

The protection of these virgin forests for future use seems to be one of the most urgent matters requiring the attention of Government. The total area of forest land reserved at the 31st March, 1901, was 2,552,067 acres. A very small proportion of this area, however, comes under the heading of "State forests," the major portion being reserved for the purpose of preserving vegetation at the sources of rivers and crests of ranges.

It is hardly necessary to refer to the destructive influence consequent on the indiscriminate clearing of forest lands, especially at the sources of rivers. Spain, at one time noted for its salubrious climate and the richness of its soil, is now one of the poorest and driest countries in Europe, with a rainfall of only 9 in. per annum, owing entirely to the denudation of her forests. Other instances of the disastrous results caused by the reckless destruction of forests may be found in the island of Cyprus, St. Helena, Mauritius, Egypt, India, and many other countries, including our own colony, where periodical floods frequently occur, doing immense damage to bridges, roads, and low-lying country.

Cattle, sheep, rabbits, and the wild pig are the chief agents in the destruction of our Alpine vegetation, and their efforts are ably seconded by the shepherd, who during the spring months is constantly burning not only the coarse herbage to obtain fresh succulent growth for his flocks, but every year his fires encroach further and further into the wooded valleys, and in time leave only isolated patches in some of the damper situations. Cattle and sheep assist in the general destruction by practically clearing all the under-scrub within their reach. Rabbits and hares peel and bark the young growth of many sub-alpine plants, and when feed is scarce eat down the herbage on steep hillsides to such an extent that further growth is arrested—a bare patch occurs on which the sun and wind have full play—gradually the barren area extends, and heavy rains soaking into the open unprotected soil cause a landslip, which is carried down to the lower valleys by successive floods.

The reservation of watershed-areas is but the first step towards conservation. What is being done towards their protection from trespass by man, stock, and the disastrous effects of fires? None of the areas are fenced, no fire belts have been cleared around the boundaries, and but for the occasional visit of a Crown Lands Ranger they are practically unprotected. Owing to the surface-rooting nature of most of our forest trees they are particularly sensitive to any damage occasioned through trampling by stock. The New Zealand bush in a virgin state is, with the exception of kauri forests, practically impervious to fire, owing to the natural carpet of moss, fern, and other growth being kept constantly moist by the overhead canopy formed by the tops of evergreen trees. Once stock is admitted, however, a year or two of trampling and browsing soon shows its effects. The more sensitive varieties begin to lose their leaves and branches, and gradually perish for want of root-protection and insufficient supply of moisture. One tree after another falls, and carries with it numerous lesser trees and saplings, the foliage of which is eagerly devoured by stock. The sun and wind find an entrance through the gaps thus caused; the fallen *débris* is shrivelled up and rendered highly inflammable; trees, deprived of their natural shelter (both in root and branch), gradually succumb to the altered conditions, and in time become also a mass of easily ignitable material, requiring only the careless dropping of a match to complete its destruction.

In kauri forests the danger from fire is even in the natural state decidedly great, owing to the accumulation of fallen leaves, bark, and particles of gum around the base of each tree. The gum-digger enters, and finds a tangled mass of undergrowth impeding his work. A match is applied, and hundreds of acres may vanish in smoke within a very few hours. No tree is more susceptible to fire than the kauri, the slightest scorching of its roots being sufficient to prove fatal within a very few months. Not only is the whole forest destroyed by fire, but owing to repeated burnings of second-scrub growth the top soil is frequently converted into ashes, which are blown away by the wind, leaving only the bare subsoil of pipeclay, thus rendering reforestation practically impossible.

The functions of the forest trees in shading the soil and preventing excessive evaporation, and of the spongy floor in retaining moisture and giving it out subsequently as required, may be briefly mentioned. First of all, the surface is covered with a thick layer of dead leaves and a carpet of moss and lichens, which develop rapidly under the shade trees. This spongy covering imbibes the water and performs the function of an immense natural reservoir, from which plant-life draws its supply. Any excess of moisture infiltrates into the ground in proportion to the degree of its permeability to supply springs, and the residue is prevented from rushing to the lower valleys by encountering on its journey the thousand obstacles of which a forest soil is composed. If the forest be cut off, then opposite agencies come into action and cause reverse effects—heavy rains wash away the soil, torrents rush down the watercourses with great rapidity, whilst streams and rivers overflow their banks, devastating large areas of low-lying parts under cultivation.

Our four principal cities are at present engaged with the question of extending their water-supply for domestic use and power purposes. Numerous municipal authorities throughout the colony are securing extensive areas for watersheds. The development of water-power was until recently confined to locations close to streams, but recent advances in the application of electricity permit of industries being placed at points convenient for transportation and labour. These conditions open up a wide field for the utilisation of streams as a source of power. In various parts of the colony extensive water-power plants are in operation or contemplated, and it is probable that the number of these will be considerably augmented as time goes on. Irrigation is also becoming a recognised feature of successful farming in many parts.

Accepting the almost universal testimony that forests are conservers and regulators of water-supply, the importance of protecting the sources of streams is apparent. The purity of water-supply, the prevention of destructive floods and consequent periods of drought, and the continuous supply of water-power for mechanical purposes are all dependent on the forest covering being maintained as nature provided it. No country in the world has been so abundantly supplied by nature as ours with generous and varied forests, or with permanent and well-distributed streams, for the many uses of man. *Æsthetic* and other reasons could be advanced in favour of forest-protection, but probably these would not have so much weight as the more pressing demands of a permanent supply of timber and water.