

The original forests appeared to the pioneer settlers as inexhaustible, and so no proper means were taken for their conservation, forest areas having constantly been burnt for purposes of settlement without first utilising the trees of commercial value. Such waste has been a common experience not only in New Zealand but in all colonisation.

The gradual extinction of the forests has now reached a point when, at the present rate of consumption, the end of the timber-supply will be in no very distant future, and the question as to the value to the Dominion of the forests as they stand and their future treatment daily becomes one of more importance.

2. CHARACTER OF THE NATIVE FORESTS.

The tree-communities of New Zealand belong to that class designated by plant-geographers "rain-forest." Such is specially characteristic of the tropics, but is rarely met with in the Temperate Zone: being quite absent in Europe and the extra-tropical parts of Asia, and North America—those regions which furnish the greater part of the timber-supply of the world.

The presence of rain-forests is due to an equable climate with the rainfall spread over *all* the months of the year, and not confined to some particular season. Such regularity of the downpour is not at all an essential for the growth of trees, the deep-rooting habit of many species allowing them to utilise the ground-water at a considerable depth, and to actually occupy situations where meadow-grasses cannot thrive. Nor does it matter at what season of the year the rain falls which keeps up the subterranean supply, or even whether such is dependent upon the snowfall. Also, intense cold is not inhibitory, as witness the forests of northern Asia and America.*

A typical New Zealand rain-forest resembles in many ways one in the tropics, and is altogether different from the timber-forests of Europe and North America, a matter of considerable influence on its economic value. Thus the trees are of various sizes and of many species, while, with a very few exceptions, they are evergreen. There is a close undergrowth of small trees, tall shrubs, and tree-ferns, a second of smaller shrubs, and a third of ferns in abundance, sedges, and a few other herbaceous plants. Certain of the trees have plank-buttresses at their bases, and a few bear flowers on the trunks or thick branches. Mosses are usually very plentiful, forming mats or even cushions on the forest-floor and growing in profusion on the trees themselves. Woody climbing-plants and epiphytes are extremely common. Generally speaking, the trees have far-spreading but not deeply-descending roots, so that they are dependent for their water-supply rather on the frequent rain than upon the ground-water, the quantity of which in consequence they reduce but slightly. Such shallow rooting also leads to their being easily uprooted by the wind. The mosses play an important part as water-storers, and are aided by the leafy shelter of the close undergrowth of shrubs. It can also be seen that the moist forest-interior is very favourable for the production of humus.

Such a New Zealand rain-forest depends for its well-being not only on the climate, but on its composition and the arrangement of its members. The trees, which form with their crowns its roof, are provided with more or less drought-resisting leaves, partly in harmony with their evergreen nature and partly because such are wind-tolerating. The close canopy serves to keep out the wind and to restrain evaporation from the ground, so that within the interior there is always a moist atmosphere, a fact demonstrated by the numerous filmy ferns whose leaf-structure resembles that of water-plants.

It can be readily seen that such a forest as the above cannot tolerate being interfered with. Any cause which can let in more light, or wind, changes the environment of the plants and leads to damage. Many of the trees are so dependent on the forest mode of life that they will not thrive when growing isolated; in fact, it is quite impossible in many places to cultivate certain indigenous trees in the open, even in exactly the same climate which regulates the association as a whole.

The forest is not uniform, either as to species or their relative abundance, throughout New Zealand. There are two main classes—the *mixed*, where the trees are of many species, even though one or other may dominate, and the *pure*, where one species of tall tree is alone present.

The mixed forest occupies the lower country and the better land. Its most important timber-trees are various species of pine. These pine-trees are not closely related to those of the Old World: one, the kauri (*Agathis australis*) is allied to the araucarias (monkey-puzzle tree, Norfolk Island pine, &c.), and the remainder belong to a family, the *Taxaceae*, of which the yew of Europe is a well-known member. The terms "white-," "black-," and "red-pine" are therefore somewhat misleading.† The species decrease in number from north to south of New Zealand, but there are many common to all the mixed forests.

The pure forests are either made up of the kahikatea (*Podocarpus dacrydioides*) as the sole tall tree, or the various species of the southern beech (*Nothofagus*).‡ In the former case they occupy swampy ground in the lowlands, and in the latter are chiefly on the mountain-slopes, or if at low levels, then on the poorer ground unsuitable for the mixed forest. Both classes of pure forest contain more or less small trees, shrubs, and ferns—indeed, frequently the number of species present is considerable. Between beech and mixed taxad forests are transitions where both *Nothofagus* and various species of pine occur in the same plant-society, as in the fiord country of Otago.

* Wind is the factor which prohibits the growth of trees in the Arctic, owing to its effect in causing transpiration at a time when the roots cannot function on account of the frozen ground.

† *Pinus Strobus* is known as "white-pine" in North America.

‡ The incorrect term "birch" is still almost universally used by sawmillers, and even yet to some extent in official reports. This error would not matter if the names of the various so-called "birches" were uniform for the whole Dominion, but quite the contrary is the case—e.g., the red or toothed-leaved beech (*Nothofagus fusca*) = red-birch in Wellington, black-birch in Auckland, brown-birch in Nelson. The silver-beech (*N. Menziesii*) = red-birch, silver-birch, black-birch, and brown-birch according to the district and the fancy of the bushman. The entire-leaved beech (*N. Solandri*) = black-birch, white-birch, brown-birch, red-heart-birch. Even the kamahi (*Weinmannia racemosa*), which, of course, is neither a beech nor a birch, is frequently called "red-birch," "brown-birch," and "white-birch."