

The geological evidence shows plainly that a great deal of subsidence has taken place in the lower valley, and the presence of undecayed forest *in situ* below high-water mark shows that subsidence has occurred within comparatively recent geological times. Whether this downward movement is now going on cannot be determined with certainty, but in any case your Commissioners do not consider that a movement either upwards or downwards is likely to occur at a sufficiently rapid rate to justify them in making any modification of their suggested works to cope with this movement.

FLOODS AND FLOOD-DISCHARGE.

Heavy floods have been recorded in 1851, 1866, 1878, 1912, 1913, 1917 (two), and 1919. The 1878 flood was the highest known since settlement occurred, but physical evidence of a still greater flood was observed by the early settlers, showing that the water stood something like 6 ft. above the highest level reached by the 1878 flood, near the top of Inch-Clutha. It is quite impossible to form any idea of how long ago this flood occurred, although there is a Maori tradition as to its occurrence.

The heights of successive floods, as recorded on the gauge on the Balclutha traffic-bridge, are as follows :

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|---|----|----|--------------|
| September, 1878 (flood occurred before gauge was erected, and height was obtained inferentially) | .. | .. | 16 ft. |
| October, 1912 | .. | .. | 12 ft. |
| March, 1913 | .. | .. | 13 ft. 6 in. |
| May, 1917 | .. | .. | 15 ft. 6 in. |
| September, 1917 | .. | .. | 11 ft. 6 in. |
| January, 1919 | .. | .. | 17 ft. |

The heights of the floods occurring prior to 1878 were not recorded at the same station, because it did not exist before then. The evidence of witnesses, however, shows that at Inch-Clutha the 1866 flood was approximately 2 ft. below the 1878 flood. It might be imagined from the fact that the 1919 flood stood at 17 ft., while that of 1878 only stood at 16 ft., that the former was the greater flood; such, however, is not the case, because at the time that the 1878 flood occurred the conditions existing at and below Balclutha were entirely different from those obtaining at the time of the more recent floods, inasmuch as in 1878 no levees had been constructed, and the flood-waters, not being confined, spread over a considerable area of country. As a consequence of this, very considerable difficulty has been experienced in arriving at a definite conclusion as to what is the maximum flood-discharge which is reasonably likely to occur, and which should be provided for in any projected remedial works. However, after very careful consideration of all the facts and data at their disposal, including levels, slopes, and cross-sections at Clydevale and Pukeawa, where little alteration in the stream has occurred, your Commissioners have arrived at the conclusion that the flood-discharge of the 1878 flood may be fairly stated as not exceeding 180,000 cubic feet per second, while that of 1919 was about 120,000 cubic feet per second.

An interesting feature in comparing the 1919 flood with that of 1878 is that at Alexandra the 1878 flood was higher by 12 ft. 6 in., at Beaumont by 7 ft., at Clydevale by 4 ft. 6 in., at Pukeawa by 4 ft., at Barnego by 4 in., and at Balclutha 1 ft. lower. At Mr. Smaill's house (Sections 7 and 8, Block VI, Inch-Clutha) it was 6 in. higher, and at Mr. Aitchison's (Section 2, Block IV, North Molyneux) it was 15 in. higher.

MINING.

Your Commissioners found that mining operations of enormous magnitude in the aggregate have been carried out within the watershed of the Clutha River, the total yardage moved being estimated by them as in the vicinity of 300,000,000 cubic yards. Since the first recorded gold-output from the district this works out approximately at over 5,000,000 cubic yards per annum, the greater part of which may be termed foreign matter swept into the tributaries acting as sludge-channels, and far exceeds what might reasonably be expected from natural denudation. When