

The Vegetation

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The soil-forming ash-showers of the central North Island as now defined cover, sometimes disjointedly, over 20 per cent. of the area of New Zealand. This size in itself is of great importance ecologically.

The remarks that follow are based upon a general knowledge only of some of the vegetation growing on these showers, and upon one or two detailed studies. Much of the natural vegetations has been destroyed and is difficult to reconstruct in theory, but on the young showers the pattern of the primitive vegetation often remains. It is to this pattern that the following remarks apply.

Attention will be confined to the younger showers, more particularly the Taupo shower, because their influence on the vegetation is obvious even from a superficial examination. Older showers have become mostly covered with forest.

From the pattern of vegetation on the Taupo shower, certain broad determining influences can be deduced. The south-eastern area of the Taupo shower, which is mountainous country, is occupied for the most part by a mosaic of beech forest and tussock grassland, with pockets of podocarp forest at lower elevations. Disjointed areas of cedar forest (*Libocedrus bidwillii*), some fairly extensive, occur along a line from the southern end of National Park to the Ruahine mountains. The central areas, which are mostly plain and rolling country, are occupied by tussock grassland, fernland and *Leptospermum* shrubland, also with small pockets of podocarp forest; the western areas, mostly of low mountains, are occupied mainly by podocarp forest. This points to the strong influence of the "historical factor" in determining what vegetation is present, because beech forests to the east have migrated from adjacent beech forests on the mountains behind Hawkes Bay, and the podocarp forests to the west have migrated from similar forests in the King Country and Taranaki. Tussock grassland occupies extensive areas below the forest line, so that it is probable that these were the first plant communities to migrate on to the raw pumice following the eruption. Shrubland and fernland might also have played a part in this early clothing by vegetation, but this is difficult to determine because these communities were partly induced by Maori occupation.

The structure of the vegetation yields evidence of migration of the forest through tussock grassland and shrubland. This is taking place presumably because the climate below the timber line is essentially a forest climate, yet much of the area is occupied by tussock grassland and shrubland. The main evidence for migration comes from the structure of ecotones of specialised vegetation between forest and other communities, and from the forest itself. In the ecotones, seedlings and saplings of the dominant trees of the podocarp, *Phyllocladus* and *Libocedrus* forests are present, but are generally absent from the mature forest itself. From beech forest edges, beech seedlings advance into tussock, but apparently only within the influence of large trees, and under some circumstances through ecotones.

Apparently migration mainly proceeds by the invasion of one complete community by another complete community. The pioneering stage of the invading community is telescoped as it were into a narrow ecotone not more than a few chains wide. Rimu forests may have advanced through wide belts of pioneering vegetation too wide to be termed ecotones. The pioneering phase would then have been somewhat similar to the pioneering of podocarp forests in induced *Leptospermum* following man-destroyed forest.

To explain the structure of broadleaf-podocarp forests, Cockayne advanced the theory that in the natural succession of the forest broadleaf species, like tawa and taraire, replaced the podocarps in the climax community. More recently Holloway (mss.) has maintained that this replacement is being brought about by climatic changes within the past few hundred years. This hypothesis certainly explains the facts as we know them now, and either the capacity of podocarps to regenerate inside the forest has been lost, or conditions so favour broadleaf species that they prevent podocarp regeneration.

In the area being considered podocarps have been regenerating successfully under the special conditions of the ecotones in quite recent times, if, indeed, they are not still doing so.