportion of the land in hay and grass would make possible a more adequate living on the more level lands and would in addition prevent continued erosion on more rolling land. The introduction of improved machinery and improved technique in agricultural production has increased the disadvantage of farmers in these areas in crop production as a basis for commercial agriculture. Farmers on the better lands have been able to make more general use of these improvements. The downward trend in total crop acreage is an indication of the adjustments farmers in these areas have been forced to make as a result of this increasing disadvantage. Consolidation of farms, with a higher proportion of the total land devoted to the production of hay and pasture, would mean a continuation of this trend. Although this region undeniably needs, in line with changed economic conditions, a better adjustment between type of agricultural production and natural resources there are even more serious problems whose solution may have to be given precedence. The difficulty of finding better opportunities for the families displaced must be overcome before a general program of extensification of type of farming can be undertaken.

In the Cotton Belt, State land-planning consultants report scattered areas from central Texas east to South Carolina where erosive land is farmed too intensively and where the farms are not large enough to permit

the most desirable type of land utilization. Indications are that a readjustment could be effected by returning to forest cover those lands having steep slopes, and by bringing into crop production other lands having more moderate slopes on which terracing and other measures would economically conserve the soil, making sure that each farm contained enough smooth land to meet the crop requirements of a farm family. Such a readjustment would probably not require any net change in the population of the areas, or in the acres of the principal crops. The detailed plans for such readjustments in a few particular areas, and experimental and demonstrational projects to determine their feasibility, are urgently needed.

Irrigation projects in numerous cases have been blighted with too great a subdivision of the land to permit an economical system of farming. In other instances there has been lack of sufficient water to supply properly all the units dependent upon it. Some irrigation projects depending on wells as the source of their water supply, are experiencing progressive lowering of the water table. This points to future difficulties, even though water depletion may not yet have progressed to the point of causing economic distress. The situation is analogous to that of soil depletion. Correction of these maladjustments implies larger farms in some cases, or, if water shortage be a limiting factor, a shift to crops requiring less water (in conjunction with larger farms) is required. The solution of these difficulties will vary with each irrigation project.

4. *Changes in Cropping System to Reduce Erosion Without Increasing Size of Farms.*—In cases where changes in the cropping system are required in order to control erosion, enlargement of the farm unit may also be necessary; more often it is not. Changes in cropping system or in farm practice in order to control erosion are recommended in most agricultural areas where serious erosion is taking place. Among the larger areas in which changes in the cropping system without enlargement of farms is reported as desirable, are the Piedmont upland from Virginia to Alabama, the Mississippi silt-loam uplands of western Kentucky, Tennessee, and Mississippi; the highland rim of Kentucky and Tennessee, the hills of southern Ohio and southern Indiana, the Driftless Area of Wisconsin and Minnesota, the loess prairies of Iowa, Nebraska, Missouri, and Kansas, the Black Prairies of Texas, the Redbeds Plains of Texas and Oklahoma, the High Plains of Texas and Oklahoma, the Palouse wheat country of Washington, Oregon, and Idaho, and many valley and foothill areas of California. The specific changes in cropping system were not determined.

5. *More Judicious Use of the Range.*—Uncontrolled use of the public domain range has led to forage deple-

tion, accelerated erosion, injury to water supplies, and other difficulties. The passage of the Taylor Grazing Act is expected to overcome many of the difficulties arising from unregulated use of the range, through establishment of grazing districts in which grazing will be adjusted to the range resources. The problems of range grazing are common to much of the arid regions of the Great Basin and the Southwest, with somewhat less important occurrence in the Great Plains. Injurious use of privately owned range land has been reported in Texas, California, Idaho, and elsewhere.

6. *Improving Drainage, Flood Control, or Water Supply to Permit the Continuance of Economic Agriculture on Existing Farms.*—It is occasionally true that the provision of some improvement in drainage, in protection from flood, or in water supply, requiring collective action for its accomplishment, will remedy a condition of distress on farms. This type of adjustment is needed in widely separated local areas, but is not characteristically required in any broad region. It is reported as desirable largely in the form of improvements in drainage in the Southern and Central States, and in the improvement of water supply and/or drainage in some of the Western States.

This adjustment should not be confused, on the one hand, with the provision of works to bring new farms

into existence, or, on the other hand, with the provision of improvements by the individual farmer on and solely for the benefit of his own farm. It is proposed only in those cases where the lack of an improvement, which can not be effectuated by individual action, stands between desirable agriculture and undesirable agriculture.

Land-Use Problem Regions and Adjustments

Understanding of the major areal differences in land-use problems will be increased if the country be divided into broad regions, each having a characteristic pattern or association of land-use problems which distinguishes it from adjoining regions, and the land-use adjustments in each be discussed. In this connection, attention is called to figure 2, a map of land-use problem regions.

Eastern Highland Regions

Northeastern Highlands (hilly or stony parts of the New England States, New York, Pennsylvania, New Jersey, and Maryland). Major adjustments advocated: (1) Widespread local replacement of crop farming by some other productive land use, (2) institution of constructive management of forest land.

While this region still has much uneconomic farming in its hillier, stonier, more remote, or otherwise less-

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BUREAU OF AGRICULTURAL ECONOMICS

FIGURE 2.—Each of these large regions has a characteristic combination or pattern of land-use problems, which differs in some important respect from that in adjoining regions.

productive parts, the abandonment of farming on much of the least desirable land has already taken place in response to changing economic conditions, particularly in New England. This adjustment has been facilitated by the development of sources of industrial employment in the region, and by the opening of more productive agricultural lands in the West, both of which offered better livelihood than agriculture on the steep and stony lands. Despite this economic adjustment in the past, there appears to remain in agricultural use a considerable body of farm land so poor as to offer little hope of yielding a reasonable return for the farmers' labor even under conditions of national prosperity. (See description of social and economic conditions in areas in which it appears desirable to encourage discontinuance of crop farming.)

Much of the land in the region is forest land not in farms. Although intensive forest management is practiced in some localities, and although the recreational use of forests is important, much forest land is contributing very little to the support of local communities. It is believed that a more constructive use of the forest land in parts of this region would provide alternative or supplementary employment in sufficient quantity to support stable part-time agriculture and local wood-using industries, and to maintain communities which would otherwise be decadent. Local examples of woodworking industries using nearby forest land under sustained-yield management, and providing a stable basis for community support, are to be found in this region, notably in New England. An important consideration in regard to the importance of constructive forest management in this region, is its proximity to populous industrial wood-consuming centers, now deriving much of their forest products from regions 1,000 to 3,000 miles distant.

Probably the most noteworthy example of desirable forest land utilization under private ownership is presented by northern Maine. Unlike most other forest regions, much of northern Maine has almost no scattered agricultural settlement and no local governmental organization. Having little interspersed settlement, the forest land has not the burden of supporting roads, schools, and other governmental services. Tax revenue from forest land, therefore, needs to be little more than enough to provide fire protection. Moderate taxation in this section permits forest landowners to hold their properties for continued forest production. It reduces the tendency to "cut out and get out", notable in regions where the forest must support local governmental activities.

By reducing the cost of carrying timberland, and thereby fostering sustained forest production, the tendency to unload forest land onto the agricultural

land market is reduced, and the tendency to introduce scattered or uneconomic agricultural settlement in the forest area is avoided. In part, the situation has resulted from the early lumbering practice of culling rather than clear-cutting. The continuously producing forest resulting from this practice is in contrast with the idle forest land remaining after clear-cutting in our more recently exploited forest regions, where cut-over lands, unprofitable to hold for forest production, have been disposed of for agriculture, or have become tax delinquent.

This example of desirable forest land-utilization is noted because it appears to be an outstanding case of the avoidance of the maladjustment of forest-land use characteristic of many of our forest regions, and is indicative of what might be achieved through comparable land-use adjustments elsewhere.

Southern Highlands and their Margins.—Major adjustments advocated: (1) Widespread local withdrawal of crop farming in the roughest areas, converting land to constructive use (see description of social and economic conditions in areas in which it is proposed to encourage withdrawal of arable farming); (2) instituting of constructive management of forest land; (3) increasing size of farm units in the less rugged areas to permit greater acreage of pasture per farm, and to provide enough acreage per farm for an adequate family living; and (4) instituting of erosion control measures in the better farming areas, where no increase in size of farms is necessary.

Unlike the rougher and less desirable parts of the Northeastern Highlands, the steeper parts of the Southern Highlands have not, in general, experienced much migration from rural areas. On the contrary, in some sections farm population has increased, and in some, notably in eastern Kentucky, it has increased much beyond the capacity of the agricultural land resources to support it.

Unlike the Northeastern Highland region, urban and industrial enterprises were not present in this region in sufficient number to provide alternative employment to very many of the people in the poorer areas who failed to make an adequate living on the land. It is believed, however, that a more effective use of the forest land in the steep or stony sections would support a part of the population which would otherwise be forced to migrate from the area, or to suffer progressively greater future privation.

Much of the smoother land in the northern and western part of the region, particularly in Missouri and Arkansas, southern Illinois, southern Indiana, and southwestern Ohio, is relatively poor crop land. It might be better suited to pasture than forest, and when operated in large livestock farm units should be capable

of maintaining economic farming. It is thought that many farms in these areas are too small at present to provide adequate family living under the type of farming best suited to land of its character. Some of the hilly lands of southeastern Ohio and West Virginia are superior grazing lands, and if operated in farms somewhat larger than at present could, it is believed, support desirable agriculture.

On many of the better and more heavily cropped areas in this region, erosion is active, and immediate measures are required to conserve the land resource.

Southeastern Hilly Cotton and Tobacco Region

Major adjustments advocated in this region which includes tidewater, Virginia: (1) Local withdrawal of crop farming, converting land withdrawn to constructive use (mainly forest); (2) introduction of erosion control measures in the better farming areas; (3) institution of constructive management of forest land; (4) establishment of larger farms in the interest of erosion control and adequate farm income (mainly in Mississippi).

On the poor, and particularly the more eroded lands in this region, it is believed advisable to discontinue crop farming in part at least, and to devote the land released from crops to forest production. (See discussion of social and economic conditions in areas in which it appears desirable to encourage withdrawal of crop farming.) On the superior farm lands of the region, which embrace mainly the smoother parts, it is desirable for agriculture to continue. It will be urgently necessary, however, to use much of these smoother lands under cropping methods which reduce erosion if further reduction of the already diminished acreage of good land in the region is to be prevented.

Prior to the advance of the bollweevil into this region, soils of heavier textures were at little disadvantage in cotton production, except where, as in the Piedmont, they occupy steeper slopes, and therefore tend to erode more rapidly. Under conditions of bollweevil infestation, however, finer textured soils experience greater incidence of bollweevil injury because of the later maturity of cotton grown on them. The washing off of sandy-surface soils, particularly in the Piedmont, exposes a sandy clay subsoil less desirable for cotton, even if the land is not injured by gulying.

Much of the crop production in this region is carried on by share-tenants and croppers. Merchant and landlord credit secured by a crop requires that tenants use their labor in producing cash crops, preferably non-perishable crops, rather than subsistence crops or livestock. This has led to much continuous cultivation of row crops, on the same tracts, to the encouragement of soil erosion. Supervision of tenants by the landowner in the interest of good farm practice is generally

inadequate. On the larger holdings, particularly, supervision of the many small tenant farms is difficult. Institutional changes, notably in tenure and credit systems, will be necessary to facilitate desirable adjustments in land use in this region.

In scattered areas the enlargement of farms too small to provide adequate income has been indicated as a desirable adjustment. It is probable that income is limited, on family operated farms, not so much by the acreage available, as by the acreage in crops for which family labor is available. Idle arable land is interspersed throughout most parts of the region. Enlargement of units would probably be with the objective of getting enough land in any one unit to permit the crop land needed to support a family to be located on smooth productive land.

It is believed that a more effective use of the forest land, which occupies a large portion of the total area of the region, would materially increase the base of economic support. Forest growth is rapid, and a number of species of high utility are native to the region. At present little consideration is given to management of the forest land as a source of farm or of community income.

Cut-Over Regions

Great Lakes Cut-over Region.—Major adjustments advocated: (1) Instituting constructive management of forest land; (2) widespread local discontinuance of crop farming, and conversion of the land withdrawn to constructive use.

Exploitation of the forest in the northern Lake States began more recently than in the Northeastern States. Large-scale methods of harvesting and clear-cutting left much forest land in a nonproductive state. Timberland owners attempted to dispose of cut-over land for agricultural use. Proper discrimination between agriculturally desirable and undesirable land was not exercised by buyers or sellers. Scattered agricultural settlements sprang up in forested areas. Subsequent abandonment of many farms accentuated the sparseness of settlement, and increased the cost of providing public services. The cost of supporting these services fell on progressively fewer properties, and the individual tax burden, including that on forest property, increased. Forest land could not bear its carrying costs after the timber was cut, and hence was allowed to revert to the State or county, through tax delinquency.

In contrast is the situation in northern Maine, previously described, where sustained use of the forest land prevailed and where agricultural settlement was not encouraged.

It is believed desirable to eliminate much of the scattered settlement in the northern Lake States, particularly that on poor land, thereby avoiding the

necessity for providing the unduly expensive public services required by such settlements. The establishment of a sustained yield management of forest land, it is believed, would be facilitated if the expensive local governmental services which exist, in many instances, to serve impoverished uneconomic settlement, were eliminated. It is believed that constructive management of the forest land would tend to stabilize employment by providing a continual source of material for wood-using industries. State and Federal acquisition of much forest land has taken place.

Atlantic and Gulf Cut-over Region.—Major adjustments advocated: (1) Instituting constructive management of forest land; (2) widespread local withdrawal of arable farm land. It is indicated that more constructive use of the forest land should furnish additional sources of income for resident farmers, in some instances in sufficient measure to facilitate continuance of agriculture that would otherwise be decadent. The forest country bordering the Atlantic and Gulf coasts is a sparsely settled region, in which large-scale exploitation of the timber resources has, except in the north-eastern part, taken place relatively recently. The forest is composed in large measure of fast-growing species of high utility, and its comparative advantage in wood production is high. It is therefore, a region of desirable forest land utilization.

While local bodies of desirable agricultural land exist, a large part of the region is either poorly drained or has relatively unproductive sandy soils or both. In attempts to settle or colonize cut-over timberlands there has been a failure to distinguish properly between desirable and undesirable land. It has been commonly supposed that the long frost-free season and mild winter climate adequately compensates for any deficiency in soil productivity. In a measure, it is true that climate is a compensating advantage, but on the whole, agricultural settlement in this region has not been notably successful. After 200 years, during which the rest of the country was agriculturally appropriated, the region remains almost wholly in forest.

It is believed desirable to eliminate some of the most scattered settlement on poor land in this region, and to institute constructive management on the forest land, so as to use most effectively a productive and desirable forest region.

Pacific Forest and Cut-over Region.—Major adjustments advocated: (1) Withdrawal of scattered farm settlement occupying poor land; (2) instituting constructive management of forest land; (3) increasing acreage of improved land on farms by further clearing, and in some localities, by increasing size of ownership units.

Of the great forest regions of the United States, that of the Pacific coast has been most recently exploited.

The appropriation of cut-over lands for agricultural settlement in this region has probably been retarded by the very great cost of clearing land of the characteristically large and thickly set stumps. Nevertheless some scattered settlement does exist in shoestring valleys and on relatively poor land. It is believed desirable to eliminate such scattered settlement and to concentrate agriculture in more compact communities on better lands in more accessible locations.

Subsequent to the Forest Homestead Act of June 11, 1906, many isolated and scattered tracts were entered for agricultural use within the boundaries of national forests. Only in exceptional instances have these isolated farms been capable of supplying themselves with public services and providing their operators with an adequate living. It is believed desirable to eliminate many, if not most, of the scattered, privately owned farms within national forests, in the interest of facilitating the administration of the forest and reducing uneconomic farm settlement.

Equally or even more desirable is the introduction of some sort of sustained yield management of the private forest land in order to stabilize employment through the continuance of forest industries which provide markets and possibly part-time employment for farmers.

Of the farms now located on desirable land in developed communities, many have an acreage of cleared land inadequate to support a family. The expense of clearing additional land is, in many instances, beyond the financial ability of the operator, except through the application of labor over many years. It is believed that assistance to farm owners, possibly in the form of credit, in increasing their cleared acreage, is desirable in the interest of community well-being.

In a considerable area bordering Puget Sound, particularly near the larger cities and on the islands the controlling or guiding of future land-use developments is believed to be a problem. No specific adjustment appears to be necessary in this area at the moment, but it is believed desirable to undertake a classification of land, and to establish some use-control to avoid undesirable developments in the future, and to provide a direction for developments to assure the uses socially and economically most desirable.

The Arid and Semiarid Regions

Western Great Plains.—Major adjustments advocated: (1) Replacement of some of the crop farming in the driest and agriculturally least desirable sections by stock ranching or other grazing use; (2) enlargement of farms in these and other sections to permit more extensive types of farming, with more pasture and less crop land per farm.

Parts of the Great Plains are subject to recurring drought of such frequency and severity that arable

farms are uneconomic and undesirable. (See description of social and economic conditions in areas in which it is desirable to encourage the withdrawal of arable farming.) In other parts of the region subject to recurrent droughts, but which are somewhat better agriculturally, it is believed desirable to increase the size of crop farms to permit the substitution of pasture for some of the crop land on farms, or to permit the increased use of summer fallow on cash grain farms.

A few years of above-the-average rainfall in the northern, or of pronounced drought in the southern Great plains would no doubt result in a somewhat different designation of problem areas than the present one. The recognition of land-use problems in the Great Plains of Kansas, Oklahoma, and Texas was confined largely to the problem of controlling wind erosion, although small areas in which it is believed desirable to replace crop farming with grazing were indicated in Kansas and Oklahoma.

California Valleys and Foothills.—Major adjustments recommended: (1) Local withdrawal of crop farming in the less productive areas, converting the land withdrawn to constructive use; (2) locally, increasing the size of farms so as to provide economic units, to permit the extension of pasture on poor or eroding land, and to permit reduction in crop acreage in irrigated areas which are subject to progressive diminution of the water supply; (3) instituting of measures to control soil erosion on farms needing no increase in size; (4) more judicious use of the range so as to prevent forage depletion, soil erosion, and injury to water supplies; (5) provision of adequate drainage for irrigated farm lands.

Objectives of the land-use adjustments indicated as desirable appear to be the conservation of land, water, or forest resources in the interest of the common good; although in some cases, the alleviation of poverty and the reduction of high cost of governmental services associated with uneconomic use of land or scattered settlement, is paramount.

Erosion, both on farm and range lands, requires control to prevent further waste of the land resource. On some irrigation projects in which ground water is pumped, progressive lowering of the water table and depletion of the supply is in progress. It is believed necessary to reduce the drain by reducing acreage in crops requiring water within the project until a stable condition is reached. Much irrigated land has been reduced in productivity by alkali accumulations resulting from inadequate drainage. The provision of drainage is suggested in these cases.

Scattered through the foothills and coast ranges as well as on the poorer lands of the Sacramento-San Joaquin Valley are farms which it is thought should

be replaced in their entirety by stock ranches or other grazing properties.

Columbia Basin.—Major adjustments advocated: (1) Widespread replacement of grain farming by extensive grazing; (2) more judicious use of the range, so as to prevent forage depletion and soil erosion.

Arid Grazing and Irrigated Region.—Major adjustments advocated: (1) More judicious use of the range so as to prevent forage depletion, soil erosion and injury to water supply; (2) withdrawal of arable farm land from scattered dry-farming areas, replacing it with extensive grazing, and preventing expansion of dry-farming, also replacing arable farming on parts of a few irrigated areas; (3) increasing size of units so as to decrease both aggregate crop acreage and number of families on irrigation projects which have a population too great for water supply.

The problem of the uncontrolled use of the range has been troublesome in this region, particularly in those sections in which the dominance of public domain range, makes impracticable the fencing of private lands. Stockmen, unable to control, by fencing, the use of the land their stock graze, are forced to keep their ranges overstocked and grazed to the limit in order to prevent the appropriation of forage by newcomers. The Taylor Grazing Act provides a means of overcoming this problem by the establishment of grazing districts, in which grazing will be under control. As its provisions are carried out, the extent of eroded and overgrazed range may be materially decreased.

There is also some overgrazing, erosion, and consequent injury to forage and water supply on privately owned ranch lands, and on Indian reservations, where some measure of improved range management is desirable.

In the arid portion of Texas, where the grazing land is almost entirely in private ownership and under fence, overgrazing and depletion of the range appears to be less common than in the public land States.

Other land-use problems of the arid grazing and irrigated region are small, widely scattered, and have to do with the use of low-grade dry-farming land which should be returned to grazing, and with occasional irrigation projects having inadequate water supply and poor soil, or with land which is in financial distress.

Miscellaneous Agricultural Regions

Northeastern Agricultural Region.—Major adjustments advocated: (1) Local withdrawal of crop farming in a few scattered areas; (2) instituting of erosion-control measures in some of the hillier areas.

Although possessed of a great deal of land of low agricultural productivity along with much that is agriculturally desirable, the northeastern agricultural

region is one of the less important regions in point of the magnitude of land-use problems. In a long-settled region of this sort, land use has had time to become fairly well adjusted to land character, and is, therefore, reasonably stable. Parts of the region are urban and industrial, rather than agricultural. Land-use problems of importance are restricted mainly to the southern part, in New Jersey, Pennsylvania, Maryland, and Delaware.

Central Agricultural Region.—Land-use problems are reported mainly in the southern part of this region. Major adjustments advocated: (1) Institution of measures to control erosion on farms without necessitating increase in size of farms; (2) increasing size of farms in order to permit the use of erosive land for pasture and to reduce the acreage in crops; (3) local withdrawal of crop farming in widely scattered small areas, devoting land withdrawn to forest or recreation.

This region is responsible for much of the volume of the agricultural production of the United States. On the whole, agriculture here has been marked by the provision of a relatively good family living and the support of fairly stable public services and institutions.

Immediate land-use adjustment in this region is mainly concerned with soil conservation. Erosion control is believed to involve the replacement of intertilled crops, notably corn and cotton, by close-growing crops or pasture, by keeping erosive land in grass, legumes, or pasture for a longer part of the rotation, or by keeping the most erosive slopes permanently in soil-protecting cover. In certain areas, many of the farms may need somewhat larger acreages to provide adequate incomes after making this adjustment. In some of the other areas in the region, larger acreages per farm would not be necessary.

Gulf Coast Prairie.—Major adjustment advocated: Provision of additional drainage.

The Gulf Coast Prairie of Texas and Louisiana is characterized by naturally poor drainage. Much of the land, when artificially drained, is productive; some having impervious subsoil is used for rice growing under irrigation. It is believed that additional drainage to benefit some of the land now in farms will promote agricultural stability.

Mississippi Delta.—Major adjustments advocated: (1) Provision of additional drainage and/or flood control for farm land in some localities, (2) local withdrawal of crop farming on a few widely scattered areas.

The Mississippi Delta, the extensive body of alluvium along the lower course of the Mississippi River, contains some inherently productive bodies of land. However, much of it is now poorly drained or subject to

overflow and agricultural settlement is confined to the better-drained parts, which are densely settled and intensively used.

Estimates of the productivity after drainage of the parts of the region now poorly drained has been a matter of controversy. Much of the soil is unquestionably fertile, but poor drainage and frequency of overflow have retarded its development. Much of the poorly drained land has fine textured (clay) soil very retentive of moisture, requiring skillfully constructed works to effect satisfactory drainage.

Some of the soils are reputed to have good structure and when drained, to be among the most productive cotton soils of the country. Others are notably less productive. It is evident that proper discrimination between productive and less productive land was not exercised in undertaking drainage enterprises, as there appears to be some poor land in many of them. Tax delinquency on the poorer land has, in some instances, intensified delinquency on the better lands, since drainage taxes have been applied to reduce the debt of the entire district, rather than to reduce the proportionate debt of individuals. Hence, in such cases farmers on the better lands have deliberately allowed taxes to become delinquent.

It is believed that refinancing of some drainage enterprises would contribute to permit local stabilization of agriculture.

In some instances inherently productive land has been provided with inadequate drainage. It is believed that additional drainage would make possible the establishment of economic agriculture in some of these cases.

Southeastern Middle Coastal Plain.—(Middle coastal plain of Alabama, Georgia, South Carolina, North Carolina, and Virginia.) Major adjustments advocated: (1) Instituting constructive management of forest land; (2) local withdrawal of land from crop farming in a few widely scattered areas.

The southeastern middle coastal plain embraces the undulating or gently rolling lands of the Coastal Plain extending from Virginia to Alabama just inland from the poorly drained coastal flatwoods of the Atlantic and Gulf coast cut-over region. Except for the effect of an undesirable and unstable form of tenure in many sections, agricultural land use is probably more stable than in the other regions of the Southeastern States. Because of the generally smooth surface, erosion is only locally a serious problem. So many of the farm families are tenants operating small farms that the average income of families in much of the region is not high. Because of the high labor requirement of the principal

crops (cotton and tobacco), it is not certain, however, that individual families could well operate larger acreages.

Much of the land is in woods, although notably less than in the adjoining cut-over region. It is believed that a more effective use of much of the forest land would add materially to community income. The region is desirable for forest production, as it contains valuable, rapidly growing native species, and is relatively accessible to the large wood markets.

Western Gulf Coastal Plain.—Major adjustments advocated: (1) Increasing size of farms to obtain economic units and to facilitate erosion control; (2) introducing measures to control erosion on farms, without necessitating increase in size of farms.

In character of landscape, that part of the rolling Coastal Plain west of the Mississippi River resembles that to the east in Mississippi and Alabama. No doubt the shorter period of agricultural use, and therefore of erosion, which this region has undergone, as compared with that east of the Mississippi, helps to explain the difference in adjustments recommended in regions which superficially resemble each other.

The changes toward larger farms advocated for much of this region, is apparently an attempt to anticipate the effect of too intensive cotton and corn cropping which is in evidence in certain longer-settled regions, by permitting reduction in intensity of cropping and by introducing more pasture. Control of the process

of erosion by land management can, it is believed, prevent the impairment of land resources to a point beyond the margin of economic agriculture.

This region further resembles the southeastern hilly cotton and tobacco region in the high percentage of land operated by share tenants, and in the low average income per farm family. The problem of land tenure is an outstanding one throughout most of this region, and the most desirable measures of adjustment for its solution are not readily apparent. The matter of soil conservation is closely related to the system of land tenure, and its satisfactory establishment will probably depend on a change in the character of tenure.

Palouse Wheat Region.—Major adjustment advocated: Instituting measures of erosion control without necessitating change in size of farm. The Palouse wheat region, as defined here, embraces the better watered and agriculturally superior part of the Columbia Plateau wheat region. Wheat yields exceed those in most other cash grain farming areas. Erosion is active and is accentuated by the practice of rotating wheat with fallow. It is believed that measures to control erosion are essential to the continued stability of agriculture in the region.

6. Non-Problem Regions, Having Little Agriculture

The remaining regions have little or no agriculture and no very important problems of land use.

SECTION II

CONDITIONS OF AREAS IN WHICH FARM RETIREMENT IS PROPOSED¹

Introduction

The following discussion is limited to an analysis and description of social, economic, and to a lesser extent, physical conditions of those areas from which it is proposed to retire a substantial proportion of the farms from arable agriculture. Such areas are indicated in section I of this volume. A discussion of the program for bringing about the retirement of the farms and the conversion of the land to a more desirable use is taken up in section III.

The land in the areas from which it is proposed to retire a considerable number of farms is not only substandard for agricultural production, but also so poor in geographic location that opportunities for employment off the farm from which supplementary income might be secured are almost negligible. This is the land commonly referred to as "submarginal land." The continued agricultural occupation of such land has created and continues to create social ailments which are both acute and far-reaching in their effects. The general welfare would be better served if a vast amount of this land were removed from arable farming and devoted to other purposes. There is all too obviously little possibility of improving the condition of farm inhabitants in such areas as long as they remain in their present location and number. As a consequence, a considerable number of the occupants will have to be moved in order to effect a balance between the population and the land.

The solution proposed for bringing about this adjustment is to first identify and locate all of the so-called submarginal land in this country and then to retire a considerable acreage of it from arable farming and put such retired farm lands into forest, grazing, recreational, or some other desirable use. This is not a new solution; it is rather a rationalization of an old situation—farm abandonment. This latter phenomenon, which is really nothing but forced farm retirement, has already occurred in many of the areas under discussion. Any farm retirement plan would, therefore, merely seek to make it selective, to speed up its operation, and to render it a form of social saving rather than allowing it to remain a form of social waste—a saving of both human and natural resources.

At the very outset the question must be raised as to what is submarginal land. No satisfactory single answer can be set forth because of the numerous variables involved. The matter may, however, be approached from the standpoint of soil. In the National Resources Board Report of December 1, 1934 (pt. II, report of the Land Planning Committee, p. 127), the soils of the United States are classified into five grades on the basis of physical productivity. The first three grades comprise about 35 percent of the area of the country and are essentially agricultural in their entirety. Grade five, comprising 46 percent of the total land area, is essentially nonarable and hence nonagricultural. It is therefore grade four land which causes most of the trouble. This class consists of more than 360,000,000 acres of land, and comprises nearly one-fifth of the total area of the Nation. In a sense this land may be regarded as marginal land because, while it is physically possible to cultivate much of it, there is usually no economic profit in doing so. However, this type of land would seem to invite agricultural occupation without giving warning of resulting low income; only the more discriminating person is able to withstand its lure. Indeed, it is probable that one-third or more of all grade four land is now so utilized. The result of such utilization has been the creation of an extensive social and land problem, or what is often termed the "submarginal land problem." Certainly conditions do not warrant permitting more of this grade of soil to be put into farms, and much of that now in farms should be removed from such status.

While the matter of soil fertility is perhaps the largest factor in determining whether or not land is classified as submarginal, it is by no means the only factor. In the arid and semiarid portions of the West, scattered settlement, remoteness from markets, and rainfall conditions are contributing factors. In the forest and cut-over sections, scattered settlement, prohibitive cost of land clearing, and sometimes wetness or stoniness are important. In the areas of highland farming, impossibility of mechanization of agriculture, disastrous erosion of steep lands, dispersed rural settlement, presence of topographic barriers, and inaccessibility to markets, complicate the issue. In the better agricultural areas, submarginal land conditions are the results usually of erosion, soil depletion, or local

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variation in natural conditions affecting physical productivity.

Location and Amount of Land to be Retired

The results of the methods used in locating specifically the areas of poor farming (described in sec. I) are only approximate, and will, therefore, have to be refined by closer scrutiny. In general, however, most of the areas have been satisfactorily located within which the retirement of land from farming is desirable and advisable. Such areas are found in every State and if combined would form a total greater than the extent of New York, New Jersey, and the New England States. The population on the farms involved totals well over 2,000,000.

In general, the so-called submarginal farm lands of the United States lie in four different sorts of situations: (a) Arid and semiarid areas of the West; (b) rugged hilly areas of the South and East; (c) forest and cut-over areas in the South, North, and Pacific Northwest; and (d) scattered through the better agricultural regions in all parts of the country.

It has been preliminarily estimated that more than 450,000 farms, containing over 75,000,000 acres, should be retired. This includes some land in strictly agricultural areas, together with probably half of all grade four land now in farms. It would include all of such grade four land were it not for two circumstances. First, some grade four land can profitably remain in cultivation because of compensating economic factors which are the results of favorable geographic location. Second, a good many farmers on grade four land can profitably remain on farms incapable of providing them with a living because of the possibility of part-time employment off the farm. National and State forests, recreational areas, game management areas, mines, and rural manufacturing are examples of employment of part-time farmers on poor land.

Summarized, the recommendations for retirement of farms and farm acreage may be stated as follows:

Classification	Farms to be retired	Acreage to be retired
Western dry lands.....	46,000	36,000,000
Ozark, Appalachian, and New England.....	176,000	16,000,000
Better farming regions.....	161,000	15,000,000
Forest and cut-over regions.....	71,000	8,000,000
Total for all regions.....	454,000	75,000,000

From this classification it is apparent that nearly half of all land proposed for retirement lies in the western dry areas, principally the Great Plains. There the land has been put under extensive cultivation in large units of ownership and operation. For this reason relatively few farms are involved in the proposed readjustments.

In marked contrast to this are the southern and eastern highland areas. Here are involved a great number of farms and a large total population, but a smaller total acreage.

At first glance, the farm-retirement figures for the better agricultural regions, extensive though they be in total area, seem unnecessarily large. If these figures are resolved into two components, however, considerable light is shed upon the problem:

Better farming areas	Farms for retirement	Acreage for retirement
Cotton Belt	129,000	11,000,000
All other agricultural areas.....	32,000	4,000,000

Most of the farms to be retired obviously lie in the South, whereas other agricultural regions contain relatively few. Similarly, in the case of "problem" farms in the eastern and southern highlands, of a total of 176,000 farms, fully 125,000 lie in the Ozark-Southern Appalachian region.

The appalling extent of the human aspects of the problem in the southeastern United States may be noted when it is seen that within the section which is usually known as the South there are more than 63 percent of the farms recommended for retirement, whereas there is only 29 percent of the acreage so designated.

General Character of Social and Economic Conditions

The use of lands for agriculture which are unsuited for agricultural purposes is almost always productive of certain social ills. Some of the more pronounced of these are (a) small incomes and consequent low plane of living, (b) low level of community life and morale, (c) financial difficulties of local government units, (d) waste of individual and social effort, and (e) the exploitation of people who are ignorant of the facts and conditions in these areas.

Land Values.—The farms to be retired are located in areas where land values are in general very low. (See accompanying map of the value per acre of farm land and buildings.) There are two situations where this does not hold true: Certain areas are shown on the land-value map as having a high average value of farm land and buildings, particularly in the West, where the high value is due to irrigated land or other land of high value, associated with much lower-priced farm land or nonfarm land. In such areas there are many poor farms which should be eliminated from agricultural production. There are also large areas of low-valued land used only for grazing with few farms dependent upon arable agriculture, and consequently there are few farms to be eliminated in those areas.

VALUE OF FARM LAND AND

AND BUILDINGS PER ACRE

DOLLARS
PER ACRE

- Under 10
- 10 - 19
- 20 - 39
- 40 - 59
- 60 - 99
- 100 - 179
- 180 and over

MINOR CIVIL DIVISIONS
WITH LESS THAN THREE FARMS
LEFT BLANK

SCALE 1:5,000,000

UNITED STATES DEPARTMENT OF AGRICULTURE
BUREAU OF AGRICULTURAL ECONOMICS

IN COOPERATION WITH
NATIONAL RESOURCES BOARD
AND
FARM CREDIT ADMINISTRATION

BASED ON 1930 CENSUS

Income Conditions.—The total value of production of the farms to be retired was \$203,610,000 in 1929. This includes products consumed by the family as well as those sold or traded. A very large proportion of this—45 percent—was consumed on the farm and 55 percent was commercial production. These percentages, when compared with 13 percent for products consumed on the farm and 87 percent for products sold from the farm for all farms in the United States, show that these farms in the poor farming areas are much less commercial than are the other farms of the country as a whole (see fig. 3). There is considerable variation in the degree of commercialization on these farms located on poor land. Those located in the Great Plains, the Columbia Basin, the Interior Basin, and the Cotton Belt are more highly commercialized than those in other regions.

Low income is the basic cause for many of the difficulties prevalent in submarginal land areas. Small incomes are found, however, in good as well as in poor sections. The so-called submarginal land areas are, to state the matter briefly, merely those where there appears to be no possibility of increasing the returns on low-income farms. The gross income in some

instances may appear to be fairly large, but that part available for family living may be wholly inadequate because of very high costs; in other instances, where there is little cash outlay, a small gross income may provide a much better net income. It is the net income available for the family living, therefore, which really determines the profitability or unprofitability of farming, and hence is one of the important criteria used to determine whether or not land should remain in agriculture. Outside of areas of specialized production, such as the Cotton Belt or the Wheat Belt, most of the farms on submarginal land are general farms, and even in the poorer parts of the specialized farming regions general farms are quite common. On this type of farm where, during more prosperous times, the gross production may average \$500 (including the products consumed by the farm family), the actual cash income available for family living will be less than \$250. On general farms in the Cotton Belt the gross production averages \$300 or less and the net cash income is only a little over \$100.

A picture of the inadequacy of the living available from submarginal land is given in table I. This shows how an income of \$235 in cash and \$265 of home-grown

FIGURE 3. Commercial agriculture is characteristic of practically all parts of the United States, except the Southern Appalachians. In several counties of eastern Kentucky only about one-fourth of the products of the farms, measured by value, were sold in 1929, according to the census. On the other hand, in most of the States westward and southward from Iowa, also in northern and central Illinois, parts of Indiana, Ohio, New York, and Massachusetts, and in nearly all New Jersey, over 90 percent of the products of the farms were sold. These figures are heavily weighted by the larger farms, which sell nearly all their products. However, in all the United States in 1929 there were only 500,000 "self-sufficing" farms, that is, farms on which more than half the products were used by the farm family. This is about 8 percent of all farms, excluding the 340,000 part-time farms, many of which are also self-sufficing.

products, and one of \$120 cash and \$180 of home-grown products, tends to be distributed. This is compared with the distribution of living costs during reasonably prosperous times of farmers in better farming areas. One hundred dollars is the minimum amount of cash needed to provide the barest outlay of those food necessities which cannot be produced on the farm. A cash expenditure, therefore, of \$60 or less means that the people do not have adequate food. That many of the families in these areas are undernourished is evident. Dietary studies in two counties having considerable areas of the type of land under consideration show a decided lack of iron, calcium, phosphorus, protein, and vitamins in the diets of the people. An adequate supply of the first 4 elements was found in only 3 out of 41 families in the poorer county and in 7 out of 15 in the county which has less of the poorer land. In neither of these two counties are all the farms on land as poor as that which it is proposed to retire.

TABLE I.—*Distribution of farm family living when the total annual value of family living is \$300, \$500, and \$825, and with cash incomes of \$120, \$235, and \$500, respectively*

• [Excluding housing]

Total value.....	\$300	\$500	\$825
Furnished.....	180	265	325
Purchased.....	120	235	500
Food.....	\$230	\$350	\$450
Furnished.....	(170)	(250)	(300)
Purchased.....	(60)	(100)	(150)
Clothing.....	30	60	100
Household operation.....	25	40	85
Furnished.....	(10)	(15)	(25)
Purchased.....	(15)	(25)	(60)
Furnishings and equipment.....	2	10	30
Transportation.....	2	4	25
Personal care.....	3	10	20
Medical care.....	3	10	30
Formal education, recreation, gifts outside the family, and community welfare.....	5	10	60
Savings.....	0	6	25

The comparison of the living provided by these low incomes with that provided by incomes of farmers at a higher level shows that a large proportion of the low incomes goes for the bare necessities of life and a very small proportion goes to make living more worth while; food and clothing, 82 and 87 percent as compared to 67 percent, and for those items making for a higher plane of living (the items listed under "Furnishings" to "Savings"), 10 and 5 percent as compared to 23 percent. Housing has not been included in the discussion above. There is much more variation in the housing on this poor land than in the other items. In areas where farming was prosperous at one time and in individual instances where the farmer has moved onto the land in possession of sufficient capital, the houses may be fairly adequate. But on most of the farms situated on poor land the housing is relatively no better than the other aspects of living. Even the number of rooms available is often inadequate, and such facilities as running water, telephones, and electricity, are almost entirely lacking.

Public Services and Institutions.—Schools, roads, churches, and other community facilities are also meager and of poor quality. The schools provide for little else than teaching children to read and write. When a comparative study is made of the value of school property, school expenditures per pupil, teachers' salaries, length of school session, average attendance, and such other items indicating the quality of schooling, these areas rank very low. A very large proportion of the farms to be retired are located on unimproved dirt roads. It is probable that of these farms less than one-third are on improved roads of any kind. For the country as a whole, over 60 percent of all farms are on roads improved to some degree. Some of the counties, in which considerable areas of this poor land are located, have but one graveled road, that connecting the county seat with a neighboring county seat. These areas could not provide even the schools and roads which they do possess if it were not for State and Federal aid for roads and State aid for schools. Church facilities are even poorer, for here they are compelled to depend to a greater extent upon their own resources. In the southern mountain areas, many counties from which it is proposed to retire land from arable farming, have a church membership of less than one-third of their population as compared with nearly one-half of the rural population of the country as a whole. The community, because of the poor roads, inadequate schools and churches, cannot contribute much to a fuller life for these people. Spontaneous social groupings do not occur; clannishness and extreme individualism are prevalent.

It is not surprising that people who are living at the economic margin even in prosperous times have to rely upon relief when their low income is curtailed. Information regarding the relief burden in these poor areas is not available, but data for counties having large areas of submarginal land indicate that the relief burden is much above the average for the United States. In some of these counties over half the population was receiving relief in May and June 1934. For those families on distinctly "problem land", it is probable that from one-fifth to one-third are on relief. For the relief load by counties, see the maps showing relief for October 1933 and May 1934.

The conditions described below, however, are not those which have resulted from the present depression, from drought, or from other unusual causes. They are conditions under which the farmers on such land lived in more prosperous times, conditions better than those likely to prevail in the future, and vastly better than those at the present time. The inadequacy of the results to be obtained from cultivating poor land can only be realized when they be compared with the results to be obtained from farming in other areas under

similar general economic conditions or to conditions under which it should be possible for them to live elsewhere, considering the resources and technical knowledge that are available.

Some of this land has always been of low quality and has always provided a low level of living for the people who have operated it. Other land may have at one time supported the people on it at a comparatively adequate level, but the soil has become so depleted that it now provides a very meager livelihood. In other areas, the competition of better land has reduced the income on this relatively poor land so that a satisfactory return is no longer possible. In the more recently settled areas a few exceptionally favorable crop years, or high-pressure salesmanship, have induced families to settle on land which should never have been cultivated.

Problems of Local Government.—Costs of local government vary widely among the different areas of poor land. In some densely populated poor-land areas, particularly in States which have offered little assistance to local units of government in the attainment of high standards of public services, the total dollar costs per capita of local government are very low. Such expenditures buy only the minimum of services—salaries of public officials are small, roads poor, and school buildings often inadequate. In many instances schools have heavy enrollments per teacher, thereby creating a minimum cost for providing instruction.

Some economies in government might be possible through reorganization, particularly by the consolidation of small counties, but in general these areas already are at bedrock of expenditures. What is actually needed is a reorganization of the economic basis of the community, a circumstance which would provide a redirected use of the resources and afford the people of the region greater economic opportunity and greater ability to support government.

In the poor land sections of some States one may, on the other hand, find a very expensive system of local government with costs high in relation to both population and taxable property. Particularly is this the case in the settlements within cut-over and dry farming country, where farm homes or small communities are widely scattered. Here many forces converge to produce high costs of local government: Sparse settlement, which requires the administrative costs of the numerous local governments to be apportioned among a small population; and the scattering of families, which necessitates many miles of road for a few farms, a school for a few children. In 5 typical northern Wisconsin counties, 38 towns have more than 1 mile of road per farm, an arrangement which costs the State \$40 per mile in town road aid. There are literally hundreds of small schools throughout this

vast sparsely populated frontier zone. The furnishing of such facilities is a heavy burden both upon the State and upon the more productive parts of the counties, and in this type of area very significant savings in school and road costs might be effected by a redistribution of the population.

The demonstrational projects of the submarginal land program have not yet been carried to the point where the analysis of particular projects will yield a complete picture of the fiscal conditions throughout the problem areas. A few final proposals are available for study, however, and offer striking testimony concerning the financial distress in submarginal land areas.

In one Montana purchase area 40 percent of the elementary schools have less than 10 pupils per school. If the relocation of settlers be carried out as projected, it is estimated that the removal of 1,000 families to irrigation and other types of farms would make possible an annual saving of \$60,000 in schools alone. This shift would make possible an additional estimated savings of \$50,000 each year in expenditures for roads and county poor relief.

In the Lake States the evidence is equally persuasive. In one submarginal land purchase project area there, 63 percent of the farmers receive less than \$100 farm income per year. By relocating the isolated settlers, savings of more than \$100 per family in school costs and State road aids alone are likely. A few cases have been cited where the net cost to governmental agencies is \$500 or \$600, even \$1,000 per family. In one land-purchase project area it has been estimated that the average isolated farm family in nonagricultural zones costs the various units of government \$400 per year more than paid in taxes.

The scattered settlement of these people combines with the poor soil on which they live in a conspiracy to keep them in poverty. In one project area in Minnesota involving 268 families it was found that on an average the homes were 19 miles from a shipping point, 7 miles from a store, 20 miles from a high school, and 27 miles from a doctor. Under such conditions even a minimum of governmental and community services must be expensive.

The thousands of rural communities which are built upon poor and ill-used land fall between the extremes indicated by the above. In some densely settled areas costs are now at a minimum, although the services are inadequate; at the other extreme are the communities where settlement is sparse, and serious effort is made to provide adequate services. In these latter areas State assistance is sometimes generous. Taken as a group, they offer great possibilities of reduction in fiscal expenditures through relocation of persons and reorganizations of government.

The costs of local government on poor land in those States which maintain high standards of services may be illustrated by two Midwestern States—Wisconsin and Indiana—which contain very different kinds of poor-land areas. In 1932, in practically all counties of Wisconsin within what is commonly called the cut-over region, costs of local government exceeded 5 percent of the true valuation of all property in the county. In one county the costs were equal to almost 9 percent of the true value of the property. In five other counties in the lighter soils area of the central part of the State, total costs of local government exceeded 5 percent. In marked contrast to these counties, total local government costs in the predominantly rural counties of southern and eastern Wisconsin were slightly more than 3 percent of the true value. Similarly in the poor-land counties of southern Indiana total local government costs in 1931 varied from 4 percent to almost 7 percent. In the better agricultural areas the total costs of local government were usually below 3 percent. Thus in these two States, total costs of local government were from 50 to 100 percent higher in the poor-soil areas in relation to the underlying property, than in the counties with the better land.

Not all of the burden of local government costs, however, is borne by local payers of the general property tax. In recent years, particularly since 1920, the majority of States and the Federal Government have developed a system of subventions, commonly known as State and Federal aids. With the exception of certain emergency-relief grants for maintenance of the unemployed or to prevent the closing of poor schools, only a small amount of the Federal aids have gone to the direct assistance of the local units of government. The State aids, however, are now an established part of the system for financing services performed by local governments, and in practice these aids are usually financed from sources other than the general property tax.

The main purposes of State aids are either to assist or induce the local governments to attain higher standards of services or to equalize the burden of those services which are recognized as being of wide public interest. The school equalization laws are instances of a highly developed usage of the latter principle. Since these State aids have been grafted onto an existing system of local finance based upon general property-tax revenues, it is to be expected that any equalization of burdens would be related to the amount of taxable property or general property tax revenue produced within the various units of government. Thus, in any genuinely progressive system where equality of burden is attempted, State aids will be higher in the poorer areas. This is illustrated

by the experience of both Wisconsin and Indiana where subventions amount to between 25 and 40 percent of the total costs of local government in the poor land areas, in contrast to an average of 10 percent or less in the better rural counties or in the industrial counties.

Even with the assumption by State aids of the markedly greater percentage of the cost of local government in the poor land areas, taxes levied for the support of local government have been much higher in the poor areas than in wealthier portions of the States. The total of local levies in 17 northern Wisconsin counties for county, town, school district, and city or village taxes in 1932 exceeded 3 percent of the true value. In one county the average rate exceeded 6 percent. Total levies in the better farming sections averaged about 2 percent. A similar difference of from 50 to 75 percent of the rate of the better areas existed in Indiana in 1931. Preliminary investigation indicates that generally poor counties still pay higher rates of taxes in spite of the many liberal and progressive systems of State aids.

That this burden of taxation is greater than the owners of property could or would bear is shown by the high rate of tax delinquency and reversion in northern Wisconsin and other cut-over areas. While tax delinquency has not reached such proportions in Indiana as in northern Wisconsin, chronic tax delinquency has been most frequent in the poor-land areas of the southern part of the former State.

The high costs of local government in poor-land areas, both to the people living in the territory and to the remainder of the State, point to the conclusion that cost of government is determined by what may be termed the institutional pattern of the community, and in an agricultural community the institutional pattern is determined by the land use. In the American scheme of things, persons engaged in farming are dispersed over the land, and government services are supplied to them at or near their doors. This manner of dispersal means, on the basis of the probabilities of past experience, a small population scattered over a large area of new country. In the poorer sections ill adapted to farming, this widely scattered settlement seems to persist for a long time.

This suggests, furthermore, that the only alternative to expensive government in sparsely settled localities is such a change in the use of the land as will modify the institutional pattern of the community. In some areas this can be accomplished by increasing the population to the point where roads, schools, and marketing facilities may be used more intensively. In others, there is probably no alternative to abandonment of the area for agricultural uses and turning the land to a more extensive use, such as timber growing or livestock grazing.

Analysis of Conditions by Regions

Social and economic land problems vary greatly from one part of the country to another. Nevertheless, they tend toward general similarity over large areas or regions. A detailed discussion of the human conditions together with a brief description of the physical aspects of submarginal land is herewith presented regionally. The discussion and data apply only to those parts of each region in which the land is definitely submarginal. Within each of the general land-use regions there are excellent agricultural sections, to which the descriptions are not applicable. Within each region, however, are numerous so-called submarginal areas to which they definitely do apply. The discussion which follows is based upon the regionalization set forth in section I of this report.

Northeastern Highlands

The New England and Middle Atlantic States consist largely of rugged hill country, with interspersed fertile valleys and lowlands. In a few localities, as the White Mountains and the Adirondacks, the relief assumes mountainous proportions, while in parts of Pennsylvania the region locally assumes a plateau aspect. Hill country, mountain, plateau, and interspersed valleys, because of general similarity in their land-use problems, may be grouped together as the Northeastern Highland Region.

Scattered through this region there are districts containing many submarginal farms which in the aggregate contain more than 7,000,000 acres of farm land. The existence of these unprofitable farms is due to poor soil, rough topography, stoniness, and, in a few localities, to isolation.

Farm Abandonment.—While it is estimated that more than 50,000 farms in this region should ultimately be retired, and the land on them permanently withdrawn from agriculture, such a figure by no means indicates the full measure of the original submarginal land problem, because farm abandonment has here been going on for more than a century. Consequently, many farms on poor land have already been retired through the spontaneous process of abandonment. This adjustment has been facilitated by the development of sources of industrial employment in the region, and by the opening of more productive agricultural lands in the West, both of which offered a better livelihood than agriculture on the steeper and stonier lands. Despite this economic adjustment in the past, there appears to remain in use a considerable body of farm land so poor as to offer little hope of yielding a reasonable return for the farmers' labor even under conditions of national prosperity.

Owing to population increase in the coastal lowlands, much of the adjacent highland area was well occupied

before the Revolutionary War and the remainder was at least thinly settled soon after. In most of the towns of the region, the amount of land in agricultural use reached a maximum about 1810 and remained at that level until shortly after 1830. The opening of the Erie Canal and the subsequent construction of railroads facilitated the settlement of the Middle West and changed the entire agricultural set-up in the Northern States. At the same time, manufactural industries which had been scattered through small villages and rural communities began to concentrate in large city areas. The hill farmer cultivating poor soil and rough terrain, soon found it impossible to compete with the midland farmer in the production of wool, meat, and grain. Simultaneously both the cheap western lands and the high wages prevailing in nearby industrial cities offered direct inducements to farm abandonment. Consequently, many of the rural towns of this region have shown a continuous decline in population since 1830.

Early Self-sufficing Economy.—The hill towns of the Northeast constituted, at the beginning of the nineteenth century, largely self-sufficing communities. What was true of the town or township was also true of the individual farm. Not only did it tend to meet its own needs in food and clothing, but to supply most of the required nonagricultural products as well.

With the development of manufacturing and trading in the nearby villages and cities, northeastern farms manifested some tendency to specialize in the production of sheep, beef cattle, and dairy products. Western competition first ruined sheep rearing, and later drove out the production of beef. Finally, even the making of cheese and butter became unprofitable in many localities. Today, a majority of farms in the Northeastern Highlands are engaged in producing milk for city consumption. They are, however, much smaller and less specialized than the farms in the adjoining better dairying areas.

Districts of Low Incomes.—The returns from agriculture in the poorer parts of this region are and always have been small. Low soil fertility, stoniness, and rugged topography have been reductive factors, but almost equally important is the small size of fields which characterizes the farms of the region and which is the result of physical ruggedness. Modern machinery can be used only to a limited extent, and the amount of man labor required to produce the moderate yields which are returned is very high. Consequently, supplementary sources of income have been eagerly sought. In much of this region, lumbering at one time offered auxiliary winter employment. In the early part of the nineteenth century small local manufactories offered part-time employment in many localities. This resulted from the fact that much of the land in the region is and always has been forest land not in farms. Although

intensive forest management is practiced in some localities and although the recreational use of forest is considerable, great areas of forest land are contributing very little to the support of local communities.

Coal mines and oil fields (after 1859) also offered employment in parts of New York and Pennsylvania, as did marble, granite, and slate quarries in certain New England towns. These various local industries have served not only as sources of part-time wages, but what is more important, they also have provided local markets for farm products. Unfortunately, many of these supplements to farm incomes have either vanished or are greatly reduced. To a limited extent, they have been replaced by income derived from tourists, but this is true only in certain favored localities.

Small Crop Acreage on Farms.—The average “submarginal” farm in this region appears to be fairly large if measured in terms of total acreage. If, however, it be judged by amount of crop acreage or by volume of business transacted it is very small. Even in fairly prosperous years the total production from such farms will not average over \$500 annually. By total production is here meant not only products sold off the farm, but those consumed by the farm family as well. Commonly about two-thirds of the products of these farms go to family living, whereas only one-third or less enter commercial channels.

General Social Conditions.—Social conditions in the submarginal parts of the Northeastern Highlands, while superior to those in many other “problem areas” in the United States, appear in a very poor light when compared with conditions in regions of stable agricultural adjustment.

Moreover, if many of the highland or hill towns of New England or the Middle Atlantic States were forced to maintain their own community institutions and facilities from local tax funds, public services might be no better than those in some of the self-sufficing districts in the Southern Highlands. As it is, submarginal farm communities in most instances are only small patches scattered through the region. They frequently, therefore, share the same local government with well-to-do agricultural localities. These latter are compelled to maintain, in large part, public services for the poor communities with which they are politically united. To a certain extent, subventions from the States care for the needs of the submarginal districts. In some areas in the Northeastern Highlands, 90 percent or more of the cost of operating rural schools is met by State aid funds. Likewise, a large proportion of road construction and maintenance costs are defrayed from the treasuries of the several States. Not only are these areas agriculturally submarginal, therefore, but they are really no more than mendicant

communities which constitute a permanent drain upon adjacent more prosperous regions.

Savings Through Farm Retirement.—The elimination of “problem” farms from this region will obviously reduce expenses for schools and roads. In one locality comprising six rural towns, the average school expenditure per pupil exceeds \$100 annually; in another, the expenditure was \$71. Such costs compare unfavorably with an average of \$58.43 for the State as a whole.

“Problem” farm retirement would also permit the closing of many miles of roads, leaving only those needed for the forest or recreational use to which the land may be put. The savings accomplished by the elimination of roads and schools would very soon equal the total cost of acquiring the submarginal farms in some of the areas in question. Moreover, in all such areas the savings within a few years would amount to a substantial portion of the cost of farm retirement.

While fiscal savings constitute an important item, they are by no means the only or even the most important consideration. The principal reason for Federal or State acquisition of these lands is to provide for those who are now attempting to eke out a living on poor land, a chance to relocate where better opportunities exist. Such a program would also prevent these low-grade lands from being resettled by others who are ignorant of the lack of opportunities offered in these areas. On many hill farms the process of occupation and abandonment has been repeated over and over by those unacquainted with actual conditions on these uneconomic lands.

Southern Highlands and Their Margins

This region has been referred to as a forgotten frontier, and its inhabitants have been called pocketed Americans, our contemporary ancestors, survivals of Elizabethan England, and twentieth century pioneers. All of these characterizations are inaccurate, but they do express certain elements of truth in regard to the social geography of the region.

More than one-fourth of all farms in the United States which have been proposed for retirement lie in the Southern Highlands. Farm retirement here is not a matter of economic recovery nor of the regaining of prosperity; the people have never been prosperous. The highlands were first settled by frontiersmen at a time when rugged, wooded country represented the most desirable land. Later, the population was augmented by white farmers crowded out of the Cotton Belt by slave labor and plantation management. Between 1800 and 1860 the people of this region existed under a lower standard of living than that of most Negro slaves on plantations. Since the Civil War, life

in regions adjoining the Southern Highlands has been increasingly commercialized, whereas it has here largely retained its pioneer self-sufficing character. This condition alone is enough to place the highlands in an increasingly unfavorable light as compared to its neighbor areas. As pointed out by Dr. A. E. Morgan, Tennessee Valley Authority, most of the inhabitants have never known prosperity in any form. There are many thousands of families which have never seen as much as \$300 a year cash income.

General regional character.—While this area is customarily referred to as a highland region, very little of it actually exhibits such characteristics. It is only in northeastern Georgia, western North Carolina, and adjoining small parts of Tennessee and Virginia that the physical relief assumes mountainous proportions. Elsewhere, the area consists of rugged hill country, little if any higher than the bordering plains.

This region receives an abundant rainfall of 40 to 60 inches and in some localities nearly 80 inches annually; temperatures are mild and represent a transition from continental to subtropical conditions. Consequently, this hill region originally supported a fine cover of trees, in fact the finest hardwood forest in the world aside from the selvas of the tropics.

Isolation.—The Southern Highlands are located in the east central portion of the country and accessible by one day of automobile travel from Chicago, St. Louis, Atlanta, Washington, Baltimore, Philadelphia, Cleveland, Cincinnati, or Detroit. Nevertheless they are isolated to an unusual degree. In part this is due to the physical relief of the region and in part to the nature of the transportation pattern of eastern United States.

Most of the main railway lines avoid this region, skirting either its northern or southern margins. For many decades most sections were wholly without railroads. Even today existing rail facilities are for the most part minor lines designed for transporting timber, coal, and other raw products. National arterial highways also have tended to avoid the Southern Highlands. In a few instances, however, highways have been constructed directly through the region in order to reduce its isolation and make its scenery available to tourists. At the present time many counties are acquiring their first graveled roads, and numerous localities are still accessible only by horseback, or by jolt wagon. Approach to the area from some quarters is made difficult by steep escarpments and broken topography, and travel within the region is rendered difficult by tortuous rivers, labyrinthine valleys, and long unbroken ridges.

In the relative seclusion of the highlands pioneer conditions have been perpetuated to a surprising degree. Far from markets and denied the possibility of a large

cash income, families have tended to produce what they needed for their consumption. Consequently the region is characterized largely by general agriculture and in many localities by self-sufficing farming.

Blue Ridge Mountain Section.—This physical feature is a narrow ridge in Maryland and northern Virginia, but toward the south it widens out into a high and rugged mountain area. In North Carolina it reaches a width of more than 100 miles. This section has no coal, only a moderate amount of arable land, but rather excellent resources of timber. The more accessible portions were logged over many years ago, but in the more isolated districts the forests are just now being exploited.

Arable land is, in the main, scattered through the mountains in small patches known as coves or hollows. These vary in size from those able to contain only one, two, or three farm families, on up to those large enough to support several score of families. The pressure of population has become so great that every spot where cultivation is possible has been occupied. The soil, originally quite fertile, has in many localities been depleted by overcropping. Most of these coves are badly isolated from other similar areas and from markets. Houses and living standards are poor. Local intermarriage has been the common practice, and degeneracy and feeble-mindedness are said to have resulted all too frequently. Owing to dispersed settlement these people cannot be adequately served by schools, churches, or public-health and social-welfare workers.

Ridge and Valley Section.—Just west of the Blue Ridge a long narrow belt of alternating ridges and valleys, known as the Folded Appalachians, extends from central Alabama northward to Maryland. Three hundred miles to the west in Arkansas and Oklahoma lie the similar Ouachitas. Many of the valleys are floored with fertile limestone soil and the larger ones are fairly accessible. Many of the smaller valleys, however, are extremely isolated and frequently contain poor shale soils.

Farms on the ridges themselves and those in many of the extremely isolated canoe-shaped valleys are definitely submarginal and should be replaced by forest. Particularly is this true in the Ouachitas, where low-grade, self-sufficing agriculture is almost universal.

Plateau Areas.—Locally, the Southern Highlands present the aspect of small plateaus, or elevated tablelands bounded by steep escarpments. Sand Mountain and Walden Ridge in Tennessee and Alabama, portions of the Cumberland section in Kentucky, and many of the narrow flat-topped ridges in West Virginia are examples of fairly level land upon the higher elevations. In such localities, the roads, farms, and settlements lie

upon the ridges and upland areas rather than in the narrow intervening valley. The narrow ridges afford room for perhaps only one elongated farm. Wider areas may accommodate many farms and even small communities.

For the most part the upland soils are poor and stony, the summers provide relatively short growing seasons, and access to markets and outside communities is poor. To provide public services for farms on the smaller plateau areas is very costly and usually wholly uneconomic.

Cumberland-Ozark Hill Country.—A large part of the Southern Highlands was once a plain or low plateau. Stream erosion and dissection, however, has progressed so far that most of it has been transformed into an elaborately branching system of narrow, steep-sided valleys separated by winding knife-edged ridges. The present appearance is that of a rugged hill country, exhibiting great relief in the so-called Boston and Cumberland "Mountain" sections, but elsewhere, as in the Highland Rim and Shawnee Hills, showing a low relief of only a few score feet.

Agriculture.—Agricultural and other economic and social conditions vary from one part of the Southern Highlands to another. The Cumberland hill country, however, may be taken as fairly typical of the region as a whole, and hence forms the basis of discussion in the pages which follow.

Valley land was early settled and brought under cultivation. The natural increase of population, which has not been counterbalanced by emigration, has finally resulted in the utilization of practically all arable land in the Cumberlands with the exception of some of the southern portions. Unlike the rougher and less desirable parts of the Northeastern Highlands, the steeper parts of the Southern Highlands have not, in general, experienced much migration from rural areas. On the contrary, in most sections farm population has increased, and in some, notably in eastern Kentucky, it has increased much beyond the capacity of the agricultural land resources to support it.

In many of the so-called submarginal localities, therefore, much sterile and very steep land has been cleared and planted. Except along the larger streams, there is rarely any level land in the valleys. Hence the fields run steeply up the hillsides. After several generations of primitive cultivation, much land has been eroded beyond repair and abandoned. Many a barren field, however, is still doggedly tilled as the only means of family subsistence. The average crop land per farm ranges from 16 to 40 acres, and in no case is it very large.

Social and Economic Conditions.—Farm incomes are exceptionally low. Within submarginal areas scattered through five States in this region 40 to 60 percent

of all farmers received an income under \$600 in 1929. The average income ranged between \$364 and \$391. Since from \$125 to \$245 of this was living contributed by the farm, it may readily be seen that cash incomes are indeed low. Many a home must get along with less than \$100 in cash per year.

Poor living conditions must necessarily result from such low incomes. Houses are often small, shake-roofed log cabins surviving from earlier days, but more often they are simple board shacks, devoid of paint. They usually possess but one story, a chimney of rough stones and mortar, and a porch with unsightly shelves or pegs for pails and kettles. In 1930, the average value of 228 houses examined in Knott County, Ky., was only \$340. In some instances the value of houses ran as low as \$20.

Where the family is unusually large, a house may have as many as 3 or 4 rooms, each containing 1 or more double beds. Walls are commonly papered with newspapers, windows are unscreened, and heat is furnished by an open fireplace. Roofs often are leaky, and most of the scanty furniture is home-made. Sanitary arrangements are crude or lacking altogether. Wells are unprotected from contamination, spring floods often sweeping the filth from a farmyard into the wells farther down the valley.

Diet consists largely of corn bread, bacon, and sorghum molasses, supplemented in summer with vegetables either fresh or cooked in bacon fat. A survey of 41 sample diets in 1930 found that the food habits of these people generally resulted in serious deficiencies in phosphorus, calcium, iron, proteins, and vitamins.

Typhoid fever and dysentery are common. Tuberculosis claims many victims, and hookworm is highly prevalent in many districts. Serious epidemics of contagious diseases are common. Doctors are few outside the few larger towns of the region. Patients needing medical care and hospital treatment are sometimes carried on men's shoulders for many miles over rough hill trails. The general level of physical efficiency is low, the death rate is high, and old age comes early to most men and women.

Bad as are the conditions in these submarginal farm areas, those in some of the coal-mining districts are still worse. To work in the mines, many families left their self-sufficing farms and settled in miners' shacks without even garden space. In numerous instances the mines have subsequently shut down and have left hopelessly stranded considerable groups of these people.

Though one-room schools are numerous, many of the submarginal farms are too remote from them for regular attendance. Equipment is often poor and teaching inadequate. In spite of rapid improvement in recent

years, and notwithstanding the establishment of schools under home missionary and philanthropic agencies in many localities, the schooling provided the children of families in the "problem" districts is far from equal to that offered in other regions.

Although churches are highly esteemed, many remote valleys have no religious organizations or services, and others have only churches of ancient sects which elsewhere have long since passed out of existence. Preachers of whatever denomination are almost invariably uneducated men who earn their living through farming or some other secular occupation. Many families in the submarginal areas are quite out of touch with any church, and comparatively small proportions of the whole population are enlisted in the church membership. Sunday schools are rarely found outside the larger towns. Preaching services and other gatherings of a religious or semireligious nature, form almost the only organized means of social contact, there being almost no social organizations other than churches. Informal social contacts are limited to those of family life and the visiting of neighbors.

In these areas public relief is a serious problem. In four counties, more than half the population was receiving relief in May 1934, and in some months this has been true in an even larger number of counties. Indeed, the whole Southern Highland region is one of a very few sections of the country where the Federal Emergency Relief Administration has had to extend public relief to large proportions of the total population (see maps of public relief).

Border Areas.—In southern Illinois and Indiana, southeastern Ohio, and western Kentucky are extensive areas which, while not strictly a part of this region physically, do exhibit many problems in common with it.

These border districts are nearer to the prosperous agricultural areas of the Middle West, and are more accessible to city markets. They are lower in elevation and less rugged in relief, and approach to them is, therefore, not difficult. The forest and mineral resources have been thoroughly exploited, and many of the more hilly farms have been impoverished by long cultivation. Buildings are falling into disrepair, local markets have dwindled with the passing of lumbering, quarrying, and other local industries, and tax delinquency is becoming a serious problem.

Emigration has been severe, and has seriously impaired many local communities. Subventions for such localities have made heavy drains on State funds. For example, of the total amount expended for public services in Vinton County, Ohio, more than half was provided by the State. All through the border districts the public relief load has been heavy. In many instances this has resulted from derelict city families fleeing the depression and temporarily occupying the

many abandoned farmsteads scattered through these hilly areas. This recent movement has brought no additional taxable wealth to the areas in question, but it has greatly augmented school, road, and relief loads.

Southeastern Hilly Cotton and Tobacco Region

This region extends a thousand miles southwestward from the Potomac to the bluffs of the lower Mississippi. Included in it are such diverse sections as the old plantation district of Virginia, the Piedmont Upland, the clay and sand hills of the upper Atlantic Coastal Plain, the Black Belt of Alabama and Mississippi, and the rolling uplands of the Gulf Coastal Plain. In spite of this physical diversity, the region shows a definite unity in land use and in attendant land use problems.

Much of the land in this region is rolling or hilly in character, and therefore subject to many of the problems which are prevalent in the Southern Highlands. "Problem" farming is almost as extensive and probably constitutes a more urgent situation here than in the Southern Highlands. Consequently, this region contains in proportion to its area, more farms recommended for elimination than do the latter. For these reasons, it might possibly be grouped with the eastern highland regions.

On the other hand, the physical relief is much less, and the proportion of land suitable for arable farming much greater than in the highlands. Indeed, this region might well be classified with the better agricultural group of regions. It differs from these, however, in its manifestation of a prevalence of "problem" farming on submarginal land. Because of these overlapping characteristics, this region should probably be treated as a unique case.

These so-called "problem" farms are very small in size and contain an average of only 18 acres in harvested crops, and have an average in real-estate value of only \$507. The proportion of croppers and tenants, both black and white, among farmers is very high. This suggests that most of the farming is carried on without reserve resources. By the same token, farm efforts are mainly directed toward the production of immediate-money crops such as cotton and tobacco. When market prices are low, therefore, the region suffers general misfortune. Consequently, the condition of both the land and its cultivators is critical over large areas.

Soil Erosion.—With the exception of parts of the Black Belt and other small local areas, the surface of the southeastern hilly cotton and tobacco region varies from moderately to steeply rolling. In places the topography is markedly hilly, particularly in the localities near the larger streams. A large proportion of the total land area has been cleared and devoted to

agricultural uses. Crops demanding clean intertillage have been planted on very hilly land.

Few agricultural areas in the United States experience as large an annual rainfall as does this region. No part of it receives less than 40 inches and many sections receive 50 to 60 inches. The rainfall is most abundant during the summer and autumn when the loosened soil is particularly exposed to erosion. The heavy and sudden thundershower occurrence of the summer rainfall is peculiarly conducive to soil destruction. Winter temperatures are mild and the ground is usually not frozen. Hence the abundant winter rains are able to continue the processes of erosion without interruption.

Rectilinear plowing on rolling and steep hilly land has hastened both sheet washing and gullying. Striking examples of this may be seen in several localities in northeastern Mississippi, where the soil was originally a yellow loam varying from 3 to 7 feet in thickness. Under clean cultivation sheet erosion was so severe that large areas were abandoned. Gullies then developed in the idle fields, and at the same time the sandy subsoil layer was washed out. This undermined the topsoil and caused it to cave in. Soon the hills were stripped bare of their loam and only a sterile sand covering was left. The beds of streams were choked with eroded materials, and the valley soils were covered with coarse sand deposits. In the end, much agricultural land was converted into sandy waste.

Under continuous cropping in cotton and tobacco, any but the best grade of land soon becomes depleted. Many fields reaching this condition are let lie fallow. When hilly or even moderately rolling land lies fallow without a grass cover, serious erosion soon takes place.

With so many conditions augmenting soil destruction, it is not surprising that large amounts of eroded land are found in nearly every part of this region. On the Piedmont section of North Carolina, for example, 704,528 acres, or 20 percent of the total cleared land, are estimated to be in the more serious stages of erosion. This is an area larger than the State of Rhode Island. Prior to the advance of the boll weevil into this region, soils of heavier textures were at little disadvantage in cotton production, except for the tendency to erode more rapidly. Under conditions of boll-weevil infestation, however, finer textured soils experience greater incidence of boll-weevil injury because of the later maturity of cotton grown on them. Erosion of the sandy surface soils, particularly in the Piedmont, often exposes a sandy clay subsoil less desirable for cotton, even if not injured by gullying.

Farm Organization.—During the early stages of agricultural development the lands of the Southeast were cultivated in a prodigal spirit. A few years of

tobacco cultivation robbed them of their humus and soluble plant foods, after which they were abandoned for freshly cleared fields. Large plantations soon developed, based first upon indentured white farm labor, and later upon Negro slave labor. Neither of these types knew anything about the wise use of soil, and the owners and overseers knew but little more.

When the system of plantations run by means of slave labor was ended by the Civil War, there arose gradually a system by which the Negroes did the farm work under supervision for a share of the crop. At the same time many poor white farmers, who had lived in the Appalachian Highlands, the Piney Woods, and elsewhere outside the plantation belt, took advantage of the collapse in the price of farm land following the war to secure farms. Many such white farmers settled in the upper part of the Piedmont, and in other undeveloped or less developed areas. Large numbers of tenants, too poor to own tools or draft animals, worked for the large landowners on a share basis under the name of croppers. Since the Civil War the proportion of farms operated by tenants has steadily risen, until 1930 it was 64 percent or more in the portions of those States lying in this region.

In some areas the land is so largely operated by tenants or croppers that the use of land is controlled by their activity. In effect, these tenants are equivalent to hired farm labor, but, being paid in kind rather than in cash, and operating each a separate tract, their status is also more or less that of farm operators. They are enumerated as such by the Federal Census. The scheme of operating farms by means of share-tenants accompanied by a crop-lien system of merchant credit to tenants, was devised following the Civil War, as a means of enabling the landowners without liquid capital to operate their farms. It has served this purpose, but has given rise to practices not conducive to stable land use. Merchant and landlord credit secured by a crop requires that tenants use their labor in producing cash crops, preferably nonperishable commodities rather than subsistence crops or livestock. Tenants, having little stake in the land they operate, and receiving little incentive to practice good land management because of lack of immediate benefit and of uncertain tenure, fail to effect soil maintenance.

Between poverty and inability to plan ahead, neither tenants nor, in many cases, landlords have been able to meet the expense of raising a crop and of supporting their families until it was marketed and, therefore, a large proportion of the farm operations have, of necessity, been conducted on credit. Rates of interest have been high and returns have been uncertain, varying with the year's crop and with the market price.

Unfavorable factors.—Since credit can be obtained by tenants only on the security of a cash crop, one-crop

systems of farming have become firmly established in this region. Cotton tends to be the money crop wherever climatic conditions permit its production, although locally tobacco and, in a few instances, other products replace it. To a considerable extent even subsistence crops are crowded out by these main cash products.

The tenant-credit-cash crop system of agriculture has some very unfavorable results. The farm-tenant income is too small to permit of more than a bare subsistence to the family and the continuous cropping and poor methods of cultivation promote soil erosion and the depletion of soil fertility. This system has precluded the development of an energetic, progressive class of landowning farmers, and has kept the standard of living at a low level. It has tended to keep schooling brief and intermittent and the percent of illiteracy high—particularly among Negroes. It has encouraged landlords and merchants to exploit ignorant and helpless debtors and has rendered unstable both the economic and social structure of the community. The ravages of the boll weevil together with the low price of cotton during the last several years have combined to make more difficult the plight of both tenant and owner. Even Government regulation of crop acreage has not solved the matter. Such conditions are features not only of the submarginal areas but of the whole cotton and tobacco region, although they are most serious in the poorer districts.

Standard of Living and Diet.—Over large areas 80 percent or more of the farm families report an average annual income of less than \$1,000. Indeed, a considerable proportion receives less than \$600 annually. The effectiveness of these incomes is considerably diminished by charges of 20- and 25-percent interest for supplies purchased on credit from local stores. In good years whatever surplus is realized is soon spent for unnecessary articles vended by traveling salesmen and agents.

Forest products have long provided a supplementary income in many of the more hilly localities, but this has been a dwindling source of revenue as more and more of the slopes are cleared to compensate for the fields ruined by erosion. In the more severely eroded sections incomes are so low that they barely afford the means of livelihood. Some farmers are so poor that they do not own even a cow or a pig.

Houses in the submarginal areas reflect the low income conditions rather strikingly. In western Tennessee, for example, homes in the eroded districts are built of rough lumber, unpainted, and badly arranged and constructed. None have running water or sewage disposal, many are not screened, and all are cheaply and meagerly furnished.

In lieu of barns there are only a few sheds and lean-tos. So poor are living conditions in the poorer parts

of the Piedmont section of this region that large numbers of farmers, both black and white, have emigrated to the North or to the nearby mill cities.

The diet of the cotton farmer is usually deficient in certain essentials, even during prosperous periods. During hard times the diet of tenant families, particularly, tends to be restricted to the "three M's" (meal, meat, and molasses). This, even when not deficient in amount, is apparently conducive to pellagra. In addition, many families on poorer lands undoubtedly do not have enough food of whatever quality.

Tax Delinquency.—In many of the submarginal areas in this region tax delinquency is high and has accumulated over periods of 4 to 6 years. In 4 sample districts the rate of delinquency was respectively 50, 56, 70, and 100 percent. In many of the depleted and eroded areas the land is no longer capable of contributing a living for the tenant family and an income to the landlord, and of earning taxes besides. As a consequence, tax receipts have seriously declined and promise to shrink further in the future.

Many of the county governments are financially in the doldrums and some of them are so hard hit as to be unable to maintain public services and social institutions. In those States which lie partially within this region, the counties are generally unable to meet their public-relief problems, although most of them are making earnest attempts to do so.

Many families in the hilly cotton and tobacco region are receiving public relief funds, as is the case in other areas of "problem" farming. The Federal Emergency Relief Administration monthly maps, however, show that in this region the proportion of the population on relief is not exceptionally high. This appears to be due to the fact that while people here need relief as badly as those in any other area, they are so accustomed to a hopeless plight and a low living standard that they do not demand relief except in dire extremity. Then, too, the vexatious system of store credit in vogue doubtless cares for many cases.

A Poor Economic Structure.—The poorer farmers on eroded and depleted land live most of the time on credit. Farm owners who borrow on notes from the banks pay high interest rates. During 1921 these rates ranged from 6.2 percent in North Carolina to 8.94 in Georgia. Cash and share tenants obtain credit from their landlords or indirectly through their landlords from merchants and banks. Croppers depend upon landlords or upon "store credit." In 1923 only 12 percent of all cotton producers could finance their farming program without borrowing, and over 50 percent required credit from spring plowing until the time when the crop was marketed.

This wholesale dependence upon credit not only demoralizes the debtor but sometimes the whole eco-

nomie structure. Frequently the debts incurred exceed the price received from the cotton crops. When this does not cover the store credit extended, the remainder is carried over on the tenant's bill to the following year. When finally the debt becomes unbearable, a tenant family may move to another community and make a fresh start. Sometimes landlords will overlook the debt in question, lest a change of tenants prove to be for the worse. When a merchant, in turn, accumulates too many bad debts he goes into bankruptcy, throwing the burden on the wholesale houses. The net result is general business insecurity in addition to poverty and debtor dependency. The high cost of merchant and landlord credit makes it very difficult for tenants to escape from that status and become farm owners. The tendency has been, on the contrary, for tenancy to increase and ownership to be concentrated in fewer hands.

General Social Conditions.—Under an economic setup of this kind, a sound and integrated community is difficult if not impossible to maintain. Not only is the population layered into definite caste levels by land tenure and race, but, in addition, tenant families move so frequently that usually they feel neither interest nor responsibility in community problems. Social organizations are few and churches are often weak and poorly supported. As to the people, themselves, it is difficult to generalize. Some observers maintain that the human stock in many of the poorer sections is, or has become, inferior in a biological sense. If so the problem of land-use adjustment is greatly complicated. What seems more probable is that a combination of circumstances has operated almost completely to discourage individual initiative and constructive enterprise.

The Problem.—There is no question but that a large proportion of the total socio-economic fabric in this region is urgently in need of remedial treatment. Large areas of land are being progressively diminished in agricultural value, a process which has already resulted in tremendous soil ruination, and which is pointing to wholesale tragedy in the region. Economic and social stability and well-being are being undermined, and locally the inhabitants are showing symptoms of deterioration. These people are without either knowledge or resources to better their conditions. Even the States concerned are unable to cope with the problem adequately without Federal assistance.

On the poor, and particularly the more eroded lands in this region, it will unquestionably be advisable to discontinue arable farming, in part at least, and to devote the land released from crops to forest production. On the superior farm lands of the region, which embrace mainly the smooth parts, and notably the larger bodies of smooth lands with sandy surface soils,

which are more desirable for cotton and tobacco and for many of the vegetables, it is desirable for agriculture to continue. It will be urgently necessary, however, to use even these smoother lands under cropping methods that reduce erosion in order to prevent further reduction of the already much diminished acreage of good land in the region.

Great Lakes Cut-Over Region

Adjacent to Lake Superior, Lake Huron, and the northern end of Lake Michigan is an area of approximately 100,000 square miles which is wholly unlike the neighboring parts of the country.

Originally this was a region of old worn-down mountains, of ridges covered with deep residual soils, valleys filled with fertile alluvium, and large river systems furnishing adequate drainage to the land. But for many millenia this area was subjected to glaciation on a scale now taking place in Greenland and Antarctica. Today the general appearance of the region is that of a plain, above which rise a low, ice-scoured ridge of hard rock, smaller ridges of sand, and irregular hills of gravel. Former valley systems have been obliterated by glacial moraine, and present-day drainage is rudimentary. The northern parts of Wisconsin, Michigan, and Minnesota contain thousands of lakes; and tens of thousands of ponds, bogs, and muskegs dot the surface. The soils, since they are the product of haphazard glacial deposition, are extremely variegated. Some areas are closely strewn with granite boulders, extensive areas are muck or peat, and others are deep sterile sand. Central Wisconsin, for example, contains one sand area covering nearly 5,000 square miles.

Forests.—When first discovered, this region was covered with a magnificent stand of coniferous forest. White pine was the principal commercial tree, but jack pine, Norway pine, and even spruce and fir were associated with it. In the southern portion, beech, birch, and maple occur with the conifers.

The Great Lakes forest was cut during the period between 1870 and 1900, and settlement began during the seventies. The hardwood forests farther south had been cleared somewhat earlier and the land had been successfully occupied by farmers. Consequently, it was generally believed that forests on these more northerly lands would also be replaced by agricultural land use.

As a rule, the large lumber companies made a clean cut of the timber, leaving only slashings and stumps behind. No plan for reforestation was ever conceived, and hence the area was allowed to burn over time and again. Not only has this destroyed the seedlings of desirable species but it has so completely burned off the forest litter and topsoil that conditions in many

localities no longer permit of the growing of these species.

Land Settlement.—Upon the cessation of lumbering, pieces of land here and there were bought and cleared by former loggers. As a general rule, hardwoods grew on better soils whereas pines covered the more sandy sections. Not until the pine stands were depleted, however, were the hardwood areas cleared. These latter released large amounts of good land for agriculture, and their settlement was promoted by lumber companies, State immigration bureaus, and land development companies. Unfortunately, poor lands were sold along with the good. High-pressure salesmanship was used to direct streams of immigrants, workers in mines and factories, white-collar men from the cities, and farmers from the Corn Belt onto these northern cut-over lands.

Some of these settlers obtained good land which repaid the labor of clearing, but an equally large number were not so fortunate. Frequently they found themselves in possession of outcrops of crystalline rock, of undrainable peat bogs and marshes, or of stump land covered with granite boulders. Others found themselves owners of soil so light and sandy that, when cleared, it was blown about by the wind. Even many of those who did secure good land were faced with the handicap of severely dispersed settlement. Patches of good clay loam soil scattered through a generally sterile sandy region are almost worthless unless their area is large enough to support a small community and thereby make possible the attainment of means of transportation, access to market, stores where supplies may be obtained, and the acquisition of certain social institutions.

Agriculture faces many handicaps in this region. Pine stumps will persist for a century or more without rotting. To clear such land, therefore, is a long and difficult process. Soils are of the northern gray podsol type, most of which is better suited for forest growth than for farming. The superior soils can support a potatoe, rye, and limited dairy adjustment, but there are very large areas within which agricultural adjustments are out of the question.

Over much of the region the winters are long and severe. The growing season is short, and frosts may occur even during the summer months. Agriculture is cursed also with the lack of a staple crop. Hay and root crops are perhaps best adapted to natural conditions, but both are handicapped economically. Hay together with pasture here means dairying, but dairying requires expensive winter housing. Root crops production suffers from the lack of nearby markets, as does also the production of fresh milk. Consequently, agricultural crop possibilities are decidedly limited in the region.

In many of the thinly settled areas, roads are poor. Where the land is swampy, these consist of rough corduroy traces in a bad state of repair, or of rude trails skirting the muskegs and impassable during wet weather. In the pine areas they are usually little more than wheel tracks through sand. Most of the logging railways have been dismantled and on the few which remain, service is both limited in nature and irregular.

Many of the settlers have been defeated in their attempt to clear and cultivate cut-over land. In the northern part of the lower peninsula of Michigan, where the earliest attempt at settlement of such lands was made, nearly 4,000 farms were abandoned between 1910 and 1920. During the next decade 30 percent of all farms either were abandoned or changed hands. In 1926 a survey was made of a county in northern Wisconsin. The survey showed that 18 percent of all farms in the county had been abandoned. In 1931 county surveys show similar conditions in Michigan and Minnesota.

In recent years abandoned farmsteads have been reoccupied in certain localities. In most instances, this represents nothing save families fleeing depression conditions in the city and seeking subsistence opportunities in the cut-over sections. The disadvantage of this program, however, is that such families rarely are able to maintain themselves. Instead, they become relief charges in already overburdened counties.

General Uneconomic Conditions.—Throughout large parts of the cut-over region agriculture is submarginal and nearly 4,000,000 acres of land in farms should probably be retired from settlement. On the other hand good land does occur in patches large enough to support whole townships or at least sizable farm communities. It also occurs locally where either mining or recreational developments create markets for farm products, or else render it feasible to carry on part-time farming. Apart from a few such localities, general economic conditions are very unsatisfactory.

A survey in 1934 of 3,000 isolated families in northern Wisconsin reports the average family income to be \$291.03, of which the farm contributed less than \$100. A similar study of 93 farms in northern Minnesota shows the average receipts from sale of products, labor off the farm, and family living contributed from the farm amounted to \$568. In either case a low income level is indicated.

As might be expected, many of the farmers are in debt. In 1934, 40 percent of the isolated farms in the northern cut-over areas were mortgaged. In some of the poorer counties of Michigan 73 percent of the farms were under mortgage. Moreover, the rates of interest to these farmers were higher than in the nearby better agricultural regions. Needless to say, many of these farmers are unable to pay their taxes,

and tax delinquency on farm land has become a very serious problem.

Exploitation of the forest in the northern Lakes States began more recently than in the northeastern States. Large-scale methods of harvesting and clean cutting left much forest land in a nonproductive state. Timberland owners attempted to dispose of cut-over land for agricultural use. Proper discrimination between agriculturally desirable and undesirable land was not exercised by buyers or sellers. Scattered agricultural settlements sprang up in generally forested areas. Subsequent abandonment of many farms accentuated the sparseness of settlement, and increased the cost of providing public services. The cost of supporting these services falling on progressively fewer properties, the individual tax burden, including that on forest property, increased. Forest land could not bear its carrying costs, after the timber was cut, and hence was allowed to revert to the State or county through tax delinquency. As early as 1920, an area in the northern part of the lower peninsula of Michigan equivalent to six average-size counties, had reverted to the State for delinquent taxes. In Minnesota, tax delinquent land in practically all cut-over counties ranged between one-fourth and three-fourths of the total in 1932. Wisconsin similarly reports a large proportion of privately owned forest land as tax delinquent.

In contrast is the situation in northern Maine, for example, where sustained use of the forest land has prevailed and where agricultural settlement was never encouraged.

General Social Conditions.—The homes of most of the settlers are very poor. Many are tar-paper shacks or board cabins chinked with clay. Barns are frequently lacking, and fences often are crude makeshifts. Almost invariably the farmstead is set against a background of grisly stumps or fire-blackened trees.

Owing to the low scale of farm incomes, home conveniences are very few; many families lack clothes suitable for attending church or community gatherings. Since the decline of lumbering in the Lakes States, many farmers find it difficult to secure part-time labor with which to supplement their scant farm earnings. Income from farm woodlots usually has not been possible, owing to the original methods employed by the lumber companies, and the subsequent ravages by fire.

The cost of schools, roads, and county government is rendered exorbitant by dispersed farm settlement. Many miles of improved roads are maintained for only a few families. In one area in Minnesota it was found that road costs per family averaged \$90.88, whereas the taxes collected averaged \$7.03 per family. Similarly, schools are maintained and teachers' salaries paid for very small groups of children. In a sample community

in Minnesota it was found that school transportation averaged \$185.61 per family although taxes collected averaged only \$6.22. Where settlement is as dispersed as it is here, most of the land yields no taxes, and consequently this region is a serious drain upon the better, more thickly settled portions of the Lakes States.

It is believed desirable to eliminate much of the scattered settlement in the northern Lakes States, particularly that on poor land, thereby avoiding the necessity of providing the unduly expensive public services required by such settlements. The establishment of a sustained-yield management of forest land, it is believed, would be facilitated if the expensive local governmental services which exist, in many instances, for impoverished and uneconomic settlement were eliminated. It is believed that constructive management of the forest land would tend to stabilize employment by providing a continual source of material for wood-using industries. State and Federal acquisition of much forest land has taken place.

Most farmers on the cut-over lands are carrying a double load in trying to wrest a living from the soil and at the same time to clear their land of stumps. They are, therefore, too preoccupied, too weary after working hours, to participate in social activities or community life. Many of the settlers are foreign immigrants—German, Swedish, Danish, Norwegian, Finnish, Swiss, or Bohemian. Families of different nationalities are, therefore, separated by barriers of language and custom, even where distance between farms does not prohibit social intercourse. This same factor operates in the realm of church affairs. Consequently, church membership in some localities falls as low as one-fifth of the total population.

Promising Aspects in the Situation.—There is more reason to expect local and State cooperation and even initiative in connection with submarginal farm retirement programs in this region than in other "problem" areas. The poor economic and social conditions here are not of long standing and have not, therefore, come to be accepted as inevitable. Most of the inhabitants in the Great Lakes cut-over region have previously been familiar with better modes of living, and desire to have them in their present environment. Consequently, moves to better the general regional conditions will not meet with public opposition.

Political leaders in the Lakes States are fully aware of the hapless situation of farmers on the cut-over lands and are eager to cooperate with the Federal Government in any readjustment program. The States have already done much in establishing public forests and fire protection, while in Wisconsin many of the counties have enacted land-use zoning ordinances.

Atlantic and Gulf Cut-Over Region

The Flat Coastal Section.—Along the Atlantic coast the land slopes inland from sea level at a rate not exceeding 1 or 2 feet per mile. Even at the inner margin of the region, 50 to 75 miles from the coast, the elevation above sea level is only 50 to 150 feet. Consequently, since land slopes are very feeble, and since the annual rainfall totals 40 to 60 inches, drainage conditions are poor. In localities where river development is poor, the rainfall accumulates in extensive swamp areas, such as the Everglades in Florida, the Okefenokee Swamp in Georgia, and the Dismal Swamp in Virginia. Upland swamps, locally called "pocosins", are also common. Tidal marshes occur along the coast and extend inland for some distance from the lagoons which lie behind the low sandy barrier islands offshore. The swamp areas, with their muck and silt soils, originally supported forests of cypress, gum, and tupelo. The sandy interstream areas were, however, covered with extensive pine woods, which possessed locally an undergrowth of saw palmetto.

The Rolling Pine Lands.—Inland from the wet coastal section, lie the rolling pine lands. In general, the surface appears to be absolutely flat, but in certain sections there are low hills, hummocks, and generally rolling plain. In parts of these interior flatwoods of east Texas some localities are steep enough to be subject to rather severe erosion.

The prevailing soil type is a fine gray sand or sandy loam, none too fertile at best, and in many places underlain by impervious clay subsoil. Where this latter occurs, drainage is apt to be rather poor. Here and there are areas of almost pure sand, and less frequently of good silt or clay loam soil. Most of this section was originally covered with a forest of long-leaf, loblolly, or slash pine. This forest has in large measure been removed. Where it still exists and in localities where second growth has matured, logging activities are being pushed vigorously. In these southern cut-over districts conditions generally resemble those in the Great Lakes cut-over region.

Settlement.—Owing to forest cover, poor drainage, generally infertile soil, and unfavorable health conditions the flatwoods pine lands were long avoided by agricultural settlers. Small amounts of land in South Carolina and Georgia were cleared and planted during colonial times, but these were exceptions to the general rule. Prior to the Civil War, however, there had been a gradual infiltration of "poor whites" into the flatwoods of Mississippi, Alabama, Florida, Georgia, and the Carolinas. They were referred to as "crackers", "tar heels", "pine woods folk", or similar terms of near contempt by the inhabitants of adjacent regions.

White yeoman farmers in the South could not readily secure land which was capitalized on the basis of Negro

labor and plantation management. The submarginal flatwoods therefore furnished a retreat for such people. An environment of this kind is not conducive to a high degree of initiative and other qualities that make for successful living. Undoubtedly, the sandy pine lands have also attracted to themselves those who were unable or disinclined to make a living in regions of more commercialized existence.

In southeastern Mississippi the rural families on the poorer lands are mostly squatters, deriving their living from livestock grazed on the unfenced cut-overs and from the sale of wood cut from forests under absentee ownership. The number of both squatters and careless owners is still increasing, partly through the sale of cut-over land to city people, largely ignorant of farming, and partly through the gravitation thence of people from adjacent areas.

Agriculture.—Perhaps the best agricultural section of this region lies in central Florida. Much of the land appears flat, and is in part poorly drained. There are, however, numerous low hills and gentle swells known as hammocks. On some of these, good soils replace the customary sand, and hardwood forests rather than pine woods constitute the flora. Many of these have been cleared and now support orange and pomelo groves, the estates of winter residents, and tourist hotels. Outside of this section, however, agricultural land use is slight.

While local bodies of desirable agricultural land do exist, a large part of the region is either poorly drained or has relatively unproductive sandy soils or both. In attempts to settle or colonize cut-over timber lands there was failure to discriminate properly between desirable and less desirable land. It has been commonly supposed that the long frost-free season and mild winter climate adequately compensate for any deficiency in soil productivity. In a measure it is true that climate is a compensating advantage, but, on the whole, agricultural settlement in this region has not been notably successful. After 200 years, during which the rest of the country was agriculturally appropriated, it remains almost wholly in forest.

Only a small part of the Atlantic and Gulf cut-over region is in farms, and the amount of land in crops is very small indeed. Owing to infertility or poor drainage of soils, cotton and corn yields from much of the land are not high. Of late years, therefore, the region has tended toward the production of early vegetables and small fruits, items for which it is in some respects admirably adapted. Such crops, however, require not only abundant fertilizer but a progressive type of farm management. Many farmers of the flatwoods have been unable to supply either, but have adhered to traditional practices. It is therefore believed desirable to eliminate some of the most scattered settlement on

poor land in this region, and to institute constructive management on the forest land, so as to use most effectively a productive and desirable forest region.

General Economic and Social Aspects.—In the past, farm incomes have generally been eked out by part-time work in the naval stores or logging industries. In many localities this source of income is dwindling rapidly or has disappeared completely, and with it has gone the local market for farm products.

A large proportion of the flatwood farms are very small and of the self-sufficing type. On those farms definitely adjudged submarginal, an average of not more than 15 acres is devoted to crops, and the average value of farm property is approximately \$300. Cash incomes, already small, are becoming even smaller as the forest industries dwindle. Living standards are here comparable to the most isolated sections of Appalachia.

General health conditions are deplorable. Not only are these a result of poor living conditions and a restricted, unbalanced diet, but also of high humidity, poor drainage, and the prevalence of malaria.

The decline of the lumbering industry, the decrease in cash incomes of many farmers, and the general tax delinquency have greatly reduced tax receipts. It has, consequently, become almost impossible to maintain social institutions and public services in these southern cut-over areas. Added to this, the situation is greatly aggravated by dispersed settlement. Roads are poor, therefore, and schools are operated for only short terms by poorly trained and underpaid teachers.

The Prospect.—Agriculture is in the main small-scale "patch farming", operating under poor methods and achieving an income too low to maintain even a low-average living standard. Health conditions are poor. A large proportion of the land needs drainage, but the cost of this would be prohibitive. The region lacks a staple crop. For miscellaneous fruits and winter vegetables there is no prospective demand in sight. Rural settlement is so scattered that public services cannot be supplied much longer by outside agencies. A large percentage of the farmers themselves are on public relief. The region is admirably suited to the production of pine timber, and yet the visible supply of softwoods in the United States is rapidly shrinking. This forest country bordering the Atlantic and Gulf coasts is a sparsely settled region, in which large-scale exploitation of the timber resources has, except in the northeastern part, taken place relatively recently. The forest is composed in large measure of fast-growing species of high utility, and the cost of marketing its products in the timber-consuming centers is moderate. It is, therefore, desirable as a region of forest-land utilization.

Pacific Forest and Cut-Over Region

Included in this region are the Pacific Coast Ranges from San Francisco Bay northward to the Olympic Mountains, the Sierra Nevadas of California, and the Cascade Mountains of California, Oregon, and Washington. Farther inland are the Blue Mountains of Oregon, the Okanogan Highlands of Washington, and the Bitterroots, Coeur d'Alenes, and Clearwater Mountains of Idaho. Included with these are a great number of foothill areas, valleys, and partially enclosed lowlands. In general these are lands of abundant winter rain or snowfall, and originally supported a very heavy cover of coniferous forest.

Of the great forest regions of the United States the forested Pacific Northwest has been most recently exploited. The expropriation of cut-over lands for agricultural settlement has probably been retarded by the very great cost of clearing land of the large and thickly set stumps characteristic of cut-over land in this region. Nevertheless, some agricultural settlement does exist.

Settlement and Population.—Rural settlement in this region consists of extremely scattered farms in the higher mountain valleys, medium to sparse settlement in the rugged foothills, and fairly dense concentration in the lower valleys. Except in the last-named situation, few if any of these farms are socially desirable or economically profitable. It is believed desirable to eliminate such scattered settlement and concentrate agriculture in more compact communities on better lands in more accessible locations.

In California many of the inhabitants came in with the advent of mining, and were for a time prosperous because of local markets which existed in the mining camps. In Washington and Idaho, agriculture was more often an auxiliary adjustment to logging. In addition, this mountain- and hill-country habitat early began to attract trappers, hunters, prospectors, and those who preferred subsistence agriculture to the competition of commercialized living. The western foothills of the Cascades, for example, contain many migrants from the Ozarks, the Cumberlands, and other inferior agricultural areas, who chose this region because it was somewhat similar to their native environment, and enabled them to perpetuate the philosophy of life and habits of living to which they had become adjusted.

Mountain "Scratch Farms."—Soils in the mountain area are usually poor and have, where cleared, entailed great labor expenditure. Most of the farmhouses are frame shacks and, less often, log cabins, devoid of plumbing, running water, or electricity. The mountain "scratch" farms consist of from 2 to 10 acres of

cleared land (for gardens, hardy fruit trees, and crops of hay, oats, and other grains). Livestock includes a cow or two, a few hogs and chickens, and a work animal or so. Such farms are usually incapable of supplying family living even where eked out by hunting, fishing, and woodcutting. Consequently, auxiliary employment in logging camps or mines or seasonal employment in nearby cities has been imperative. The closing of mines and the cessation of logging in many areas has left these populations stranded. Between 1910 and 1930, from 5 to 15 percent of such farms were abandoned. Since then public-relief demands have been high. Except for through highways, roads are poor and blocked with snow during winter. Schools and churches are few and poor in quality. Isolation in most of these areas promotes provincialism and retards all progress.

Many of these mountain farms were occupied after the Forest Homestead Act of 1906 threw open for use many scattered tracts within the boundaries of national forests. Few if any of the settlements which have resulted have provided the operators with an adequate living or enabled them to pay for necessary public services. Moreover, their existence within the national forests probably increases the danger of timber fires, and for this if for no other reason they might well be eliminated.

Foothill "Stump Ranches."—The typical farm of the foothills is somewhat larger and more productive, but rarely prosperous. Such units include perhaps an average of 40 acres of crop land and arable pasture, together with varying amounts of stump pasture. The gross income per farmer is low, usually only a few hundred dollars. The soil usually is poor and returns so disparagingly small that even subsistence farming cannot be regarded as permanent. The institutional pattern is poor, and cost for maintenance of roads and schools is very high.

Some of these farms are located on desirable land, but their acreage of cleared land is too low to permit adequate income. The expense and labor of clearing additional acres is usually beyond the farmer's resources, except through the gratuitous expenditure of labor over many years. Some public aid in financing additional land clearing would, therefore, seem to be imperative.

Farms in "Shoestring" Valleys.—Several fairly large valleys lead back into the mountains of this region. Usually these contain deep, fertile, residual, and alluvial soil, and include a fair amount of generally level land. Mountainous slopes, entirely unsuited for agriculture, rise sharply from the valley floor. Many such valleys are quite productive. They are often many miles in length, but so narrow that the square farm tracts overlap into the adjacent mountain slopes.

As a result, they form long "shoestrings" of settlement reaching far into the national-forest areas.

Where these valleys lie along a transmontane route they are accessible to markets and to the benefits of tourist trade. On the other hand, where they end in cul-de-sacs or blind-valley heads, as do the upper Cowlitz River in Washington, the McKenzie in Oregon, and the Mokelumne in California, their very attenuation renders them remote from all possible markets. Only a few families can live in a valley of this kind and remain self-supporting. In many instances, 10 or 15 miles of country road and one or more schools must be provided for the benefit of but a few families. Frequently these cost the taxpayers more than the total value of production in the valley. In one case it was found that the cost of providing a regular grade-school education had reached a total of \$250 per pupil in contrast to the average of \$80 for the county as a whole. The roads up such a valley must be graveled at considerable expense if they are to be passable during the winter and spring. It is clear, therefore, that the maintenance of such communities is definitely uneconomical.

The Western Great Plains

The area commonly referred to as the Great Plains extends from approximately the 97th meridian westward to the Rocky Mountains. Over wide expanses the surface is surprisingly flat, but it is locally marked by considerable land relief. In central Montana the general plains character is broken by hilly and even submountainous districts. Climate varies from subhumid and semiarid to almost arid in places. The region is in general treeless, and supports a natural vegetation of short grass.

Eastern Versus Western Great Plains.—The eastern one-third of the Great Plains falls into the "blackearth" or dark-colored chernozem zone. This type of soil is unusually fertile. Ordinarily, rainfall deficiency is but slight, and grain farming on an extensive scale has been profitable.

The western two-thirds of the Great Plains presents a quite different aspect. In place of black chernozem soil, this section is characterized in its eastern part by chestnut-colored soils. Toward the west, this gives way to brown soils and locally even to gray soils. Most of these soils are also quite fertile, but the rainfall is both deficient and uncertain.

As a result of general rainfall deficiency, great rainfall variability, lower soil fertility, and locally rough topography, the western part of the Great Plains is quite generally a region of "problem agriculture."

Settlement.—Agricultural occupancy of the Great Plains began in central Kansas during the seventies and in Nebraska and Oklahoma in the eighties. In the Dakotas most of the land has been put under crops

since 1900. Montana, north and east of the Yellowstone River, was homesteaded between 1908 and 1914. South of that river only small patches of homesteading occurred. After 1910 large areas in Wyoming, Colorado, New Mexico, and western Texas received agricultural settlement.

Thus, by 1920 the Great Plains had been transformed within 50 years from an open-range pastoral area to a region of extensive dry-farming. Events have subsequently shown that this has been a development of dubious value. Over much of the western Great Plains, agricultural settlement aside from stock ranches should never have been undertaken. Indeed, this region today constitutes one of the most critical areas of uneconomic farming in the country.

Crucial Factors.—Several factors have contributed to the distress in this area.

1. Systems of farming employed have not been adjusted to the character of the region. In some instances they represent transfer of methods from humid lands farther east. In others, they represent imperfect adjustments in dry-farming.

2. The homestead unit permitted by law has usually been too small. Farms in the eastern part of the Great Plains zone average 325 acres, which is in most instances sufficiently large. Farther west, in the semi-arid zone, farm holdings average 683 acres. These are probably only two-thirds as large as they should be. Still farther west, in the more arid zone, holdings average 1,225 acres, which are in most instances far too small.

3. Violent fluctuations in the amount and seasonal distribution of rainfall occur. This has resulted from time to time in wholesale crop failure, and occasionally in widespread suffering.

4. Pastures and range land have been seriously overgrazed. This has so reduced the vegetative cover that both water and wind erosion have become acute. To this must be added during dry years the violent wind erosion from abandoned dry-farm areas, fallow fields, and even from croplands.

5. The western Great Plains, like all other of the world's shortgrass lands, are subject to additional hazards which contribute to agricultural insecurity. Hail, grasshoppers, wheat rust, chinch bugs, army worms, Hessian flies, and many other such factors assail the dry farmer.

The Rainfall Factor.—Accurate rainfall records for the western Great Plains have been kept in a few localities for nearly 50 years. An examination of such records suggests that this is the really critical factor in the agriculture of the region. In Grant County, in southwestern Kansas, the average annual rainfall over a period of approximately 50 years is about 16 inches. This suggests a rainfall normally sufficient for dry-

farming adjustments, but it actually includes such extremes as 26 inches in 1891, 8 inches in 1896, or 10 inches in 1926. Great droughts in this section occurred in the 1870's, the 1890's, the second decade of the twentieth century, and in the early 1930's.

As pointed out by S. S. Visser in his *Geography of South Dakota*, local droughts happen every year, and general droughts recur at frequent intervals. For example in South Dakota widespread droughts occurred in 1864, 1874, 1886–87, 1889–97, 1910–12, 1926, and 1931–34. A study of the records for many localities over this region suggests that there is no apparent periodicity in the ups and downs of the rainfall. If there be anything approaching a regular cycle in the recurrent droughts of this section, however, its discovery would enable man to be forewarned and to a certain extent forearmed. So far, rainfall records do not cover a period long enough to permit accurate statistical conclusions to be drawn.

This region has produced good crops in certain years and will do so again in the future, but is subject at all times to great risk. Emergencies which will entirely deplete the resources and reserves of a large proportion of the population are bound to recur again and again in the future.

Land Abandonment.—The great drought of the seventies in Kansas almost completely routed agricultural settlement. A series of wet years had tempted settlers from the Corn Belt to extend their crops and farming methods far out onto the Great Plains. With the advent of drought years the agricultural occupance melted away. During the following decade a second wave of settlement advanced into Kansas, only to be defeated by the drought years of the nineties. During this period Kansas is said to have lost nearly half a million of its inhabitants, many of them being literally starved out. Nebraska and the Dakotas suffered somewhat similarly. During the ensuing period of resettlement in Kansas, dry-farming methods were carefully worked out, and crops selected to fit environmental conditions were introduced. As a consequence, geographic stability has been achieved in eastern and central Kansas.

Again in 1913 drought produced a vast unrest in Kansas and Oklahoma, and some land abandonment took place in the western parts of those States. Farther north in Montana after 1915 almost complete abandonment of dry farming has occurred over extensive areas.

Since 1930 large areas in eastern Colorado have lost 10 percent or more of their population. The western parts of the Dakotas have also experienced some land abandonment since 1930, and large areas would probably have been evacuated had it not been for public relief, seed loans, crop benefits, feed loans, and other

forms of aid. The great drought of 1931-34 did not so seriously affect the southern Great Plains, except perhaps in parts of New Mexico as it did the northern portion lying in Montana, Wyoming, and the Dakotas. At the time of this report there was a more general recognition of problem areas in the northern than in the southern Great Plains, due perhaps to the relatively greater severity of the dry period in the northern Plains States during the years 1931-34, accentuating conditions of distress and raising questions of agricultural adaptability. A few years of above-the-average rainfall in the northern, or of pronounced drought in the southern Great Plains, would no doubt result in a somewhat different designation of problem areas than the present one.²

General Economic Conditions.—In addition to the general precariousness of farming in the western Great Plains there are locally many areas where soils are infertile or nonretentive of moisture; steeply rolling or rough topography adds its quota of poor land; occasional belts of sand hills, steep escarpments, or areas especially subject to wind erosion locally give slender returns to agriculture. For example, in some of the northern portions of the Great Plains, more than 50 percent of the land is unsuited to crop production. In many localities, therefore, land values are low. Over much of eastern Colorado, 1929 land values averaged only \$10 per acre. At present much of it is valued at \$3 to \$5 per acre. In 1934 between 25 and 35 percent of this land, formerly cropped, lay idle. Moreover, 50 percent of all land which was planted was not harvested, owing to crop failure. Nor is this an unusual occurrence, for a large acreage of wheat is left unharvested even in good or fair years. In southwestern Kansas, near the Colorado boundary, this abandoned acreage has averaged 40 percent during the last 20 years. Over large areas of the western Great Plains wheat

yields average 8 to 10 bushels and in some areas as low as 6 or 7 bushels.

Under such conditions farm incomes are frequently quite low. In western South Dakota at least 20 percent of the farms reported gross incomes of less than \$1,000 in 1929. In the "problem areas" of eastern Colorado 30 to 40 percent had gross incomes of less than \$1,000. In Montana, North Dakota, and New Mexico large numbers of farms earned less than \$600 yearly. Today these figures are much lower than in 1929.

In many localities from one-half to two-thirds of the farms are owned by absentee landlords. Well over half of the farms were mortgaged even in 1929. Today the proportion is doubtless much greater. Tax delinquency is quite general. In southwestern Kansas a 5-year weighted average for a large group of counties shows a delinquency of 17 percent. Parts of South Dakota showed on November 1933 a 20 to 30 percent delinquency in all taxes levied between 1928 and 1932. In one area in New Mexico tax delinquency has reached 92 percent. Large acreages in the Great Plains have accordingly reverted to the counties.

One of the great handicaps to many parts of the western Great Plains is the distance to market and railway. Extensive areas of farm land lie from 20 to 50 miles from railways and many farms lie at least 15 miles from rail service.

*Emergency Crop and Feed Loans.*³—In many years crop failure is so complete that seed for the following year is not available locally. In 1918-19 the President allotted approximately \$5,000,000 from the war emergency fund for seed loans in the Great Plains States. In 1921-22 Congress appropriated \$3,500,000 for the same purpose. Beginning with 1921, emergency seed or feed loan appropriations have been made available in 10 different years. The earlier appropriations were available only to limited areas which

² Since the preparation of this report, the Southern Great Plains has been more severely affected by drought, especially in the region which has been called the "Dust Bowl."

³ This discussion on emergency crop and feed loans was contributed by Norman J. Wall, Division of Agricultural Finance, Bureau of Agricultural Economics.

TABLE II.—*Emergency crop and feed loans, 1921-34*¹

Loan year	Loans made		Total collections through Aug. 31, 1934		Balance outstanding Aug. 31, 1934	
	Number	Amount	Amount	Percent of loans made	Number	Amount
1921-30, inclusive....	121,368	\$15,198,603.44	\$11,275,956.26	74.2	30,577	\$3,922,647.18
1931.....	438,952	55,786,975.85	36,900,881.73	66.1	225,725	18,886,094.12
1932.....	507,632	64,204,503.06	39,481,854.94	61.5	258,865	24,722,648.12
1933.....	633,585	57,376,039.87	44,951,608.68	78.3	238,667	12,424,431.19
Total 1921-33.....	1,701,537	192,566,122.22	132,610,301.61	68.9	753,834	59,955,820.61
1934.....	394,541	233,296,284.00	21,519,479.76	9.2	383,351	31,776,804.24
Grand total.....	2,096,078	225,862,406.22	134,129,781.37	59.4	1,137,185	91,732,624.85

¹ Data from Farm Credit Administration.

² Only \$6,783,000 of the 1934 loans had matured as of Aug. 31, 1934.

had been affected by an unusual climatic disturbance, such as drought, storm, or hail. The appropriation for 1931, occasioned by the widespread drought of 1930, was the first one to cover a very extensive area. In 1932 there was a departure from the previous policy of limiting loans to designated areas which had been affected by unusual climatic disturbances and loans were authorized in any part of the United States where farmers were unable to obtain loans for crop production.

Table II summarizes the loan operations which, until the organization of the Farm Credit Administration, were administered by the Secretary of Agriculture.

Over very large areas in the northern Great Plains, a substantial majority of the farmers have received seed loans. In portions of the Dakotas, seed loans have been required in more than half the years of the last decade. The cost to the Federal Government in extending this type of emergency credit has been very high because in the majority of instances these seed loans have not and are not likely to be repaid. For example, in 1 community selected at random in New Mexico 34 seed loans were made in 1932. Of these, only three were ever repaid, and then from other sources than farm profits. Of all the loans made during

1921 to 1933, inclusive, only 69 percent of the principal had been collected by August 31, 1934. While subsequent collections will probably raise this ratio slightly, it is evident that appreciable losses will be incurred. The cost of making and collecting these loans has been substantially greater than the amount of interest received. According to the first annual report of the Farm Credit Administration, the administrative costs for loans made in 1931 and prior years, exceeded interest collected by \$560,286 on December 31, 1933. Total administrative expenses for the 1932 loans exceed interest income by \$2,462,822 and for 1933 loans, by \$1,141,857.

These seed and crop production loans have been available in 7 different years in the States of Montana, North Dakota, and Florida. Such loans have been available for 6 years in South Carolina, North Carolina, Georgia, Alabama, Virginia, New Mexico, Idaho, and Washington. The frequency of the Federal emergency loans, on a county basis, is indicated in figure 4. The largest amount loaned in any one State during the 1921-34 period was \$20,637,237 in North Dakota. The next largest amounts went to Georgia, Arkansas, South Carolina, and North Carolina, in the order named.

FIGURE 4.—From 1921 to 1934 Federal seed loan funds were available in 10 different years. These funds have been available most frequently in the spring-wheat-growing States and in the Southeastern cotton-growing States.

The maximum number of loans was made in 1933 when the total of 633,585 represented about one loan for every 10 farms in the country. In individual States this ratio ran as high as 22 percent for North Dakota and for individual counties the ratio was substantially higher. The ratio of total number of crop production loans to total number of farms in each county in 1933 is shown in figure 5; and the ratio of feed loans to total number of farmers on August 31, 1934, is shown in figure 6. The high-ratio counties are chiefly concentrated in the spring-wheat producing States of the Great Plains and in the Southeastern cotton States. While unusual climatic conditions have been largely responsible for much of the financial distress, the continued reliance on Federal emergency financing seems to indicate that reorganization of farming programs and possibly withdrawal of marginal lands will be required to attain a sounder economic organization in these areas.

The basis upon which these loans have been made, limited as the loans are primarily to financing the purchase of seed and feed, has prevented many farmers from making necessary changes in their farming program. In many cases, it is probable that if loans were

designed to enable the farmer to reorganize his farming operations they might lead to a better utilization of his land and a higher standard of living, as well as to greater economic security.

This examination of the seed-loan situation suggests that the Federal Government has been called upon to supply extensive emergency financing in many of the areas which should probably be classified as unsuitable for farming purposes.

General Social Conditions.—The western Great Plains is a region of large farms and hence of sparse settlement. The average density of population in western South Dakota, for example, is between one and three per square mile; in North Dakota it is perhaps twice that number. In Montana, Colorado, and Wyoming the population is nearly everywhere less than two per square mile. This sparseness of settlement has enforced a high degree of isolation and has reduced the opportunity for the development of community life. Moreover, it has meant that large numbers of people are denied access to physicians, hospitals, or even churches.

It is a geographical truism that wherever population is small in relation to area the institutional pattern is

FIGURE 5.—In 1933 the largest number of emergency crop loans were made in the Southeastern States and in North Dakota and Montana. Adverse economic conditions, together with drought conditions in some areas, accounted for the large demand for this type of credit.

apt to be poor. Even though this be true in this region, the cost of political and social institutions is still too high, sometimes exceeding total county tax receipts. One must conclude that in part this is due to county units being far too small, but in part, however, it is due to an institutional program not adjusted to basic land productivity. Public buildings are costly in proportion to the total taxable wealth, the standard of school expenses high, and roads (owing to the haphazard location of farmsteads) are numerous. Consolidation of county units and zoning of rural residence to achieve lower road and school costs might achieve some economy, but the quality of public service would still be low unless these areas are to receive assistance through States and Federal funds.

In portions of the western Great Plains as many as 60 percent of all farm families depend upon cash grain crops for the major portion of their income. In a region subject to complete crop failure this is a fertile cause for wholesale distress. Even in good or average years low incomes are almost universal in many districts. A gross income of less than \$1,000 or even \$1,500 means real poverty even in normal times,

because operating expenses are high and net income is very low, and the farm often contributes almost nothing to family living. Immigrant farmers are usually more successful than those of native American stock, partly because they will accept a lower standard of living, but more so because they make their farm yield more toward family subsistence rather than concentrating their efforts on the production of the principal cash crop.

Where net incomes are as small as those of many Great Plains farmers, expenditures are limited to the purchase of the necessities of life. Practically nothing remains in all too many instances for home conveniences, amusement and recreation, or for self-improvement. Fairly representative of the areas of "problem" agriculture over the Great Plains are conditions in southwestern Kansas. Here the houses are frequently either meager frame shacks or "dugouts" with very few outbuildings. Well improved homes are scarce. The usual farmhouse has bare floors, often the plaster has partially fallen from the walls, furnishings are scarce and poor in quality, and modern conveniences are rarely seen. Wells must often be supplemented by

FIGURE 6.—The severe drought in the Northwest States in 1934 required extensive advances from the Federal Government to enable farmers to purchase feed. Additional funds were made available through the winter of 1934-35.

cisterns, machinery is unsheltered from the elements, and kitchen gardens are conspicuous by their absence.

At present, families occupying such quarters are nearly all on public relief. In some of the "problem" areas between 60 and 70 percent of the total rural population was on public relief in 1934. Even as early as 1930 some localities showed 20 to 50 percent of their rural inhabitants on relief. In some of the more critical districts large numbers of rural families are permanently stranded with no solution in sight save that of their permanent retirement from farming in this region.

In the accompanying table the western or "problem" portion of North Dakota is compared for certain items with the eastern or "nonproblem" portion of the State.

North Dakota—Contrast between the eastern and western portions

Item	East	West
Rainfall average.....	16 to 24 inches.....	12 to 16 inches.
Wheat yield per acre.....	13 bushels.....	9 bushels.
Land value per acre.....	\$40.....	\$15 to \$18.
Farm dwelling value.....	Many over \$2,000.....	Mostly less than \$1,000.
Farm incomes under \$1,000 gross.....	Under 15 percent.....	15 to 30 percent.
Mortgaged.....	5 to 25 percent.....	50 percent and over.
Seed loans: number of years between 1921-32.....	1 or 2 years out of 12.....	4 or 5 years out of 12.
Families on public relief:		
April 1930.....	0 to 15 percent.....	20 to 50 percent or over.
October 1933.....	3 to 5 percent.....	8 to 11 percent.

California Valleys and Foothills

Extent and Characteristics.—This region extends in a north-south direction through California, from Shasta County, near the Oregon line, southward to the Mexican border, and comprises perhaps half the State. The larger portion of the area consists of the Great Central Valley of the Sacramento and San Joaquin Rivers, together with the Coast Ranges on the west and the foothills of the Sierra Nevada on the east which form an almost complete rim of hill country. The remainder consists of the so-called "Valley of Southern California," a triangle of lowland lying between the ocean and the Coast Ranges which latter here swing inland for a distance of 50 to 60 miles. In all save its northern end the region is arid to subhumid in climate.

The earliest geographic adjustments to environment were pastoral. Later these were superseded by extensive agriculture and placer mining. These in turn have given way, over much of the area, to adjustments in irrigation agriculture, although earlier forms of land utilization persist in a number of localities. Today many parts of the region are characterized by forms of land utilization which are distinctly uneconomic, and it has been conservatively estimated that nearly 10,000 farms, including more than 3,000,000 acres, should be retired from agricultural production.

These constitute three distinct types of problems as follows:

1. Submarginal farming areas on the lowlands.
2. Depleted grazing areas in the northern foothills.
3. Scattered farm lands in the southern foothills.

Red Hardpan Lands of the Sacramento Valley.—Along the eastern side of the Sacramento Valley there are large areas of hardpan lands scattered among better agricultural lands. The soils are rich and friable, but are underlain at a depth of perhaps 30 inches by a very dense subsoil layer, impermeable to roots and ground water. Many attempts have been made to settle this area and to raise a wide variety of crops. On the whole, these attempts have proved unsuccessful. Where the subsoil has been dynamited tree crops have been fairly successful, but this has proved to be too expensive in most instances. Repeatedly this land has been subdivided and put on the market, with disastrous results. Today a considerable farm population is in serious financial distress. Water is almost universally scarce, houses have fallen into disrepair, tax delinquency is high, and abandonment has occurred quite generally. The resulting dispersed settlement which remains is plagued by an excessive per capita cost for rural education, roads, and governmental service.

Farther south, on portions of the alluvial fans of the Stanislaus, Tuolumne, and Merced Rivers, and on the gray hardpan along the east side of the San Joaquin River, conditions are equally unfavorable. Additional handicaps are present in the form of excessive alkali and a complete lack of irrigation water.

Clay Lands of the Santa Clara Valley.—In the southern portion of the Santa Clara Valley, there are extensive tracts of dense clay soil, upon which attempts to grow fruits and vegetables are being made. Such localities are too dry for dependable nonirrigated farming, but when they are irrigated, the orchards and vineyards are seriously damaged by alkali and poor drainage. There is needed here a careful land classification and a withdrawal from cultivation of those lands not suited for agriculture.

Poor Lands of Southern California.—In Riverside County there is a large area of medium to poor soil, which has been subdivided into small farms and marketed by assiduous salesmanship. The rainfall is deficient, irrigation water is scarce or lacking, and extremely active erosion has attended improper cultivation and overgrazing. There has resulted a great amount of tax delinquency and farm abandonment. The area at present is a social burden and no solution save retirement of arable farming suggests itself.

Grazing Lands of the Northern Foothills.—Around the edge of the Great Valley the land rises from the valley

floor through a foothill zone to the forested highlands above. On the lower portions of the foothill zone grass is the characteristic cover, while in the upper reaches chaparral and timber predominate.

Practically the entire foothill zone has passed into private ownership and has experienced some degree of agricultural settlement. The lower portions are devoted to ranch pastoralism and are in process of ruination through overgrazing and erosion. The upper foothills are partly given over to grazing, and in part occupied by scattered general farms. The farm population was once greater than at present, but land abandonment has gone on apace and today the remaining population is both sparse and haphazardly distributed. Fires intermittently sweep across these areas, probably originating in many instances from attempts to convert chaparral into grazing land. The result has been destruction of property, denudation of hillsides, and appalling erosion.

Isolation, resulting from dispersed settlement, has caused a lapse in community life. Declining population has caused school attendance to dwindle. Many farms are unable to support a family without supplementary sources of income, a circumstance which has evoked widespread financial difficulties. Over large areas total county income from taxes and other sources is less than the cost of schools, roads, and public relief for those families in distress.

Most of the upper foothill zone should be retired from private ownership, reforested, and devoted to such use as will conserve the water supply of the Great Central Valley. Portions of the lower foothills should also be withdrawn from arable farming. The remainder should remain in grazing use and be left in private hands, provided a system of intelligent range management can be evolved.

Toward the southern end of the Great Central Valley conditions are progressively worse, and ranches are in a precarious condition. Here the rainfall averages no more than 5 or 6 inches per year in some localities. Probably most of this land should revert to public range. The upper chaparral zone has no potential value for forest, but it does possess a critical importance in waterflow regulation.

In the southern Coast Ranges west of the San Joaquin section of the Great Valley the situation reaches its worst aspect. Tax delinquency has occurred on a large scale, and farm abandonment has been almost wholesale. Erosion and the burning over of scrub land have given the whole countryside the appearance of a man-made desert.

Farmlands of the Southern Foothills.—Farm settlement is scattered thinly over the numerous foothills and low mountain areas lying between the Great Central Valley and the Mexican border. Farms are usually

restricted to the small valleys between the ridges, and are, therefore, isolated from one another. Only a small amount of land is in cultivation, the intervening areas being used for grazing. Most of the farms are too small to support a family, erosion is proceeding at an alarming rate, and water supplies are precarious. Some farm abandonment has occurred and the standard of living for those who remain is often very low. Owing to dispersed settlement, the cost of governmental services is high.

Much of the southern foothills land has no value for forest production and but little for grazing. It is, however, badly needed as a watershed area for the lowlands. Its recreational value also is very high, far higher than its value for any conceivable form of agricultural use. This is due primarily to the fact that these rugged areas are not only attractive but easily accessible to more than 3,000,000 people, or 52 percent of the population of California. The value for recreation must necessarily increase in the future.

The Columbia Basin

The agriculturally undesirable part of this area lies wholly within the 10-inch rainfall line, and in many localities the annual average precipitation is as low as 5 or 6 inches. Soils are, for the most part, the light gray or brown soils typical of arid regions, and carry a natural vegetation of sagebrush. In the somewhat better watered localities of the south and east these give way to the chestnut-colored soils of the steppe under a flora of scanty bunch grass.

Settlement.—Practically all of this region was homesteaded, and all land level enough to cultivate was cleared of its sagebrush and put under the plow. Dry farming on a very extensive scale offered the only method of land use over most of the area. In contrast to this, the valleys about the margin of the Columbia Basin were irrigated and made to produce orchard fruits and alfalfa.

Abandonment.—Emigration from this region has been going on for 30 years. After a very few years of occupancy many settlers gave up and the abandonment rate in all save the irrigated districts was very heavy. This has continued until today. Over large areas land abandonment is almost complete, and only a very sparse settlement remains. In localities possessing slightly better soil and more rainfall land relinquishment has proceeded at a less rapid rate, but it has accelerated with the recent period of short crops and low prices.

Economic Conditions.—Farm holdings are very large, and, owing to the abandonment of intervening areas, the wheat ranches are interspersed among range lands. Wheat yields are almost universally below 10

bushels per acre; more often they average 6 to 8 bushels per acre. Water supply is inadequate in many localities, roads are mere trails through the sagebrush, and the average value of farm improvements is low. Wind erosion and the blowing out of crops is a serious menace and is becoming increasingly worse each year. Tax delinquency is very high in comparison with the better wheat lands of the Palouse area to the east.

Social Conditions.—This is an area of cash grain production with practically no opportunity for a farm to furnish any substantial part of the family living. Consequently, with low wheat yields, most of the gross income is absorbed in operating costs; particularly is this true in years of poor wheat prices. Living standards are very poor and the net family income exceedingly small. Houses are in some areas fairly good, but practically all modern conveniences are lacking. In many areas, however, houses consist of flimsy frame shacks which merely offer protection against wind, sun, and infrequent rain. Outbuildings are few, barns often being nothing but huts with poles supporting a straw roof. Machinery is commonly unprotected from the elements. The almost complete land abandonment has left the residual farms badly isolated. Grange halls, country churches, and schools now stand idle over large areas.

The Case of Jefferson County, Oreg.—During the last 25 years rainfall in this county has averaged 8 inches, and for one-fourth of these years it has fallen below 6¼ inches. In August 1934 72 percent of all wheat lands were tax delinquent, of which more than one-fourth had been delinquent for 6 or more years. Fifty-one percent of all farms were under mortgage to the Federal Land Bank prior to 1924, since which date no new loans have been made. More than one-third of these loans have now been foreclosed and most of the remainder are delinquent and subject to foreclosure.

Jefferson County farmers received \$125,000 (\$400 per farm on the average) under wheat allotment contracts. Even with these benefit payments almost half of all farm families were on direct public relief in July 1934. Were it not for these measures farm abandonment would have been very high. From 1920 to 1925 the number of farms in Jefferson County decreased 19 percent; from 1925 to 1930 the decrease was 28 percent; and from 1930 to 1935 the rate will undoubtedly approximate 30 percent. Judged in the light of these facts, practically all wheat lands in the Columbia Basin should revert to public range.

Arid Grazing and Irrigation Region

This region includes most of the arid lands of the United States. It is, roughly, a triangle whose base extends from the lower Rio Grande westward along

the southern international boundary to the Imperial Valley, and whose apex lies far to the north in Idaho and Oregon. Within this great triangle of aridity, adjustments in arable farming fall into three categories:

1. Irrigation farming on the lowlands.
2. Dry farming on the lowlands, piedmont slopes, and lower plateaus.
3. Subhumid farming in the timbered mountains and higher plateaus.

Each of these types includes definite maladjustments which locally are so serious as to render farming clearly uneconomic.

Irrigation Maladjustment.—A considerable number of small irrigation projects were developed during a period of heavier rainfall, as for example at Piute, Utah, in the Sevier Valley. On the average, there is not sufficient water for irrigation over a long period of time, and during the present dry period crop failure is severe and suffering is intense. This is necessarily the case, because while irrigation is not immediately dependent upon rainfall, the watersheds from which irrigation waters are derived are subject to the same fluctuations in precipitation as are the neighboring arid or semiarid lowlands. Consequently, the amount of water available for irrigation has often proved insufficient on a number of reclamation projects.

Other areas have become hopelessly waterlogged or alkalized after being irrigated, and for topographic reasons it is impossible to drain them. In the Honey Lake area of California, for example, the topsoil is very fertile, but its subsoil is so full of salts as to compel abandonment after a few years of irrigation. Throughout the region many areas have been included in irrigation projects without regard to the physical character of the soil. Some are fine sand, in which the crops may be blown out by the wind during dry or windy years. In others, outcrops of rock render cultivation difficult; in still others, the subsoil is so porous that water cannot be retained, or the soil is so infertile that crop yields are small.

In certain areas the response to these conditions has been partial abandonment, but more often it has meant poverty, failure to improve property, and inability to maintain even a moderate standard of living. In numerous irrigation districts 30 to 50 percent of the population has been forced onto the public relief rolls. Arizona reports some such localities where the inhabitants are 80 to 100 percent on relief, with a consequent loss of most of the comforts of living.

A few irrigation projects were conceived upon very poor economic plans. In the San Juan and Animas Valleys of New Mexico farms average about 75 acres in area and contain about 35 acres of crop land, on which beans, wheat, alfalfa, and other miscellaneous crops are produced. Owing to poor yield, lack of mar-

ket, alkali, and seepage, much land abandonment has occurred. The total improvements on these farms average less than \$1,000, so that even in good years the standard of living is startlingly low.

Maladjustment in Dry Farming.—Dry farms and stock ranches are sparsely disseminated through the semiarid belt along the eastern foot of the Cascades in Oregon. The homes consist of rude shacks or cabins devoid of all common comforts and wholly isolated. Instead of being directly abandoned, these farms usually change hands several times before finally becoming unoccupied, thereby causing the financial ruin of several families. Recently, hopeful back-to-the-landers have reoccupied many of these farms and a new cycle of loss has been initiated.

All through southern Idaho are patches of dry wheat land, which were settled between 1915 and 1920. The subsequent decline in wheat prices coupled with a diminution in rainfall has led to a high rate of farm abandonment. Those farms in the poorer areas which remain are distinctly submarginal. In Washington County, for example, crop yields have reached a very low level. Many farms have passed into the hands of mortgage companies.

In Utah the situation is even worse. Here, also, many dry-farming areas were settled during a period of heavier rainfall, and are now largely abandoned. Many areas, however, are on the edge of the adequate moisture belt even in good years. In many places the land is worth no more than \$3 to \$5 per acre. The water supply in some localities is so limited that drinking water must be hauled long distances. In some places the rural inhabitants have been literally starved out and a large part of the land has been sold for taxes. For those that remain, incomes approach the vanishing point, and weeds from the abandoned acres overrun the crops. Tax delinquency runs to 40 or 50 percent, and in some localities it approaches 100 percent. A high percentage of farm families is on public relief.

Farther south, in New Mexico, entire communities of submarginal farms may be noted. In one area reported from Catron and Valencia Counties the background is one of poor soil, alkali, and rough topography. In some places wells must be drilled 100 to 400 feet to procure drinking water. The expense of drilling has limited the number of wells to a ratio of one to each six families and many of these wells yield only brackish water. Farm homes are frequently one- or two-room shacks with dirt floors. Over a hundred families are too poor to own a cow; many are too far from a schoolhouse to allow their children to attend school. In the Sandoval Basin, fully 50 percent of the rural population is on public relief. Similar conditions exist in those portions of Arizona, Nevada, and California which lie in this region.

Maladjusted Subhumid Farming.—Subhumid agriculture in this region is confined to the higher mesas and plateaus and to the better watered submountainous uplands. One such area near Ravensdale (Lassen County), Calif., lies at an elevation of 5,000 feet. Killing frosts may occur during any summer month, a circumstance which, coupled with lack of access to markets, renders it almost impossible to make a living from 160 acres of land. Similarly, in the higher farming areas of Utah, the frost-free growing season is short, and crop yield is precarious. Poor roads, poor rural schools, and isolation due to abandonment of intervening areas are all conducive to a lack of community life and a lowered social tone. Most such areas should unquestionably be converted to national forest.

Arizona shows farms, and communities of farms, through the pine belt, most of which are within the limits of the national forest. A few localities can support self-sufficing farms, but most of them are distinctly submarginal.

New Mexico, likewise, contains many subhumid farm lands within the national forests or in partially timbered areas adjacent to them. In some localities settlement is so scattered as to cause a complete break-down in community and social life, but in a few areas it is so dense that all available patches of land are cultivated with an attendant serious overgrazing of the adjacent national forest. In the areas of scattered settlement roads are extremely poor and usually impassable during the winter months. The schools are usually substandard, incomes very small, and living conditions very low even in good years. The acreage of these farms is restricted and yields of gardens, root crops, forage, and small grains are meager. The total improvements per farm average from \$350 to \$600, and the access to market is usually very unsatisfactory. In many instances these farms lie from 10 to 50 miles from a market town; more rarely they lie 90 to 120 miles distant. The water table stands far below the surface and well drilling is but little developed. Most farms, therefore, must haul domestic water from sources several miles distant. Under such conditions the rate of farm abandonment has been high, some farms having been taken up and relinquished five or six times during the last few years. Taxes are about 33 percent delinquent and charity help and relief work are quite general among Anglo-American and Spanish-American and Mexican farm families alike.

Northeastern Agricultural Region

The principal part of this region extends from the lower Connecticut Valley to the Potomac River. Southeastward from this, the Shenandoah Valley extends into Virginia. Toward the north, several detached districts form related outliers. This region

is not a unit agriculturally, but includes such diverse units as the Aroostook potato district, the Connecticut Valley, the Champlain Lowland, the trucking section of the northern Coastal Plain, and the general farming areas of southeastern Pennsylvania and the Shenandoah Valley.

Settlement and Population.—This was the first region in the United States to receive extensive settlement. Consequently its soils have long been required to support agricultural production. Over large portions of the region the soils were not fertile at the outset, and great amounts of fertilizer have been required to make them productive. In addition, the rapid evolution of manufactural and commercial adjustments nearby have long afforded a counter attraction to labor. In the adjacent Northeastern Highlands, farm abandonment has been going on for a hundred years. In contrast to this, the northeastern agricultural region shows a slightly increasing farm population, and a very greatly increased farm production.

Relation to City Population.—Within or adjacent to this region is a long line of large cities, reaching from Portland, Maine, to Washington, D. C. The total population of these cities exceeds 13 million or one-tenth of the total population of the United States. As pointed out by Dr. O. E. Baker in his *Agricultural Regions of North America*, probably no region on earth possesses such an enormous and immediate city market for its products. Consequently, it has here been profitable to fertilize relatively infertile lands and to expand the production of crop specialties. Simultaneously, farm abandonment has been reduced to a minimum, and agricultural expansion locally has been encouraged.

Areas of "Problem" Agriculture.—Natural fertility and superior farm management have produced a number of highly exemplary farming areas in this region, such as the Shenandoah Valley and portions of southeastern Pennsylvania. There are many other areas of moderate fertility and even some with relatively infertile soil where the location and favorable climate outweigh soil deficiencies and make possible a profitable agriculture. Much land in the vicinity of New York, Philadelphia, and Boston which would ordinarily be submarginal for agriculture has a high value for suburban residence and part-time farming. This is true of much land adjacent to the smaller population centers also.

In contrast to these generally satisfactory conditions there are probably more than 1,400,000 acres of farm land which are distinctly submarginal. Accordingly, 3,500 farms, valued at \$7,000,000, have been recommended for elimination. Most of these lie on extremely sterile sandy soil, or on poorly drained land, in a few

instances, on land the use of which is urgently needed for public recreational use.

The largest areas of "problem" farming in this region lies in the southeastern and south central portions of New Jersey. For the most part this district is covered with sterile sandy soil, but, here and there, sandy loams are present. In addition, there are unnumbered small bogs. Originally the land supported a forest of pitch pine, mixed with black oaks and many small shrubs. For this reason, the area has long been known as the New Jersey "pine barrens."

Agricultural settlement in the pine barrens began during the Colonial period, but proceeded slowly. As urban markets developed, the encroachment of agricultural settlement upon the margins of the area was accelerated. The acreage of improved land increased each decade between 1860 and 1910. Since the latter date a decline has occurred.

At the outset, the same sort of people settled on the pine barrens as chose the better lands of New Jersey. But through emigration of the more energetic individuals, there has been a selective depreciation of the stock which has remained. Added to this, as the commercialization of agriculture proceeded, the less efficient human types have been "elbowed" out of the progressive areas, from whence they have drifted onto the submarginal sand areas.

Early land clearing for agricultural occupation tended to follow certain major thoroughfares without regard to soil quality. Many areas, therefore, were abandoned and the land has reverted to oak scrub and coppice. Between 1883 and 1898 logging operations were prosecuted along the railways, and the forest area was much diminished. Since then fire has taken a serious toll of the remaining timber.

In southeastern New Jersey, there is today an area of probably 1,200 square miles wherein there is little or no farm settlement, but upon which public management of forest is needed. Immediately surrounding this central area there is a marginal zone embracing perhaps 1,000 square miles which contains a more or less scattered farm settlement. In 1908 Dr. R. H. Whitbeck described the denizens of the pine barrens as seemingly untouched by modern urban civilization and almost as primitive as the mountaineers of the self-sufficing areas of the Southern Appalachian hill country. A large majority of the inhabitants dwelt in cabins devoid of paint. Clothing was poor, and adults commonly went barefoot during much of the year. Family living was derived by cultivating a few infertile acres, gathering cranberries in the bogs, and picking wild huckleberries. It was further eked out by raising a few hogs and chickens, and by collecting firewood from the scrub timber.

Conditions have changed since 1908, but living standards are not much improved. In 1929 probably 40 to 50 percent of all farms showed a gross income of less than \$600. Cash returns are realized from the sale of berries and cordwood. The growth of Atlantic City and other resorts along the coast has provided a market for vegetables and poultry, and many of the men find part-time employment off the farm. But the total results are far from satisfactory. Much of the land is not and cannot be occupied profitably. Under present methods of use, potential forest is rapidly being depleted by fire and by culling. An additional objection to the unrestricted use of this area arises from the fact that the land is used over and over by realty companies as "sucker bait" in inducing city families from New York and Philadelphia to acquire farm homes.

Although possessed of a great deal of land of low agricultural productivity, along with much that is agriculturally desirable, the northeastern agricultural region is one of the less critical regions as regards the magnitude of its land problems. In a long-settled area of this sort, land use has had time to become fairly well adjusted to land character and is reasonably stable. Parts of the region are urban and industrial rather than agricultural. Land use problems of importance are therefore restricted mainly to the southern part, in New Jersey, Pennsylvania, Maryland, and Delaware.

Central Agricultural Region

The Central Agricultural Region is perhaps the largest areal unit dealt with in this report. It extends from western New York, Ohio, and the Kentucky bluegrass district westward to and including much of the Great Plains. From north to south it comprises all of the land between the Great Lakes cut-over region and the Appalachian-Ozark Highlands.

In general, this is a region of excellent agricultural adjustment. Its heart is the American Corn Belt, but its margins include large portions of several adjacent agricultural provinces. The outstanding trait of this region is its general lack of submarginal agriculture. Here and there over the region are areas, each 10,000 square miles or more in area, wherein no major problems in agricultural adjustment are in evidence. Over other areas, even more extensive, the only existing problems are those of erosion control or a change in size of the farm unit.

This region is responsible for much of the volume of the agricultural production of the United States, and it contains most of the larger bodies of productive agricultural land. On the whole agriculture has been marked by the provision of relatively good family living and the support of fairly stable public services and institutions.

"Islands" of Problem Agriculture.—Scattered through this extensive region, however, are irregular patches and long strips of land in which agricultural conditions are far from satisfactory. In some instances they are as definitely submarginal and maladjusted as those of the Ozark-Appalachian hill country. These "islands" of poverty and uneconomic farming are rendered all the more conspicuous because they are set amidst a background of generally satisfactory social and economic conditions.

Such areas frequently are small, covering, perhaps, 5 to 20 square miles. Others include whole townships, groups of townships, and indeed large portions of counties. These submarginal "islands" in midwestern agriculture have resulted locally from diverse causes.

In the bluegrass basins of Kentucky and Tennessee such submarginal areas lie on patches of highly erosive shale soil or glade (rocky) land. In Ohio they lie on sand ridges or on poorly drained areas. In southern Wisconsin they are confined to valleys containing sand trains; in Michigan they consist of sterile sand plain or rough, stony terminal moraine. The imposingly steep bluffs of the Missouri River constitute a long, narrow strip of hill country in western Iowa, wherein soils are erosive, droughty, and difficult to cultivate.

Perhaps the most extensive occurrence of problem agriculture in the midlands is in western Illinois, northern Missouri, and southern and eastern Iowa. This section consists of maturely dissected hill country adjacent to the Mississippi and its principal tributaries. Such areas exhibit a relief of from 50 to 200 feet; they are usually quite rugged. This hill land was originally forested and covered with gray-brown soil, in contrast to the more fertile and lasting black soils of the adjacent prairie land.

Extent of Problem Agriculture.—Compared with the total number of farms in the central agricultural region, the number of problem farms appears very small. They probably do not exceed 12,000 in the 18 States or parts of States involved. This would include 1,402,000 acres of farm land, of which 570,000 acres are crop land. The total value of land and buildings on these farms is approximately \$25,000,000, or \$2,000 per farm.

The Case of Southeastern Iowa.—Prior to 1830 southern Iowa received considerable colonization from Missouri and the southern Appalachian States. Invariably these early immigrants in Iowa chose the bill lands along the rivers as loci for settlement. Here shelter, a water supply, wild game, and fish were immediately at hand. There was wood for houses, fences, fuel, and outbuildings. Mast for hogs was plentiful, and the soil, when cleared, was easily tilled, and adapted for corn and vegetable production. Consequently, the

river hill lands were fairly well settled before agricultural adjustment began on the prairies.

From 1830 to 1880 settlement of the prairie areas took place, and gradually a highly commercialized system of agriculture and rural living was evolved. By 1910 the river hill lands began to evince a handicap in comparison with the prairies. Life in the former localities failed to become commercialized at a rate commensurate with that on the level uplands. In part this retardation of the hilly areas can be charged to poorer transportation and inferior access; in larger part it has occurred because hill land will not readily support commercialized production. Simultaneously, the household arts and domestic industries have declined almost as rapidly on hill farms as on prairie farms. Consequently, the former has come to contribute less to family living without yielding a proportionately increased cash income.

General Economic and Social Conditions.—Improper crop rotation, poor farm practices, severe erosion resulting from the farming of steep hillsides, and increased soil acidity have resulted in generally lowered productivity of the land. At the same time the general depletion of local timber resources has caused auxiliary production to dwindle. Farm incomes in the river hill areas are generally low, averaging 50 percent or more below the State average. Such incomes, comparatively low as they are for Iowa, may seem high as compared with those of the self-sufficing agricultural areas in the Appalachians. However, with the generally higher standard of living with which these people are familiar, the incomes are often not as effective as are much lower incomes in the hill country of the Appalachians or Ozarks, for example. Not only is farm income small but the value of the farm dwelling is low on most problem farms, averaging probably between \$500 and \$1,000, but less than \$500 in many instances.

From 1920 to 1930 rural population in the problem areas of southern Iowa decreased by 25 percent. In part this resulted in desirable farm consolidation and in part in outright abandonment. During the current depression many of the vacant farmsteads have been reoccupied by migrants from the towns and cities. This class of people, usually without resources and frequently without farm experience, have merely added to the already critical public relief burden. The number of families on public relief has varied from place to place in accordance with local policies, and occasionally in relation to relief demands. During the first half of 1934 the proportion of families on relief in the problem districts in Iowa has averaged 60 percent higher than in the State as a whole.

Tax delinquency in southern Iowa is high, and in general runs higher than in other portions of the

State. As early as 1928 the area showed a 20-percent delinquency. By 1931 it had risen to 41 percent. By 1933 this had been reduced approximately to 33 percent because large amounts of farm land had passed into the hands of business concerns which have been able to pay the taxes. This agglomeration of corporate holdings has proceeded until in many localities today one-fifth to one-fourth of all farm land is corporately owned.

Erosion Control.—The high average of agricultural productivity of some of the States lying largely in this region has given rise to the recognition of problems in the use of poor land, which might appear relatively unimportant in States characterized by lower levels of agricultural productivity. In Illinois, for example, the conversion of some farm land, reported at relatively high values, to forest is advocated. In Iowa the acquisition of small scattered tracts of woodland and eroded land to be administered as public forests, is proposed. Inasmuch as the greater part of this region is characterized by relatively high income per farm family, it appears that the urgency of land use adjustment must be mainly concerned with soil conservation.

Erosion control is believed to involve a measure of replacement of intertilled crops, notably corn, by close-growing crops or pasture, by keeping erosive land in grass, legumes, or pasture for a longer part of the rotation, or by keeping the most erosive slopes permanently in soil-protecting uses. In certain areas many of the farms need somewhat larger acreage to provide adequate incomes after making this adjustment. In some of the other areas in the region larger acreages per farm would not be necessary.

Gulf Coast Prairies

This region extends from southwestern Louisiana westward along the Texas coast as far as Baffin Bay. In general, this is a low, level, plains region, trenched by shallow stream valleys. Its black soils are in the main fertile and suited for agricultural use.

In the east rice is the principal crop. In the center this gives way to cotton, and this in turn is superseded by stock raising toward the west. In the neighborhood of Galveston there is an area of dairying and mixed farming.

Over much of the region there is widespread need of drainage, but practically no areas of submarginal farming. Along the Texas coast and on the long, narrow, barrier islands offshore the soils are very sandy and wholly unsuited for agriculture. At the same time, such areas have an impelling value for public recreation and game refuge uses. Accordingly, the few farms of the islands should be eliminated to make way for more profitable use of the land.

Mississippi Delta Region

The Mississippi River, from southern Illinois to the Gulf of Mexico, flows for 500 miles over a low, flat, flood plain. South of this it continues across the delta plain which it has built outward for 150 miles into the Gulf. The Delta proper, together with the flood plain, forms a regional unit some 650 miles long and from 40 to 125 miles wide, with perhaps an average width of 75 miles.

This region may be described as 50,000 square miles of alluvium, across which the river meanders in a bewildering series of loops and turns. The average fall of the Mississippi is from 6 to 12 inches per mile through this region, a circumstance which results in a very sluggish rate of flow. The river is confined between levees of its own building (reinforced by man-made embankments) and it has aggraded its channel many feet above the level of the plain. During flood periods, crevassing of the levees occurs and large areas of the back country are flooded.

General Appearance.—The Mississippi Delta region is monotonously level in appearance, covered with rather fertile clays and fine silts, and was originally mantled with a forest of hardwoods. Here and there the land is so poorly drained that prairie or canebrake replaces forest. Occasional ridges rise above the flood plain and exhibit sandy, sandy silt, or gravelly soils.

A tremendous amount of money and effort has already been expended upon flood control and drainage in this region, but no general reclamation has been affected. Neither has any provision been made to utilize the silt burden of the Mississippi floodwaters annually to refertilize the region.

Population and Land Use.—A small proportion of land in this deltaic region has been cleared and made to yield abundant crops of cotton, corn, and sugarcane. The United States, however, has scarcely begun to utilize its alluvial lands. The Mississippi Delta today contains probably 4 million inhabitants. In contrast to this, on the Hoang-ho Delta of China, an area of identical size supports between 20 and 30 million people on soil no better and under climatic conditions less productive than those of the Mississippi Delta. The geographic adjustments which obtain on the alluvial lands of North China will probably never be approximated in the United States, but it is clearly evident that, if utilized carefully, the Mississippi Delta lands are capable of supporting a considerable proportion of the American people.

At present, conditions in this region are unique. A large percentage of the land is still in forest or swamp, because of its susceptibility to overflow, and agricultural settlement is confined to the natural levees and other better-drained parts. These are intensively

cultivated by a relatively dense population and present a striking contrast to the back swamp areas.

In the poorly drained areas there is much potentially productive land but to render it cultivable would require large drainage and flood protection works. Along with these areas of productive land, there is a considerable amount of less fertile soil. In planning many of the existing drainage units the land was not carefully classified, with the result that some farms lie on good soil, while others are on poor soil. Low incomes on these latter have occasioned tax delinquency, and this in turn has almost compelled delinquency on the better lands. The reason for this lies in the fact that drainage district taxes and assessments are pooled and applied to the entire indebtedness of the district instead of being used to reduce the indebtedness of individual farms. Hence, an individual farmer is faced with the choice of carrying the indebtedness of his delinquent neighbors or of defaulting on his own obligations.

A very large share of the improved land is in cotton (70 percent in the Yazoo Basin). There is an almost complete lack of yeoman farms, 85 percent of the farm land being in plantations and 86 percent being worked by Negro tenants. Mosquitoes, malaria, floods, and high land values have combined to keep small white farmers out of the Delta, and hence the population is predominately Negro. Per-acre crop yields are well above the averages for the four States involved, and average incomes for landowners are fairly satisfactory. Incomes for tenants, however, are far from satisfactory, illiteracy is very high, and health standards very unsatisfactory.

Areas Subject to Flood.—A large amount of potentially productive land is unutilized because of the lack of reclamation measures. Numerous areas already under cultivation, however, present very grave problems. For example, within a narrow strip extending along the river from Memphis to Vicksburg, a large amount of the land is farmed. Over the entire strip in question crops are uncertain, owing to the likelihood of their being washed away by floodwaters inside the levee or saturated by seep waters outside it.

A wide strip along the eastern edge of the Yazoo Basin is frequently overflowed. Hence farming is here both dangerous and undependable. A large portion of this is needed for retaining reservoirs in order to effect flood control. It might be made to serve additional service as public forest and game preserve.

Similarly, a considerable area at the southern end of the Yazoo is largely uneconomic for agriculture. More than 80 percent of the farmers in this district are Negroes, and 40 percent of the farms are operated

by tenants. Approximately 73 percent of the total land area is in nonproductive use at present, so that only the better soils are now being cultivated. In spite of this, the expenditure of Civil Works Administration funds averaged \$10 per capita during 1933-34. Most of this area should ultimately be used for hardwood forest and flood-control purposes.

The Outer Delta.—This section includes the margins of Lake Ponchartrain, the outer "bird's-claw" of the Delta and a wide strip along the entire southern coast of Louisiana. In general, this area consists of salt marsh and supports a dense cover. Here and there through the marshlands run higher and hence better drained ridges of older alluvium. On or adjacent to these ridges are farms, roads, and schools. The intervening marsh-grass areas, on the contrary, are unpopulated or nearly so. Scattered through them however, are hundreds of families, many of whom are squatters, who live under conditions of almost unbelievable poverty and isolation.

Such a family will customarily depend upon fish and shellfish for food, although some of them do clear tiny patches for gardens on the smaller ridges. Some income is derived from trapping fur-bearing animals, but the standard of living is usually at the irreducible minimum. The amount of clothing purchased is unbelievably small and the diet is very restricted. Frequently there are no roads reaching the homes of these people and large numbers of them are without any school service.

It is estimated that 75 percent of the wild waterfowl of the United States and Canada winter in this district. In addition, the marsh-grass cover affords excellent sanctuary for muskrat, opossum, mink, otter, raccoon, and other fur-bearing animals. Practically all of this part of the Delta region should, therefore, be withdrawn from settlement and converted to game preserve.

Southeastern Middle Coastal Plain

Extending from the James River in Virginia to southern Alabama is a region which, for want of a better name, may be designated as the Southeastern Middle Coastal Plain. From the standpoint of general land use it is clearly set off from the lower or flatwood section of the Coastal Plain on the one hand and from the hilly upper section on the other.

The surface of this region is generally level to undulating, and averages from 100 feet in elevation at the edge of the flatwoods to perhaps 500 feet at its inner margin. Several large rivers cross the plain in a sluggish manner, but many localities are very poorly drained. Certain large interstream areas are permanently swampy or contain ponds which have no outlet. In numerous instances the river bottom areas are in-

undated during spring flood and remain saturated for months.

Land Use.—Approximately half of the land is still in forest. This is a low percentage in comparison with the adjacent Atlantic and Gulf cut-over region, but it is surprisingly high for a major agricultural area. It would seem desirable to encourage forest production in this region because of several reasons. The rate of growth is rapid, the species are valuable, large lumber markets are near at hand, and most communities rather urgently need an auxiliary source of income.

Most of the nonforested land is devoted to agriculture, and with the aid of much fertilizer the rather light soils are made to produce abundant crops of cotton. Cotton, however, is not the only staple crop, for it is locally eclipsed in several localities by tobacco, peanuts, melons, vegetables, or small fruits. Corn is a universally important crop, and in hog production this region leads all other portions of the South.

The natural vegetation of the Coastal Plain was mainly longleaf pine, with an undercover of wire grass. Along the streams and on the swamp areas this gave way to cypress and gum forests. A large proportion of the longleaf pine has been cut over. In part this has been the result of long-continued lumbering operations. Indeed, many counties of the Coastal Plain today support from 10 to 50, or even more, sawmills, and in several the annual cut of timber exceeds \$100,000. In part, however, it has resulted from general land-clearing practices in connection with agriculture. The soils are prevailing sand or sandy loam, usually with sandy clay subsoil, and are easily depleted of their fertility. After several years of more or less continuous cropping in corn and cotton, therefore, it is customary to abandon for a time the poorer fields and to add new crop acres by clearing woodland.

In many portions of the region such methods are not in vogue, and yields are maintained by crop rotation, application of commercial fertilizers, and careful cultivation. Such practices would be more general were it not for the high proportion of farm tenancy, the curse of the crop-mortgage system, and the dominance of cotton in the production program.

Most of the tenant-operated farm units are small in size and do not as a rule yield a satisfactory income. Enlargement of farms, however, does not seem to offer a ready solution, because the principal staples, cotton and tobacco, require so much labor that the average tenant family cannot efficiently operate larger acreages.

Submarginal Farming Areas.—In general, this region is relatively freer from major land-use problems than most parts of the South. In many respects, therefore, it is one of the better farming regions of this country. In spite of this, there are numerous districts where

farming is definitely uneconomic. Such areas are of at least two kinds: (1) Extensive tracts of deep sandy soils which are not only nonretentive of moisture during the summer but are too infertile to justify the application of commercial fertilizer; (2) districts characterized by dispersed farm settlement. Ordinarily this last results from patchy distribution of good soils through a generally sandy area. In certain instances, however, it results from the separation of arable spots by stretches of swamp. In either case communication is made difficult and all vestiges of community life are destroyed.

On areas of these kinds there are approximately 6,800 farms containing 661,200 acres, of which 298,700 acres are now in crops. The total value of such lands, together with the buildings on them, is probably less than \$4,600,000.

By every social and economic measure these localities are submarginal. Illiteracy is high, health and dietary habits are poor, and houses are almost unbelievably flimsy and dilapidated. The cost of maintaining an institutional pattern for such districts constitutes a serious drain upon the nearby better areas and probably exceeds the total value of commercial production from the submarginal farms involved.

The elimination of farming from the areas of infertile soils would not only permit their more productive use under forestry but would also offer opportunities to their inhabitants to achieve a higher standard of living elsewhere. The retirement of farms from districts of scattered settlement would, through the mere concentration of population in other areas, provide at lower costs better schools, churches, roads, medical attention, and other amenities of individual and group living.

Western Gulf Coastal Plain

This region is known locally as the "Piney Woods" farming area. Its surface is generally rolling, but in numerous places it contains areas of rough hilly terrain and of rather level prairies. Most of the region was originally covered with a forest of pine interspersed with gum trees. Toward the southwest, in Texas, this gives way to a light woodland of black and post oak, with strings of elm and cottonwood along the streams. All of the virgin timber has been cut, and a large proportion of the land has been under cultivation for a number of years.

Land not in cultivation supports a second-growth forest, which in turn is now being cut. For a time the land was fairly productive and many farmers derived part-time employment from the forest. But cultivated

land is eroding badly, and income from the forest has disappeared.

Since 1910 farm abandonment has occurred rather generally, having been particularly marked between 1910 and 1920. Today, abandoned farmsteads are a common sight throughout northeastern Texas and the adjacent portions of Arkansas and Louisiana. The result of this abandonment has been to increase the size of some farms, but the land-operations unit is still far too small. Some authorities in Texas believe that from 25 to 50 percent of the total population in this region should ultimately be withdrawn in order to provide larger farms for the remainder. However, the question immediately arises as to whether a farm family can cultivate more than the present acreage of cotton. Perhaps the answer lies in a thoroughgoing change in farm economy in this region.

There is undoubtedly a too-intensive cropping in cotton and corn, with attendant erosion and soil depletion. If this be allowed to continue there will eventually be created a submarginal-land problem comparable to that of the hilly cotton and tobacco region east of the Mississippi.

In four or five small areas in Texas and one in Louisiana farming is distinctly uneconomic and should be replaced by forest land use. In some instances these submarginal areas result from poorly drained clay soils, in others from deep, sterile sand or gravelly soils, in still others from topography too rough to cultivate.

For the entire western Gulf Coastal Plain gross farm incomes are generally quite low. Probably 20 percent of all farms return less than \$250 annually; 30 to 50 percent, less than \$600 annually; and 80 to 85 percent, less than \$1,000.

Tax delinquency was high as long ago as 1921. By 1933 between 30 and 40 percent of all farms were delinquent. Farmhouses are usually dilapidated, devoid of paint, urgently in need of repairs, and poorly and meagerly furnished. Telephone lines are commonly in a bad state of repair, and roads impassable during a part of the year. Subvention in the form of State aid for school maintenance is generally quite high. It appears, therefore, that much of this region lies at or near the margin of profitable agricultural use.

Palouse Wheat Region

The Palouse wheat region, as here defined, embraces the better-watered and agriculturally more productive part of the northwestern plateau wheat area, and is the smallest of the land-use problem regions of the United States. Comprising the black and dark-brown soils of the eastern part of the Columbia River Basin, it

was for several decades a bonanza wheat producer. Wheat yields here (today) exceed those in other cash-grain areas.

While for many years, wheat was practically the only commodity grown, single cropping has during the last decade tended to give way to a more rational system of crop rotation, wherein peas and forage crops alternate with wheat.

Locally the region is divided into sections known in common parlance as the "Spokane, Palouse, Clearwater, and Walla Walla districts." Of these the Palouse "country" or district is perhaps the most representative, and its name might serve to characterize the whole region.

There is a limited amount of land within the region which is submarginal for agricultural use, but the total amount is so small as not to warrant discussion. Wind erosion is active along the western margin, but soil destruction by sheet washing and gulleying is proceeding almost wholesale over large portions of the region. If this be not checked, much good land will be reduced to submarginal status within a few decades.

Nonproblem Regions Containing Little Agriculture

Northern Maine.—Approximately 6,000 square miles of land in northern Maine are unsuited for agriculture. Indeed, the region contains but little population, but instead is almost wholly under forest cover. It is significant that this is one of the few large areas in the United States where forests have been satisfactorily maintained under private ownership. This is in part due to the lack of interspersed agricultural settle-

ment, which make local governmental organization and the provision of public services unnecessary.

Under these conditions, taxation of forest land is very low and the owners of timberland can afford to hold title to it and to plan for future managed production, meanwhile merely paying nominal taxes to provide for fire protection. Since the landowners know that they will not be called upon to support local government, they are not tempted to destructively exploit the forest resources and then abandon the land. Neither are they tempted to sell their land to agricultural settlers and thus create a region of scattered "problem" farming, as in most other forest and cut-over regions. Therefore the area remains in forest and gives promise of perpetual timber production under private management.

Southern Rocky Mountains.—For the most part this is a nonagricultural region, although within it there are extensive areas which are devoted to farming and grazing. A large proportion of the more rugged areas is in national forest.

Central Rocky Mountains.—This region contains the Yellowstone and Grand Teton National Parks, and the Shoshone Indian Reservation. Practically all of the remainder is in national forest.

Northern Rocky Mountains.—A very large part of this region is in national forest, national park, or Indian reservation. The foothill areas are for the most part devoted to ranch pastoralism. Considerable agricultural development is to be found in the mountain valleys, the markets for which lie in the mining centers. As a general rule, this agriculture exhibits no major maladjustments.

SECTION III

THE PROGRAM FOR RETIREMENT OF POOR FARM LAND¹

The conditions which have been described as existing in the areas from which it is proposed to retire a substantial proportion of the farms are not the result of the present depression. The depression has aggravated the difficulties in many instances, and in some of them the burden of relief is unusually heavy. The life of the people, however, is on a very low plane even in prosperous times. The adjustments in the past have been accomplished through the individual action of people living in these areas of poor farm land. These people, who have had no opportunity to secure supplemental income, could better their situation only by abandoning their farms and seeking new land or opportunity for other employment elsewhere. This process of abandonment, which has been going on in many areas for a hundred years, in itself adds to the difficulties of an area, and is a wasteful form of adjustment—wasteful of both human and natural resources. The people struggle along for years against adverse conditions before they finally abandon the land. It often happens that the older people remain, and eke out a bare existence to the end of their days. The land fares no better than the people since no one can afford to utilize it in the best way to conserve the soil. When the land is finally abandoned, it is often allowed to remain idle; the owners being in no financial position to put it to any constructive use. Such land holdings are, as a rule, too small to permit of their economical use for forestry or grazing—the only uses to which much of the land to be retired from arable farming is suited.

The remedy for and alleviation of conditions described above and throughout this section of the report are being sought through the collective action of the people. This raises the question of planning and of a program. Shall such collective action be entirely by the Federal Government, or by the various States, or by local communities, or if a mixture of all three, what shall be the scope of each? What shall be done, and how shall it be done? It is one thing to diagnose social and economic ailments; it is another thing to prescribe the remedy. Certain recommendations followed the examination of the facts as presented by the various agencies in the fall of 1934, and these have been set

forth in the National Resources Board report of December 1934. Significant among such recommendations is that “a permanent land-planning section * * * be established”, and “that a land-purchase program * * * be undertaken over a term of years, involving continued retirement of submarginal lands at the rate of about 5,000,000 acres per year for a period now estimated at 15 years.”

Certain steps have been taken to cope with the submarginal land problem, and a brief discussion of the activities follows:

The Current Land Program

The realization that Government action was necessary to improve the condition of the people living in poor farming areas and to replace the haphazard process of abandonment by a rational process of retirement, brought into existence a demonstrational program in the fall of 1933. The Public Works Administration allocated the sum of \$25,000,000 to the Surplus Relief Corporation for the land-retirement program, the administration of which was placed in the hands of a submarginal land committee. The advocates of the land-retirement program visualized the new program as the beginning of a long-time plan to readjust our land-use pattern to yield the highest social and economic benefits and to aid in the rehabilitation of hundreds of thousands of rural families who are victims of maladjustments. It was determined therefore to purchase land in areas where distress was most serious, aiding the families to locate in areas where there are better opportunities, and devote the land thus acquired to its highest social and economic use.

The selection and planning of the areas to be purchased were carried on by the Land Policy Section, Division of Program Planning, Agricultural Adjustment Administration. Resettlement activities were under the supervision of the Division of Rural Rehabilitation and Stranded Populations of the Federal Emergency Relief Administration.

With the establishment of the Resettlement Administration² the retirement of poor farm land became a part of a broader program under the Relief Appropriation Act of 1935 which involved resettlement, rehabili-

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² The Resettlement Administration was established by Executive Order No. 7028 on Apr. 30, 1935 pursuant to the authority vested in the President under the Emergency Relief Appropriation Act of 1935.

tation, and certain other relief activities. The functions and duties of the Rural Resettlement Administration as prescribed in the Executive order consist of:

(a) To administer approved projects involving resettlement of destitute or low-income families from rural and urban areas, including the establishment, maintenance, and operation, in such connection, of communities in rural and suburban areas.

(b) To initiate and administer a program of approved projects with respect to soil erosion, stream pollution, seacoast erosion, reforestation, forestation, and flood control.

(c) To make loans as authorized under the said Emergency Relief Appropriation Act of 1935 to finance, in whole or in part, the purchase of farm lands and necessary equipment by farmers, farm tenants, croppers, or farm laborers * * *.

To the extent necessary to carry out the provisions of this Executive order the Administrator is authorized to acquire, by purchase or by the power of eminent domain, any real property or any interest therein and improve, develop, grant, sell, lease (with or without the privilege of purchasing), or otherwise dispose of any such property or interest therein.

The lands purchased or to be purchased under the present administrative procedure are contemplated for certain uses, which fall in the main under forestry, recreation, wildlife preservations, Indian lands, grazing, and demonstrational projects. Insofar as possible the administration of these purchased lands is being referred to those established Government agencies which are concerned with the particular use for which a given area is intended. In some instances it is probable that cooperation with the States will be undertaken for the administration of such lands.

The Long-Time Program

The character of current financing for submarginal land purchases is not such as to place the present purchasing activities in the category of an assured

long-time land program. As previously noted, there are 454,000 farms which may be classed as submarginal, and which it is proposed to retire from arable farming. There is a total of 75,345,000 acres in these farms; of this acreage, 20,163,000 acres, or 27 percent, are crop land; 34,883,000 acres, or 47 percent, are pasture land; and 20,298,000 acres, or 23 percent, are other land such as woodlands, farmsteads, etc. (See tables III and IV for a more detailed account of the character of these acreages.) The total value of these farms is estimated to be about \$682,090,000. This would give an average value for the 75,000,000 acres of about \$9 per acre. There is still left a great amount of land for which no provision for purchase exists at present with respect to funds. However, since the purchases and the options on land up to the present (June 1, 1935) have been confined for the most part to particularly poor sections, it may be expected that the first moneys spent will purchase a greater acreage per unit cost than most of the future expenditures.

Also, since an adequate submarginal-land program must of necessity be conceived on a long-time basis, the administration of and administrative machinery for such a program will need to be worked out. Certain aspects of land problems are being handled by agencies definitely established in contemplation of long-time activities, for example, the work in forestry, agricultural economics, national parks and recreation, soil conservation, reclamation and grazing. The character of such activities and problems are set forth in other sections and parts of this report. Certain other aspects of land problems are being acted upon by governmental and other agencies, but without the same elements of assured continuance; and some aspects have received little or no action at all.

TABLE III.—Number and area of farms, acreage of crop land, pasture, and other land, and value of real estate on farms proposed to be retired from arable farming ¹

Region	Number of farms	Total	Crop land	Pasture land	Land in woodland, farmsteads, etc.	Estimated value, real estate as of 1934
	Number	Acres	Acres	Acres	Acres	Dollars
1. Northeastern Highlands.....	50,300	6,534,500	1,658,300	1,909,500	2,966,700	108,476,000
2. Southern Highlands and their margins	125,500	9,085,700	1,815,200	2,404,800	4,865,700	90,857,000
3. Southeastern hilly cotton and tobacco	122,700	10,368,000	2,957,000	874,100	6,536,900	62,208,000
4. Great Lakes cut-over.....	27,500	3,437,500	1,100,000	550,000	1,787,500	51,563,000
5. Atlantic and Gulf Coast cut-over.....	30,500	1,828,100	548,400	274,200	1,005,500	9,441,000
6. Pacific forest and cut-over.....	13,300	3,039,000	332,700	1,702,600	1,003,700	21,312,000
7. Western Great Plains.....	26,000	28,365,900	7,306,700	20,739,100	319,800	170,195,000
8. California valleys and foothills	9,500	3,203,000	698,700	2,360,200	135,100	64,060,000
9. Columbia Basin.....	2,800	3,244,000	1,513,000	1,604,400	96,600	32,440,000
10. Arid grazing and irrigated.....	7,300	2,512,400	728,800	1,472,500	311,100	10,050,600
11 and 12. Northeast and Central agricultural.....	15,100	1,634,300	666,100	460,300	507,900	32,686,000
14 and 15. Gulf Coast prairie and Mississippi Delta.....	16,600	1,431,600	509,800	493,600	428,200	21,474,000
16. Middle coastal plain.....	6,800	661,200	298,700	28,900	333,600	1,628,000
Total.....	454,200	75,345,200	20,163,400	34,883,500	20,298,300	682,090,000

¹ Preliminary estimates based on reports from the State land-planning consultants.

Research, analysis, study, and coordination of the various aspects of land problems need to be a continuing process. The problems of and recommendations for submarginal land are only part of a larger program. It is important, therefore, that the present treatise on submarginal lands should not be viewed as an attempt to answer the problem solely in terms of having the Federal Government purchase such lands and take them out of agriculture. Families will need to be moved in the process; they must be moved to locations where greater opportunities and better living will be afforded them. Methods of preventing future settlement in areas which are unsuited to agricultural pursuits will need to be invoked. Consideration will have to be given to soil conservation. These and other

problems are implicit in any sort of an adequate submarginal-land program; and on the other hand, programs which comprehend primarily other social and economic aspects of the land question will require the consideration of submarginal-land problems.

In view of the great importance, size, and character of our Nation's land problems, the operations and experiences of the present submarginal-land policy, integrated with accompanying policies and programs, may be looked upon as a tremendously large demonstrational program upon which a thoroughgoing, long-time plan for the readjustment of our land use pattern to its highest economic and social values may be projected.

TABLE IV.—Number of farms, harvested acreage, and acreage in important crops on the farms proposed for retirement ¹

[In thousands]

Region	Number of farms to be retired	Total harvested acres	Acreages of the various crops to be retired											
			Hay	Wheat	Corn	Oats	Barley	Rye	Cotton	Tobacco	Potato	Sweet-potato	Buck-wheat	Flax
	Number	Acres	Acres	Acres	Acres	Acres	Acres	Acres	Acres	Acres	Acres	Acres	Acres	Acres
1. Northeastern Highlands.....	56.3	1,409.5	1,033.0	21.6	98.0	132.6	6.0	6.5	-----	-----	31.7	-----	37.2	-----
2. Southern Highlands and margins.....	125.5	1,397.7	365.0	32.6	604.0	94.1	-----	3.7	177.0	3.8	16.3	7.5	-----	-----
3. Southeastern hilly cotton and tobacco.....	122.7	2,365.6	179.2	63.8	876.0	71.2	-----	2.5	938.2	45.4	6.1	36.9	-----	-----
4. Great Lakes cut-over.....	27.5	972.4	544.2	31.2	108.3	153.7	31.4	24.4	-----	-----	43.3	-----	-----	-----
5. Atlantic and Gulf Coast cut-over.....	30.5	466.1	14.6	-----	161.6	2.5	-----	-----	236.0	2.5	1.5	11.0	-----	-----
6. Pacific forest and cut-over.....	13.3	273.9	163.7	31.0	3.7	18.0	5.7	-----	-----	-----	2.1	-----	-----	-----
7. Western Great Plains.....	26.0	6,546.8	1,365.0	2,480.0	913.0	309.0	303.0	23.1	-----	-----	11.9	-----	-----	299.0
8. California valleys and foothills.....	9.5	524.0	131.4	43.0	8.2	13.0	77.5	-----	-----	-----	1.1	-----	-----	-----
9. Columbia Basin.....	2.8	776.2	105.8	617.5	1.0	3.6	10.3	-----	-----	-----	1.5	-----	-----	-----
10. Arid grazing and irrigated.....	7.3	536.4	268.5	195.1	13.1	12.6	19.0	-----	-----	-----	5.6	-----	-----	-----
11 and 12. Northeast and Central agricultural.....	15.4	603.7	193.0	29.4	203.2	77.4	3.7	3.0	2.0	.4	5.5	-----	-----	-----
14 and 15. Gulf Coast prairie and Mississippi Delta.....	16.6	441.0	34.9	-----	135.8	15.4	-----	-----	171.3	-----	3.3	14.1	-----	-----
16. Middle Coastal plain.....	6.8	277.1	26.2	-----	108.3	2.3	-----	-----	86.6	6.6	.3	2.7	-----	-----
United States.....	454.2	16,590.4	4,444.4	3,545.2	3,234.1	965.1	456.5	63.2	1,611.1	58.5	130.2	72.1	37.2	299.01
Percent of the United States total for each item in 1929.....	7.2	4.6	6.6	5.7	3.4	2.6	3.5	2.1	3.7	3.2	4.4	11.1	6.0	10.1
Percent of the harvested acreage on farms proposed for retirement.....	-----	-----	26.8	21.4	19.5	5.8	2.8	.4	9.3	.4	.8	.4	.2	1.8

¹ Preliminary estimates based on reports from the State land planning consultants.

SECTION IV

DROUGHT FREQUENCY ¹

Many devices have been used in presenting climatological data to show the frequency of droughts. The effect of a drought on the growth of vegetation, water supplies, etc., has many angles, depending, to a considerable extent, upon several modifying phases, such as the season of the year in which the drought occurs with reference to plant growth, conditions preceding the period of deficient precipitation, and the prevailing temperature. Very important modifying factors are the accumulated deficiency, or excess, in precipitation for the months, or even years, immediately preceding the droughty period, and the temperature conditions prevailing during it.

These supplemental factors, in addition to the fact that successive droughts are never directly comparable with regard to the actual deficiencies in precipitation or as to magnitude of the area affected, make it difficult

indeed to compare one drought with another in the matter of relative severity. When all these things are considered, however, there is no doubt that the 1934 drought was the severest in the climatological history of the United States.

From the standpoint of the effect of droughts on agriculture and the growth of vegetation in general, their frequency of occurrence is shown best through important deficiencies in precipitation, in relation to the normal, which occur during the most important growing months. Figure 7 is based on the frequency of rainfall shortages of significant amounts occurring during the 4 most important growing months, May to August, inclusive. It shows the percentage of years on the average, in which rainfall for these months is less than two-thirds of normal, based on records for 600 well-distributed stations for a uniform period of 40 years from 1894 to 1933, inclusive.

¹ By J. B. Kincer, Weather Bureau, U. S. Department of Agriculture.

FIGURE 7.—This map, prepared by the Weather Bureau in cooperation with the National Resources Board, shows the frequency of rainfall shortage during the important growing months, May to August, inclusive. It indicates that droughts are relatively infrequent east of the Mississippi River, and as a rule, become increasingly frequent westward from the Mississippi Valley. In the Great Plains and intermountain regions droughts are especially serious because of the generally light rainfall and lack of moisture reserves.

The map shows that droughts, as thus defined, are comparatively infrequent east of the Mississippi River, and, as a rule, become increasingly frequent westward from the Mississippi Valley. That is, areas having comparatively light rainfall are subject to the most frequent variation from normal, especially with regard to deficient amounts.

The lowest frequencies are shown for the Southeastern States, the eastern Ohio Valley, the Northeast, and the Lake region. In these areas considerable sections show as low as 2 to 5 percent, or during the active growing season rainfall is less than two-thirds of normal only once in 20 years or more. In fact, in most places east of the Mississippi River, droughts of this character occur less frequently than once in 10 years, on the average.

In the Great Plains States they are more frequent, becoming, as a rule, increasingly prevalent with decrease in the normal rainfall. Here the percentages range mostly from 10 to 20. However, there are several considerable areas, especially in north-central Nebraska and southern South Dakota, southwestern and extreme eastern Montana, the eastern half of Wyoming,

northern Oklahoma and extreme southern Kansas, and the Panhandle of Texas, which show comparatively infrequent droughts. On the other hand, there is a section comprising western Texas and southern New Mexico which shows much greater drought frequency, while smaller areas in different parts of the Plains States have comparatively large percentages. In the Great Basin and the far Southwest droughts are more frequent than in any other areas shown on the chart. Here the percentages in most places range up to 25, or higher, showing an average of 1 drought year in 3 or 4. The largest percentages appear in the far Southwest, especially in southern Nevada and southwestern Arizona where they run as high as 40 to 50.

It is important to bear in mind the fact that relative frequency of drought recurrence is much more serious in areas of low average rainfall than in regions of high average rainfall, for in the latter the accumulated reserve of water, both above ground and underground, is much more ample.²

² For extended information and maps on rainfall conditions, the reader is referred to pt. III, National Resources Board Report of the Water Planning Committee, December 1934.

SECTION V

RURAL-URBAN MIGRATION IN RELATION TO LAND QUALITY¹

The back-to-the-land movement during the depression years has had a most profound significance in the light of both long-time and emergency programs for land-use planning and population redistribution. A study recently completed by the land policy section in cooperation with the study of population redistribution of the Wharton School of Finance and Commerce² shows an unmistakable inverse relationship between the volume of rural-urban migration and the quality of agricultural land.

The conclusions of this study indicate that the poorer subsistence farming areas, many of which are well-known problem areas, lost larger proportions of their population than good land areas during the period of industrial activity from 1922 to 1929, and gained larger proportions during the subsequent depression. Furthermore, the poorer the land, the greater were the recent increases in population, especially in areas suitable for subsistence farming. These increases are the result of two separate influences; namely, (1) Cessation of the normal city-ward flow of excess farm population, and (2) actual migration from the city to the country. Regardless of the comparative importance of these two influences, it is apparent that many people, during the depression, have acted on the assumption that the country offered them greater economic opportunity than did the city. It is particularly significant that an important proportion of these people moved to areas, not too remote from industrial and urban centers, where opportunity existed for a subsistence type of farming. Such areas are characteristically poor for commercial agriculture, and offer meager prospects for an adequate living. It follows logically that, as industrial activity is resumed, the people least favorably situated in the rural areas are most likely to migrate to the cities.

During the present and preceding depressions the land has provided a partial shock absorber for industrial unemployment. This study shows conclusively that

in the current depression the poorer subsistence farming areas have played the dominant role. A program designed to rehabilitate these back-to-the-land migrants must recognize that the rural areas to which a large part of these migrants have retreated are not areas in which they would desire to stay, or should be induced to stay, with a return to prosperity. In such areas rehabilitation efforts would be most likely to fail. Furthermore, a program designed to prevent occupancy of such areas must be accompanied by other provisions for the economic security of the people affected.

The above conclusions are based upon an analysis of available annual school census data for States containing a sizeable group of agricultural counties.³ Though changes in the number of children of school age (usually from 6 to 20 years) will not correspond exactly with changes in total population, the discrepancies generally would not be sufficient to invalidate the inferences drawn. Agricultural counties were arbitrarily considered to be those in which the rural-farm population in 1930 represented more than 50 percent of the total population. For each State, data on agricultural counties so defined were arrayed according to gross farm income per rural farm inhabitant in 1929, and divided into quartiles. In most States where the land and climate are adapted to subsistence farming, the lowest or poorest quarter of counties, as classified according to farm income, corresponds very closely to the areas designated in this report, and in the recent summary report of the National Resources Board, as areas in which a substantial part of the land should be permanently retired from arable farming. In general, the division of agricultural counties into four groups, on the basis of income per person in 1929, classified the counties broadly according to land quality. To the extent that this is true, the conclusions stated above are valid, and may further be considered as applicable to similar areas not included in the scope of this analysis.

With little exception, the lowest-income counties include well-known problem areas. In the poorest quarter of counties, representing 21 percent of the school census of all agricultural counties, in the five

¹ By Kenneth H. Parsons, Land Policy Section, Agricultural Adjustment Administration.

² A summary of this study may be found in the Land Policy Review, Vol. 1, No. 2, March 1935, monthly publication of the Land Policy Section, Program Planning Division of the Agricultural Adjustment Administration. A more extended discussion of this study may be found in Supplement No. 1, of the Land Policy Review, June 1935, with accompanying maps and charts. The complete treatise of this study is to be published by the Wharton School of Finance and Commerce, Study of Population Redistribution.

³ Information was secured for many more States, but for the purposes of this report it seems advisable to limit the discussion to the following 12: Iowa, Kansas, Kentucky, Michigan, Missouri, Nebraska, North Dakota, Ohio, Oklahoma, South Dakota, West Virginia, and Wisconsin.

Middle Western States (Iowa, Missouri, Wisconsin, Michigan, and Ohio), school population decreased about 10 percent from 1922 to 1929, and increased about 7 percent from 1929 to 1933. In the best quarter of counties school population declined only 4 percent between 1922 and 1929, and increased only 2 percent between 1929 and 1933. Slight decreases in all groups since 1933 are apparent.

Changes in the school census of agricultural counties in these five States have been generally similar in direction, though different in degree. The most extreme change occurred in the low-income counties of Michigan. In this group, the census fell more from 1922 to 1929 and has risen more since 1929 than that of any comparable group of counties in the other four States. This may be attributed to the comparative nearness of large industrial centers, the wide fluctuations in employment characteristic of the major industries of the area, and the availability for "squatting" and subsistence farming of cheap land generally undesirable for commercial agriculture. The school census for this poorest Michigan group declined 21.1 percent from 1922 to 1929, and increased 16.1 percent from 1929 to 1934. In marked contrast with the Michigan figures are those for Iowa for the same period. Unquestionably the high quality of Iowa land, the stability of prevailing types of farming, and the relatively greater distances of most of the State from large industrial centers explain the greater stability of Iowa's rural population. In this State, the lowest income group of counties showed only a 6-percent decline in rural population from 1922 to 1929, and a tendency to level off after 1930.

In Wisconsin and Ohio the rural population of all four groups from 1922 to 1929 increased at relatively uniform rates. While the proportionately greater increase for the poorer Ohio counties since 1929 is quite obvious, that for the corresponding counties in Wisconsin is partially concealed by the fact that the reversal in trend did not take place until 1930. The more obvious increases in Ohio further support the assumption that nearness to industrial centers influences the migration of people to relatively poor subsistence farming areas in times of industrial depression. A further significant fact in this connection is shown by the pronounced dip, since 1933, in the rural census of all groups of counties for all States except Iowa. These dips are in pronounced inverse relationship to the trend of industrial employment for the same period. In Missouri the declines were similar for all groups from 1920 to 1929, but the two poorest groups have each seen sharp increases since 1929. In 1934 the rural census of the second poorest group of agricultural counties in this State reached the highest level in 14

years, while that of the poorest group closely approached the peak for the same period. In this State, the declines in rural population since 1933 are somewhat less pronounced than those shown for Michigan and Ohio.

The poorest groups of agricultural counties in Kentucky and West Virginia show population trends essentially similar to those of the comparable group of counties in Michigan, except that declines prior to 1929 were decidedly less pronounced. Since 1929, however, the increases in population in these counties have been very pronounced. The relative stability prior to the depression may be accounted for in part by the high birth rate in these areas. This factor also contributes somewhat to the great increases since 1929. However, the birth rate can hardly account for all the recent increases in the census of these areas. This is especially true of West Virginia, where the increase since 1929 was 26.7 percent. Apparently large numbers of people have migrated to these counties, probably from nearby industrial centers. While the poorest groups of counties have not shown actual decreases in population with the expansion of business activity since 1933, as was the case with Michigan, Ohio, and Missouri, they have shown a significant deceleration in the rate of increase.

Farm income does not provide as accurate an index of land quality in the five Great Plains States as in the States previously discussed. The differences in income per rural farm inhabitant, as between the lower and higher income groups of counties in these States, reflect other factors as well as variations in land quality. Differences in the density of population, in the prevailing types of farming, and in the variation of rainfall and other climatic factors from year to year, perhaps have as great an influence on income per farm inhabitant as does the relative quality of the land. In this area, trends in the census are almost the reverse of those described for the Middle West and for Kentucky and West Virginia. This difference may be attributed in part to the greater distance from industrial centers, but chiefly to the fact that the land and climate of the Great Plains States are not generally adapted to subsistence farming. An exception is seen in Oklahoma, where much land is not only adapted to subsistence farming, but has long been used in this way. In this State the declines in rural population prior to 1929, and the increases subsequent to 1929, most nearly resemble those shown for similar areas in Michigan. In Nebraska, on the other hand, good land areas showed gains, while poor land areas showed losses throughout the period covered by the study. Kansas, however, showed a tendency to reverse in all groups after 1929.

The reversal did not, however, alter the general downward trend of population in the poorer counties, while that of the better groups continued to gain.

A somewhat different picture is that presented by the data for North Dakota and South Dakota. Populations of all groups of counties in South Dakota have consistently increased during the period from 1920 to 1931. The proportionate increase for the poorest group of counties has been unmistakably greater than

that for the other groups. Each group of counties in this State showed a significant drop in school population since 1933. The situation in North Dakota has been substantially the same, except that declines for all groups began in 1931. The persistent increases in rural population in these two States, and particularly in the lower-income counties, are perhaps characteristic of relatively new country in which the better areas are settled first.