

of enormous thickness—thundering, tearing, levelling, plowing—flowing slowly, majestically, continuously, while ages roll.

It is now the climax of desolation and destruction.—Slowly, but surely the dismal Empire declines, and after the lapse of ages, it passes away. Mountains have become plains, plains have become lake basins, and river channels. Around are *roches montonnées* and *blocs perchés*—rock surfaces polished and striated. Drift accumulations cover the sides of mountains, obscure the rocks of plains and valleys. Our boulder has now an individuality—the result of glacial action, although it is still obscured by overlying drift. The glacial *debris* becomes the soil of noble forests. These with lakes and rivers adorn the scene of former desolation. A colony of giant mammals, from the south, descendants of the pre-glacial races, roam through the forests, and recline on the lake margins. The red man appears, and possibly exterminates the *Mastodon Ohioticus* of Cape Breton, becoming the lord of the forest, with its new race of mammals—Moose, Carribou, Foxes—black and red—Bear, Wolf, Loupcervier and Wild Cat.

Acadians arrive and divide occupation with the Micmac. The Briton comes and assumes the supremacy. He takes possession of the land, builds a city, erects towns and villages, constructs roads and railways, exposes our boulder to the eye and hammer of the Geologist, who having read its history, leaves it. *Henceforth*, “*Requiescat in pace.*”

ART. XII. THE ECONOMY OF TIMBER AND PRESERVATION OF STRUCTURES FROM FIRE AND DECAY. BY A. P. REID, M. D., M. R. C. S., Edin. &c. &c. &c.

ECONOMY OF TIMBER.

THIS subject should receive the greatest consideration from us at present, as our lands are being rapidly cleared of their timber, and more for foreign than home use. This though helping to swell our exports, and bring financial wealth into the country, is not an un-mixed benefit, for we are squandering a patrimony in a way that

will soon exhaust our supplies, and demand from us an expenditure of a far higher sum for its equivalent than we have received, besides depending on a foreign or distant source for our supply. The exercise of a little judgment in this matter would be of great future avail, without being a present hindrance. Take a case in point.

The Province of Quebec has 1000 acres of valuable forest for one that we have; yet for years it had been the object of the old Canadian Government while fostering the largest lumber trade to provide for its ultimate continuance.

To guard the future as well as the present is the duty of every Government; whereas the aim of the Commercial mind is to get the largest amount of wealth in the shortest time, little heeding the prospects of the successor. Thence the conflict between the *Government* and the *individual*,—the former, having commanding power, should prevent the latter from injuring the commerce or trade of his successor.

The old Canadian Government did this by selling the land in small quantity, by the acre, and in perpetuity to intending settlers or cultivators, and by selling the timber by the square mile to those who did not want the land, but what was on it. It was sold for a term of years and by auction, so that the largest revenue was obtained while shewing no partiality to intending speculators. The object of this sale of timber, and not of land, was to favour the growth of timber, because when the largest trees are removed from a forest the smaller ones rapidly increase by growth, and the supply will not much diminish. There is an additional tax on each log that is brought down to the saw-mill. These regulations have been in force for very many years, and have worked well for all parties.

Nova Scotian legislation has not been of this conservative tendency, because but little value had been put on timber, and comparatively little had been introduced to market:—in fact our legislators did not know either the quantity or quality of Nova Scotian timber. They are now awakened to the fact, when it is all but too late; however, much can yet be done to foster this industry, and I will throw out a few suggestions.

That all owners of 1000 acres of land, and upwards, who do not carry on lumbering operations, shall be compelled to pay a tax of

— cents for each acre yearly. This would prevent the accumulating of land in the hands of those who do nothing with it.

Where real farming is being carried on on the property, the tax to be on the excess (if any) over 1000 acres. I place the maximum at 1000 acres as it would not be oppressive on small land owners, or farmers who generally have much more land than they cultivate, more than can be cultivated owing to marsh and barrens.

That those who carry on lumbering, or saw mill operations, shall pay instead of the tax for wild land a tax of — cents on every 25 feet of length of logs—irrespective of their diameter. Logs taken from the top part of the tree to be estimated at only half value, and half the tax.

That if in any case the sum accruing from this tax should not come up to the amount which should accrue from the land, if no operations were carried on, the difference to be made up to this amount; but if it come up to or exceed this, then no specific tax to be collected.

I would recommend the tax to be on logs, irrespective of their diameter, to the end that lumbermen should only cut the large timber, which, while preventing the degeneration of the forest, will continue the supply indefinitely.

This is needful for two reasons; first, because much of our soil at present in forest is only fit to raise forest timber; and, second, to favour shipbuilding, where a less size of timber is required, and this supply would thus be continued where saw logs had become exhausted,—and it is far more profitable for the Province to export its timber as ships than as sawed lumber.

That on logs or timber solely to be used in shipbuilding in the Province, the tax to be only one-fourth of that above referred to, or less owing to locality; the proceeds to be used in making wood roads, or improving the streams or harbors on which ships are built, to the end that this industry be assisted.

I believe it would be unwise to put any tax on lumbering operations, that would tend to diminish them, or jeopardize capital that has been thus expended; and I would suggest that after the expenses of collection have been paid, the balance should be put into a special fund to be expended in means to benefit this industry.

There are a great many small streams and rivers in Nova Scotia (I may say all of them) that it is extremely difficult to lumber on, on account of the exceedingly rough rocky bottom and the small amount of water they carry ; and the Government could in no better way further the interest of the Province than to expend a sum of money yearly in blasting out rocky obstructions, and building dams and timber slides, on the most frequented streams. These improvements would save ten times their tax to the mill owners, in the large sums they now pay for log driving, besides the very large loss they sustain in logs that are scattered along the banks of the rivers, which cannot be made use of, and become much deteriorated from exposure, besides being a dead loss of about 10 to 30 per cent. of their raw material and capital for from two to three years. Practically a large per centage of logs are always so situated as not to be at command. Laws of this kind would tend to foster our lumber trade, while at the same time preventing very much waste that now exists. The crown timber lands yet to be sold should be auctioned by the square mile for 7 or 10 years for lumbering purposes.

Government should appoint an officer to superintend this department of our trade, a man thoroughly posted in lumbering and shipbuilding operations, to give reliable information and suggestions to the Government on the best method of carrying it on ; such as making outlay, variation of tax on shipbuilding operations, (owing to locality,) and to attend to other duties in relation to the forest, to be again referred to.

Shipbuilding requires a great deal of timber, but a kind of little value for saw-mill purposes, and with care could be continued indefinitely. To this every attention should be paid, as the demand for wooden ships will continue to be much better than of late years, owing to the failure of iron sailing ships.

As another means of economising our timber, greater encouragement should be given to the manufacture of wooden wares, thus giving a larger home expenditure with a diminished demand on our supplies ; for in addition to supplying the home demand they could be made large items of export, as now obtains in many parts of the Dominion. This variety of industry is being rapidly developed ;

and though we may hail "*Saw Mill*" Companies as a boon, yet of far greater value is the Furniture, or Pail and Tub Factory.

There is a great deal of waste land in the Province, that with a little care and judicious inspection could be made to furnish timber either by trimming undergrowth, or by planting land that could grow pine trees even better than fir, alder, and scrub. This would have the additional advantage of making our streams perennial, instead of dry, a good part of one-half, and frozen the other part of the year, with freshets, chiefly, intervening.

Thus our climate would be kept from deteriorating, which has been proved to be the case where forests have been cleared over large areas. They modify frost, heat, rainstorms, freshets, droughts and destructive lightning discharges. We must diminish the use of wood on railways as fuel—this is now being done—and for sleepers, which must be done, by some preservative process, that will arrest their decay and in so far prevent accidents. This, however, will cure itself as it has in England, where railway sleepers of inferior wood well preserved, last for more than thirty years and still sound; with us they serve for two or three years, when they become so much decomposed as to be dangerous.

PRESERVATION OF TIMBER FROM FIRE AND DECAY.

From Decay.—Timber exposed alternately to dampness and dryness, suffers injury or absolute destruction, owing to the amount of exposure, lapse of time, and kind of wood; and various methods have been adopted to overcome this difficulty. Charring the exposed portion, was supposed to be of benefit, but it will not prevent the entrance of water and air which destroy the interior.

By steaming or boiling timber, which coagulates the albuminoid substances and washes away soluble salts, there is given a modicum of preservation which is not a commercial success for this purpose.

It is known that the resinous and odorous woods—pine, *lignum-vita*, cedar, &c.,—will endure the longest, and efforts have been made to add to other woods substances of this character, but the greatest difficulty has been to cause resinous and fatty substances to permeate the pores of all kinds of timber, and without which the outside protection does not much avail.

When creosote which prevents decay in all albuminoid substances was discovered in tar, the idea at once presented itself of using this means, either as crude tar from wood, or from coal, which is similar, or their products. This is by far the best method yet known to prevent decay. The tar cannot be made to permeate the wood, and when applied externally it prevents moisture from escaping, and in so far favors decay; hence its use has been abandoned. A crude, cheap, liquid creosote is obtained from tar by distillation, which can be made to permeate timber, and has remarkable preservative powers. It is now the substance most extensively used in England for this purpose.

If we could thoroughly permeate timber with creosote, tar, resin of any kind, soap, paint, or oil, we can preserve the wood thus acted on, but it is rendered more inflammable, and under any circumstances is costly.

Many metallic salts when forced into wood, preserve it from decay, and render it less inflammable. The most active agents are *Corrosive Sublimate*, Sir Wm. Burnett's *Chloride of Zinc*, *Sulphate of Copper*, *Pyrolignite of Iron* and *Phosphate of Baryta*; but their cost greatly excludes their use. *Sulphate of Iron* is cheaper, but of less value.

Common Salt has great preservative power, and is much used in shipbuilding, and might be much more used with good effect to ward off decay.

There are three ways of using these substances :

1st.—Applied to the surface which is of little use.

2nd.—A French Process of making a hole in the tree, and introducing the substance in solution. By this method before the tree dies the salt will thoroughly permeate it, and while preserving the timber, will, with some salts stain it very beautifully. The objection to this, apart from cost, is its impracticability on a large scale where lumbering is carried on.

3rd.—Placing the wood in large strong vats and forcing the solution into it. This is the most available method.

Preserving from Fire.—In this country this result would be even preferable to protection from *decay*, but the means which confers the former does the latter as well.

Chemistry has furnished us with substances that possess this property in a marked degree. *Common Alum* is very good. Filling the pores of timber with *Sulphate of Lime* or *Plaster of Paris*, by double decomposition, is also good. *Tungstate of Soda* is better than either, but its price militates against its use. Silica either alone or combined with an alkali or alkaline earth, is the best substance as yet known, and is most frequently used as Silicate of Potassa, or Soda in solution. Fuch, of Munich, Bavaria, in 1823, first made known the remarkable properties of these compounds and used them as preservatives of *stone* from decay, and of *wood* from fire and decay—and as well the best groundwork and fluid for the *Fresco* Painter. The theatre of Munich was the first edifice protected from fire and decay and ornamented also by these compounds.

Ransome in England in 1845-56, patented the use of soluble silica for the making of an artificial stone, and the preservation of stone and timber; and it is at present largely used for these purposes.

One of my objects this evening was to show the value of Silica,—injected into the pores of the wood, when united with Soda or Potassa, or decomposed afterwards by lime in solution, when so introduced, and the saturation of the timber with common salt at the same time. Or by simple application of the solution to the exterior, either alone or with clay, whiting, or Plaster of Paris, which makes a cheap and effective fire paint.

When injected into pine timber, and afterwards dried, I find it is not difficult to increase the weight 50 per cent. and confer great powers of indestructibility. It could be introduced with very great facility into telegraph poles, wharf logs, and undressed timber, by the method used for the introduction of Sulphate of Copper into telegraph poles in England, viz: by hydrostatic pressure. The fluid being elevated a number of feet above the ground, and a tube connecting it with a cup, which by means of a Caoutchouc connection is tightly secured around the large end of the log, the sap of the timber is expelled and replaced by the preservative.

I will briefly summarize the advantages due to silicating timber:

1. To prevent wet and dry rot.
2. To increase the hardness and density.

3. To preserve its elasticity.
4. To prevent shrinking and warping in drying.
5. To prevent the cracks and splits that are common in thick lumber.
6. To confer on it non-inflammability owing to the heat producing a coating of glass around each fibre, thus preventing access of air.
7. To make timber at the same time a good non-conductor of heat.
8. To prevent the joinings in frame work from giving away as is now the case, long before the timber is much weakened by the fire, which expedites the work of destruction, and endangers firemen's lives.
9. To make fireproof Mansard Roofs.
10. To have cheap and good houses, with low fire insurance rates.
11. To make stronger and more lasting wooden ships.
12. To almost prevent that awful calamity—fire at sea.