

the felling and removal of timber, known by the French as *exploitation*, is carried on in New Zealand in a most expeditious and workmanlike manner, but, from the large supply and comparatively low rates generally ruling, especially for small stuff, without much, or indeed any, consideration as to waste of material, and still less of care in its removal not to damage the young crop of trees left standing.

Felling is usually performed with the axe; indeed it is only on the West Coast (near Hokitika) that I found the saw in general use for this purpose, one side of the tree being first scarped with the axe. The saw recommends itself wherever material is scarce, as its use certainly effects a saving of several cubic feet in a fair-sized tree, and wherever it is desired to fell trees carefully and in a certain direction so as to interfere as little as possible with the standing crop. It could not, however, be brought into general use with the kauri, from the enormous size of their trunks, and I am not sure that it is economical as regards labour, although the bushmen at Hokitika consider it is so. When the tree is felled one or more logs of convenient lengths are cut out of the trunk by cross-cutting, and the rest, including top, lop, and branches, left lying in the forest. It is very striking what fine pieces, which would be of great value in other countries, are thus left to rot or burn: this is especially the case in the kauri forests, where none but the best portions of the finest trees have been, as a rule, made use of, and where the bushman looks with contempt on anything under 3 feet diameter, which he terms a "ricker."

The logs are next moved to the side of the timber slip, where such is used, and rolled down it to the nearest sidling on the tramway, or dragged, generally by bullocks, direct to the tram. I have not seen any regular rolling roads, except in the kauri forests, where on the other hand the work of getting the logs to the tram is done by manual labour, whereas in others bullock power is used. The Auckland bushman makes use of a powerful auxiliary in the shape of the screw-jack, and it is marvellous the amount of work two men trained to its use will get through, and the enormous logs which they will move about as required by its aid.

In other parts of the colony, where the logs are smaller and lighter, the jack is not much used, its place being taken by what are known as cant-hooks of various constructions.

The universal use of the tramway forms a marked feature in the treatment of New Zealand forests. I have seen them of all descriptions, and no saw-miller ever dreams of working a forest without one. They are, as a rule, constructed by bushmen on contract, the price per chain varying greatly, according to locality, nature of the country in which the forest is situated, and size of timber to be taken out. In the Pelorus, near Havelock, the forest tramway assumes the shape of a regular light railway, with iron rails and locomotives specially constructed and solely used for the transport of timber; but, as a rule, the rails or longitudinal sleepers are of wood; their construction is identical with those met with in Switzerland (described in the supplement to "Reports on Forest Management"), and the haulage is by horses. I have seen no such system *generally* applied in any of the forests I have visited out of New Zealand, but it may possibly be common in America.

Floating is common for the transport of timber in the Auckland district, where dams are constructed on the smaller rivers or streams to store up the water till required. One of those which I saw at Mangawhau cost as much as £1,000.

The use of dams on the subsidiary streamlets to augment the supply of water as required would probably be found an advantage, and still more the preparation, by means of sleeping, and construction of locks on the stream down which the logs are floated, as is universal in the Black Forest and other parts of the Continent of Europe, where, however, the supply of timber, being under systematic management, is permanent and regular—not, as in the kauri forests, merely temporary.

I have not seen floating in any other parts of New Zealand, though it is resorted to in Otago, and doubtless elsewhere, the main difficulty being, as in India, that many of the timbers will not float unaided in a green state, and there is at present no demand for the lighter descriptions which might serve as floats or rafts. Taken as a whole, there is nothing to find fault with, and much to admire and copy elsewhere, in the felling and transport of timber in and from the forests to the mill or market, except the waste, and damage caused to what is left—evils which will cure themselves when the produce is more scarce, and found only in more inaccessible places, requiring a greater outlay of capital to work a forest, and pieces and descriptions now discarded as worthless acquire a marketable value. Systematic management, and the leasing of only such portions of the forest as are actually required to supply the demand, or which it is desirable to clear for the extension of settlement, will also tend to this result. At present, any one working a tract of forest knows he can readily get another, and consequently finds or considers it preferable only to take the cream, and leave one block for another. This system would not so much matter were the worked portion left in a state to recover by the process of natural reproduction; but unfortunately it is not so. The saplings have already been rudely damaged; the covering or compactness of the forest has been abruptly broken, and a flood of light and air suddenly admitted. Decay of the half-mature trees sets in, and fire generally follows, which, fed by the *débris* and want of healthy vitality in the growing trees, completes the havoc, and destroys the forest for ever.

Turning to the methods of conversion, I need scarcely state that by far the most usual is that of saw-machinery, of which the motive power is generally steam, but in some instances water. The saw-mills of New Zealand compare favourably, I should imagine, with those in any part of the world. From the Aratapu Saw-mill, on the Wairoa River (Auckland Provincial District), capable of turning out 150,000 superficial feet per week of six days, without overtime, to the small mill turning out its 5,000 or 10,000 superficial feet per week, I consider they are generally eminently adapted for the work which they have to do, and the greatest boon to the settler and general public in providing a supply of sawn timber ready, it may be said, at every one's door. The saw-mill indeed appears to me, no less than the forest tramway, a marked feature and excellent institution in connection with the working of the forests. I have given the subject much attention, and been specially employed in selecting saw-machinery for the Bombay forests, where its use has until lately been quite unknown—the majority of our Indian timbers are very hard and difficult to saw, and the climate in the forests is often deadly at some seasons of the year—but I have nowhere in Europe seen machinery better adapted for the purpose or so generally employed as here.