REPORT

OF THE

STATE CONSERVATION COMMISSION.

INTRODUCTORY.

The state conservation commission of Wisconsin was appointed by Governor James O. Davidson, June 24, 1908. Since the legislature of 1909 was to meet in less than six months from that time, the first report of the commission was very partial and was confined to those subjects in reference to which immediate action seemed desirable,—water powers, forests, and soils. The report of the commission was published by the order of the legislature.

In reference to water powers it was recommended that hereafter special franchises be not granted for their development, that a general statute be framed upon the subject, and the granting of franchises be given by some commission under this statute. A number of recommendations were also made in reference to state forests. The legislature of 1909 followed these recommendations to the extent of granting no water franchises during the session. A special recess committee upon water powers, forestry, and drainage was created by the legislature, to investigate these subjects and prepare a complete report, together with appropriate general bills to present to the legislature of 1911. The recommendations of the commission both with reference to water powers and forests went to the committee for consideration.

The recommendation of the commission that a state soil survey be undertaken was adopted by the legislature and an ap-
propriation of $10,000 per annum for two years was made for this purpose. In consequence of this action co-operation has been secured with the United States Soil Survey, under which the government spends a like amount in Wisconsin, so that there has been available for the soil survey work for the year 1909-10, $20,000, and a similar amount will be available for the current fiscal year.

The subjects which naturally come before the commission for consideration are the resources of the state with reference to (1) minerals, (2) waters, (3) forests, and (4) lands. The relations of these resources to mankind with reference to the enjoyment of them by humanity through the ages to come is regarded by the commission as a special purpose for which it exists. A fifth branch of the subject,—the conservation of man himself,—might be interpreted as a field which the commission should enter. This field, is, however, one of such enormous extent and complexity, and enters the work of other divisions of the government, such as the state superintendent, dairy and food commission, the labor commission, the state board of health, the state park commission, etc., that it has not been regarded as advisable to enter it.

If anything like a full treatment of the four classes of natural resources mentioned were made with reference to their conservation, this would involve writing an elaborate treatise. The commission, therefore, has confined itself to those parts of the field in which concrete suggestions or recommendations could be made advantageously. The brief report of the commission is largely based upon a number of special papers which are appended to its report under the names of their authors.

MINERALS.

The chief exhaustible minerals of the state are those of iron, zinc, lead, and sulphur. The only underground fuel of the state is peat.

Iron.—In reference to iron, the state contains a considerable quantity of ores which are available at the present time, and vast quantities which are likely to be available in the future. With reference to this metal, it may be said that the methods of mining of ore are such that there is little or no criticism to be offered, no suggestions to be made from the point of view of con-
servation, except that a detailed survey of the districts in which the ores may occur should be made by the geological survey with reference to the estimates of the quantity and quality of the iron ores. Such a survey would be most advantageous in reference to the further development of the iron ores of the state.

**Zinc, Lead, and Sulphur.**—The zinc, lead and sulphur ores occur together in the southwestern part of the state, in the counties of Grant, Iowa, and La Fayette; the zinc as sphalerite, also called "blend" or "jack;" the lead as galena; and the sulphur as pyrite. In reference to these, the losses in exploitation and extraction are great,—unnecessarily great. There are serious wastes which may be prevented by intelligent mining. Of these products the most important is zinc. Mr. Hotchkiss' report shows that under the present practice the total loss of zinc is, in some cases, as much as 48 per cent; in other words, the recovery as metal is only a little more than one-half of the total. These losses are due to poor mining, poor milling, poor separation, and smelting. The losses in mining, estimated at 13.4 per cent, in milling estimated at 16.4 per cent, and in magnetic separation estimated at 10.1 per cent, all may be reduced, and with an increase of profit.

The loss in mining occurs largely in connection with the lease system of small parcels of land under which a flat percentage of the concentrate recovered is paid as royalty, commonly ten per cent. The lease holder is interested simply in securing the maximum profit in the shortest possible time. He therefore takes out of the ground only the richer ores. If the land were owned by the operator and the product was not subject to a lease charge, large quantities of ore could be profitably handled which are now left in the mine. Indeed, in the zinc districts closer mining is done in the case of those companies who own the fees of their own properties than by those operating on the lease system. Especially is this likely to be the case if the company which mines also smelts its ore, for it is an advantage under such circumstances to take out all the material which can possibly be mined, even to the extent of a slight loss for the lower grade material, if such loss may be more than compensated by the gain in smelting.

It is not supposed that it will be practicable to change at
once from the method of mining by lease to that of mining by the fee holder, or even in the distant future; but the above facts clearly point out the necessity for remedies in operating under the lease system. The rate of royalty should decrease with the grade of the ore. The relation of the richness of the ore to the royalty to be paid is very carefully discussed by Mr. Hotchkiss in his report. He shows that a ten per cent royalty should be limited to ores which contain not less than 8.62 per cent of zinc; but it may be suggested as fair that a ten per cent royalty should only be paid on ores which contain as high as ten per cent zinc; and that for lower grades the rate of royalty should not be a flat rate upon the quantity of zinc, but a percentage of the total profit.

There are difficulties in putting such a plan into operation because the different grades of ore underground cannot easily be separated. But the same end might be met by changing the form of leases so that the rate royalty shall be on a sliding scale dependent upon the average richness of the ore, as in the case of many leases for iron ores. To such leases detailed provisions could be added as to the nature of the material which must be mined. By a change in the practice along the lines suggested the total profits of the fee holders could be made somewhat more than they now are; the profit of the miner would be as large or larger than at present; and the amount of material left underground could be greatly decreased.

Mr. Hotchkiss estimates that of the total concentrates, 14 per cent are lost in roasting and magnetic concentration. Nearly half of this could be saved if the ores were handled by a few large efficient plants instead of by many small inefficient ones. The principles of conservation in this matter clearly point either toward consolidation or co-operation of the different interests. The same thing is true, as already pointed out, with reference to mining and smelting.

Further, Mr. Hotchkiss recommends that the fine tailings from the mills be kept separate from the coarse material, since the former contains the chief values not extracted. In the future, improvements in the methods of extraction may be made so that the values may be partially recovered.

Peat.—Peat might appropriately be considered in connection with minerals or in connection with the land, since peat bogs
may be drained and used for agriculture, or they may be held for the future extraction of the peat. What should be done in reference to this matter is a question on which it is difficult to make definite statements. While this generation should undoubtedly consider later generations, future wants cannot be placed upon exactly the same basis as present needs. The subject is quantitatively discussed by Mr. Hotchkiss in his report. He reaches the conclusion that the peat bogs which are well adapted to crops are probably more valuable for agriculture than they would be if they were held as a possible future supply of fuel. Therefore, natural development should be allowed to take its course.

WATERS.

Water Powers.—Under waters, water powers are the most important subject considered by the commission. The commission made recommendations in reference to the water powers in its first report to the last legislature. These recommendations were again considered in reference to their modification and reaffirmation at a meeting of the commission, July 14, 1909, after the legislature adjourned, at which meeting there were present several members of the special legislative committee upon water powers, forests, and drainage. The subject was again considered at a later meeting. While no change is made in the fundamental principles recommended two years ago, as summarized in the first page of this report, after careful consideration changes were made in reference to the character of the leases. The recommendations of the commission with reference to water powers as amended are as follows:

Recommendations Concerning Water Powers.—1. That franchises for water powers be granted under a general statute.

2. That the issuing of such franchises be placed in the hands of the railway commission, or similar board, under conditions to be provided by a general statute.

3. That such franchises be granted by one of two methods: (a) Leases for a reasonable period of years, such leases to be renewable on equitable terms; or (b) indeterminate franchises carefully safeguarded and under the general principles of the public utilities act. In either case rentals or a tax should be charged, the income from same to go to the state. The rate of rentals or
taxes should at first be low; and should be readjusted at definite and reasonable periods.

4. That the survey of the water powers of the state be completed in co-operation with the United States Geological Survey.

Artesian Waters.—There are many other questions of importance with reference to the waters of the state which in the future will require consideration. At the present time only two of these will be considered. The first of these is the waste water in connection with artesian wells. An accompanying paper by S. Weidman, of the state geological survey, shows that many cities and towns in the state derive their water from the underground supply and especially from the deep seated artesian source. The value of this water is estimated by him at a number of million dollars per annum. Contrary to the general belief, the supply of this artesian water is strictly limited; therefore, it should not be wasted. At the present time, many such wells are so constructed as to have leakage in the pipes, or water is allowed to flow from them without being used, and the wells often are so located as to interfere with one another.

In 1901 a law was passed by the state legislature prohibiting the waste of artesian water. This law is as follows:

"Where there are two or more artesian wells in any vicinity or neighborhood, one or more of which are operated or used by any person or owner, the person or owner of such well shall use due care and diligence to prevent any loss or waste or unreasonable use of any water therein contained or flowing from the same, as would deprive or unnecessarily diminish the flow of water in any artesian well, to the injury of the owner of any other well in the same vicinity or neighborhood.

"Any person who shall needlessly allow or permit any artesian well owned or operated by him, to discharge greater quantities of water than is reasonably necessary for the use of such person so as to materially diminish the flow of water in any other artesian well in the same vicinity, shall be liable for all damages which the owner of any such other well shall sustain." (L. 1901, chap. 354.)

The above law apparently was based upon the principle that it should be unlawful needlessly to waste a natural resource which is limited in quantity. From the point of view of conservation, which is the same as saying from the point of view of
the people of the state, and therefore from the point of view of the public welfare, it would seem that this principle is incontrovertible. The progress of the state is dependent upon the useful use of its resources. When a natural resource limited in quantity is unnecessarily wasted some portion of the people of the state and indirectly the welfare of the commonwealth are injured.

In a case which arose under the above law with reference to an artesian area, in which according to the statement of facts, the supply of water at any one time was limited and waste of water at one well lessened or destroyed the flow of others, an opinion given by the supreme court of the state in 1903 holds that such artesian water may be wasted even if in so doing the person is actuated by malicious motives. Says the opinion:

"The owner of the land had, at common law, a right to sink wells thereon and use the water from them, supplied by percolation, in any way he chose, or allow it to flow away, even though he thereby diminished the water in his neighbor's wells, and even though in so doing he was actuated by malicious motives.

"3. Such right of the landowner is a property right, which cannot be taken away or impaired by legislation, unless by the exercise of the right of eminent domain or by the exercise of the police power."

It is further held that this law "takes private property for private use and without compensation, and is therefore void."

Huber vs. Merkel, 117 Wis. 355.

Since your commission does not presume to discuss the opinion of the supreme court of the state from a legal point of view, it must be content merely by presenting the case as it appears to laymen interested in the future welfare of the state, and with citing decisions which seem to point in a different direction from that of our state court. It does seem to your commission unfortunate that the court has felt constrained to declare void a law which was clearly in the interests of the commonwealth, was clearly favorable to the greater good of the greater number, and the enforcement of which would in no way injure anyone.

Even granting, as the court says, that at common law a land
owner has the unrestricted right to make such use of the percolating water under his land as he pleases, even though he acts maliciously, such a right exists only against other land owners. Apparently, however, the court by its decision extends this right and makes it good even against the public. Is such an extension defensible?

Further the question arises as to the relations of the common law, that is the law made by the courts, and statute law. The decision cited makes no direct reference to any provision of the United States or state constitution which is clearly violated by the state law declared to be unconstitutional.

Nor does the opinion of the court explain how the prevention of the needless waste of property takes away private property. To your commission it appears that to prevent the waste of water does not take away property; it merely prevents its useless dissipation. This is a wholly different thing, as it seems to them unfamiliar with the law, from taking private property without compensation. The commission fail to comprehend how prevention of needless waste can be construed as taking private property. Such prevention seems to them to be the control of the use of property rather than the taking of property, and the former is may be suggested is legitimately within the conceded scope of the police power.

The views, that a law, the enforcement of which would be clearly for the public good, should only be set aside on the ground of a clear constitutional prohibition and that needlessly to waste a natural resource is not a taking of private property are not merely the opinion of the commission; they are fully confirmed by opinions of the supreme courts of Massachusetts, Maine, and Indiana, and by the opinions of the United States supreme court.

In Massachusetts a law was passed, the object of which was to protect Boston harbor by preserving the integrity of its beaches providing that "Any person who shall take, carry away or remove, by land or by water, any stones, gravel or sand, from any of the beaches in the town of Chelsea, shall, for each offense, forfeit a sum not exceeding $20.00." The statute was violated and the party so doing "defended on the grounds that he was the owner of the land in fee and the statute did not intend to prohibit the owner from taking gravel from it; and if the stat-
ute did so intend it was unconstitutional under article ten of
the declaration of rights, which provided that "no part of the
property of any individual can be taken from him or applied
to public uses without making him reasonable compensation
therefor." " Chief Justice Shaw, in 1846, more than fifty years
ago, delivering the judgment of the court, said: "The court
are of opinion that such a law is not a taking of property for
public use, within the meaning of the constitution, but is a just
and legitimate exercise of the power of the legislature to reg-
ulate and restrain such particular use of property as would be
inconsistent with, or injurious to, the rights of the public. All
property is acquired and held under the tacit condition that it
shall not be so used as to injure the equal rights of others, or
to destroy or greatly impair the public rights and interests of
the community." * * * 

Commonwealth vs. Tewksbury, 11 Mete. (Mass.) 55.

Answering questions propounded by the senate of the state
of Maine to the justices of the supreme court the following de-
claraions were made by the court in 1908:

1. "The legislature of Maine has by the constitution of Maine,
full power to make and establish all reasonable laws and reg-
ulations for the defense and benefit of the people of this state,
not repugnant to this constitution, nor that of the United States.

2. "It is for the legislature to determine from time to time
the occasion and what laws and regulations are necessary or
expedient for the defense and benefit of the people; and, how-
ever inconvenience, restricted, or even damaged particular
persons and corporations may be, such general laws and regula-
tions are to be held valid, unless there can be pointed out some
provision in the state or United States constitution which clear-
ly prohibits them.

3. "Legislation to restrict or regulate the cutting of trees on
wild or uncultivated land by the owner thereof, etc., without
compensation therefor to such owner, in order to prevent or
diminish injurious droughts and freshets, and to protect, pre-
serve, and maintain the natural water supply of springs, streams,
ponds, and lakes, etc., and to prevent or diminish injurious
erosion of the land, and the filling up of the rivers, ponds, and
lakes, etc., would not operate, to, 'take' private property within
the inhibition of the Constitution.
4. "While such legislation might restrict the owner of wild and uncultivated lands in his use of them, might delay his taking some of the product, might defer his anticipated profits, and even thereby might cause him some loss of profit, it would nevertheless leave him his lands, their product, and increase untouched and without diminution of title, estate, or quantity. He would still have large measure of control and large opportunity to realize values. He might suffer delay, but not deprivation. While the use might be restricted, it would not be appropriated or 'taken.' Such legislation would be within the legislative power, and would not operate as a taking of private property for which compensation must be made."

69 Atlantic Reporter, p. 627.

The above answers of the supreme court of Maine show that that court fully accepts the principle for which the commission contends, viz.: (1) That a law should not be declared unconstitutional unless there is some provision of the state or United States constitution which is clearly contradictory to it; and (2) That an owner of private property may lawfully be severely restricted in the way he uses a natural resource which is his property, and that such restrictions are not a taking of private property.

The legislature of Indiana has passed two laws concerning the waste of natural gas, a natural resource limited in quantity; the first prohibited the waste of natural gas; the second limited the time during which gas or oil may escape into the open air to two days. Both of these have been declared to be constitutional by the state courts.

In reference to the first of these, in 1897 the Indiana supreme court made the following declaration: "A statute prohibiting the waste of natural gas being within the police power, a determination by the legislature that the burning of natural gas in flambeau lights is a wasteful use is conclusive on the courts."

In answer to the contention that the law was a deprivation of private property the court said: "The act in no way deprives the owner of the full and free use of his property. It restrains him from wasting the gas to the injury of others, to the injury of the public." "It (the statute) was to prevent him from needlessly wasting the gas which he is draw-
ing from the general reservoir which nature has furnished and which experience and prudence teach is liable to be exhausted." * * * "The rule that the owner has the right to do as he pleases with or upon his own property is subject to many limitations and restrictions, one of which is that he must have due regard for the rights of others."

Townsend v. The State, 147 Ind. 624.

By the United States supreme court in reference to the second of the Indiana laws concerning natural gas, in 1900 it was declared to be "not a violation of the constitution of the United States; and its enforcement as to persons whose obedience to its commands were coerced by injunction, is not a taking of private property without adequate compensation, and does not amount to a denial of due process of law, contrary to the provisions of the Fourteenth Amendment to the Constitution of the United States, but is only a regulation by the State of Indiana of a subject which especially comes within its lawful authority."

Ohio Oil Co. vs. Indiana, No. 1, U. S. Reports, Vol. 177, p. 190.

The above citations clearly show that the supreme court of Indiana holds the prohibition of the waste of a natural resource to be within the police power of the state, and that such restraint is a proper limitation and restriction of the rights of private property; and furthermore the United States supreme court concurs in this opinion.

The decisions in the Indiana gas and oil cases are very important since they deal with substances which are in many respects similar to underground water. Oil and gas like water are mobile. Underground they move from place to place. A given particle of oil or gas or water today may be below the land of one man, tomorrow below that of another. Because of this fact waste of any of these producers by a party owning any tract of land is an injury to parties holding tracts of land adjacent into which the underground liquid or gaseous bearing stratum extends, and because a natural resource is destroyed, is an injury to the public. The only difference with reference to the point at issue between oil or gas and water is that they are
renewable at different rates; oil and gas slowly, water more rapidly. But the renewal of underground water is a slow process. An artesian basin once exhausted may take years to be refilled; and therefore the principles of law which apply to the conservation of oil and gas should apply to underground water.

Finally with reference to the principle of conservation under discussion, the prohibition of needless waste of a natural resource, Mr. Justice Holmes in an opinion of the United States court given in 1908 has given a most sweeping pronouncement. He says:

"The state, as quasi-sovereign and representative of the interests of the public has a standing in court to protect the atmosphere, the water and the forests within its territory, irrespective of the assent or dissent of the private owners immediately concerned.

"The public interest is omnipresent wherever there is a state, and grows more pressing as population grows, and is paramount to private property of riparian proprietors whose rights of appropriation are subject not only to rights of lower owners but also to the limitations that great foundations of public health and welfare shall not be diminished.

"A state has a constitutional power to insist that its natural advantages remain unimpaired by its citizens and is not dependent upon any reason for its will so to do. In the exercise of this power it may prohibit the diversion of the waters of its important streams to points outside of its boundaries."


While in the opinion just cited, it appears that the question before the court was one of riparian rights, the principle which evidently guided the court in its decision was the broad one which we hold,—that the state, as representing the interests of all the people, has the power, by appropriate laws, to protect the community from unnecessary or wilful waste of any natural resource within its limits perpetrated in the name of private property. The pronouncement of the supreme court of the United States is clearly in harmony with the general welfare of the country; and now that it is realized that many of our natural
resources are severely limited is likely to have a far reaching effect on the development of laws concerning conservation.

The law has developed as one of the institutions of the state to advance the common weal, but in the case of the artesian waters of Wisconsin, the decision of the Wisconsin court seems to the commission to be directly athwart the path of progress of the conservation movement; whereas the statute of the legislature was in the direction of progress.

It may be that the commission has failed correctly to interpret the significance of the decision, and that the court has not intended to hold to the principle that needless or willful waste of a natural resource is unconstitutional; also since the decision was rendered the opinion of the supreme courts of the state of Maine and one of those of the United States court cited have been rendered.

Recommendation Concerning Waste of Natural Resource. Therefore, your commission recommend that the legislature pass an act making it unlawful unnecessarily or willfully to waste a natural resource, and providing proper penalties for violation of the same.

Contamination of Water. Underground waters may be contaminated by careless disposal of sewage and in other ways; as may also the streams by the refuse from mills, factories, and sewage. Usually it is true that a community suffers by allowing the underground waters or the streams to become polluted. Already we have laws with reference to a very limited aspect of this subject, (Wisconsin Statutes 1898, pp. 651, 1065), but in the near future it is certain that the state will be obliged to consider the formulation of proper general laws preventing the pollution of such waters as are likely to be used as a water supply for the people, or which in any way may endanger the health of the community, along the lines of those already adopted in a number of states, such as Connecticut, Massachusetts, and Minnesota.

Forests.—The state forester submits a report which discusses the present situation in reference to the forests of Wisconsin, the importance of the industries connected with the same, and the necessity of so managing the forests as to yield a supply of raw material to continue these industries. The chief losses at the present time are those due to fire and to waste, the first
being of far the greater importance. In reference to the practice of forestry, the chief difficulties are fires and taxes. Because of these difficulties, if forestry is to be practiced, there is very great advantages in state ownership, since under such ownership the difficulty of taxes is altogether eliminated, and the amount of land which the state holds will warrant the establishment of an efficient system of fire protection for state forests. The utilization of waste is a matter for scientific investigation which is now being carried on in the forest products laboratory at the university. In this summary no attempt will be made to give an argument in favor of the conclusions which have been reached by the commission. The reasons for them are to a large extent given in the appended paper of the state forester.

The recommendations made are in accordance with the resolutions adopted at the Lake State Forest Fire Conference held at St. Paul, December 6 and 7, 1910, at which there were present representatives of the forest services of the three states of Michigan, Wisconsin, and Minnesota; also representatives of the lumber, transportation, and insurance interests of those states.

The recommendations submitted are as follows:

1. That a state tax of two-tenths of a mill be levied and collected annually for a period of twenty years for carrying on the work of the state board of forestry.

2. That the state constitution be amended so as to admit of a more rational method of taxing timber land, in order that it may be practicable for owners to hold growing timber on land not primarily available for agriculture.

3. That an efficient system of state fire patrol be organized under the charge of the state board of forestry, and that the burning of slashings be under the charge of the same board.

4. That the cost of this system be defrayed in the first instance by state funds under the charge of the state board of forestry, and that so far as practicable the cost of the protection of forest lands, privately owned, be charged back to the owners of such lands.

Lands.—Of the natural resources of the state the land is that of immeasurably the greatest importance; indeed it is more important than all other resources. Hence of all the problems of
conservation, the conservation of the soil is the one of supreme moment. From the products of the land of this and other states the people of the nation must derive their food and clothing; all of their other needs are subordinate to these. It was considerations of this kind which led the commission to make the recommendation to the past legislature for a soil survey.

One of the main functions of agricultural education from the rural school to the university is that of teaching the farmer to save his soil from destruction by erosion, and to prevent it from becoming depleted in its fertility. To treat this part of the subject with fullness and adequacy would require an extensive monograph. The report of the commission will therefore be mainly confined to those phases of the subject in reference to which immediate improvements may be made thru education and investigation. The first step to be made is an investigation of the actual condition of the land of the state with reference to erosion and depletion, the causes which have led to deterioration, and the methods of restoring the soil to its virgin fertility. The second step is to get this knowledge to as large a proportion of the farmers of the state as is practicable. As yet the subject is not in a stage of development in which legislation is advisable with reference to any but some special phases. This report will confine itself to the subjects of erosion, depletion of the soil, the losses thru weeds, and the influences of the tenant system of farming.

The soil survey already begun shows that a very considerable percentage of the land of the state is on slopes so steep as to be subject to serious erosion. In Iowa County, the only one in which the soil survey has made a determination on this point, it is found that 11.5 per cent of the area is so steep that it should not be cleared and cultivated, but should be left for forests; that 24.9 per cent of the land, while not so steep as to make it necessary to retain it in forests, is subject to such serious erosion that exceptional methods of cultivation and crop growing should be practiced.

It is not possible in this report to enter into the details of these methods, but in other parts of the country, where surfaces as steep as these obtain, contour plowing and terracing are usual. In our own state these processes for preventing erosion have scarcely been undertaken anywhere. In many other
counties of the state the proportion of lands of these two classes is not so large as in Iowa County, but it is certain that a considerable area in the state on account of the steepness of the slopes is better adapted to forestry than to agriculture; and that another considerable area has slopes so steep that the most advanced knowledge for preventing erosion should be applied.

In the larger area of Wisconsin the slopes are not so steep that erosion has been regarded as serious; that is, there is not a sufficient amount of erosion so that the loss in any one year is noticeable. While this is the situation it does not at all follow that erosion of the soil is not taking place on relatively gentle slopes much faster than it is being manufactured. Indeed it is probable that taking the state as a whole the apparently very slight erosion of the great area of moderate slope represents a more serious loss of soil than the more rapid erosion of the limited area. Land which may not lose a serious amount of its soil in ten years may do so in one hundred years. Therefore every practicable effort should be made to reduce the erosion to a minimum on the lands, the slopes of which are gentle. This subject cannot be discussed in detail, but it may be said that the problem is to make each acre of land which is cultivated take care of the precipitation of that acre; that is, not to allow the water to gather into streams which carry the soil away. Since this state is one in which throughout almost every growing season there is a deficiency of water, the accomplishment of this, which would involve getting a larger proportion of the water to go underground, would result in increased crops, and would more than pay for the extra trouble involved by the superior methods of cultivation.

The soil survey has gone far enough to show that the lands of the state vary greatly in their amount of phosphoric acid, the crucial element in soil fertility. The studies which the state agricultural college has made show that land which has been cropped for fifty years in this state has in some cases already lost one-third of its phosphorus. Some fields which had originally a sufficient amount of phosphorus are now short in it, and others originally were deficient in this element. (See appended report of Professor Whitson). In such cases it is necessary that phosphorus fertilizer be applied; not only so, but every effort should be made to prevent further losses of phosphorus. At
the present time these losses are due to wash and waste of farm manure, to exploitive farming, that is to the growth of such crops as tobacco, and to losses through the crops being sent to the cities, the phosphorus of which mainly goes into the sewage.

If the soil is so cultivated that each acre takes care of its own water, this will reduce the amount of phosphorus lost by wash. If the manure produced upon the farm is saved as far as practicable, this loss, which at present, according to Professor Whitson's report, amounts to not less than $10,000,000 to $12,000,000 per annum, may be reduced by at least one-half. By proper rotation of crops the loss of phosphorus through leaching will be reduced. The loss of phosphorus caused by tobacco cultivation can only be stopped by eliminating the crop. A preliminary investigation at Madison of the losses of phosphorus from sewage shows that it may be possible to recover at least one-half of the phosphorus in this material.

Many of the lands of the state are also deficient in humus, and the remedy for this consists mainly in the cultivation of leguminous crops and plowing them under.

In the state there are some three or more millions of acres of marsh land. In a great many cases the improvement of these lands is impracticable, since so to do will require the removal of dams. Here we have opposed to each other conflicting values, that of the land and that of the water. In such cases, some commission should have authority to determine which is the more valuable, and to provide for the removal of the dams in case the agricultural interest is greater, with, of course, proper compensation to such vested interest on the part of the owners of the dams as they may show to exist under the law.

A report submitted herewith by A. L. Stone shows that one of the greatest losses to agriculture, and one which is a serious menace to the fertility of the soil, is the rapid extension of noxious weeds in the state. This report shows that for some 500 farms, reported upon by the Wisconsin Experimental Association, on an average thirty acres are infested with Canada thistle, quack grass, and mustard, and that more than 5½ per cent of the pastures are spoiled by weeds. The struggle to eradicate weeds from these farms has cost the farmers one-half as much as they paid for taxes. In the farms reported upon in eight adjacent counties in the northeastern part of the state,
where the average farm contains 129 acres, 35 acres, or 27 per cent are occupied by noxious weeds. In the widely separated counties of Eau Claire, Iowa, Langlade, St. Croix, and Sheboygan, 404 farms, reporting to the department of agronomy in the college of agriculture, containing 60,025 acres, 3,073 acres, or 5 per cent was seriously infested with noxious weeds. While the weed survey has not yet been completed, it is safe to say that the annual loss to the state as a whole through noxious weeds is several millions of dollars per annum.

Realizing the seriousness of the situation, the legislature of 1909 passed a law preventing the importation into the state of seeds containing noxious weeds and placing the administration of this law in the hands of the agricultural college. Since imported seeds have been the main source for the introduction of such weeds in the state, the enforcement of this law will prevent further extension of the weed infested areas from outside sources. The problem therefore before us is preventing the farmers from using the seeds they themselves grow containing noxious weeds, and to eradicate the weeds from the infested areas.

As with reference to the other measures for the conservation of the soil, the most important remedial measure is the general education of the rural communities with reference to the recognition and eradication of noxious weeds. As one factor in the campaign of education it is believed that it would be advisable to publish a large edition of a book, under the direction of the college of agriculture, which shall describe each of the noxious weeds of the state, indicate how they may be eliminated, and to send copies of such book to every school and library of the state.

There already exists a statute which requires that noxious weeds be prevented from seeding either upon publicly or privately owned land. The enforcement of this law is placed upon the weed commissioners in township, village, or city. It is a dead letter, because it requires local officials to take actions which may arouse the antagonism of their neighbors. This weed law should be so amended as to be made clear as to its meaning and efficient as to its enforcement. Its enforcement should be placed in the hands of some state official, similar to the dairy and food commissioner, who shall have the power to
appoint inspectors, the duty of whom shall be to see that the laws are enforced.

The report of Professor H. C. Taylor shows beyond question that to the present time tenant farming in this state leads to exploitative farming, illustrated by single cropping and selling grain from the farm as its chief product. It is certain that in this and other states tenant farming is likely to increase rather than diminish. Since this is the situation the elimination of exploitative farming by tenants should be considered seriously. As yet no definite recommendations can be made upon this subject, except that the system of tenancy which prevails in other countries where tenant farming has been carried on without deterioration of the land should be investigated in order to learn how to remedy its defects in this country.

As already indicated the practice of farming so as to retain the fertility of the soil is not mainly to be accomplished by legislation but by education. If each boy who is to become a farmer can be taught not only the duty of maintaining the fertility of the land of which he has charge, but can be shown that by so doing his own profits will be increased, we shall have gone a long way toward preventing the depletion of the land.

To apply the principles in reference to erosion and depletion of the soil, it is necessary to have a full knowledge of the soil and of the topography of the state.

Recommendation Concerning Lands. In view of the foregoing, the commission submits the following recommendations concerning lands:

1. That the recommendations of the committee on industrial education as to increasing the efficiency and scope of agricultural education especially in the rural school, the country graded school, the township high school, and the county training school, be provided for by appropriate legislation.

2. That the soil survey be continued, and that the appropriation of $10,000 a year for two years be extended for such length of time as is necessary to complete the soil survey of the state; indeed it would be advantageous to increase the annual sum available for a soil survey in order that the work may go on more rapidly and especially to classify the lands with reference to the use to which they are better adapted.—agriculture or forests.

3. That provision be made for a topographic survey with the
condition that the work be done through cooperation of the state and the United States government, under which the government and the state shall each furnish half of the funds.

4. That the state provide for the publication of a large edition of a weed manual.

5. That under the police power of the state, there be created a state office to be known as a weed commissioner; that such officer shall be an expert; that it shall be his duty to direct the campaign for the eradication of noxious weeds from the state; that he have authority to appoint inspectors to work under his direction; that the laws be amended so as to indicate clearly the weeds which are noxious under its terms the noxious weed be declared to be a menace; that the commissioner and his inspectors have adequate authority to require communities and individuals to eliminate noxious weeds from the lands for which they are responsible; and that the state make a sufficient appropriation to carry out the act.

THE CONSERVATION OF MAN

A number of reports were submitted to the commission in reference to the fifth branch of the subject,—that of the conservation of man himself. These reports came from the following officers: The Dairy and Food Commissioner, the State Superintendent, Chairman of the State Park Commission, the Chairman of the State Board of Health, the State Fire Marshal, and the Commissioner of Labor. Since it is the understanding of the Conservation Commission that these papers with accompanying recommendations are to be published by the state in the reports of the officers submitting them, they are not here included. The subject presented and their recommendations are of great importance, but the commission decided that it would be wise to limit their report to the consideration of and recommendations concerning the natural resources.

Very respectfully submitted,

CHARLES R. VAN HISE,
Chairman,

H. P. BIRD,
E. A. BIRGE,
E. M. GRIFFITH.

Madison, Wisconsin, January, 1911.