



AgEcon SEARCH
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

The World's Largest Open Access Agricultural & Applied Economics Digital Library

This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.

Help ensure our sustainability.

Give to AgEcon Search

AgEcon Search

<http://ageconsearch.umn.edu>

aesearch@umn.edu

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

No endorsement of AgEcon Search or its fundraising activities by the author(s) of the following work or their employer(s) is intended or implied.

Historic, archived document

Do not assume content reflects current scientific knowledge, policies, or practices.



U. S. DEPARTMENT OF AGRICULTURE.

OFFICE OF EXPERIMENT STATIONS—CIRCULAR 76.

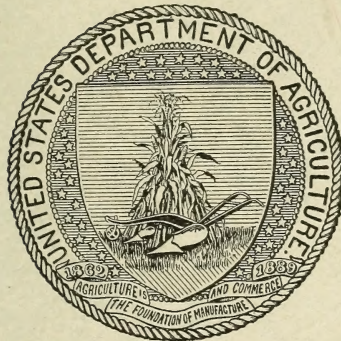
A. C. TRUE, Director.

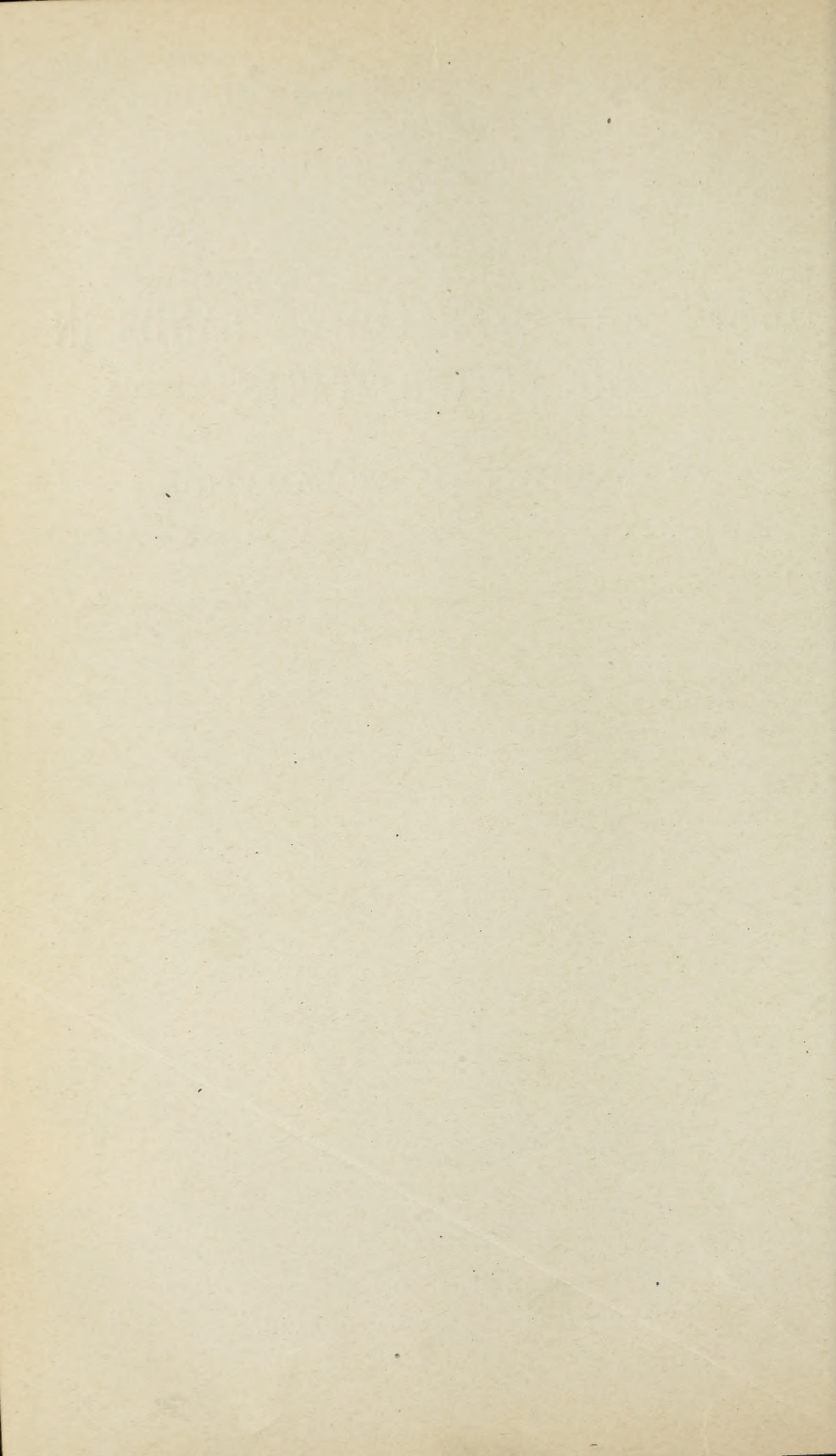
SWAMP AND OVERFLOWED LANDS IN
THE UNITED STATES.

OWNERSHIP AND RECLAMATION.

BY

J. O. WRIGHT,

*Supervising Drainage Engineer,
Irrigation and Drainage Investigations.*WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1907.



LETTER OF TRANSMITTAL.

U. S. DEPARTMENT OF AGRICULTURE,
OFFICE OF EXPERIMENT STATIONS,
Washington, D. C., August 31, 1907.

SIR: I have the honor to transmit herewith a report giving the results of a canvass made by this Office to determine the area of swamp and overflowed lands in the States east of the Rocky Mountains. The estimate, based on this canvass, is 77,000,000 acres. The high prices of agricultural lands have created a demand for the reclamation of this wet land, which makes this estimate of its area and a statement as to its ownership and the possibilities of its reclamation of special interest. It is therefore recommended that this statement be issued as a circular of this Office.

Respectfully,

A. C. TRUE,
Director.

Hon. JAMES WILSON,
Secretary of Agriculture.

[Cir. 76]

(3)

CONTENTS.

| | Page. |
|--|-------|
| Grants to States..... | 5 |
| Amount and location..... | 7 |
| Quality of the soil..... | 9 |
| Can these lands be reclaimed?..... | 9 |
| Drainage a public function..... | 11 |
| Cooperation necessary..... | 11 |
| Drainage laws necessary..... | 12 |
| Methods of assessment..... | 20 |
| What the drainage of these lands means to the United States..... | 23 |

ILLUSTRATION.

| | Page. |
|---|-------|
| PLATE I. Map showing the areas of swamp and overflowed lands in the States east of the Rocky Mountains..... | 8 |

[Cir. 76]

SWAMP AND OVERFLOWED LANDS IN THE UNITED STATES.

GRANTS TO STATES.

The swamp lands of this country have been the subject of public discussion for more than half a century. Their value and future possibilities were recognized at an early day, and to encourage and promote their drainage the swamp-land grants were made by Congress, ceding these lands to the several States in which they were situated. The first act was passed in 1849 and reads as follows:

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That to aid the State of Louisiana in constructing the necessary levees and drains to reclaim the swamp and overflowed lands therein the whole of these swamp and overflowed lands which may be or are found unfit for cultivation shall be, and the same are hereby, granted to that State.

On September 28 the following year a similar act was passed by Congress ceding to each of the other States of the Union in which swamp and overflowed lands were situated all of such lands within their borders that remained unsold at the passage of the act. Neither the amount nor the location of these lands was known at the time, but the grant included all the swamp and overflowed lands unfit for cultivation and remaining unsold at the date of the grant. In construing this law the Secretary of the Interior ruled that it did not grant swamp and overflowed land to States admitted into the Union after its passage; hence, on March 12, 1860, Congress extended the provisions of the act to the States of Oregon and Minnesota, which had recently been admitted into the Union.

At the time of the passage of these acts two methods were specified, either of which the States might select for the purpose of designating the swamp lands within their borders:

(1) The field notes of the Government survey might be taken as the basis for selections, and all lands shown by them to be swamp or overflowed within the meaning of the act, which were otherwise vacant and unappropriated September 28, 1850, would pass to the States.

(2) The States could select the lands by their own agents and report the same to the United States surveyor-general, with proof as to their character.

Some of the States elected to take the first method, and others took the second, but later they found it to their advantage to be guided by the field notes of the Government surveys, and the first method was adopted by most of the States. Under these grants swamp lands have been claimed by the various States up to June 30, 1906, as follows:

Swamp lands claimed by the States up to June 30, 1906.

| State. | Acres. | State. | Acres. |
|-----------------|-------------------------------|------------------|------------------|
| Alabama..... | 534, 190. 04 | Michigan..... | 7, 293, 278. 93 |
| Arkansas..... | 8, 656, 372. 39 | Minnesota..... | 5, 472, 375. 86 |
| California..... | 2, 066, 253. 22 | Mississippi..... | 3, 604, 795. 93 |
| Florida..... | 22, 273, 207. 98 | Missouri..... | 4, 843, 676. 09 |
| Illinois..... | 3, 981, 784. 10 | Ohio..... | 117, 992. 00 |
| Indiana..... | 1, 377, 727. 70 | Oregon..... | 526, 903. 63 |
| Iowa..... | 4, 572, 816. 27 | Wisconsin..... | 4, 802, 872. 12 |
| Louisiana..... | ^a 11, 216, 831. 33 | | |
| Louisiana..... | ^b 785, 270. 00 | Total..... | 82, 126, 347. 59 |

This table shows that three States—Florida, Arkansas, and Louisiana—have received half the lands granted by these acts, while the other half has been distributed among twelve States, though Illinois, Indiana, Iowa, Michigan, Minnesota, Wisconsin, and Missouri received the most of it. There still remains several thousand acres to be patented to the States under the provisions of this act, but it is in small tracts and in many places no survey has been made of it. The States, however, can call for this land when its location is determined and it must be deeded to them under the provisions of this swamp-land grant; so, in reality, the Federal Government owns no swamp land, but is simply holding it in trust for the several States in which it is situated.

Upon the organization of the Federal Government all the unsold land in the thirteen original States became vested in the States, and, if it has not been sold or granted to private ownership, is still the property of the States. The Federal Government never had any ownership in the salt marsh and the swamps and overflowed land in these States. Therefore, with the exception of the swamps on a few Indian reservations, over which the Federal Government has jurisdiction, these lands are all held in private ownership or else are owned or, when located, can be claimed by the States in which they are situated. As the country is developed and these lands become more accessible there is a greater demand for them, and many of the old claims are now being contested and suits brought to quiet title and determine the legal ownership. These proceedings, however, are between individuals or between the State and individuals and do not affect the Federal Government except so far as determining whether the land in question is swamp and overflowed in the meaning of the swamp-land acts.

^a Act of 1849.

^b Act of 1850.

AMOUNT AND LOCATION.

In order to have definite and reliable information concerning the extent, character, and possibilities of these swamp and overflowed lands, the Office of Experiment Stations during the past year made an extended investigation of this matter. The information gathered and tabulated is as complete and reliable as can be secured without an actual survey. To supplement and verify the data previously collected and published by others, the following letter and blank for statistical information were sent to one or more persons in each of the counties in the several States east of the one hundred and fifth meridian, and through the courtesy of the correspondents full and complete reports were received in most cases:

WASHINGTON, D. C., *October —, 1906.*

_____,
Auditor ——— County, _____.

DEAR SIR:

This Office is being called upon by Members of Congress and others interested in the matter for information as to the amount and location of swamp and overflowed lands in the United States that can be reclaimed for agriculture. These frequent inquiries, together with the fact that numerous bills were introduced in both Houses of the last Congress for the drainage of swamp lands, show that the reclamation of these lands is fast becoming a matter of national importance.

In order that we may have more reliable information for the use of officials interested, we request that you fill out and return to this Office the inclosed blank as soon as you can do so. A return envelope for this purpose is inclosed, which requires no postage.

Sincerely yours,

ELWOOD MEAD,
Chief Irrigation and Drainage Investigations.

[Inclosure.]

STATISTICAL INFORMATION FOR THE OFFICE OF IRRIGATION AND DRAINAGE INVESTIGATIONS, U. S. DEPARTMENT OF AGRICULTURE, WASHINGTON, D. C.

State of _____.

County of _____.

Acres of salt marsh: _____.

Acres swamp: _____.

Acres overflowed: _____.

Owned by corporation or private parties: _____.

Owned by State: _____.

Owned by United States: _____.

In filling out this blank, if you have not a record of the exact amount of swamp land, give us the best estimate you can form after consulting the county surveyor and others familiar with the lands of the county.

NOTE.—Salt marsh should include all lands along the coast that are covered or partly covered with salt water at high tide.

Swamp should include all land, whether open or timbered, above tide water that is too wet for cultivation.

Overflowed land should include all bottom land along streams that can not be cultivated safely because of overflow.

Shallow lakes that can be drained should be included under swamp.

From many counties the questions on the blank were not only fully answered but long and interesting letters were received discussing the drainage problems of these localities and explaining what was being done in the way of reclaiming the land. In a few cases the blanks were returned with a statement that the land had not been surveyed and there was no record in the county showing the number of acres. Further correspondence in such cases, however, usually secured carefully considered estimates, which were used. In parts of Maine and Michigan, where the counties are large and sparsely settled, blanks were sent to the township officers to get more complete reports. In many of the States containing large areas of swamp land further investigations were made to corroborate the reports received and to ascertain the character of the land and its fitness for agriculture.

In the State of Florida, which contains the greatest amount of swamp land, the trustees of the internal improvement fund and the secretary of agriculture had collected a great deal of information relating to the swamp lands in that State, which this Office was permitted to examine. In addition to this, a party of engineers was sent into the State and a survey was made of the country lying south of Lake Okeechobee, known as the Everglades, to determine the feasibility of draining these lands and their fitness for agriculture.

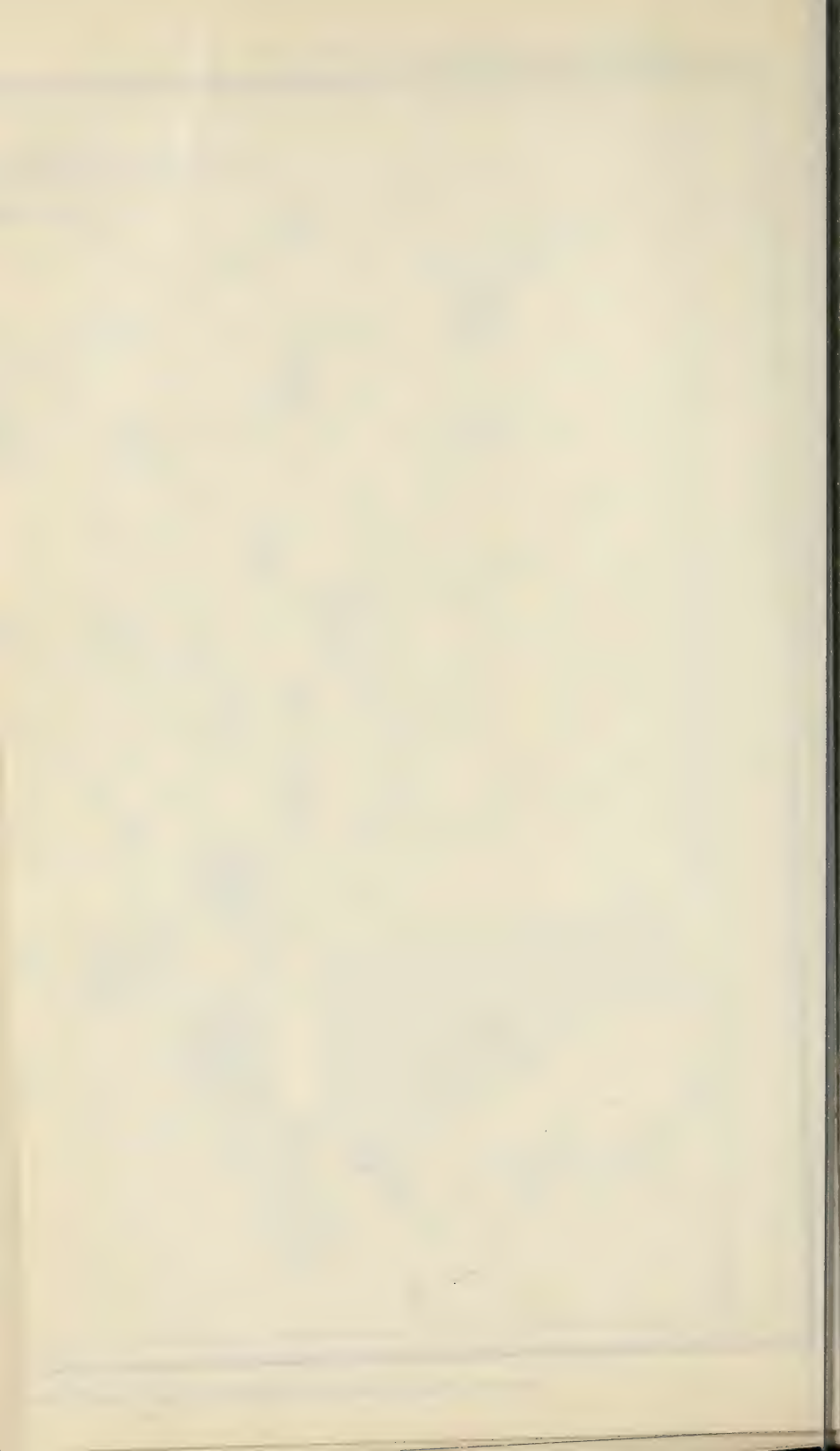
This Office had an expert in Louisiana who made a study of the marshes and swamps of that State, giving especial attention to the methods and cost of diking and draining them and their value for agriculture when reclaimed. In both Minnesota and Wisconsin special agents were employed to make studies of the swamps in those States and report on the probable benefits that would result from their drainage. In addition to this, the Office of Experiment Stations has made extended surveys in many of the States during the last four years, prepared drainage maps, and collected data which gave a better knowledge of the extent and character of these lands and the feasibility of reclaiming them. The data thus secured gave a valuable check on the information gathered by our correspondents.

Not all swamp land is suited for agriculture, but from the data collected and analyzed by this Office it is certain that there are in the eastern portion of the United States 77,000,000 acres that can be reclaimed and made fit for cultivation by the building of simple engineering structures. This land is distributed throughout the several States, as shown on the accompanying map (Plate I), and more than 95 per cent of the entire amount is held in private ownership. Because these lands are found in widely separated tracts their vast extent is not fully realized. Were it possible to collect them into one body it would make an empire as large as England, Ireland, Scotland, and Wales. If placed in the eastern part of our own country it would cover the

PREPARED BY
IRRIGATION AND DRAINAGE INVESTIGATIONS
 OFFICE OF EXPERIMENT STATIONS
U.S DEPT OF AGRICULTURE



MAP SHOWING THE AREAS OF SWAMP AND OVERFLOWED LANDS IN THE STATES EAST OF THE ROCKY MOUNTAINS.



six New England States, New York, and the northern half of New Jersey. It would make a strip 133 miles wide, reaching from New York to Chicago.

QUALITY OF THE SOIL.

There is no question as to the fertility of swamp or overflowed land, and when it is protected by embankments to keep out the overflow and is relieved of the excess of water by proper drainage, its productiveness is unexcelled. In nearly every one of the States large areas of similar lands have been reclaimed by draining and embanking and have proven to be the most productive farm lands in the districts in which they are located. Illinois, Indiana, Iowa, and southern Louisiana have taken the lead in work of this kind, and in no other part of the country do we find more profitable or higher-priced farms than in those States. Along the Atlantic coast sufficient work has been done to indicate that the vast extent of salt marsh reaching from Maine to Florida can by proper methods be won to agriculture and when reclaimed the soils are especially adapted to market gardening.

To ascertain why these lands have been allowed to remain so long in their present state we must look to some cause other than their lack of fertility, as this has been fully established by chemical analyses of the soil and by hundreds of productive farms that have been made from such lands.

In the early settlement of our country the farms were located on what were considered the most desirable tracts, determined by accessibility, natural water supply, and the fertility of the soil. As civilization extended westward the homeseeker selected the rolling prairie that needed little or no drainage, so that the swamps and overflowed lands were passed by, and only recently has an imperative demand arisen for their reclamation. The desirable farming land is practically all occupied or held for speculation, and to meet the needs of our steadily increasing population it is necessary for this swamp land to be drained and put to proper use. Its nearness to market and its great fertility make it very desirable for small farms.

CAN THESE LANDS BE RECLAIMED?

Can these lands be drained, what will it cost, and how can the work best be done are questions of vital interest to the American people. After considering what has been done to reclaim the marshes of Holland, two-fifths of which lie below the level of the sea, and the difficulties that have been overcome in draining the fens of England, it would be a reflection on the skill and intelligence of the American engineer to proclaim the drainage of our swamp lands impossible. On the contrary, the engineering problems are simple, as most of these lands are several feet above sea level and have natural creeks or bayous that

need only to be improved by straightening, widening, and deepening to afford outlets for complete drainage. In case of some of the river bottoms and the salt marsh along the coast it is necessary to build levees to prevent overflow and to construct internal systems of drainage with sluice gates or pumps to discharge the water from within, and by the use of modern machinery this work is neither difficult nor expensive. Levees can be built and ditches excavated with suitable dredges at a cost ranging from 7 to 16 cents per cubic yard. Large works in swamps where the land is overflowed are readily and cheaply constructed in this manner.

As to the cost of draining these lands, and whether or not it will pay, we have but to refer to the numerous works of this kind that have been completed. In those States where large areas of swamp land have been thoroughly drained by open ditches and tile drains the cost ranges from \$6 to \$20 per acre, while in places where tile drainage was not required the average cost has not exceeded \$4 per acre. Judging from the prices which prevail in a large number of these districts where work of this kind is being carried on, it is safe to estimate that the 77,000,000 acres of swamp can be thoroughly drained and made fit for cultivation at an average cost of \$15 per acre. The market value of these lands in their present shape ranges from \$2 to \$20 per acre, depending upon the location and prospect of immediate drainage, with an average of probably \$8 per acre. Similar lands in different sections of the country that have been drained sell readily at \$60 to \$100 per acre at the completion of the work, and in many instances, when situated near large cities, they have sold as high as \$400 per acre. To determine whether or not it will pay to drain these lands we have but to consider the following figures:

| | |
|--|--------------------|
| Cash value of 77,000,000 acres after thorough drainage, at \$60 per acre..... | \$4, 620, 000, 000 |
| Present value of this land at \$8 per acre. | \$616, 000, 000 |
| Cost of drainage at \$15 per acre..... | 1, 155, 000, 000 |
| Value of land and cost of draining..... | 1, 771, 000, 000 |
| Net increase in value | 2, 849, 000, 000 |

These figures, though large, are not fanciful, but are based on results obtained in actual practice in different sections of the country where work of this kind has been done. An extended investigation shows that in every case where a complete system of drainage has been planned and carried out the land has increased in value many fold. In some instances, however, much time and money have been wasted because the work was undertaken without any well-defined plan or it was not sufficient to afford adequate and complete drainage.

The reclamation of swamp and overflowed lands is no longer an experiment; it has become a highly profitable business when based on

correct principles. The methods of drainage practiced in different parts of this country and in some of the foreign countries are being carefully considered, and many experiments are being made to determine the best and most economical methods of draining land, and the information thus collected is being classified and the results compared and general rules deduced, which, if followed, will in all cases bring highly beneficial results. The comparative cost of the different methods of doing the work and the most satisfactory way of providing funds are also being duly considered.

DRAINAGE A PUBLIC FUNCTION.

In many cases conditions are such that drainage can not be secured in an economical manner without cooperation, and where a project affects the lands of several owners cooperation can rarely be secured by mutual consent. To secure an adequate outlet for drainage, it is frequently necessary to improve natural streams, by widening, straightening, and deepening, and to construct new channels where none exist, or to build levees or embankments on private property. In order to carry out such works, the States have come to view drainage, when it extends beyond the boundaries of the individual landowner, as a public function. The courts have frequently held that such works confer a benefit on the community at large by improving the public health, benefiting the public highways, and contributing to the general welfare of the community.

To secure the right of way for carrying out large drainage projects, private property must be taken, the rights of way of railroads and public highways must be crossed, dams creating water power must be removed from streams, and other things requiring the power to exercise the right of eminent domain must be done in carrying out a large drainage project.

Although drainage is conceded by the States and by the Federal Government to be a public work, the cost is left to the owners of the lands benefited, and such powers only are delegated by statute as are necessary to enable the owners of the land to be benefited to carry out the work at their own expense.

COOPERATION NECESSARY.

In order to take advantage of the power delegated by statute, cooperation of the interested landowners is necessary. The swamps are large, often extending into two or more counties, and one portion can not be drained without affecting the entire area. Any such improvement benefits the entire drainage area, and its cost should be distributed accordingly and should not fall entirely upon the owners of the land on which the work is to be done. Where lands are to be

embanked or drained it rarely makes an equitable distribution of the cost for each to do the work on his own land. There is necessarily a community of interests that can be justly served only by distributing the cost of the drainage over all the lands benefited.

After the ditches are dug, care and maintenance must be provided for. Because of the slope or peculiar nature of the soil one portion of the ditch may fill more readily than another, the banks may cave and obstruct the flow, or a lateral ditch may bring in silt and débris from one owner's land and deposit it upon that of another; yet it would be manifestly unjust to require the owner of the land on which the obstruction is formed to remove it at his own expense for the benefit of the entire district. These and similar conditions make cooperation necessary to reclaim in an equitable manner any large area of swamp land owned by several persons.

In order to determine the community of interest that exists, and see what land would or would not be benefited by the construction of a certain improvement, it is necessary to have extensive surveys made and maps prepared showing the natural conditions and the character and extent of the work needed. This survey should be strictly impartial and should be made by a competent engineer in order to meet with the approval and indorsement of the landowners. In many places it is difficult to get such a survey made, and the lack of it greatly retards the drainage work of the community. Many landowners would be glad to undertake the drainage of their swamp land if they could see in advance just what work is necessary and the probable cost. Such information would eliminate much useless discussion and diversity of opinion in drainage matters and do much to encourage and foster the spirit of cooperation.

DRAINAGE LAWS NECESSARY.

In order to secure the necessary cooperation for efficient work in all cases and to set out the detail of procedure so as to insure uniform practice, some legal method of compulsion has been found necessary, and drainage statutes have been enacted by many of the States. All the persons interested may not agree as to the necessity for the improvement, and even if they do, when it comes to deciding what lands shall be embraced in the project, where the ditches shall be located, how the work shall be done, and particularly, what each individual landowner shall pay, differences of opinion are sure to arise. To overcome this diversified sentiment and enable the owners of swamp and overflowed lands to reclaim the same in an efficient and equitable manner, drainage laws have been found necessary. Some of the laws enacted have proven crude and inoperative, some have been fairly successful, while others have made it impossible to carry on the

work in a manner satisfactory to the people interested and to the community at large.

England has probably more drainage laws on her statute books than has any other country, but most of these are special acts relating to particular localities. It is stated that there are upward of 100 acts of Parliament pertaining to the drainage of the Bedford Level. In 1884 Sir Robert Peel, prime minister, considered it due to the agricultural interests that an advance of public money should be made for the drainage of land. The advantages of such a plan were freely discussed, and from 1846 to 1856 five acts, known as the Public Money Drainage Acts, were passed by Parliament. The object as expressed in the preamble was to "facilitate works of drainage by advances of public money to a limited amount on the security of the land to be improved." Under the provisions of these laws \$36,000,000 was loaned at 3½ per cent, to be repaid in 22 annual installments. The demand for money thus appropriated was so great that it was necessary in 1849 for Parliament to pass the private money drainage act. The preamble of this act states that "the whole of the advance authorized by the public money drainage act had been applied for and appropriated, that further sums had been applied for, and that it was expedient that the same should be advanced by private individuals and that landowners should be enabled, with the sanction of the drainage commissioners, to borrow money to be expended in draining their lands."

Other laws of like character were passed in England from time to time to enable the landowners to cooperate and borrow money to carry on extensive drainage schemes. France, Germany, and Italy have each enacted liberal and comprehensive drainage laws to aid in the formation of drainage districts. These laws apply to drainage both for sanitation and agriculture, and provide the means for acquiring the necessary funds for doing the work. The drainage of the swamp lands in these countries is considered of sufficient importance to justify the government in extending substantial aid and exercising supervision over the construction of the work. Such a course has proved very advantageous in these European countries and should be given due consideration by all those interested in the reclamation of our swamp land.

Throughout the United States the progress that has been made by the several States in land drainage has depended more upon the character of the drainage laws than on the geographical location of the State or the fertility of its soils. The swamps of the Yazoo Delta, Mississippi, and those of the eastern part of North Carolina are more fertile and are susceptible of producing a field crop worth much more per acre than the lands in Indiana or Illinois, yet practically all the

swamps in the latter States have been drained under the provisions of wise and beneficent State drainage laws, while little or nothing has been done to drain the lands of North Carolina and Mississippi.

The first settlers of this country recognized at an early date that some legal method was necessary to secure a full cooperation of all the parties benefited in reclaiming the swamp lands, but they were without precedent and experience in matters of this kind, and the first laws enacted were found after a time to be inadequate or required modifications to meet new conditions.

The first drainage law in this country of which we have any authentic record was enacted by the governor, council, and general assembly of the colony of New Jersey, September 26, 1772, and it was reenacted by the State when it adopted its constitution, July 2, 1776. This being the first law on the subject of drainage, it is interesting to note some of its provisions and requirements. The preamble reads: "An act for clearing and removing the several obstructions of the free course of the waters in Passaic River and the several branches thereof between Little Falls in said river and the milldam across said river near Day's Bridge, and for other purposes therein mentioned."

Section 1 says, in a general way, that between Little Falls and Day's Bridge many thousands of acres of valuable meadows and lands were overflowed and rendered in a great measure useless to the owners. That some of the public roads leading from the county of Essex to the county of Morris are rendered impassable for the greater part of the year to the injury of the public in general, and they have prayed that they may be able by law of this colony to clear out and remove the obstructions in the river and its several branches within the boundaries named. They ask that it shall be made lawful for the owners and possessors of the meadows, lowlands, and swamps to remove and take away the several obstructions of the free course and passage of the waters of the Passaic River and its several branches and to keep the same clear and open for the free course of the waters.

Section 2 provides a penalty of £5, to be recovered in an action for debt, from anyone who shall obstruct in any manner the free course of the water in the river.

Section 3 provides that the cost of clearing out the river shall be equally assessed upon the owners of the meadows, swamps, and lowlands benefited, in proportion to the quantity of meadows, swamps, or lowlands owned by each and benefited by the clearing of the river or any of its branches.

Another clause provides that a survey shall be made of the meadows, swamps, and lowlands that will be benefited by the improvement, to determine the amount of such lands and their ownership. For carrying out this work the law provides that owners of the lands

shall, on the fourth Tuesday in August yearly, and every year thereafter, meet at a place to be designated, and shall choose, by a plurality of voices, five persons to serve as managers, who shall have charge of the improvement. These managers, or a majority of them, shall have full power to assess the owners an amount of money adjudged by them necessary for clearing and removing obstructions from the river and its branches, and that at the same meeting they shall also elect or choose a collector to receive and collect all such sums of money as shall be from time to time assessed for this work, and if any of the owners neglect or refuse to pay the sum assessed against their land for the space of thirty days after notice, it shall then be lawful for the managers to let so much of the meadows, swamps, and lowlands belonging to such delinquent or delinquents for such a term as that the rent of said meadows, swamps, and lowlands will amount to a sum sufficient to pay the assessment against it.

This method of collecting the delinquent assessment evidently did not prove satisfactory, for ten years later the act was amended, providing that the delinquent's goods and chattels, or so much thereof as may be necessary, shall be sold for the payment of these assessments made for the use of clearing the said river; and the amendment further provides that it shall be lawful for the managers to cause to be collected such further sums of money as will be sufficient to satisfy and pay the debts now due and the cost of collecting the same, any law, usage, or custom to the contrary notwithstanding.

It appears from a study of the full text of this act that the rights of landowners along the stream were the cause of much dissension and litigation. Captain James Gray and others maintained a milldam near Little Falls which held the water back, to the injury of the abutting landowners, and without warrant or sanction of law a number of landowners pulled down this dam and removed the obstructions by force and violence for the purpose of affording relief for their own property.

Section 9 of the act above cited sets forth that the pulling down of the milldam may have been unlawful and unjustifiable, and that the parties aggrieved may be entitled to some compensation or recompense. In order, therefore, to have a clear and impartial hearing and determination of this controversy, a special commission, consisting of three disinterested persons, was appointed and constituted judges to hear and determine all matters growing out of this incident, their finding in writing to be good, effectual, and binding upon all the parties involved.

The use of the streams for water power in this State seems to have been a stumbling block in the way of drainage, as appears from the history of subsequent efforts.

No records of the board of managers for clearing the obstructions from this stream have been found, neither has the award of the special judges for recompensing Captain Gray for the destruction of his dam been found, but the law of 1782 is itself evidence that the expenses were incurred and that provision was made for their payment.

An examination of this law shows that the three things which moved the people to take action were: (1) To render more useful the meadows to the owners thereof; (2) to improve the public roads so as to make them passable throughout the year, and (3) to improve the public health of the community. Although these objects were most worthy and of the highest importance to the community, yet without some method of compelling the cooperation of the interested parties they could not be secured. This has been the experience in all of the States where drainage has been undertaken. A majority of the people generally recognize and concede the importance of the work, but are not able to agree upon a plan of cooperation which will meet the approval and enlist the support of the entire community; hence to make any material progress in matters of this kind it has been found absolutely necessary to have some form of drainage law to enforce and carry into effect the will of a majority of the interested landowners. The different States have from time to time passed laws for this purpose which they deemed best suited for their needs, but experience has proven that in most cases they were deficient in some important features and required frequent and numerous amendments to get them into shape for effective work.

The details of these several laws have varied to conform to the provisions of the State and county governments, but as a rule they have been based on certain fundamental principles which are common to most of the States. The first of these principles is that of self-government, viz, (1) the consent of a majority of the interested landowners is necessary before a drainage district can be organized; (2) a drainage district can not be organized unless it is clearly shown that the benefits to be derived from the proposed work will exceed the cost, and (3) no drainage district can be organized unless it is clearly shown that the work will be conducive to the public health or the general welfare. Where these three things are found it seems proper that the law should be invoked to compel and secure the cooperation of all the people interested in the proposed work.

The laws of the several States, though founded on these general principles, differ as to the procedure to be followed. The general practice is, that on the presentation of a petition signed by one or more of the interested landowners, setting forth the necessity for the improvement and a general description of it, accompanied by a bond conditioned for the payment of certain costs, viewers will be appointed

to make an examination and report whether the conditions warrant the establishment of a drainage district.

In some States the petition is presented to the county commissioners or county supervisors of the county in which the land is situated, while in others it is presented to the judge of the county court. It seems to make little difference before which tribunal the petition is filed, as anyone feeling aggrieved has a right to appeal to the courts of higher authority.

In some States special commissioners or viewers are appointed in each individual case, while in others each county has one or more special drainage commissioners to serve on all cases coming up for consideration during their term of office.

At the time of appointing the viewers the court sets a day for the hearing of the report. At that time any person interested is permitted to present objections to the report of the viewers. If, after thoroughly reviewing the case, the court is of the opinion that the proposed improvement is practicable, that it will reclaim the lands, that it is of public utility, and the cost will not exceed the benefits, it will cause a public drainage district to be established and commissioners appointed to carry out the provisions of the State law. These laws set forth in detail the method of carrying on the work of the district and prescribe the duties of the several officers.

The drainage law of Indiana, which is regarded as a very good one, provides that the county commissioners shall appoint one drainage commissioner for a period of two years, who shall be a citizen and freeholder of the county; and the county surveyor, who is elected by popular vote, shall be ex officio a drainage commissioner; and that the court shall appoint a third commissioner to serve in each individual case that is filed before him. The drainage commission, composed of these three persons, has charge of all the drainage work within the county, and one of the commissioners is usually appointed to have immediate charge of the construction of the work.

The drainage law of Iowa, under which much effective work is being done, provides that when a petition is filed before the board of supervisors they shall appoint a disinterested and competent engineer to make a preliminary examination and report to them, and if his report is favorable to the construction of the ditch, they are to appoint three appraisers to assess benefits and damages who shall be freeholders of the county and not related to any party interested in the proposed improvement, nor themselves interested in a like improvement. The law provides for a separate commission for each petition that may be filed. The same engineer is usually appointed, but the appraisers and commissioners are most likely changed.

The drainage law of Arkansas, which was recently framed and had

for its guide the experience of the other States, is considered by those who are good judges to be one of the best drainage laws now on the statute books of any State. It provides that when a petition for drainage is filed before the county judge he shall appoint three resident freeholders of the county not interested in the work nor of kin to any person interested in it, and a competent engineer to assist them, who shall make a preliminary survey of the proposed ditch. This provision is very much like that in the Illinois law and usually results in the appointment of the same engineer, but a different board of appraisers and assessors.

The drainage law of Louisiana provides that the police juries of the several parishes may divide their parishes into drainage districts, and they shall have power to appoint three commissioners, and the governor of the State shall appoint two commissioners from a list of names recommended to him by the voters in the drainage district. These commissioners shall own real estate to the value of \$1,000 and be electors in the district in which they are appointed.

The drainage law of South Carolina, recently enacted, is based primarily on the idea of drainage for sanitation, and the law provides "that the governor, upon the request of the senator and representatives from any county in the State, shall appoint in and for said county, by and with the consent of the senator and the members of the house of representatives for each county, respectively, or a majority of them, not less than three, nor more than five, discreet, responsible, and resident freeholders, who shall be known as the 'sanitary and drainage commission' of that county."

The drainage law of the State of Kansas is based on slightly different principles. It provides that on receipt of a petition properly signed by two-fifths of the taxpayers residing within the boundary of the proposed district, setting forth the necessity for a certain improvement, the county commissioners shall declare the territory described in the petition to be incorporated as a drainage district under some special name, and that thenceforth the said territory and the inhabitants residing therein, and their successors, shall constitute a body politic and corporate under said corporate name, and shall have perpetual succession. An election is then called and the people in the district select by ballot five of their number to constitute the directors of the corporation. In addition to the above law the Kansas legislature of 1907 passed an act similar to the Indiana law.

As to which of these provisions is best can be determined only by the workings under them. The laws of Indiana, Iowa, Arkansas, Illinois, and many other States are the same in general principles and differ only slightly in their minor details. Under these laws much efficient work has been done. The laws of South Carolina, Louisiana,

and Kansas are of recent enactment and have not been sufficiently tested to determine their adaptability to conditions in these States.

The one great drawback to all these laws is a lack of adequate compensation to the persons upon whom devolves the responsibility of carrying out their provisions. The compensation provided by law for the engineer is usually \$4, and never to exceed \$5, per day for the time actually employed, and for the commissioners from \$1.50 to \$3 per day, and in Louisiana the law provides that the commissioners shall have no compensation. To make an examination of the land in a drainage district and determine the best and most practicable method of draining it, to properly locate the ditches and compute the size necessary to drain the land, to determine the value of the land taken for the improvement and to classify it so as to make a just and equitable assessment for the construction of the work, requires time and much patient and exhaustive research, and it is unreasonable to expect to get good and competent men who are willing to do this work without fair compensation. The law provides that they shall have no personal interest in the matter, and to expect to get good men to serve as drainage commissioners on a project in which they have no interest is unreasonable. Good engineers are in demand and can command a salary in a permanent position much greater than that provided by law for their services as engineers in a drainage district. In many localities, therefore, it is difficult and in places impossible to secure competent men to serve in this capacity.

The preparation of plans that are adequate for the needs of the district and the equitable apportionment of the cost of the work on the lands benefited are matters that should be intrusted only to experienced and skilled persons, as upon the correctness and efficiency of their work depend largely the success and ultimate value of the work done. Many of the appeals from the findings of the assessors and much of the litigation growing out of the formation of drainage districts are due to the fact that some great injustice is unwittingly imposed on some landowners because of the inexperience and lack of ability of the men whose duty it is to apply the provisions of the law in a just and equitable manner. In some instances, after the work is planned, its execution is improperly carried out because the engineer or commissioners in charge of the work have had no experience in matters of this kind and do not know how it should be done, or are too busy with other matters to give this work proper attention. In the absence of more liberal provisions in the law it would be wise for the judge or supervisors appointing the engineer and commissioners to select the most competent persons to be had and continue their services on the several projects that are brought before them, and not attempt to get a new set of men for each petition filed. By this method men would,

in time, become familiar with the conditions and requirements of law, would gain experience in the application of its principles, and would be able to make a more just and equitable distribution of the cost of the work, and some arrangement should be made whereby they can be fairly well compensated for the services rendered.

METHODS OF ASSESSMENT.

For apportioning the cost of a drainage district two methods have been employed in assessing the land. The first is to levy a flat rate of tax per acre, as in Louisiana, Florida, and South Carolina, on all the land in the proposed drainage district without reference to the amount of the benefits it will receive, the rate of assessment per acre being such that it will produce the necessary amount of money to do the work. This practice gives rise to dissatisfaction. The lands are not all equally benefited, and it seems an injustice for each owner to pay the same amount per acre. Some of the lands are wetter than others, and the ditch may pass through some lands, while others are situated a considerable distance from it. So, to obviate this dissatisfaction and render more nearly equal justice, many of the States amended their laws so as to make an assessment on the several tracts in proportion to the amount they would be benefited by the construction of the improvement. If the land is extremely wet and lies adjacent to the ditch to be constructed, it will necessarily receive a greater amount of benefits and should, therefore, pay a higher rate of taxation than other land that is much drier and located at a greater distance from the channel.

After having completed the organization of a drainage district under the laws of the State and determined what work is necessary, another troublesome matter has been to determine the best plan for getting it done. In the first case of this kind, as shown by the New Jersey law above cited, they proposed to levy an assessment on the lands benefited and collect the amount in cash and employ some one to do the work necessary. There seems to have been some difficulty in collecting the assessments under this law, and that method of raising the money was after a time decided to be unsatisfactory. This same method was prescribed in the drainage laws of many of the States and is still in force in some of them. In order to favor the landowner, the States of Ohio and Indiana enacted laws which permitted the doing of the work by allotment; that is, the entire work was planned and its cost estimated and this cost was assessed against the lands benefited. Instead, however, of having the money paid in to some officer of the drainage district, a certain parcel of the work, amounting in cost to the assessment against each tract of land, was allotted against the land, to be performed by the owners thereof. It

was argued that such a law would not require the payment of cash and that the owner of the land, or members of his family, would, in many instances, be able to perform the work, whereas they could not pay the cash. This method, although it seems practicable on its face, was persistently tried in both Ohio and Indiana for a number of years and proved a failure. The time for doing the work was fixed in the report. The allotment at the lower end of the ditch was to be completed first, the next one upstream a few days later, and so on to the head of the ditch, covering a period from a few months to one or two years, owing to the length of the ditch and the amount of excavation to be handled. Often, because of the water and the lack of drainage, it was not practicable for one person to complete his allotment until all the others below him had completed theirs. By this means, if one man failed to complete his allotment in the time specified, it blocked the whole work and delayed the completion of each allotment above him. Frequently there were nonresident landowners and persons having no interest in the work who neglected to complete the portion allotted to them, and the result was that under this method a ditch of any great magnitude was rarely completed.

The law provided that if a person did not do the work within the time specified it was the duty of the county auditor, after advertising the same, to let the construction of it to the lowest responsible bidder. Under this law no steps were taken to enforce the completion of the work until the time specified had passed, and then it required several weeks in which to advertise it, and possibly on the day of the letting no one would bid on the job, so in many an instance the whole scheme was held up from year to year and finally allowed to go by default.

Another objection to this method of doing the work was that the ditch did not pass through all the lands benefited, so that often the owner of the land was given an allotment to construct remote from his home and on the lands of another person. This did not appeal to him. It was hard for him to see and realize that by digging a ditch on another man's land he would be benefiting his own land, and for this reason landowners often refused and neglected to construct the allotments set apart against their lands.

As the country developed it was found necessary in many drainage districts to excavate large canals for main outlets, requiring the use of machinery. Under this system of allotments it was not feasible to employ a dredge boat to do work of this kind, as no one would have a sufficient amount of work to justify the purchase of a machine, and it was difficult to get all the holders of allotments to join in one contract.

After many years of unsatisfactory work this plan was abandoned by the States attempting to use it, and the assessment was required to

be paid to the drainage commissioner in charge of the work in monthly installments, and he was empowered to let contracts and construct the work and pay for it out of the money thus collected. This works well where people have the money, but it often happens that the man owning large areas of swamp land has no ready money, and it is difficult for him to raise it to meet these monthly assessments, and the result is that he usually remonstrates against the construction of the ditch and does all he can to delay the proceedings and evade the payment of his assessments.

Having knowledge of these difficulties, the State of Illinois passed a drainage law in 1879 which introduced a new method of raising the money for construction, which has proven very satisfactory and has been followed by practically all of the States having efficient drainage laws. The Illinois law provides that when a drainage district has been organized and the assessment made for doing the work, the district is empowered to issue bonds which shall be a lien upon the lands embraced within the district for the purpose of raising money for the construction of the ditches. These bonds bear a low rate of interest and are sold on the market for cash, with which the work is immediately undertaken and completed. To provide for the payment of these bonds when due, the assessment against the land is collected in small annual installments covering a period of 20 or 25 years. The advantage of such a plan was soon demonstrated, and it became very popular. By letting the work in a single contract the amount was such as to induce bidders from different parts of the country to compete for it and to employ the most modern methods for doing the work. This brought a low price and rapid construction, which gave to the landowners the benefit of the drainage within a very short time. It enabled the owner of wet land to put the same in cultivation and produce a crop out of which to pay his ditch assessments as they became due. The land, when drained, at once increased in value, so that the owner, if he so desired, could sell at a handsome profit. It made the payment of the ditch tax an easy matter, and the work grew and spread so rapidly that it soon attracted the attention of the adjoining States, and this principle of the Illinois drainage law was soon incorporated in the laws of many of the neighboring States.

Under State laws of this character much drainage work has been done and many million acres of swamp land reclaimed and made productive. In what were, twenty-five years ago, the swampy portions of Ohio, Indiana, Illinois, Iowa, and Missouri public drainage districts have been formed and hundreds of miles of large open ditches have been dug by dredges, thereby increasing the value of the land many fold and making healthful what were at that time malarious and sickly districts. The interest on the drainage bonds issued has

been paid promptly, and the bonds themselves have been redeemed as they become due. The landowner has gotten back his drainage tax, with a substantial profit, by the increased productiveness of the land, and a general air of thrift and prosperity prevails where these lands have been drained. This change could not have been accomplished without efficient drainage laws. In those States having the greatest amount of swamp and overflowed land the least progress has been made in matters of drainage. Whether this is due to the lack of proper drainage laws or to other causes, it is certain that no material progress will be made until such laws are enacted.

WHAT THE DRAINAGE OF THESE LANDS MEANS TO THE UNITED STATES.

Were this 77,000,000 acres of swamp and overflowed land drained and made healthful and fit for agriculture and divided into farms of 40 acres each, it would provide homes for 1,925,000 families. Swamp lands, when drained, are extremely fertile, requiring but little commercial fertilizer, and yield abundant crops. They are adapted to the growth of a wide range of products and in most instances are convenient to good markets. While an income of \$15 to \$20 per acre in the grain-producing States of the Middle West is considered profitable, much of the swamp lands in the East and South would, if cultivated in cabbage, onions, celery, tomatoes, and other vegetables, yield a net income of more than \$100 per acre.

In addition to the immediate benefits that accrue from the increased productiveness of these lands, a greater and more lasting benefit would follow their reclamation. The taxable value of the Commonwealth would be permanently increased, the healthfulness of the community would be improved, mosquitoes and malaria would be banished, and the construction of good roads made possible. Factories, churches, and schools would open up, and instead of active young farmers from the Mississippi Valley emigrating to Canada to seek cheap lands they could find better homes within our own borders.

Holland, two-fifths of which lies below the level of the sea, has been reclaimed by diking and draining, and now supports a population of 450 per square mile. Her soil is no better than the marshes of this country, and her climate not so good as that of the Southern States, yet we have within our border an undeveloped empire ten times her area.

There is no good reason why this condition should longer continue, and it is to be hoped that the American people will soon take steps to abate this nuisance and make these lands contribute to the support and upbuilding of the nation.

n
o-
ns
is
he
an
io
h