

mental officers or others, together with the knowledge previously obtained by various members of your Commission. Hence it follows that a general answer, so far as concerns climatic reserves, is alone possible, and that the areas suggested in Appendix A as suitable for such reserves must, in many instances, have their exact delimitations defined by the Department of Lands under the conditions laid down in our report.

(1.) *Climatic Reserves.*

For the purposes of this report, we define a "climatic reserve" in the terms of the question as one for the purposes of protection of soil, prevention of denudation, water-conservation, prevention of floods, and, in addition, shelter from winds. This latter function, not mentioned in the order of reference, is one of great moment in windswept localities, no matter the altitude, and obviously many scenic reserves have a strong climatic effect in this regard, and for that reason alone should be zealously preserved.

The value of having a forest covering of the watershed of rivers and at the sources of such and the smaller streams is now so well recognized that only a few extracts from the writings of leading authorities are needed here.

Professor I. Bowman writes dealing with the question of the evil effects of deforestation in the Southern Appalachian Mountains: "The rain beats directly upon the soil, the retarding influence of the ground litter and tree-root is withdrawn, and more rapid soil-removal occurs. When one of these evil effects have been allowed to take place mankind is deprived practically for thousands and even millions of years of the favourable conditions that preceded the epoch of destruction. In a hundred years man may achieve such baneful results as nature will compensate only during a geologic period of hundreds of thousands of years. Soil is a resource of priceless value. On resistant rocks its formation is exceedingly slow. Seventy thousand years is a very short time for the development of a soil-cover; for man it means a period so great that his mind can hardly appreciate it. The earth, as we find it to-day, must be treated with care if the human race is to have a fair distribution of its wealth in time. To the geologic mind there is something shocking in the thought that a single lumber merchant may in fifty years deprive the human race of soil that required ten thousand years to form."*

Professor Eug. Warming, of Copenhagen, writes as follows: "Every kind of covering formed by vegetation acts upon the physical relations in soil, and the denser, taller, and longer-lived the vegetation is, the more powerful is its action. Forest therefore acts most powerfully."†

Dr. B. E. Fernow states: "The conditions at the headwaters of each affluent must ultimately be reflected in the flow of the main river. The temporary retention of large amounts of water and eventual change into subterranean drainage which the well-kept forest-floor produces, the consequent lengthening of the time of flow, and especially the prevention of accumulation and carrying of soil and detritus which are deposited in the river and change its bed, would at least tend to alleviate the dangers from abnormal floods and reduce the number and height of regular floods." And again: "The well-kept forest-floor, better than even the close sod of a meadow, prevents erosion and abrasion of the soil and the washing of soil and detritus into brooks and rivers. . . . The best soil of the farms is often washed into rivers.‡

In relation to its area, few countries in the world are in more need of an adequate forest covering on their high lands than is New Zealand. The lofty mountain-ranges which traverse both Islands and the excessively broken nature of the land in many places, together with an average high rainfall, lead to the presence of innumerable streams, and offer ideal conditions for denudation.

* "Physiography of the United States, and Principles of Soil in Relation to Forestry," 1911.

† "Oecology of Plants," 1909, p. 75.

‡ "Economics of Forestry," 1902, pp. 445, 446. See also appendix for article on "Erosion of Slopes in New Zealand," by C. A. Cotton, Lecturer in Geology, Victoria College.