

and other exotic vegetation in preventing or retarding the natural causes, but is aggravated in places by the formation of resistant islands protected by gorse, broom, &c., which tend to throw the water against the more natural travel of the shingle seawards during floods. In a river so wide as the Rangitata it is difficult to detect filling-up until the same has become very pronounced.

The flooding of the adjacent lands is caused by the fact that along some stretches the natural banks are lower than the grade of a high flood, and furthermore to the fact that the river, in common with most other Canterbury rivers, is running on a "fan," and once the flood-waters get over the immediate river-bank they tend to follow old channels which lead away from the main channel, and do not return lower down, as is the case with valley rivers.

The erosion of the banks is chiefly due to natural causes, but is aggravated in places by the formation of resistant islands protected by gorse, broom, &c., which tend to throw the water against the more easily eroded unprotected banks.

REFERENCE NO. 2.

To ascertain the nature and extent of the damage done to the lands adjacent to the said rivers, and what area of land is affected by such floods or erosion, or both, and whether it is practicable at reasonable expense to prevent such flooding or erosion, or both, either wholly or partially.

Between the Arundel Bridge and the sea an area approaching 800 acres has been destroyed since the original issue of the titles. Besides this area actually washed away there are considerable areas of good land which is under water in time of flood, and consequently cannot be used for cropping or anything more profitable than rough grazing. There is a danger that if it is ploughed the soil may be washed away before the new grass has time to bind it. Erosion is occurring in a number of places, but nowhere is the erosion proceeding at a very rapid rate.

Your Commissioners are of the opinion that it is practicable at reasonable expense to prevent flooding and to gradually so train the river as to eliminate erosion to a very considerable extent in the future, but to construct works at present sufficient to wholly prevent erosion would involve an expenditure not justified by the amount of damage being done.

REFERENCE NO. 3.

To ascertain the best method of providing for the control of the said rivers and their tributaries so as to safeguard the lands affected, and to provide for the effective control and improvement of the said rivers and their banks.

As previously stated, it is not practicable, at reasonable expense, to prevent all the damage that occurs along this river, but it would be reasonable to erect levees at some distance back from the river-bank along portions where the flood-grade comes above the natural bank. These levees should be grassed over so as to withstand the flow of flood-waters along them, and should, of course, be kept free from rabbit-holes, which are such a frequent cause of trouble on similar works.

Wherever active erosion is taking place it is usually impossible to stop this, except at a cost out of all proportion to the area of land likely to be lost; but a great deal might be done by a local organization fully alive to the problem, by a system of anchored and weighted trees, which should be placed close together along the stretch on which the water impinges violently. *Cupressus macrocarpa*, *Pinus insignis*, and any other bushy trees will do quite well, as it is not likely that the attack on any one stretch of river-bank will last until these trees rot. Each tree should be hung by strong cables to logs sunk in the ground some distance back, and should be weighted either by blocks of weak concrete or by nets of stones, the former for preference. The current of the Rangitata is so fierce that it is quite likely that this class of work would be breached in places, but the general effect of a continuous fringe would be sufficiently good to justify its being carried out. At any point where a dangerous situation arose the class of protective works adopted by the Railway Department above the bridge some forty years ago would be found quite satisfactory. The very considerable expense of this method is such that it should only be