(No. 30.)

1901.

PARLIAMENT OF TASMANIA.

# RIVER GAUGINGS AND EXAMINATION OF LAKES:

REPORTS BY K. L. RAHBEK, MEM. DAN. ASSOC. C.E.

Presented to both Houses of Parliament by His Excellency's Command.

Cost of printing—£3 15*s.* 0*d.*

# RIVER GAUGINGS AND EXAMINATION OF LAKES.

## REPORT UPON THE GAUGINGS OF THE RIVERS SHANNON, OUSE, AND CLYDE, AND EXAMINATION OF LAKES SORELL AND CRESCENT.

*Office of Mines,*
*Hobart, 18th March, 1901.*

SIR,

IN accordance with the instructions contained in your letter, dated the 6th ultimo—"to gauge the rivers on the central plateau of the Island, which are likely to be of importance in connection with any future water supply or irrigation schemes"—I have the honour to report as follows:—

Before leaving town, I saw the Secretary to the Board of Health, Mr. Mault, who kindly gave me his reports on the rivers Clyde and Shannon, and the Great Lake, and the lakes Sorell and Crescent, and from which interesting reports I have obtained much useful information.

In the present report will appear several heights as taken by barometer; at best, barometrical heights are only approximate, and it is difficult to properly eliminate disturbing influences of local atmospheric variations, especially when travelling rapidly from one place to another. However, having taken all proper safeguards, I think the different heights given here will eventually prove to be correct within a margin of, say, 50 feet.

*The River Shannon.*—The catchment area of the River Shannon between the Great Lake and its junction with the River Ouse is not very large, as the Shannon, within a distance of from two to four miles, runs nearly parallel with the Ouse, and from the eastern side has a few, but not very important, affluents; the Blackman's Rivulet being the largest. The total catchment area I should judge to be about 100 square miles. It is not, then, as an ordinary river that the Shannon has any importance, but, being the only outflow from the Great Lake, it may yet prove to be one of the most important streams in Tasmania.

I gauged the Shannon on the 15th ultimo a few hundred feet below the swamp, or about two miles from the Great Lake, as no good site for gauging could be found nearer the lake, and the quantity of water flowing in the river on that day was 62·14 cubic feet per second, or 198,848 cubic yards per 24 hours. On the 27th ultimo, being on the way to the Dee and Nive rivers, I again gauged the Shannon about one mile above its junction with the River Ouse, and found the flow to be 36·35 cubic feet, or 116,320 cubic yards per 24 hours. During two weeks, then, the flow of the Shannon had decreased by 41·5 per cent.; but it must also be remembered that at this season of the year the evaporation from the Great Lake is at its highest.

The water in the River Shannon, as well as in the Great Lake itself, is not clear. I was told that, some years ago, before fish were put into the Lake, the water there was clear, but that now, during summer and winter alike, the water has a brownish appearance; nevertheless, I imagine the water is good for all ordinary purposes.

The height of the Great Lake, as taken by barometer, I found to be 3350 feet above sea-level, and at the junction of the Shannon and the Ouse the height was found to be 950 feet. The total fall of the River Shannon is, therefore, 2400 feet, and assuming its length to be 36 miles, this would give a fall of 66·7 feet per mile. This rapid fall of the Shannon River creates one of the most important factors for the profitable utilisation of the water contained in the Great Lake.

From what I was told, the Shannon River has, during the last 16 years, not been known to stop running, though at times the flow has been very small.

*River Ouse.*—On the 16th ultimo, I gauged this river about five miles N.W. from the southern end of the Great Lake. The flow on that day was 24·96 cubic feet per second, or 79,872 cubic yards per 24 hours; and, on the 27th ultimo, I gauged it again about two miles up-stream from its junction with the Shannon River, when 13·10 cubic feet per second, or, say, 42,000 cubic yards per 24 hours, was running, showing that during the eleven days the flow of this river had decreased by 47·5 per cent., and if the dry weather continues a few weeks longer it will probably stop running altogether.

Mr. Earley, the resident Police Officer at the Great Lake, and who kindly gave me some information, says that during the last 16 years the River Ouse has twice stopped running.

Although the catchment area for this river is several times larger than that of the Shannon, yet the Ouse River's carrying capacity during summer is considerably smaller than that of the Shannon; the sole reason for this being the fact that the Ouse has no such large natural reservoir to be supplied from as is the case with the Shannon.

The water in the Ouse River is crystal clear, and seems in every respect to be potable and pure.

There is every evidence to show that the Ouse, above the junction, in the wet season, or, in fact, probably during three-fourths of the year, is a fair-sized stream, and which at most times carries a great deal more water than the Shannon. The Ouse has not quite so great a fall as the Shannon; I should judge that its fall between the two places where I gauged it (being about 40 miles apart) would amount to, say, 2000 feet, or, say, 50 feet per mile as an average.

In case a suitable place for an impounding reservoir could be found anywhere within the distance of the 40 miles referred to, I have no doubt that a large quantity of water could be stored for use during the dry season; but it is clear that the expenses incurred in doing so would be large in comparison with the probable expenditure on the Shannon River and the Great Lake for effecting the same purpose.

*The River Clyde* forms the outlet of Lake Crescent. I visited this place on the 20th ultimo, and found the water-level in the lake so low that not a drop of water was visibly entering the river. Although it is not probable, yet it is not impossible that some slight underground communication may exist between the lake and the river; but, although I followed the Clyde for some distance down-stream, I failed to discover where it came in. A couple of miles down-stream I noticed a little water trickling between the stones; it was not more, however, than what could comfortably be sent through a half-inch pipe, and may have come from the adjacent marsh.

The width of the Clyde River at the lake is spanned by a weir roughly constructed of dry rubble stones, with some corrugated iron plates put down in front; but I doubt very much if this structure has ever been water-tight. In the weir is placed a roughly-constructed sluice-gate—free opening 3·5 feet in width. From the sluice-gate, and out into the lake, a channel has been excavated for a length of about 1200 feet; no water was running here, as the water-level in the lake was too low; but stagnant, evil-looking water and mud were found in pools here and there throughout the length of the channel, which, in fact, is itself excavated through a mudbank.

When passing through Bothwell on the 13th ultimo, I examined a part of the Clyde River there. Very little water was running (perhaps as much as could be forced through a three-inch pipe), but, although the water, seemingly, was not good for domestic purposes (without boiling it), yet it had a much better look than the water appeared one week later in Lake Crescent.

From what I could learn, the affluents to the River Clyde are not numerous or important. Whether the water trickling down past Bothwell came as underground water from Lake Crescent, or which is more likely, represented the general soakage from the adjacent country, is immaterial. There is no doubt that the towns of Bothwell and Hamilton are urgently in need of an improved water supply. On the other hand, it must also be pointed out that the people themselves seem to neglect taking the most primitive precautions for keeping their water supply—bad as it is—free from further unnecessary pollution. I was informed, for instance, that it was the custom to water stock, etc., at a river crossing just above the township, while the people took the water from below.

As to the proposed improvement of water supply for the two townships, I shall return to this subject when reporting upon Lake Sorell.

*Lake Crescent.*—Although I had no direct instructions to examine Lakes Crescent and Sorell, yet I considered it my duty—being on the spot—to make myself somewhat acquainted with the natural surroundings, especially as I knew that Parliament had recently passed a Bill for the purpose of facilitating and regulating the water supply from the two lakes for the benefit of the Clyde and Midland Water Trusts.

Lake Crescent has a water surface area of about 4000 acres, and its independent catchment area amounts to about 23 square miles (including the lake), and is situated principally on the eastern, south-eastern, and southern sides of the lake. The northern and western shores of the lake present a very uninviting appearance when the water is so low as now, and are covered with what appears to be decayed vegetable matter or sediment from earlier days, when the lake was probably larger than now. In one place I put, with ease, a stick down $5\frac{1}{2}$ feet, which shows how soft the material is.

On the eastern side of the lake, I noticed considerable quantities of very fine-grained sand, which would be most valuable for filter-beds (for purifying water), if it did not happen to lie at such an inaccessible place. Nowhere else in Tasmania have I noticed sand of this quality.

The water in the lake has a very muddy appearance, and seems hardly fit for domestic purposes when the water-level is so low. I had no means of rowing out on the lake, nor could I, from inquiries, learn anything definite about its water depth; but the lake shore seems to run out very flat, and I doubt if any great depth of water would be found.

The only natural outflow from Lake Sorell goes into Lake Crescent, and as the only outflow from the last-named lake is the River Clyde, the water in both lakes, as arranged by nature, belongs to the Clyde River valley. The outflow from Lake Sorell into Lake Crescent goes through the Interlaken Rivulet, which has a wooden sluice-gate at the upper end, through which the flow of water may be regulated.

I gauged this channel on the 18th ultimo, and found 3·60 cubic feet per second running, or 11,520 cubic yards per 24 hours. But this quantity, which is forwarded daily, would not, if spread out on the water area in Lake Crescent, amount to more than 0·02 inches in thickness, and is only a fraction of what the evaporation from Lake Crescent amounts to just now; so that, in spite of the present supply from Lake Sorell, the water-level in Lake Crescent must be steadily lowering.

By constructing a proper weir with a sluice-gate across the mouth of the River Clyde the water level in Lake Crescent could be raised several feet, and the outflow could be properly regulated; but, on account of the smallness of the independent catchment area, the size of the lake, the seeming shallowness, and the condition of the water, I think it would not be profitable to conserve water here, except, perhaps, in conjunction with Lake Sorell.

*Lake Sorell* is situated immediately north from Lake Crescent, from which it is divided only by a strip of low-lying land, called "Interlaken," and which, at its narrowest part, is only half a mile wide, and through which a channel (the Interlaken Rivulet) has been excavated, and conveys the overflow from Lake Sorell to Lake Crescent.

The greatest length of Lake Sorell, north-south, is five miles, and its greatest dimension, east-west, about six miles, and the water surface of the lake comprises, say, 13,000 acres (about 20 square miles.

The catchment area, which is to be found principally to the north from the lake, and partly from the eastern and western sides, I estimate at (including the lake), say, 70 square miles.

Round the southern, south-western, and part of the western and north-western sides of the lake, there are low-lying marshy lands; on the northern and eastern sides the land falls down more precipitously towards the lake.

At the time of my visit, the water-level in the lake was rather low; it was 2·15 feet above the sill of the Interlaken sluice, and the water itself was far from clear; yet it seems better than the Lake Crescent water, and the shores of Lake Sorell do not consist of the same kind of repulsive-looking matter as described with reference to Lake Crescent, and I have no doubt that, if the water surface was kept at a higher level, the water itself would improve in quality. I beg to draw attention to Mr. Mault's report on the River Clyde, dated the 9th September, 1889, in which there is a very interesting summary of the waters analysed from the Mountain River (which falls into Lake Sorell from the north), Lake Sorell, Lake Crescent, and from the Clyde River at Bothwell and Hamilton. I thoroughly agree with Mr. Mault that the water supply so urgently needed for Bothwell and Hamilton, as well as Tunbridge, should be brought from Lake Sorell, and not from Lake Crescent.

The Midland Water Act of 1898 provides that the Midland Water Trust may, under certain conditions, draw as much as 90,000 cubic yards of water per 24 hours from Lake Sorell for irrigation, domestic, and other purposes, while the amended Midland Water Act of 1900 specifies that the Clyde Water Trust shall first be provided with 100,000 cubic yards per 24 hours, and, further, that the two Trusts shall fix a level below which it shall not be lawful for the Midland Water Trust to draw, or appropriate, water from the lake. In my opinion, this minimum water-level should not be fixed lower than 2·5 feet above the sill of the present Interlaken sluice, and it would be well if the Trusts could see their way to agree to fix it a few inches higher.

From marks I found on the shore, I believe the ordinary winter level to be about 4·5 feet above the sluice sill, and, in case the minimum water-level is fixed at 2·5 feet above the sill, there will be two feet of water to draw on when the lake is filled; this represents a quantity of 13,000 x 4840 x $\frac{2}{3}$, equal to 41,946,667, or, say, 42 million cubic yards.

Assuming that the lake was filled on the 1st December, the evaporation during December, January, February, March, and April would probably amount to $24\frac{1}{2}$ million cubic yards;

these, deducted from 42 millions. leaves only 16½ millions, while the consumption during the same time would amount to nearly 29 millions, leaving a deficiency of 12½ million cubic yards of water—assuming that no rain fell during the five months. Although it is, perhaps, not likely we will ever experience such a drought in Tasmania, yet the deficiency is too large to justify depending upon a sufficient rainfall to make up for the 12½ million cubic yards, and, therefore, it seems necessary to raise the water-level permanently over the ordinary winter level.

But, to make the case complete, it should also be considered from another point of view. By the courtesy of the Meteorological Observer, I have obtained the complete monthly rainfall (as registered at Lake Sorell) during the five years 1889-93; in 1894, the records were stopped, but have been started again this year. Using the monthly means for the five years' records, I have computed the following table, which shows the probable available quantity of water at any time during a year. The total rainfall for the twelve months reckoned is 45·08 inches; the evaporation from water surface—which is not known—I have reckoned at 24 inches for the year, and the total consumption of water at 190,000 cubic yards per diem; the total catchment area I have reckoned at 70 square miles, and the lake's water surface at 13,000 acres. Assuming the lake was filled to winter level on the 1st December, and assuming the rainfall as reckoned with in the table, we would, on the 30th April (see table), yet have 42 – 17, equal to 25 million cubic yards, in reserve, or the water-level would be 14⅓ inch above minimum low-level. (By these computations I have reckoned the lake as having perpendicular sides round the 13,000 acres area.) Although, as already stated, the rainfall upon which the computations for the table are made is the mean for five years' actual records, yet I do not think these records can be depended upon, the time during which they have been taken being far too short. If the records for, say, 30 years, were obtainable, the mean of the three driest consecutive years might then have been taken, the computations based thereon and the works designed with confidence accordingly.

As it is, I would advise raising the permanent high-level of the lake, say, two feet, for the purpose of being on the safe side.

LAKE SORELL.

*Monthly and Yearly Discharge in Cubic Yards.*

| Month. | Monthly available Proportion of Rainfall as Storage. | | | Monthly Evaporation. | | Monthly Consumption. | Surplus. | Deficiency. |
|---|---|---|---|---|---|---|---|---|
| | *Gain.* | | | *Loss.* | | *Used.* | | |
| | Rainfall, in Inches. | Co-efficient. | Storage. | Inches. | Quantity. | | | |
| January | 3·61 | 0·4 | 8,673,280 | 3 | 5,241,236 | 5,890,000 | .. | 2,457,956 |
| February | 2·23 | 0·4 | 5,377,433 | 3 | 5,241,236 | 5,320,000 | .. | 5,183,803 |
| March | 2·20 | 0·4 | 5,290,700 | 3 | 5,241,236 | 5,890,000 | .. | 5,840,536 |
| April | 3·06 | 0·5 | 9,215,360 | 2½ | 4,367,697 | 5,700,000 | .. | 852,337 |
| May | 3·45 | 0·6 | 12,467,840 | 2 | 3,494,158 | 5,890,000 | 3,083,682 | .. |
| June | 9·54 | 0·8 | 45,968,384 | ½ | 873,539 | 5,700,000 | 39,394,845 | .. |
| July | 5·40 | 0·8 | 26,019,840 | ½ | 873,539 | 5,890,000 | 19,256,301 | .. |
| August | 2·93 | 0·8 | 14,115,763 | 1 | 1,747,079 | 5,890,000 | 6,478,684 | .. |
| September | 1·85 | 0·8 | 18,890,112 | 1½ | 2,620,618 | 5,700,000 | 569,494 | .. |
| October | 3·98 | 0·7 | 16,782,796 | 2 | 3,494,158 | 5,890,000 | 7,398,638 | .. |
| November | 3·69 | 0·6 | 12,858,137 | 2½ | 4,367,697 | 5,700,000 | 2,790,440 | .. |
| December | 3·14 | 0·4 | 7,545,753 | 2½ | 4,367,697 | 5,890,000 | .. | 2,711,944 |
| | | | | | | | 78,972,084 | 17,046,576 |

When reporting upon Lake Crescent, I showed that, as nature has arranged matters, all the waters from the two lakes belong to the Clyde valley, and it therefore appears, at least from an engineering point of view, that the Midland Water Trust will have to pay for (1) private or public land which may be encroached upon by the raised water-level, (2) for land which it may be necessary to acquire for the construction of embankments and by-washes (of which latter there will probably be two), and (3) for the construction and maintenance of these works; while the Clyde Water Trust has to pay (1) for the necessary land for the channel from Lake Sorell to Clyde River, as well as (2) the construction and maintenance of the channel, with accessories (sluice, bridges, fences, etc.), and (3) for the construction and maintenance of a low weir across the mouth of the Clyde River to prevent the unwholesome low-water from Lake Crescent polluting their water supply.

As far as I could ascertain during my visit, there are only two places where it will be necessary to construct embankments for the purpose of raising the water-level in Lake Sorell a couple of feet, namely, across the low-lying land about two miles west from the Interlaken House, and where Kermode's old channel is; the embankment here will probably be not far from 2000 feet in length.

The other place where embanking will be necessary is in front of the Interlaken House, where the road will have to be raised, which probably also will be necessary a few hundred feet on the road east from Interlaken House.

I have thus endeavoured to bring forward the different points to be considered in order that the two Water Trusts may have a better understanding of what is really necessary under the different propositions, and in order that there will be a clear and complete understanding of the different responsibilities involved before they decide what works they will construct.

Lake Sorell is lying at a barometrical altitude of about 2700 feet above sea-level. Tunbridge, at 750 feet; therefore, the difference in altitude is 1950 feet.

Assuming 1000 feet only of this fall would be used to generate power, then the theoretical number of horse-power (h.p.) would be—

$$\frac{90,000 \times 6 \cdot 24 \times 1000 \times 10 \times 27}{60 \times 24 \times 550 \times 60;} \text{ equal to } 3191 \text{ h.p.}$$

and of these about 2200 h.p. effective, *i.e.*, actual, may be had from the turbine-shafts.

Of course, a nearly proportionate greater power can be had if, say, 1500 feet of the fall is utilised, instead of 1000 feet; but in that case it would, perhaps, be preferable, for practical reasons, to have two power-stations, each for about 750 feet fall.

It is eminently practicable to tap the water from Lake Sorell for power towards Tunbridge side, on account of the Western Tier's abrupt, nay, precipitous, fall towards the east. To generate power on a large scale from the waters travelling down the Clyde River is possible, but not practicable.

I have made these few power computations only to show how much power may be had with such a comparatively small quantity of water (90,000 cubic yards per 24 hours), where a sufficiently abrupt fall is available. The water itself, if anything, is all the better for passing through the turbines, because that "breaks it up" thoroughly, and aërates it at the same time.

Having finished my inspection at the lakes, I paid a flying visit to the Dee and Nive rivers for gauging purposes. I was also anxious to visit Lake Echo, Lake St. Clair, and the upper Derwent River, but time would not permit of my doing so, as I understood you wished me to go to the East Coast.

*Dee River.*—On the 1st instant, I gauged this river a few hundred feet above Forster's Bridge. I found 38·92 cubic feet of water running per second, or 124,544 cubic yards per 24 hours. This river is the outlet of Lake Echo, and is not known to have ever stopped running. It is a fair-sized stream; the river bed being 40 to 45 feet wide, and the water is beautifully clear. The barometrical altitude I found to be about 2325 feet above sea-level.

*Nive River.*—On the 2nd instant, I gauged this river a couple of hundred feet below the Marlborough Bridge. Its flow on that day was 20·3 cubic feet per second, or 64,960 cubic yards per 24 hours. The water is as clear as in the Dee and Ouse rivers. This river seems to have a large catchment area, but, not having any large natural reservoir to be fed from, it is liable to get low during the dry season. The height, as ascertained by barometer, is 2175 feet above sea-level.

If the gaugings I have now made be of lasting importance, then they should be continued by someone, *i.e.*, the rivers should be re-gauged at about the same places at least once every two months during at least a year. We would then have complete records of the carrying capacity of each river, with its respective water-level, in at least six different heights, and from these it may be computed what their flow would be with water-level at any intermediate point. By having gauge-boards erected, and the height of water-level noted every day, as explained in my report dated 10th December, 1900, we would, by degrees, get complete records of the quantities of water the rivers carry in the different seasons during the different years, and which are so very necessary for the skilful designing of certain engineering works.

I have the honour to be,
Sir,
Your obedient Servant,
K. L. RAHBEK, *M. Dan. Assoc. C.E.*

*The Honourable the Minister of Mines, Hobart.*

(No. 30.)



# REPORT UPON RIVER GAUGINGS.

*Office of Mines, Hobart,*
*26th April, 1901.*

SIR,

On the 18th ultimo, I left Hobart for the purpose of gauging the Upper Derwent and other rivers in the vicinity, and to visit the Lakes St. Clair and Echo.

On the 20th ultimo, I gauged the Derwent River a few hundred feet below the southern end of the lake basin; the discharge on that day was 6864 cubic feet per minute, or 366,080 cubic yards per 24 hours. The water is clear.

The Derwent is the only outlet from Lake St. Clair, and carries a far larger quantity of water than any of the other rivers I have gauged on the central plateau. By inspecting the attached table, showing gaugings of the different rivers, it will be seen that the Derwent at its very head, and in the driest part of the season, on the day named, carried about three times the quantity of the water flowing in the Shannon on the 27th February, and about 8½ times the quantity carried by the Ouse just above its junction with the Shannon, and five to six times the discharge of the Dee and Nive rivers.

The height of the Derwent at Lake St.Clair I found, by aneroid, to be about 2500 feet above sea-level, and at the junction with the Dee River, being a distance along the Derwent of about 44 miles, the altitude is about 300 feet. The Derwent has, therefore, for that distance, a total fall of 2200 feet, or, an average fall of 50 feet per mile.

As to the probable feasibility of using the water from this magnificent stream for power, irrigation, or other purposes, I shall return to this subject when reporting upon Lake St. Clair.

*The Travellers' Rest River* empties itself into the Derwent about two miles from Lake St. Clair. It starts from what is called the Travellers' Rest, Upper and Lower Lakes, and has a length only of about 5¼ miles.

I gauged this stream on the 20th ultimo, close to its junction with the Derwent, and found that 534 cubic feet per minute were flowing, or 28,480 cubic yards per 24 hours.

*The Clarence River* starts from Clarence Lagoon, and, after traversing a length of about 12 miles, empties itself into the Nive River, 2½ miles in a straight line downstream from Marlborough Bridge.

I believe the Clarence River carries a fairly good supply of water in winter time, but at the time of my visit, on the 21st ultimo, its discharge was only 231·6 cubic feet per minute, or 12,352 cubic yards per 24 hours.

Its altitude at its junction with the Nive River is about 1900 feet. The Nive River, therefore, on its course from Marlborough Bridge, where its altitude is 2175 feet, to the junction of the Clarence, or within a distance of 3·4 miles, has a fall of 275 feet, or, say, 80 feet a mile.

*The Dee River* forms the only outlet of Lake Echo. Its altitude here is about 2975 feet above sea-level. The river close to the lake is very much obstructed with growing tea-tree and fallen timber, and the shores being rather low and marshy, a weir, if constructed here, would require to be several hundred feet in length; at a distance of 1200 feet from the lake there is another site for a weir, but which of the two will be preferable must be decided by means of instrumental surveys. I gauged the river at this last-named place on the 25th ultimo, and found the discharge to be 1393·2 cubic feet per minute, or 74,304 cubic yards per 24 hours.

As stated in my report of the 18th ultimo, I gauged the Dee River on the 1st March at Forster's Bridge, being at a distance from the lake, measured along the river, of, say, 6½ miles, and found that 2335·2 cubic feet per minute, or 124,544 cubic yards per 24 hours, were coming down.

Between the dates of the 1st and the 25th March, the river's flow had decreased from 2335·2 to 1393·2, equal to 942 cubic feet per minute, being at the rate of 40·4 per cent.

As the altitude of the river at the bridge above mentioned is 2325 feet, the river has then a rapid fall of 2975 – 2325, equal to 650 feet in 6½ miles, an average of 100 feet per mile.

On the 28th ultimo, I gauged the Dee River at its junction with the Derwent, and found its discharge to be 1381·8 cubic feet per minute, or 73,696 cubic yards per 24 hours; as rain set in on the following day, I deem this to be the minimum discharge of the Dee River for this year, as, being so late in the season, the river is not likely to be so low again.

The distance along the river from Forster's Bridge to the junction is about 20½ miles, and its total length from Lake Echo will then be 27 miles. Its altitude at the junction being 300 feet, the river has a further fall from Forster's Bridge of 2025 feet, or, say, 99 feet a mile.

When reporting upon Lake Echo, I shall revert to the subject of the possibility of taking advantage of this river's heavy fall.

Annexed to this report is a table, showing the result of the river gaugings, and which (with the exception of one set of gaugings of the Ringarooma River at the bridge leading to Ringarooma township, taken by Mr. G. J. Burke during the year 1885), have all been made since the 4th September, 1900. The gaugings I took last year of the Ringarooma River were taken during the wet season. I had hoped to be able to gauge the Ringarooma River before we were quite out of the dry season, but so far I have not had an opportunity of doing so.

As to the reasons why it is imperative to keep up the river gaugings, and the best way of doing so, I beg to refer you to my report dated the 10th December last, and which report should be read in conjunction with the present one.

I have the honour to be,
Sir,
Your obedient Servant,
K. L. RAHBEK, *M. Dan. Assoc. C.E.*

*The Honourable the Minister of Mines, Hobart.*

RIVER GAUGINGS.

| Name of River. | Where Gauged. | Date of Gauging. | Discharge. | | Barometrical Height above sea level in feet. | Name of Observer. |
|---|---|---|---|---|---|---|
| | | | Cubic feet per minute. | Cubic yards per 24 hours. | | |
| | | WINTER GAUGINGS. | | | | |
| Ringarooma ... | Derby Bridge | 4.9.1900 | 31,056 | 1,656,320 | | K. L. Rahbek |
| Ditto ...... | Ringarooma Bridge | 6.9.1900 | 12,084 | 644,480 | | Ditto |
| Ditto ...... | Above junction with Maurice River | 10.9.1900 | 5340 | 284,800 | | Ditto |
| Ditto ...... | At Briseis Co.'s site for dam | 8.9.1900 | 3870 | 206,400 | | Ditto |
| Ditto ...... | About 6 miles above junction with Maurice | 12.9.1900 | 1523 | 81,227 | | Ditto |
| Maurice ......... | At junction with the Ringarooma | 10.9.1900 | 6646 | 354,453 | | Ditto |
| | | SUMMER GAUGINGS. | | | | |
| Ringarooma ... | Ringarooma Bridge | Jan. to M'ch, 1885 | 2924 | 155,947 | ... | G. J. Burke |
| Shannon ......... | At the Great Lake | 15·2·1901 | 3728·4 | 198,848 | 3350 | K. L. Rahbek |
| Ditto ....... | One mile above junction with the Ouse | 27·2·1901 | 2181 | 116,320 | 950 | Ditto |
| Ouse ............. | Due west from southern end of the Great Lake | 16·2·1901 | 1497·6 | 79,872 | ... | Ditto |
| Ditto ....... | Two miles above junction with the Shannon | 27.2.1901 | 786 | 41,920 | ... | Ditto |
| Dee ..... ......... | At Lake Echo | 25.3.1901 | 1393·2 | 74,304 | 2975 | Ditto |
| Ditto ....... | At Forster's Bridge | 1.3.1901 | 2335·2 | 124,544 | 2325 | Ditto |
| Ditto ....... | At junction with the Derwent | 28.3.1901 | 1381·8 | 73,696 | 300 | Ditto |
| Nive ............ | At Marlborough Bridge | 2.3.1901 | 1218 | 64,960 | 2175 | Ditto |
| Clarence ......... | At junction with the Nive | 21.3.1901 | 231·6 | 12,352 | About 1900 | Ditto |
| Travellers' Rest | At junction with the Derwent | 20.3.1901 | 534 | 28,480 | ... | Ditto |
| Derwent ........ | At Lake St. Clair | 20.3.1901 | 6864 | 366,080 | 2500 | Ditto |

JOHN VAIL,
GOVERNMENT PRINTER, TASMANIA.

(*Continuation of Paper No.* 30.)

*Office of Mines, Hobart,* 8*th November,* 1901.

*Re* WATER CONSERVATION IN LAKES SORELL AND CRESCENT.

SIR,

SINCE the rainfall records at Interlaken from September, 1900, to June, 1901, amount only to 40 per cent. of the rainfall, as recorded at Dog's Head, during the years 1889-1894, I think it essential for the success of the conservation scheme not to fix the maximum quantity of water to be forwarded from the conservation works during dry seasons at a higher measure than is necessary for the wants of the people affected. It is hardly necessary to point out that the cost of conserving water will increase as the quantities to be conserved are increased, and also, that the limit of conservation depends upon the available proportion for storage purposes of the rainfall during prolonged dry seasons.

I therefore beg to recommend for your consideration that the quantities, as specified in the amended Midland Water Act, 1900, namely, 100,000 and 90,000 cubic yards per 24 hours, to be forwarded respectively to the River Clyde and the Midland, be decreased to 75,000 cubic yards per 24 hours for the Clyde Water Trust, and 70,000 cubic yards per 24 hours for the Midland Water Trust, the former having the prior rights.

I would add that 75,000 cubic yards per 24 hours (equal to 58 sluice-heads) will irrigate 4000 acres of land, and leave 21,000 cubic yards (equal to 567,000 cubic feet) for domestic and other purposes. 75,000 cubic yards per 24 hours are represented by a stream of water running 5 feet wide, 2 feet deep, and with a velocity of 2¼ feet per second.

It is during the wet season the large lake reservoirs should be filled to over-flowing, and until that time, and until the lakes are filled to the top of the by-washes, no water should be allowed to escape, except what is necessary to bring up the daily totals to 75,000 and 70,000 cubic yards.

I have no doubt that there will be plenty of water in the Clyde River during a part of the wet season, without the water from the lakes, and, if the 75,000 cubic yards of water per diem were allowed to flow down the Clyde from the lakes, that quantity of water would be running to waste, as it is not required. On the other hand, it must not be lost sight of that the waters from the lakes, as arranged by nature, belong to the Clyde River, and it should, therefore, be so provided that, as soon as the natural flow in the Clyde River goes below the 75,000 cubic yards per diem, the corresponding quantity must be sent down from the lakes, so that the flow in the Clyde never goes below the stipulated quantity. This can best be regulated by constructing a permanent gauge in the River Clyde, upstream from Bothwell. A fixed mark on the gauge will indicate when the supply is nearing its maximum quantity, and word can be sent to Interlaken to forward the water. This arrangement would necessitate telephone communication between Bothwell and Interlaken, and this would otherwise be very useful, as the man in charge of the conservation works would be in a position to give timely warning when a flood is coming down the river.

I also wish to mention that, in case the direct canal from Lake Sorell to the River Clyde should not be constructed, then, it will be necessary to move the sluice in the Clyde River some 400 to 500 feet north, where the shore of Lake Crescent is better suited to draw off water in an unpolluted state than at the present outlet, and it would consequently be well if the Minister had the power of doing so.

I have the honour to be,
Sir,
Your obedient Servant,
K. L. RAHBEK.

*To the Honourable the Minister of Mines, Hobart.*

JOHN VAIL,
GOVERNMENT PRINTER, TASMANIA.