FORTY-EIGHTH LEGISLATURE.

HOUSE. No. 56.

MEMORIAL

IN BEHALF OF THE

BOARD OF AGRICULTURE,

TO THE

LEGISLATURE OF MAINE.

FEBRUARY, 1869.

MEMORIAL.

To the House of Representatives in Legislature assembled:

The Maine Board of Agriculture at its meeting of 1869, appointed the undersigned a Committee to present to the Legislature the subject of FORESTS; and to suggest the expediency of inaugurating a State policy, encouraging the preservation and production of forest trees; and also to call the attention of the Congress of the United States to the same subject.

In obedience to these instructions we here present concisely, and with the utmost degree of brevity consistent with the magnitude of the subject, some leading considerations, which will commend themselves to your attention, in the following

MEMORIAL:

Man, in all ages and in all countries, has been a wasting agent, rather than an aid or conservatory of nature in fitting the earth for his continuous occupancy. Not the least of the evidences showing the progress of man in the present era, is his ability and his desire to examine the physical conditions of the habitable portions of the earth, and to estimate the past and present effects of his own labors as they have contributed to those conditions. As man has increased in the numbers of his kind, and extended his agricultural and pastoral industry, he has of necessity encroached upon the forests which once covered the greater part of the earth's surface otherwise adapted to his occupation. The removal of the woods has been attended with consequences so vast and varied, that the importance of human life as a transforming power is clearly seen in the changed conditions of soil and local climate. Countries once densely peopled are now waste deserts. These extreme changes of condition, we have now much reason to believe, were the slow but sure results of man's own improvidence.

When we look at the multitude and extent of architectural ruins, and of decayed works of internal improvement, that show a once dense population over the present thinly inhabited districts of western Asia, northern Africa, and southern Europe, we may apply to this vast region our present theory of cause and effect,

and see in the gradual waste of natural forests, a corresponding change in climate—a decrease of humidity, and as a consequent, a diminished productiveness of soil. These physical changes in this garden of the world, were extended over vast epochs of time, and the high civilization there attained, the perfected state of science and art, conceived and executed the most gigantic works of irrigation, by which the mountain streams for a time contributed to man's prolonged occupancy of these fair fields. If we compare the present physical condition of these countries with the description of them by the ancient historians and geographers, we see the luxuriant harvests of cereals that waved on every field from the Rhine to the Nile, the vine-clad hill-sides of Syria, Greece and Italy, the olives of Spain, the domestic animals known to ancient husbandry,—all these, the spontaneous or naturalized products of these fair climes, the cumulations of centuries of persevering labor,—all this wealth, has in extensive districts been surrendered to hopeless desolation, or at least to a great reduction in both productiveness and population. The forests have disappeared from the mountains, the vegetable earth accumulated through untold ages, the soil of the mountain pastures, are washed away; the once irrigated meadows and fields, are waste and unproductive, because the reservoirs and the springs that fed them are dried up; rivers famous in history have shrunk to brooks, and the trees that protected their banks are gone; the rivulets have ceased to exist in summer, and in winter they are torrents of terrible force. The decay of these once rich and flourishing countries, is mainly the result of man's ignorant disregard of the laws of nature. He may for a time struggle against oppression and the destructive forces of inorganic nature; but after a shorter or a longer contest, he yields the fields he has won from primeval nature, to fall into a dry and barren wilderness.

The evils of man's abuse have been perpetuated and extended to later times, and it is but recently that, in some parts of Europe, public attention has been awakened to the necessity of restoring the disturbed harmonies of nature, whose well-balanced influences are so propitious to all her organic offspring, of repaying to our mother the debt which the prodigality of former generations has imposed upon their successors.

We propose to present this subject only in the two-fold aspect, of the intrinsic value of forests as wood and timber, and the conservative influences of trees on climate.

No country possessed by a civilized people, has ever been seen to preserve for any considerable time a proper proportion of its surface in forest growth. It is but the work of an hour to destroy a tree, that has been reared by the patient labor of centuries. The motives for such destruction are almost innumerable; and the objects of the restoration are equally numerous; but unfortunately they have generally been considered as beyond the province of governments and the power of the masses. The condition of the forests of Europe is much the same in each of the countries, with perhaps the single exception of Norway. An inquiry concerning one is equivalent to an inspection of the whole. In 1750, France had by estimate forty-two million acres,—about 32 per cent. of the whole country in forests. In 1860 they were reduced below twenty million acres. It is now estimated that the proportion in 1750 was not too great for permanent maintenance. During this period of waste, France neither exported manufactured wood or rough timber, nor derived important collateral advantages of any sort from the destruction of her forests; but on the contrary, during a portion of that period, she drew largely from the forests of other countries, in timber for naval and other purposes. Active measures are now in progress in France for the restoration of the forests. The governments and the people in other countries of Europe, are more or less engaged in the same work.

The subject of American forests is suggested here as of primary importance,—the first to be considered by the National and State governments,—the first to occupy the attention of all the people of these States, after the immediate provision of food and clothing. We are destined soon to be startled by the unpleasant fact that a famine for wood is upon us, unless immediate measures are adopted whereby the supply may be increased, and the destruction of what remains diminished. Coal and peat may and should be substituted for wood, as fuel, but for a vast number of purposes in the mechanic arts there is nothing yet that will take the place of wood. This fact gives to the subject a grave importance, and when we note the constantly increasing value of wood and lumber, the grounds for serious apprehension seem to be substantial. A circular issued in the name of the Board of Agriculture, in May 1868, served to disclose the fact, that wood lands in the well settled portions of this State have advanced in value in the last ten years from fifty to two hundred per cent. Wood, as fuel, has advanced in about the same ratio; and lumber very uniformly about one

hundred per cent. After making allowance for our depreciated standard of money value, there remains a fact to be accounted for only on the basis of short supply. The probabilities of demand and supply in the next ten or twenty years, favor a farther advance in prices. Very little wood has been planted or encouraged to grow on lands that have purposely been cleared for other crops. Other important facts have been disclosed in the pursuit of this inquiry. That the county of Androscoggin retained in wood in 1859, only 38 per cent. of its entire area, and the county of Sagadahoc only 39 per cent. Some other counties were reduced in their percentage of unimproved lands nearly as low. Since 1859 the extension of manufactures and increase of population, particularly in Androscoggin, has seriously reduced the area of wood lands, and many towns are now nearly cleared of trees. Estimates carefully made in several countries of Europe, determine the proper proportion of permanent wooded surface to the entire area at 20 to 40 per cent., varying with the physical features of the country, and the humidity of the atmosphere as affected by neighboring water surfaces. It is proper to remark here, that these estimates are based more on the facts that will be presented under our second view of the subject, than on any calculation that the annual growth of such forests will be equal to a liberal supply of wood and timber for the crowded population of those countries.

We here give it as our opinion, sustained by the best informed minds, that our whole country should have in permanent wooden surface 40 per cent. of its area, and *that* very generally diffused over the States, to ensure best results. It will thus be seen that Maine, in extensive districts, has already reduced her wooded surface below a just standard.

But this subject is a National one, and can only be treated to satisfactory results by harmonious concert of action between the several States.

Among the things that are fundamental to a nation's material growth and prosperity may be named, cheap bread, cheap houses, cheap fuel and cheap transportation.

"A nation which produces the raw material for every species of manufactures and commerce,—whose people provide their own houses, and raise all they consume,—which can move its people, its products and manufactures, quickly and cheaply, is in a condition to establish the most complete division of labor, and to give to every person the result of his or her abilities, energy and skill.

Such a nation must prosper. Its people will save and accumulate from their respective earnings; and this subject of wood enters largely and constantly into each one of these great departments of industry and living."

The older portions of our country are now drawing their supplies of lumber from the newer States. The States of Michigan, Wisconsin and Minnesota, are sending their pine, oak, black walnut, and other valuable woods to the Atlantic and the Gulf seaboard, in values of tens of millions, for domestic consumption and the supply of foreign nations. France depends very much on the forests of the United States for her ship-timber; and the timber getters are constantly at work for French agents, cutting down the yellow pines in the south, while in the north white pine deck-plank enough to cover the decks of fifty ships, has been shipped from Saginaw in Michigan, to Havre in France, in one year. It has been well said, that our white oak and yellow pine forests are ravaged by everybody for indiscriminate purposes. "From navy yards to cooper shops, from railroads to street alleys, and from bridge building to shingle making, there is no quarter given to the oak and no peace to the pine." The white pine and other resinous trees, the ash, hickory, chestnut, and other timber trees of the north, are beset wherever they exist, and are fast melting away, with little or no thought for their renewal in kind, or for young trees of any sort to take their places.

Within the ten years from 1850 to 1860, more than fifty millions of acres in our whole country was brought under cultivation. Allowing one-fifth to be prairie and destitute of wood, and we have remaining an area equal twice that of Maine, or thirteen thousand three hundred and thirty-three acres of wood-land permanently alienated from timber growing, for each of three hundred working days of each year, for those ten years.

Increasing population swells these evils. Between 1850 and 1860 our population increased 8,080,785, or 35.59 per cent. It is now supposed to be advancing one million annually. While the increase in manufactured lumber, for home consumption and exportation, was $37,390,310 in 1860 over that of 1850, or 63.09 per cent. This shows that the demand for timber, notwithstanding the vast increase in the use of iron, brick and stone, increases each year with the advance of the nation in age and wealth.

If for twenty years to come the demand for lumber shall advance in the same ratio to the population as in the past twenty, more than

two hundred millions of dollars' worth of American sawed lumber will be needed each year; and the same ratio in the increase of population, which has called the fifty millions of acres into use in ten years, will then be calling it in at the rate of more than one hundred millions of acres each ten years. Our native-born and foreign population will have farms, lots and houses, fences, furniture, vehicles and agricultural implements; but every year they will be impoverishing the United States more and more of her lumber, and all these things will demand a higher price.

The State of New York, which has furnished more lumber than any other State, as long ago as 1850 reached the maximum of its ability to furnish it. That State from 1850 to 1860 increased her population 783,341, while with the enhanced price of lumber, she diminished her supply almost one million of dollars each year.

One of the most cunningly devised schemes ever invented by the master of mischief to waste the entire timber of a country in one generation, was that to relieve the country people of that State from the burthen of keeping their common clay roads in repair, by chartering companies to build upon them plank roads to the extent of thousands of miles. The loss to the State through this means, that will never be restored, is ten thousand fold greater than all resultant advantages.

In our own country the dwellings of twenty-five millions of people are chiefly made of wood, and in the world there may be six hundred millions who dwell in wooden habitations. When we look at this perishable material, as it enters into the construction of the out-buildings of Americans, and think of its amount, then of the fences of the country, which cost more in material and in labor, than all the buildings on farms, added to that of all the villages and cities, and take into the account that all this wood is destined to decay sooner or later, or be burned up,—fix all this in mind, and we have made one point in illustration. The evils of past destruction are now experienced in all our cities and large towns—and the broad country may not be left out of the account—in the great increase of cost of fuel, and in the price of lumber and timber. High rates of fares and freight charges on our lines of travel, result in the main from the increased cost of building steamboats and railroads, and running them.

Railroads are enormous consumers, of recent introduction. The sixty thousand miles now in use or soon to be completed, demand an almost incalculable amount of wood. With 2,500 ties or sleepers

to a mile, these roads require one hundred and fifty millions; and these ties decay and require renewal in about five years. This vast number causes the destruction of a nearly equal number of incipient timber trees—for they are usually cut when of a size suitable for only one or two sleepers.

The lumber used in fencing these roads, in building bridges, depots and cars, is quite an item to be added to former consumption. Then of the fuel! It is estimated that the distance run each day by trains on all the roads is 308,000 miles. Each engine with an ordinary train consumes about one and three-fourths cords of wood for every twenty-five miles. This gives a daily consumption of wood for this purpose alone of 21,560 cords, or six and one-half million cords annually. Telegraph poles are a recent item in demand. It will require half a million trees annually to supply the decay on the lines now in use.

The late civil war caused the destruction of much wood in all the region of conflict. It was cut for fuel, for fortifications, to hinder the movements of opposing forces, and to open the country for military operations. Costly railroads with their bridges and buildings were burned, towns and farm buildings shared the same fate. Some of the finest parts of Virginia are laid waste to a degree such as to offer no attractions to immigrants.

In their haste to bring land under cultivation, men cut and burn large tracts of magnificent forests, while they could, with great advantage to the crops and the general health and beauty of the country, leave every field or every farm with a belt of timber surrounding it. Much land in Maine and other States has been cleared, which should have remained permanently in wood, by reason of rocks and other obstructions—worth just nothing as cleared land—in locations where the wood, if spared, would have attained a permanent value of one hundred dollars per acre.

There are several kinds of trees indigenous to these eastern States, that now are, and must continue to be far more valuable in the arts than for fuel alone. The oak, hickory, and ash, in particular, for purposes of carriage building, and for farm-tools, implements and machines, are admitted to be superior to the timbers of any other country; and the care and culture of these trees might in time give our country the markets of the world in these departments of manufacture.

Taking a comprehensive view of American forests, we find in California no wood for a lever or a pick-handle, better in quality

than a pine limb. In the whole western half of our country no timber is grown suitable to make a carriage, a wheelbarrow, or any kind of farm implement. All these are supplied from the East. As population spreads over our vast possessions lying west of the Mississippi, and railroads are built through them, the one great impediment to prosterity will be the want of trees. All the surplus of timber now on the Pacific slope, and in Texas, will soon be wanted on those vast plains. East of the Mississippi are the prairie States, and now other considerable districts of country with no wood to spare. The available forests now remaining to furnish all the wood of commerce, are embraced in a few of the States.

Having in this cursory manner passed in review the general subject of trees, it remains to us to consider in the second place the influences they exert on climate. Climate is made up of delicate and nicely adjusted elements, subject to disturbance through various causes. Our summers, that preserve a genial temperature from April to October, maturing the crops of the field, often run on the verge of destruction to those crops. A slight increase of a disturbing power among the elements would lay waste the labors of the husbandman—and this increase may be wrought by the acts of man himself.

The atmosphere at all times contains vapor of water that is being constantly raised by the process of evaporation from land and water surfaces. This vapor—usually about fourteen parts in one thousand—is perpetually changing in amount and proportion, and is almost always below the quantity that the atmosphere at its existing temperature is capable of sustaining. This circumstance causes wet bodies soon to become dry, and the surface of the soil, though saturated with moisture, soon to become dusty. Upon variations in the quantity of moisture present in the atmosphere, the peculiaities of climate mainly depend. The frequency of rain, and other phenomena of the highest interest and importance, are greatly influenced by it. Evaporation from moist surfaces is hastened by a breeze, and very much increased by a strong wind. The evaporation must depend on the nature of the surface; and is less from naked earth than from water surface. Experiments in this department of physical science, being much more easily and simply conducted upon water than upon other evaporating surfaces, we find most observers, so far, confining themselves to the simplest form of such observa-

tions. This is to be regretted; and the present national interest attaching to this inquiry, should stimulate our scientific schools to enter at once upon such a series of observations as may result in a more thorough understanding of the whole subject than has hitherto been reached. Such observations promise to be practically useful, if continued through successive years in a primitive country where the forests are being rapidly removed, and we fear we have very little of country exempt from such changes, where any great number of trees are remaining. In this field of inquiry we are, at best, dealing with rather intractable elements. Some experiments indicate that evaporation from the moist earth may be from one-tenth to one-sixth of that from water. Other experiments show that land, with the trees or other vegetables growing upon it, emits considerable more vapor than the same space covered with water. Evaporation from the leaves of plants is very considerable; some vegetables transmitting more than half their own weight daily. We are now very far from absolute knowledge in this direction, and possibly at our best estate may not be materially wiser. The observed phenomena on a few square or cubic yards of earth must be insufficient data from which to reason upon the meteorology of a State. It is safe to say that no one can now tell what percentage of precipitation is evaporated; what carried down to the sea by superficial channels; what absorbed by the ground and carried off by subterranean conduits; what drawn from the earth or the air by a given extent of forest, of short pasture vegetation, of tall meadow grass, or a crop of cereals or any other farm product; what given out again by surfaces so covered, or by bare ground of various textures and composition, under different conditions of atmospheric temperature, pressure, and humidity; or what is the amount of evaporation from water, ice, or snow, under the varying exposures to which they are subjected in actual nature. But divesting the subject of the labyrinth of difficulties with which it seems beset, there are seen some simple facts that are of interest in this connection.

The subject matter of aqueous downfall, evaporation, and the excess of the former, so far as it retires by superficial channels—representing the water-power of the State—will probably be treated at length in the Report of the Hydrographic Survey. It is not within the scope of our present effort, to trench farther upon this ground than is necessary to elucidate the few and simple positions that follow.

From observations made near Philadelphia, the amount evaporated from water surface in one year was 32.88 inches. The amount deposited as rain and snow in the same year, 43.79 inches. During the summer months of the same year, 18.62 inches evaporated, and but 8.03 inches deposited. At Ogdensburg, N. Y., in one year, 19.94 inches were evaporated in the summer months, and for the year, 49.37 inches. At Syracuse, N. Y., in one year 23.53 were evaporated in the summer, and 50.20 inches during the year. At Salem, Mass., as the result of extended observations, the annual evaporation amounted to 56 inches; and the same result is reported from Cambridge. From many calculations made at Baltimore, the average evaporation for the summer is 19.91 inches—about twice as much as the rain-fall in the same time. Observations made at the Agricultural College of Michigan, for 1865, from March 15th to Nov. 14th—8 months—give 25.35 inches rain-fall, and 30.85 inches evaporation. For 1866, rain-fall for 8 months 29.78 inches, evaporation 32.03 inches. Observations made at Milwaukee, Wisconsin, extending through five years, and taken from March 15th to Nov. 14th—8 months of each year, the average rain 23.61 inches, while the average evaporation for the same period was 32.58 inches. In the open country where drying winds prevail and much land is exposed by tillage, evaporation may take place to the extent of three-fourths of the rain-fall throughout the year, or more than twice that fall for the entire summer. Hence the value of forests as arresters of evaporation, or as barriers against the sweep of drying winds, becomes obvious.

Observations near London, England, show a mean evaporation of 19.11 inches; and at Manchester of 25 inches. "The chief cause of the difference in dryness between the United States and England, may be found in the fact that the humidity is there borne from the ocean, while the prevailing west winds bear our land moisture away from us towards the sea, drying us, instead of increasing our store of vapor."

Researches into the phenomena of heat have disclosed the extraordinary fact that vapor of water is opaque to the rays of heat of low intensity, such as that which proceeds from the soil and from plants by night; in other words, that the heat of the earth cannot be radiated or projected towards the sky, if there exists in the air above the spot observed a large proportion of aqueous vapor. Through pure, dry air, the heat may pass off as readily as if no air there existed. It has been calculated that of the heat radiated

from the earth's surface, warmed by the sun's rays, this one-ten intercepted by the aqueous vapor within ten feet of its surface. Hence the powerful influence of moist air upon climate. Like a covering of glass, it allows the sun's rays to reach the earth, but prevents, to a great extent, the loss by radiation of the heat thus communicated. In accordance with this theory, is the fact that the withdrawal of the sun from any region over which the atmosphere is dry, is followed by quick refrigeration. On the elevated plains of central Asia, "the winters are rendered almost unendurable from an uninterrupted outward radiation, unimpeded by aqueous vapor."

Professor Tyndal says, "The removal for a single summer night of the aqueous vapor from the atmosphere that covers England, would be attended by the destruction of every plant which a freezing temperature would kill." In the torrid desert of Africa, where it has been said, "The soil is fire, and the wind is flame," the refrigeration at night is painful to bear, so that ice is sometimes formed there. Wherever the air is dry the daily range of temperature will be very great. A traveller in Spain relates, that in the valley of Grenada, where the trees have all been destroyed, the heat by day in the sun's rays was oppressive, while the hoar frost was lying white in the shade. Allusions to the same law are found in an ancient writing, where the Hebrew shepherd while tending the flock of Laban, experienced great hardship through drought by day and frosts by night, sleep departed from his eyes. The desert and mountainous regions of our own country illustrate these phenomena of radiation. In the mountain valleys along the Pacific railroad, the thermometer may stand at 90° in the afternoon, and at night fall below the freezing point. Near Salt Lake, Utah, it is difficult to grow Indian corn, though the mean temperature is ten degrees above that of Maine. The local cooling at night, and the higher heats by day are both unfavorable to the crop. Men who have been extensively engaged in making hay in the elevated valleys of California, assure us that they have had their filled water-pail frozen over by night, so that by keeping it in the shade the ice remained through the following day. These facts are important as applicable in the future to human comfort. A close connection exists between diminution of humidity and reduction of temperature; and the remedy, if any, is in protection from influences causing excessive dryness. A remedy applicable to wide areas of northern territory where low temperatures occur unsea-

sonably, through the precipitate descent of cold air from the high region of the atmosphere, may not be found; but in the regions where the extremes are not so great, where they just border on the freezing temperature, they may be applied with much promise of success. The principal cause operating around and above us, producing excessive dryness in the atmosphere and in the soil, is the westerly wind, which alone is competent to reduce the amount of vapor in the air, and to render it incapable of preventing the escape of heat absolved by the earth during the day.

On the Pacific coast the prevalence of westerly winds gives a great uniformity to the temperature, and the most of the rain comes from that quarter. These winds bear their moisture up the slopes of the mountains, where it is condensed into clouds, and is deposited as rain and snow; so that as they pass eastward they are dry winds, and must so continue over the desert region which spreads out towards the Mississippi. These conclusions are so well established, that it has long been remarked of the northern Atlantic States, "so long as the westerly winds continue to blow in winter, there is no cessation to your cold; and so long as they continue to blow in a broad, regular stream in summer, there is no end to your drought."

Our only protection from the baleful influences of this great drying agent—the westerly wind, is in ample and systematic planting of evergreen trees on the cold sides of our fields, orchards and gardens generally.

The success that has ever attended the introduction of such improvements, both in Europe and America, places the matter at once above and beyond all questions of practibility and expediency.

The action of the forest, considered merely as a mechanical shelter to grounds lying to the leeward of it, would seem to be be an influence of too restricted a character to deserve much notice, were it not for the multitude of facts that concur to show its importance as an element in local climate. A writer from Belgium may be quoted in point: "A spectator placed on the famous bell-tower of the cathedral of Antwerp, saw, not long since, on the opposite side of the Schelde only a vast desert plain; now he sees a forest, the limits of which are confounded with the horizon. Let him enter within its shade. The supposed forest is but a system of regular rows of trees, the oldest of which is not forty years of age. These plantations have ameliorated the climate which had doomed to sterility the soil where they are planted.

While the tempest is violently agitating their tops, the air a little below is still, and sands far more barren than the plateau of La Hague have been transformed, under their protection, into fertile fields."

A decline in fruit products in Maine has been apparent for a considerable time. Other farm crops are seemingly in a decline also. Potatoes, oats, and wheat, now rarely give such crops as they did thirty or forty years ago. Fruit trees take on diseases, apples become scabbed and distorted; pears often knotty, cracked, and extremely perverse, plum and cherry trees forget former habits and old friendships, blight and rust and insect destroyers are everywhere. The farmer's crops are invaded from all sides. The cry of local exhaustion of the elements in the soil, negligent culture, and a long chapter of local complaints fail to account for any portion of the difficulty. In the newer States, where the settlement has been more rapid, similar changes are noted. The States of Ohio and Michigan, in particular, originally most admirably wooded, have had a growth so rapid as to work great physical changes in a single life time. In such a field for observation, correct theories and conclusions can hardly fail to be reached. Deterioration in fruits and other crops, through climatic causes in those States, is now clearly shown as being intimately connected with the removal of their magnificent forests. Recent changes in our local climate are doubtless somewhat influenced by the general change experienced in the western States. A severe summer drought over the valley of the Ohio must affect the humidity of the winds passing thence to the Atlantic. From Ohio we have drear accounts of recent climatic changes, working defeat to the intent of the husbandman, and involving the country in losses innumerable and almost incalculable. Fruits that once grew everywhere abundantly and of the greatest excellence, have failed almost entirely, destructive floods and desolating droughts are items of annual record.

We find this subject of climate so ably and thoroughly presented and discussed by Professor Kedrie, of the Michigan Agricultural College, that no better service can be rendered the American people than to give the broadest circulation to every sentence he has so thoughtfully and forcibly uttered. Extended quotations from that gentleman will give a clearer view of the points we desire to bring out, than any other matter or facts within our reach; and for the liberty we take, we feel that no apology is due to any party

but the Hon. Doctor himself. In an address before the Livingston County Agricultural Society, in 1867, on "The influence of Forest Trees on Agriculture," Prof. Kedrie says: "You remember how Ohio was deluged with rain last fall—large districts flooded, vast quantities of corn and other grain washed away; flocks and herds drowned, railroads submerged, while at the same time the New England States were parched and dry. How is it this year? A despatch from Cincinnati, Sept. 27th, says: 'The weather continues dry. The reports regarding the corn and potato crops are even more discouraging. Farmers are selling off their stock as fast as possible. Water is very scarce.' In northern Ohio, 'The pastures are heaps of dust, and an examination of the ground and its contents in a potato patch, would hardly reveal the kind of crop planted.' Sandusky, Sept. 30. 'Never before in the memory of the living, has northern Ohio suffered from such a terrible drought as is now prevailing. For nearly three months, hardly anything to be called a shower has fallen. Cisterns long since went dry, and now nine-tenths of the wells are nearly exhausted. For nineteen miles back from the shore people depend upon the lake for water. The great drought reaches from Rochester, New York, in a belt 200 miles in width, to central Iowa. At present there is no prospect of relief.' Elmira, N. Y., 'Pastures are an utter failure, and cows are rapidly drying up on hay, which is fed out to them as though it were mid-winter. Wells are dry, and the beds of streams, instead of flowing water, show yellow belts of burning sand.' Pass on east of the Hudson, where the drought was 'master of the situation' last year, and now the country is wasted and destroyed by extraordinary floods—the Connecticut river rising ten feet in one day. 'What shall we conclude in regard to such fluctuations and irregularities in the distribution of the rain-fall? No reasonable person will deny that for all these changed manifestations of natural effects, there has been a corresponding change of natural causes; and it becomes us to inquire whether this derangement has arisen from circumstances within the control of man, and hence capable of a remedy, or whether they arise from causes beyond his control, and to whose effects he must submit with patient endurance, because they are remediless." "The rain-fall of any region is influenced by a variety of causes; the nature and direction of its prevailing winds, the influence of mountain ranges, &c.; but a cause which is very marked in its influence and which is also within the control of man, is forest growth. When

we see how rapidly these forests have disappeared under the hand of the woodman, and how steadily the climate of the United States has changed with the disappearance of the forest, have we not good reason to suspect that man's own hand has drawn down these evils upon himself?

If by this thoughtless destruction of this barrier against the fickleness of the weather, we have laid ourselves open to the operation of causes whose disastrous effects we are only *beginning* to experience, is it not time to pause and consider whether we have not gone as far in this destructive process as is safe, and whether a wise prudence in regard to the future does not warn us to stay our hand?"

We can obtain a better conception of the beneficial actions of forests upon climate, by considering the condition of a portion of our country almost destitute of them. An observing traveler writes to Prof. Kedrie as follows: "I am greatly interested in your report on forest trees and their influence on climate, especially as it explains much that I saw and experienced on the great plains lying east of the Rocky Mountains. While riding over these vast plains without a tree or bush, the heat by day was almost unendurable, yet the cold at night was excessive, so that we could not sleep unless wrapped in blankets and buffalo-robes. This vast region, scorched by the sun by day, and chilled by excessive radiation at night, the abode of countless swarms of grasshoppers, can never be the permanent home of civilized man until he can protect himself and mitigate the excesses of the climate by planting trees."

"It was a question with me whether it was possible to cause trees to grow at all, but as I came upon the bluffs back of Nebraska City, I there found the problem solved, for I there found a vigorous grove formed by planting the locust and cotton-wood, and I then became convinced that these vast and desolate plains would some day be the happy home of millions yet to be." "I returned from Fort Laramie on horseback, and went directly across the country from Fort Kearney to Nebraska City. The land is very rolling and beautiful, rich in all that a farmer wants, and yet it produces nothing but the short buffalo grass. About fifty miles west of Nebraska City, the prairie chickens began to appear, and with them the grass grows to a greater height. This grass indicates the nearness to the Missouri river. On the Missouri bottoms there is plenty of wood, principally cotton-wood. All the wood

I saw growing was on bottom lands, and hence my interest in the nursery of thrifty locust and cotton wood on the bluffs which I passed on approaching Nebraska City. It occurred to me that if they would grow there on that high land, a little effort would carry them back and back gradually towards the plains, and in that case the desert would be redeemed in a change of climate."

"Kansas and Nebraska both lie within the belt of country which suffers most for want of rain. In 1863 it did not rain at Fort Laramie for eight months, and it was dry in Kansas. It cannot be considered an agricultural State on account of its frequent droughts and consequent grasshopper plague—for I consider the grasshoppers a result of the dry climate of the plains. There is not enough rain to drown the rascals." "But all this, it seemed to me, might be changed by tree cultivation. Now for my reasons. The belt of timber on the Missouri bottoms affected the grass for fifty miles in the interior, the climate was so changed by the timber belt, that the high rolling lands grew grass sufficiently high to hide the prairie chickens. Of course the volume of the river did something towards this; but the trees served to hold the vapors which arose, and, it may be, helped to diffuse them. The circumstance, then, that trees would grow on the high lands was a fact, it seemed to me, which solved the question of the future of Kansas and Nebraska."

Michigan, in advance of any other State, has given attention to the subject of trees. She appears to have patriotic citizens who are devoted to her *future* as well as her present welfare. Having been a citizen of that peninsula when she took her position as a State in the Union, it is natural that the writer should watch with interest her growth and her history. At the period of her change from a territorial government, her wealth of forest was enormous. Could wise and prudent men from that day have managed her domain, the value of present product from her farms would be much more than it is—probably doubled. So recently has winter-wheat been their successful leading crop, that, without sufficiently noting the rapid change going on in the climate, farmers have persisted in sowing their broad fields, till the State has lost in the winter-kill of the crop, twenty million dollars in four years. Instead of being what it should have been,—the orchard and fruit-garden of America,—it is fast losing its ability to grow a home supply. But, under wise counsels, the people have there set about

repairing the damage done; and the initial legislation of the State is a perpetual reminder to the citizen, that he owes other duties to his State and country besides the payment of his annual assessed taxes.

Maine as a State, has yet a vast amount of forest, and may continue to have for centuries to come. But their preservation will be through the obstacles that nature has thrown around them, guarding them from approach, rather than by the forbearance of the present wood cutting Yankee. The location of the great mass of our forests is such as to exert but little climatic influence over the agricultural districts. To learn of the effects of trees on atmospheric humidity and the crops of the farm, we need not look to Europe nor the far West. Instances are noted within our own State, where contiguous farms under different extremes of condition, manifest corresponding extremes of results, both in fruit products and the grasses. To receive the greatest benefits from improved physical conditions of country at the hand of man, his efforts should be exerted at once on every portion of his domain; yet a single State may in degree be benefitted—and to an extent richly compensating for the expenditure of labor by and through independent action. Local acts in the great economy of nature are followed by local results. The spirit in matter is not confined to operations on the largest scale.

There is a portion of Hancock county along the coast that is now nearly denuded of trees. During the heat of summer, the radiation from the parched surface affects the atmosphere to excessive dryness. The electrical rain-bearing clouds that approach from the westward, as they come within this dry atmosphere, are absorbed and dissipated before their watery contents can reach the earth, while the clouds just north of them float on over a better wooded district, and yield copious rain-fall; and on the other hand the showers continue abundant in the more humid atmosphere of the contiguous bays and ocean. The observing, sea-faring inhabitants of that district, after years of perplexity over the fact and the hidden cause, at last inquired in all seriousness, whether a telegraph wire located to the north of them, does not unfairly "switch off" the showers that rightfully belong to them.

Whatever is done for the preservation or the restoration of our forests, and thus mitigating the fluctuations of temperature and humidity, and restraining the action of the winds, cannot be commenced too soon. The people need to be agitated and a whole-

some public sentiment created. The present theory in regard to physical laws and conditions must be understood and adopted, or discussed and rejected. Wise and able teachers are wanted in this, if in no other matter of present urgency. Men need to be taught that we have no moral right to follow blindly an instinct that leads only to present personal advantage, regardless of wide-spread future evils as a consequent. That we are but tenants of this beautiful earth, not owners in perpetuity—that we have no right to injure the inheritance of those who succeed us, but rather a duty to leave it the better for our having occupied it our allotted time. Men need to be taught to plant trees, and their children taught to plant trees and to love them. Owners of poor lands need advice and direction in planting wood upon them, as a crop more hopeful in riches to future heirs than usual expectations from wasted fields. Owners of *good* lands in Maine, or elsewhere, will, in the future, learn that their bleak fields, if judiciously planted with wood to the extent of forty per cent. of area, will produce on the remaining sixty, more in all kinds of crops than the whole now does or can be made to do under any other possible course of treatment. Lands well sheltered, can and do produce winter wheat in Maine as well as in England or on the new lands at the West. An immediate adoption of shelter to all lands, would result—as soon as such shelter could be matured—in the independence of our State from imported grain. We speak confidently, because advisedly on this point. While the State has manifested a laudable ambition in developing its resources, while it has wisely provided guardians for the Fisheries, and a Commission on Water-power, it has not yet recognized the more important public concern that underlies both those, and all other interests. We believe this to be an important public matter that does not lie outside of legitimate legislation. Shall the legislative voice continue silent on the matter of *forests*, till the last tree shall be cut, thus ensuring dry channels to the *rivers* and the consequent death of the *fishes?*

Must the man of Christendom be taught that Monarchies alone are competent to guard and preserve physical nature so as to yield its sustenance in a perpetual round? Or shall a professed Republic for once arise from an unaccountable lethargy, and assert its force in its determination to perpetuate itself, and make its declaration of intention to have a country in the distant future worth possessing and worth preserving still?

We have extended this paper beyond the limits that we would glad-

ly have assigned to it; but there was a seeming necessity to here show to the sons of Maine, that no part of our extended domain was without the blighting effects of climatic influences. That the means here at home are as available to the creation of desirable homes for ourselves and our posterity as elsewhere. Though man's past history is but a dark picture of physical misfortunes and seeming failures, yet we are hopeful for the future. We hope to see the energy, the wealth, the increased intelligence of men more employed to overcome the physical evils that surround them. After so much of the earth has been made fertile without man's agency, it would be pitiful if he could not assist in finishing the remainder. We hope to see the sons of New England, rather than stray westward to there find the necessity for labor in the world's physical redemption, choose to remain at home and contribute to the renovation of good old New England, by planting her hard hill-tops with trees.

We believe the time has come for action, and that some stimulus through legislation is demanded. We therefore suggest to your Honorable body the expediency of referring to a competent committee for consideration, the following draft for enactments.

CALVIN CHAMBERLAIN,
S. L. GOODALE.

AUGUSTA, February 16th, 1869.

STATE OF MAINE.

IN THE YEAR OF OUR LORD ONE THOUSAND EIGHT HUNDRED AND SIXTY-NINE.

AN ACT for the encouragement of the growth of forest trees.

Be it enacted by the Senate and House of Representatives in Legislature assembled, as follows:

SECTION 1. That any landholder in this State who shall plant or set apart any cleared lands for the growth and production of forest trees, within ten years after the passage of this act, and shall successfully grow and cultivate the same for three years, the trees being not less in numbers than two thousand on each acre and well distributed over the same, then on application of the owner or occupant of such lands, to the assessors of the town in which the same is situated and is so successfully cultivated to forest trees, and at the same time of such application shall file with said assessors a correct plat of such lands with description of their location, and setting forth all the facts in relation to the growth and cultivation of said grove of trees or incipient forest, the same shall be exempt from taxation for

twenty years thereafter ; provided such grove or plantation of trees shall during that period be kept alive and in a thriving condition.

SECT. 2. Any person owning or occupying land adjoining any highway of the usual width in this State, may plant or set out trees in regular rows on either side of such highway contiguous to his land, and such trees if set within six feet of the margin or boundary of said highway, and the trees not more than six feet apart, and of any evergreen variety, and so trained as to promise to result in a wind-screen to protect the highway from the obstruction of drifted snows, such person so setting and training trees successfully for three years, shall thereafter be entitled to receive in account for any assessed highway, poll or other tax, within the corporate where such highway is situate, annually, at the rate of ten dollars for each mile of road so protected on either side, for the period of twenty years ; *provided*, said row or rows of trees are kept entire and alive, and in a growing condition.

SECT. 3. Any person who shall wilfully injure, deface, tear, or destroy any tree, thus planted along the margin of the highway, or purposely left there for shade or ornament, shall forfeit a sum not less than five nor more than fifty dollars for each offence, which sum may be recovered in any court of competent juris-

diction, at the suit and to the use of any citizen within the town where such offence is committed; *provided*, that whenever it shall appear to the selectmen of any town in this state, that any shade or ornamental trees therein are an obstruction or an injury to any highway, the said trees may be cut down or removed by their order.

SECT. 4. Any person who shall negligently or carelessly suffer any horse or other beast driven by or for him, or any beast belonging to him, and lawfully or unlawfully in the highway, to break down, destroy or injure any tree or shrub not his own, standing for use or ornament in any highway, or negligently or wilfully, by any other means, shall break down, destroy or injure any such tree or shrub, shall be subject to an action for damages in a sum not less than one nor more than twenty dollars for each offence, to be recovered at the suit, and to the use of the owner or tenant of the land in front of which such tree or shrub stands, or at the suit of the surveyor of the highway in whose road-district such tree or shrub may be situated; in which case one-half the sum recovered shall accrue to such surveyor, the remainder to be paid by him to the town treasurer, to the use of the town. All penalties recoverable under the provisions of this act shall be by action of debt, before any trial justice,

municipal or police court, or other court of competent jurisdiction.

STATE OF MAINE.

IN HOUSE OF REPRESENTATIVES,
February 18, 1869.

Laid on the table by Mr. MAY of Dover, and on motion Mr. OAK of Garland, 600 copies were ordered printed.

S. J. CHADBOURNE, *Clerk.*