

## FORESTRY AND ARBORICULTURE.

The following essay by A. Eby, M.B., Sebringville, Ont., appears in the report for 1881 of the Agricultural and Arts Association, of Ontario, and was highly commended by that body:—

It was lately asserted that in thirty years from the present time the natural forests of this continent would be exhausted, and that we should be compelled to draw on Europe for our supplies of building material. It is probable that this assertion is a pessimist view of the resources of this continent, yet it is an undeniable fact that the destruction of our forests goes on far too rapidly for the future welfare of our people.

Until a very recent period forests were considered an encumbrance rather than a source of wealth in most parts, not only of this Province, but of this continent. On account of its abundance, and the want of facilities for bringing it into the market, each valuable timber was destroyed, or at best burned, for the potash it contained, within the lifetime of the present generation. It is but a few years since our timber has become valuable, and in the lifetime of many it will yet become precious.

Even should steps be at once taken for the restoration of our forests, our natural wood, and consequently our home supply of timber, will long be exhausted before we can hope to have a supply of our own growth. The time is not far distant when we shall have to draw our supply of building material from Europe instead of sending it there ourselves, as is now the case. The European nations, having long since turned their attention to forest culture, will have abundant supplies of valuable timbers when our own will be completely exhausted. While Europe is husbanding and restoring its supplies of timber, we on this continent are putting forth all our power to wipe all forests from the face of it. This is more especially the case in this Province, in which we have no mountain lands inaccessible to the plough. Though arid, sandy districts, too sterile for profitable cultivation, are not uncommon, yet, with few exceptions, they can all be tilled, and are consequently cleared and settled; whereas, had we had mountainous regions, unfit for cultivation, it is likely they would have remained unsettled in the hands of the Government, and could at once be utilized for growing forests, even if the natural timber had been removed.

It is well known that forests exercise an important influence on the climate. Forests retain much more moisture than cleared lands, and it is well known that moisture in the soil attracts rain much quicker than parched lands. It has also been observed that thunder-showers are apt to follow streams and water-courses.

It is also a well established fact that the more a country becomes cleared up and denuded of its forests, the more subject it becomes to long-continued drouths and violent storms. It is well known that districts of Europe once denuded of forest, but in which they have been restored, support a far larger population now than when denuded of trees. When the well-known Black Forest Mountains of Germany were robbed of their abundant growth of trees, it was found that streams arising in them, that were formerly navigable, gradually dwindled down to shallow brooks; whereas, since the restoration of the woods on these mountains, the streams have also again increased in size.

Spain at one time supported a population of thirty millions, but now that its mountains have been shorn of their forest coverings, it can barely support half that number.

It was well known that it never rained in Egypt. For centuries rain was unknown in that country, but since the Government has gone extensively into tree-growing, copious showers are by no means uncommon.

Mr. George P. Marsh says:—"There are parts of Asia Minor, of Northern Africa, of Greece, and even of Alpine Europe, where causes set in action by man have brought the surface of the earth to a desolation as complete as that of the moon, and yet they are known to have once been covered with luxuriant woods, verdant pastures and fertile meadows; and a dense population formerly inhabited those now lonely districts."

"Hummel attributes the desolation of the Karst, the high plateau lying north of Trieste—

until recently one of the most parched and barren districts of Europe—to the falling of its wood centuries ago to build the navies of Venice."—Northrop.

Dr. Piper, in *Trees of America*, says:—"Near my residence (Woburn, Massachusetts) there is a pond upon which mills have been standing since the early settlement of the town. These have been in constant operation until within thirty years, when the supply of water began to fail. The pond owes its existence to a stream which has its source in the hills stretching some miles to the south. Within the time mentioned these hills, which were formerly clothed with a dense forest, have been stripped of trees, and, what was never known before, the stream itself has been entirely dry. Within the last ten years a new growth of wood has sprung up on the land formerly occupied by the old forest, and now the water runs throughout the year."

"Our summers are becoming dryer and our streams smaller. Take the Cayahoga as an illustration. Fifty years ago barges loaded with goods went up and down that river. Now, in an ordinary stage of water, a canoe or skiff can hardly pass down the stream. And from the same cause—the destruction of our forests—other streams are drying up in summer."—Wm. Cullen Bryant.

Northrop says:—"Almost every work on forestry abounds in evidence that extensive forest denudation has everywhere diminished the flow of springs. The case of the famous springs in the Island of Ascension is often cited, which dried up when the adjacent mountain was cleared, but reappeared a few years after the wood was replanted. Several lakes in Switzerland showed a depression of their level after a general devastation of forests."

Siemoni says:—"In a rocky nook in the Tuscan Apennines there flowed a perennial stream from three adjacent springs. On the disappearance of the woods around and above the springs, the stream ceased, except in rainy weather, but when a new growth of wood again shaded the soil, the spring began to flow."

Marchand says:—"The river that, from time immemorial, furnished ample water power for the factory at St. Ursanne, dwindled down so much when the surrounding woods were cut away that the factory was obliged to stop altogether."

Captain Campbell Walker, who was long employed in the forest service in India, says:—"He observed the drying up of springs and decrease of the average amount of water in some of the mountain forests of India, in which extensive clearing had taken place, and that such clearing had unquestionably lessened the regular supply for springs and permanent flow in the streams and rivers."

Foresters of note, like Captain Walker and Dr. J. C. Brown, claim that the recent famine in India was due to the extensive and reckless destruction of the forests of that country by the East India Company, thus lessening the supply of water from the springs, the former source of supply for artificial irrigation. The English Government is now actively engaged in restoring the forests on the mountains of that country.

Since the settlement of Utah by the Mormons, who engaged extensively in tree-planting, Salt Lake, instead of becoming shallower by evaporation year by year, as was the case before the settlement of that territory, has actually risen ten feet in the last twenty years, from the increased amount of water received through the streams supplying it. This increased size of the streams is said to be due rather to a decrease of evaporation, on account of the large groves now covering that country, than to an increase of the rainfall.

It is a well known fact that many water-powers in the older settled counties of this Province, that were considered valuable even thirty years ago, are now that the country is fully cleared up, almost worthless, being available only for two or three months during the spring freshets.

It is not proved that the total rainfall of a country is lessened by denuding it of its forests, but in a well-wooded country there is a more general distribution of the deposition of moisture throughout the year. Observations in France have established that the rainfall in the forests

is six per cent. more during the year than in the open country; that ten per cent. of the total rainfall in the forests is caught up by the leaves and reaches the earth but very gradually, if at all, and that the evaporation in the open fields is five times greater than in the forests.

That forests exercise an important influence on the climate and the permanent water supply, is the almost unanimous opinion of the foresters of Europe. This opinion is not only sustained by theory, but is in accordance with observations made in different countries and by different observers.

"These investigations show that the general destruction of forests has rendered the climate dryer, more changeable and trying, and that forests, on the one hand, tend to lower the general temperature of a country and promote the fall of rain at more regular intervals, and, on the other hand, they ward off sudden meteorological changes which result in heavy falls of rain and disastrous floods."—Northrop.

Mr. Marsh says:—"One important conclusion, at least, is certain and undisputed, that within their own limits and near their borders forests maintain a more uniform degree of humidity in the atmosphere than is observed in the cleared grounds." Speaking of this continent, he says:—"With the disappearance of the forests all is changed. At one season the earth parts with its warmth by radiation to an open sky, and at another receives heat from the unobstructed rays of the sun; hence the climate becomes excessive, and the soil is alternately parched by the fervor of summer and seared by the rigours of winter."

Commissioners appointed by several learned societies of Europe to investigate this subject reported that "Forests exercise a beneficial influence which can hardly be estimated too highly, in an increased humidity of the air, a reduction of the extremes of temperature, a diminution of evaporation, and a more regular distribution of the rainfall, while the injurious effects of their destruction is seen in an alternation of periods of drouths at one time with wasting floods at another."

Northrop says:—"The forests serve as store houses of moisture, both from their leafy canopy, which shuts out the sun, and the myriads or rather millions of leaves covering the soil and acting like a sponge, soaking up and retaining the rain and regulating its distribution, while the roots act as vertical drains, favoring infiltration and promoting the descent of the water into the lower strata of the earth, there to nourish the springs."

In our own country it has recently been observed that seasons of long-continued drouths are much more common now than when it was first settled; but not only are drouths more common, but so also are violent storms. Twenty-five years ago the firing of a building by lightning was a rare occurrence, whereas, of late years such losses are by no means uncommon; in fact, I have known such losses to occur within a few miles of each other from the same storm in this county (Perth). In the neighboring County of Waterloo such a thing as the firing of a building by lightning was almost unknown while the noble pine forests, so common there, remained intact, but since their destruction such disasters are as common there as in other countries.

Dr. Brown, the most voluminous writer on this subject in the English language, has clearly proven, from different official documents, that fearful inundations resulted from the clearing of the forests on the mountains of France. So great have been the losses from this source, that the Government has adopted vigorous measures for replanting the denuded mountains.

That such should be the case is quite natural. Forests not only retain moisture longer than the open country, and thus attract rain from passing clouds, but the trees act as conductors of electricity between the earth and the clouds or the air. The positive electricity of the clouds is constantly neutralized by a flow of negative electricity from the earth. The foliage of the trees act as so many distributing points, thus preventing, by gradual neutralization, those violent discharges with which we are so well acquainted. The safety to farm buildings from lightning, when surrounded by tall trees, should alone induce farmers to surround their premises

with so beautiful, yet effective, lightning conductors.

From what is stated above, it must be abundantly evident that forests are a necessity to the agricultural interests and welfare of a country, not so much on account of the timber they produce as on account of their moderating influence on the climate. But while this is the case in all countries, it is especially the case in one so level as Southern Ontario. Most parts of this Province are still sufficiently wooded not to feel the effects of a treeless country, but the time is fast approaching when the rockless destruction of our forests will be deplored by our people. A country subject to the long and severe winters we have in Canada, needs the shelter afforded by trees against the blasts and storms with which we all are so well acquainted. The more a country becomes cleared up, the worse will the wintry blasts become. Even the frightful blizzards of the Western States and Manitoba will reach us at no distant day if the wasteful destruction of the forests of this Province and of the adjoining States of Michigan and Wisconsin is permitted to go on unchecked for a few years longer.

Even now, fall wheat, the great staple of the Province, has in many sections become an uncertain crop, on account of the want of proper shelter during the winter and spring. The winds sweep uninterrupted over the fields, and drift the snow from them to the fences and roads, instead of lying it as a covering to the tender plants. On the approach of sun in the spring, the thin covering of snow is melted off, and the plants lie exposed to alternate frosts and thaws. Thus, instead of a larger clearing giving a larger yield to the farmer, as he expects, his crops become more precarious and uncertain as his clearing increases. This, I believe, has been the experience of the great majority of those who settled on a bush farm. The great majority of our farmers would have larger returns from their farms if they had only three-fourths, instead of nine-tenths or the whole of it, cleared and under cultivation. The same labour put on a smaller acreage would bring a much larger return.

In order to spread a proper knowledge of so important a subject as Arboriculture, our Provincial Government should at once appoint a Professor of Forestry in the Ontario College of Agriculture at Guelph. Such a professor should deliver lectures on this important subject, and thus awaken our people from their lethargy to the importance of providing a supply of timber for future generations, and leaving them a wealth far greater than gold—a rich, beautiful, productive country, instead of a sterile, treeless, unproductive desert, as this Province will become if the present destruction of our forests, and the exhaustive and unscientific system of agricultural, now so extensively prevalent, is continued. It is highly necessary that a knowledge of a subject of so great importance to the agricultural interests of the country should be extensively spread while it is yet time to stop the rapid and often wasteful destruction of our forests. This object cannot be better attained than by the establishment of a Professorship of Forestry in our Provincial School of Agriculture, where the leading agriculturalists of the future are receiving their training.

There are many tracts of land in all parts of the country totally unfit for cultivation—barren, sandy, or stony hills, or low, marshy, boggy flats, that would make splendid forests. Many of the former are too barren to produce even sheep pasture, while the latter are too wet to make it safe for cattle to venture into them. In fact, neither the one or the other should ever have been cleared, but should have been retained as woodlands; as such they would have been valuable not only for their timber, but for the influence they would have had on the climate. Encouragement should be given to the holders of such lands to replant them with such forest trees as promise to be of most value for the future, or which may be especially adapted for the soil and climate. This could be done by exempting such lands from taxation, provided they are properly planted and attended as forest lands. But no land should be considered worthy of exemption on which cattle or sheep are allowed to pasture and destroy the young plants as they spring up. Nor should such