

PAPERS AND REPORTS RELATING TO THE RANGITATA RIVER.

No. 1.

EXTRACTS from REPORT by Mr. W. T. DOYNE, C.E.

SIR,—

Christchurch, Canterbury, 20th June, 1864.

I have the honor to report, for the information of His Honor the Superintendent, that I have now completed the investigation required to be made by me under the instructions conveyed to me by the Provincial Secretary in his letter, No. 816, of 26th March last, viz. :—

INSTRUCTIONS.

- No. 1. To report upon the selection of the best site for constructing a bridge over the Rakaia, and the character of bridge best adapted to the case.
- No. 2. To examine the River Waimakariri, with a view to considering the desirability, or otherwise, of constructing large works to prevent its further encroachment on Kaiapoi Island.
- No. 3. To examine the Rangitata, with a view to advising the Government as to the best measures to be adopted to turn the creek, if such measures be advisable.

In compliance with these instructions, I have successfully examined the three rivers named, and have prepared such sections, surveys, and diagrams as seemed necessary to a complete study of the special questions referred to me.

This systematic investigation of each river soon made it apparent that they are all governed by one general code of laws, under which they periodically change their courses, and that the study of these general laws was indispensable to a right understanding of each special case. Indeed, I found it impossible to avoid being led into the examination of the general question of the origin of these plains, and the part which the rivers have played and are now playing in their formation. From their past and present history we can best judge of their tendencies for the future, and by comprehending the natural laws that are in force, avoiding the danger of unnecessarily opposing them, and instead, bringing them to aid in the objects desired.

The Plains.

The great plains of Canterbury, which lie on the eastern side of the Middle Island of New Zealand, extend from north-east to south-west for a distance of 100 miles along the sea coast, with a depth of from thirty to forty miles into the interior, where they are abruptly terminated by meeting the base of the mountain ranges, which ascend in mountains heaped on mountains until they reach the perpetually snow-capped summits of the great Southern Alps.

These plains slope gradually from the mountains to the sea at the rate of about 40 feet to the mile for the first fifteen to twenty miles, and at an average of 24 feet to the mile for the remainder.

Between Kaiapoi on the north, and Timaru on the south, they are intersected by numerous rivers, which travel in tolerably direct lines from the foot of the mountain ranges to the sea.

The rivers between Kaiapoi and Orari (near Timaru) have certain natural characteristics which divide them into distinct classes.

The Rivers.

The Waimakariri, the Rakaia, and the Rangitata, which take their rise deep in the mountain ranges, and are chiefly fed by the melting of the snow and the glaciers.

In their passage through the mountain ranges (a distance of from forty to fifty miles each), they cut out and carry down with them great quantities of the rocks, boulders, gravel, and sand, of which the ranges are composed. These they discharge through the gorges by which they debouch on the plains, and, carrying them down the river courses, discharge a portion into the sea and deposit the remainder on the way, according as the force of the stream diminishes, either from diminished fall or increased width.

This material, as found in the river beds, is altogether silicious, and, from the great water-wear to which it is subjected, is deposited in every variety of size and form, from impalpable dust to boulders measuring two cubic feet.

This accumulation in the bed of the stream throws the water against the low banks, which, being of similar material, are quickly undermined, and the river widens out until it has no power to carry forward any but the lightest portion of the materials brought down. Thus a barrier becomes heaped up for several miles in length, raising the bed of the river above the banks and causing it to overflow. It soon cuts out a new course for itself, which it deepens and widens until the old one becomes completely abandoned and is restored to the plains, the new course becoming the true river. In time, this new course goes through precisely the same changes, and is again filled up and restored to the plains.

As the plains diminish in fall towards the sea, this tendency on the part of the rivers to fill up their beds increases, and in this way all these rivers are now so gorged that they cannot move the shingle forward beyond a point about fifteen miles from the sea.

At this point each river must now overflow its banks and find a vent in new channels, unless prevented from so doing by considerable engineering works. The tendency of these rivers to leave their courses depends, as I have explained, upon the force which they can apply to keep the shingle in