

especially when it is borne in mind that some of the present occupiers have only been in possession a short time and are in no way morally responsible for the present condition of the river-bed. Quite probably there are some settlers who by their carelessness or wanton disregard of ordinary precautions are primarily responsible for the condition of things along their own sections, but this would be a difficult matter to prove in view especially of the fact that it is well known that local bodies have planted willows higher up and have allowed them to be washed out and carried down the river, and have also, according to common report, trimmed the overhanging willows and allowed the cut-off branches to float down and take root elsewhere. Also, matters having been allowed to reach the present desperate pass without the riverside occupiers being compelled to effect remedial measures, it is questionable whether it would be fair to now demand that they should carry out work which may be financially beyond their resources, and which, as mentioned above, is not solely for their own benefit. Should this view be upheld and future work done by the district as a whole, then any occupiers who complied with the notices and cleared the creek at their own expense should have the value of work refunded to them.

So far no riverside occupier on the Orari has been served with notices to clear, partly because the area within the jurisdiction of the South Orari River Board is bounded by the south bank of the Orari River as it existed in 1872, and there is doubt as to whether the sentence in clause 7 aforesaid, "or within one mile beyond the boundary of the district," can be interpreted to mean one mile in any direction outside the legal boundaries or "only one mile beyond" measured along a watercourse flowing into or out of the district and which requires clearing. In addition it is probably clear to the Board that it would be unwise to clear out all the willows from the bed and banks, thereby rendering the banks liable to attack and widening the river-bed, which is already too wide. And apparently the Act makes no provision for calling upon an occupier to remove a portion of the obstruction or certain specific trees, &c.

Before it will be possible to design proper remedial measures a complete survey will be required showing the present beds of the streams, indicating where erosion has already taken place, also accretion, if any, and also the position and character of the obstructions. Cross-sections of the beds and the adjacent banks for some distance back, particularly when same are below flood-level, will be required, also longitudinal sections of the streams properly connected to the cross-sections and plans. Further, a small scale plan will be required with isolated levels freely scattered over it, showing all the areas which have been and which might be flooded in the event of either of the major streams overflowing or changing their courses. Flood-levels wherever obtainable either from direct observation or from local evidence must be collected, the two kinds being distinguished from one another. Any other obtainable data *re* floods, such as velocity, duration, relation to rainfall, &c., should be collected, and rainfall and snowfall data within or adjacent to the watersheds compared therewith. Particulars of all the types of protective work employed and their locations should be collected, with information as to which have proved most successful, and the probable reasons for the failure of those unsuccessful.

While this survey is being made steps should be taken to abolish the Road and River Boards and to place all the questions of river-conservation and roading under the County Council, which should engage the service of a properly qualified civil engineer.

When the survey is complete a minimum width consistent with safety and economy should be decided on for each stream, and an alignment as straight as possible consistent with making good use of the existing clear channels should be fixed and pegged out, all future work being carried out in conformity with this scheme.

In connection with the Waihi Stream, it will be necessary in parts to construct banks at a little distance back from the existing channel-banks, and to entirely clear out all fences, willows, and other obstructing vegetation within the constructed banks. No doubt there will be opposition from the adjoining occupiers, but if the banks are constructed with flat slopes and sown with grass they can be used for grazing as well as or better than the present damp flats; and while the land within the banks will be subject to no more flooding than before, and for a shorter time, the land outside the bank will be entirely flood-free and can be used for cropping, and will be enhanced in value by reason of its immunity from floods by £10 per acre, or perhaps more.

In the lower reaches it will probably be necessary to return the protective banks some distance along the sides of some tributary streams, and also the Haehaetemoana, in order to prevent flood-waters getting behind the banks. The extent to which this would be necessary can only be settled by accurate surveys.

Although the Haehaetemoana did not come within my order of reference, it will be necessary to deal with it for some distance above and below the junction with the Waihi in much the same manner.

In connection with the Orari quite an opposite course will be necessary: that is, the river-bed will require narrowing. In some places flood-banks will probably be required, and as the present river-bed is lower than the natural banks, and too porous to serve as a satisfactory base for a bank at moderate cost, it may be necessary to build banks temporarily at least on the land adjoining the river until such time as the banks are permanently fixed at the locations decided upon. All the river-bed within the future permanent bed should be cleared of willows, &c. All those which can be at reasonable cost pulled up should be planted along the new bank-lines, and made the nucleus of the continuous protective work which will be finally necessary. Those which, by reason of their being deeply buried or their enormous size, cannot be profitably removed should be killed *in situ* by the same process as was used on the Waihou and Ohinemuri Rivers improvement-work, and later on impregnated with paraffin or other inflammable liquid and burnt. To burn off the tops only would not be sufficient.

The central channel having been cleared more or less completely, systematic planting of dense willow fences should be carried out as probably the cheapest form of permanent protection. It is quite likely that portions of this will be washed out in the early stages, but when once established it should prove sufficient to keep the river within the cleared channel. It therefore would hardly be economical to build strong and therefore expensive works which would be capable of withstanding all onslaughts of the river from the commencement. As the work proceeds it will be found advisable no doubt to specially strengthen spots where the current is making a