

MADRAS RECORD OFFICE.

Government of Madras.

Public DEPARTMENT.

G.O. No.	1497	Press Mis.
Dated.	3-10	18 7/

Not to be folded or roughly handled

3rd October 1871.

No. 5. Read the following letter from the Sanitary Commissioner for Madras, to the Chief Secretary to Government, Fort St. George, dated Bangalore, 18th September 1871, C. No. 54:—

I have the honour to acknowledge receipt of Proceedings of Government, No. 2178, of 24th August, Public Works Department, containing certain reports on the quality of the waters of the Ulsoor lake and Dhobies' wells at Bangalore.

2. As Government are aware, I visited Bangalore in April last to make myself acquainted with the water-supply question, and, during my inspection of the station in July and August, I have had the subject constantly before me; I trust, therefore, that I shall be enabled, in the present communication, to afford all the information that is really essential to enable Government to take practical action in the completion of the water-works project.

3. The investigations of Assistant-Surgeon Nicholson have, I think, shown most conclusively that the water of the Ulsoor lake, when subjected to proper filtration, is not of that dubious character which former chemical analyses seemed to indicate. I have myself verified his analyses so far as the proportion of organic matter and the presence of nitrates are concerned, and, as these are the only really important considerations in a sanitary point of view, I have no hesitation in accepting his conclusions that the lake water at the present time exhibits no evidence of sewage contamination. The proportion of organic matter in the filtered water is not large, and not more than exists in many waters which are considered to be quite wholesome and fit for drinking, while analyses show that the water contains but the faintest traces of nitrates, not more than one part of nitric acid in 10,000,000 parts of water.

4. A very great improvement has taken place in the quality of the filtered water. When I inspected the works in April last, the filtration was by no means good, and the water in the reservoirs was white and opaque. Now by the use of a better quality of sand, and passing the water through a pipe containing coarsely-divided animal charcoal, it comes out quite clear and bright, and so pure is it that it may be kept for months in bottles without any decomposition or growth of vegetable or animal life. These improvements are due mainly to the practical suggestions of Dr. Nicholson.

5. From a careful examination of the lake and its feeding grounds, I am satisfied that not more than an infinitesimal amount of sewage finds its way into the lake. The ordinary house drainage of the bazaar is conveyed away in a covered sewer which runs beneath a shallow corner of the lake, and is taken away to paddy fields below the Dumbloor tank. When heavy rain falls, some surface washings of the bazaar and streets of the valley above the lake do undoubtedly find their way into the lake; but, taking into account the fact that the conservancy of the streets and waste places about Bangalore is exceedingly good, this unavoidable pollution, in relation to the great bulk of water collected in the lake, is practically unimportant.

6. The Ulsoor tank water is not an inviting fluid to look at. The drainage area feeding the lake consists of red soil, or decomposing felspathic rocks, and the water consequently retains a considerable amount of reddish or yellowish clay in suspension. Formerly, when aquatic plants were allowed to grow in the lake, the

water was much clearer. Now the only vegetation is a green scum that floats on the surface, and where this scum collects on the tank margins, and dries up, it is apt to give out very disagreeable smells.

7. This vegetable growth, which consists mainly of a microscopical *confervæ*, has, I make no doubt, tended to give the Ulsoor tank water a bad reputation. Some years ago, Dr. Orr collected a quantity of it and sent it to the Chemical Examiner for analysis. In transit to Madras some of the bottles burst, owing to the decomposition going on in the vegetable matter. The remaining bottles were received with the contents in a state of advanced decomposition, stinking abominably, so that the Chemical Examiner could only infer that they contained fecal matter.

8. The green scum, being a highly nitrogenized substance, would, in decomposing, necessarily resemble, in odour and appearance, decomposing fecal matter. Had the Chemical Examiner been made acquainted with the nature of the substance sent for investigation, the horrible odour of the decomposing compound might have been accounted for otherwise than on the supposition that fecal impurities abounded in the lake. I am not aware of any chemical or other test which would enable any one to distinguish such a composition from fecal matter.

9. I believe that this is the true explanation of the supposed fecal contamination of the lake water, and my impression is that there are no grounds for supposing that such contamination is of common occurrence, and that there are very few large lakes in this country which receive so little impurity of that description as the Ulsoor lake does.

10. As a rule, the inhabitants of the Bangalore bazaar adopt the system of cess-pit privies in their private houses. The manure from these is carefully carted away when necessary, and used in agriculture. This, in fact, is the only station I have yet visited where manure of every description is eagerly sought for, and frequently bought at rather high prices by the cultivators. This being the case, it necessarily follows that fecal contamination of the lake water cannot be so common as in other places where natives are in the habit of defiling waste places, and where they place no value on animal manure.

11. I think, therefore, that Government may be assured that the Ulsoor lake is not a receptacle of sewage, and that, although it does receive the rainfall of the valley in which a rather densely-populated town stands, yet that the resulting impurity of the lake water is practically unimportant, mainly on account of the careful conservancy of the town and the habits of the native population.

12. The suggestion of Dr. Nicholson for planting bulrushes or aquatic plants in the shallow parts of the tank, where the several feeding channels enter the lake, is a good one, and should be carried out with the view of arresting the silt of the flood waters, and to help their purification.

13. Notwithstanding the improved filtration of the lake water by artificial means, I must not omit to dwell upon the important fact that it still contains *rather more than three times the quantity of organic matter* that the dhobies' well waters yield. The dhobies' wells water obtains a very high standard as regards organic impurity. I by no means would wish it to be inferred that the Ulsoor filtered water is not a wholesome drinking water, because it compares unfavourably with the dhobies' wells

water as regards organic constituents. There are very many well and tank waters in Bangalore which contain much higher proportions of organic matter than the Ulsoor lake water does, which waters are habitually used by the population. No one can tell how much organic matter in water makes it wholesome or dangerous. Probably, in this matter, everything depends upon the nature and antecedents of the organic impurity. The filtered lake water has a distinct taste, to my palate, of vegetable matter, while the dhobies' wells water is perfectly free of all organic taste. Both, I have no hesitation in saying, are, under ordinary circumstances, perfectly wholesome water, such as may be safely issued for the use of troops or the native population; but of the two, the dhobies' wells water, owing to its freedom from all organic matter, must necessarily be the safest and the best.

14. The dhobies' wells water is simply the water of the Ulsoor lake, subjected to a natural filtration through a stratum of lateritic gravel. It has this great advantage over water subjected to artificial filtration, that it is not liable to suffer from neglect or inefficiency of the filtering apparatus. The Ulsoor lake water, as now filtered, is a very fair specimen of a potable water; but if the filter beds were neglected, or the animal charcoal allowed to be clogged, a very different result might be expected. The natural filter bed, on the other hand, is independent of human supervision, and it has this very great recommendation, that it actually removes two-thirds of the organic matter which remains in the water artificially filtered. The dhobies' wells water probably is as good a water for domestic use as could be procured anywhere. It approaches very nearly to the standard of distilled water in regard to the amount of organic impurity.

15. This very pure water being at hand and available, it only remains to consider whether it is obtainable in quantities sufficient for the use of the troops in the first instance, and of the bazaar population in the second. As regards the former, Captain Woods has shown, as the result of recent experiments on the yield of the dhobies' wells, that if the area of the present number of wells be doubled, there will be an ample supply of the very purest water obtainable for the whole of the troops in garrison. There is ample space for the sinking of more wells, and I think it would be advisable that a few of these should be of larger capacity than those already sunk. The cost of these wells would be but trifling.

16. I advocate the sinking of extra wells, and the supply of the troops wholly from the dhobies' wells, because I am assured that there is no difficulty whatever in arranging the present works with that object, and that the large engine on the rock and distribution apparatus can be made available for raising the water. All that is necessary is to connect the pumping engine with the nearest well, which would require about one thousand feet of piping, the greater portion of which is ready at hand. By using the dhobies' wells water, the troops will be guaranteed a supply of the purest water obtainable, and the risks to health and life incidental to the use of doubtful or impure water will be reduced to a minimum.

17. I think it is a doubtful question whether the wells will yield, in addition to the supply for military purposes, enough for the use of the bazaar population. The natural filtration through the gravel bed is a slow process, and the filtering area is limited. Should the supply hereafter prove to be no more than sufficient

*Proceedings of the Madras Government, Public Department,
3rd October 1871.*

for the troops, or should it at any time run short, there would not, in my opinion, be the slightest objection to the distribution of the Ulsoor filtered water through the pipes used for the well water. The points of difference in the two waters as to the amount of organic matter are too slight to cause any apprehension of fouling the purest of the two.

The filtered lake water is much better than the majority of the bazaar people are in the habit of using; and, if the Municipality provided reservoirs for its reception and the necessary distribution works, the engine is quite capable of pumping up a supply for the use of a considerable portion of the town.

18. I may here point out that all the drinking water of the troops is at present drawn from one of the dhobies' wells, and that the water in this particular well shows decided evidence of fouling. This is scarcely to be wondered at when it is considered how many dirty leathern-buckets are dipped into the water every day, with dirt from the puckallies' feet, and soakage from the spilled water around the well. The water from this well took 0004, and that from an unused well 0002 grammes of oxygen, and the former showed very distinct traces of nitric acid, while the latter gave only the faintest evidence of its presence. This fouling of the well is certainly due to the very crude method of raising the water, and it is liable to increase so long as the present practice is followed of bringing an army of dirty puckallies to the well day after day.

19. The case affords an excellent example of the way in which the very best of water in its natural state may become fouled by native usages. I could hardly have supposed that there would have been such perceptible evidence of fouling if I had not myself verified Mr. Nicholson's experiment on the point. The fact should teach the necessity of adopting such appliances for the raising and distribution of water as should effectively prevent the possibility of contamination.

20. Up to the present time no water-main has been led on to the Infantry barracks. New swimming baths have been built, but there is no water to fill them; the distributing reservoir has not yet been built. This portion of the project should be completed without delay, for the want of a good water supply is much felt here.

21. The masonry reservoirs in the Artillery and Cavalry lines, which are intended to hold clean filtered water, are unprovided with roofing; as a consequence the water pumped into them is liable to constant fouling from dust and other impurities. The crows, for instance, bring putrid bones, which they constantly drop into the water, and mischievous persons throw into the reservoir broken bottles, and other rubbish, which they cannot otherwise dispose of. On cleaning the Cavalry reservoir lately, the bottom was found covered with old bones, broken bottles, mud, and other rubbish. Without proper coverings to the reservoirs, and protection of the water from dust, birds, &c., its original purity at its source will be but of doubtful value to consumers.

22. In a climate like that of Bangalore, where the rainfall is but moderate, it seems advisable to have more than one resource for water in the event of a series of adverse seasons occurring.

The late Sir William Denison, when Governor of Madras, and His Excellency Sir Gaspard LeMarchant both approved of the collection of rain water from the roofs of the barrack buildings on the race course and its storage in underground

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reservoirs. One of these reservoirs was actually begun some years ago, and is still in an unfinished state. The experience gained at Trimulgherry shows, I think, that such rain-water reservoirs might become of great value if properly used. In Bangalore, the subsoil water is only found at a great depth from the surface, and when it is obtained, it is not always of good quality. The storage of rain water on a large scale might certainly be attempted, both as regards the race-course barracks, and those occupied by the Infantry. It would always be useful for bathing, washing, and cooking, even if it were thought better to employ other water for drinking purposes; and, although stored rain water is liable to suffer from organic developments, a very simple measure would, at all times, make it quite fit for drinking use. A reserve of locally-stored water would always be most valuable, and especially in the event of any accident to the distributing apparatus of the Ulsoor Water Project.

Indeed, in a place like Bangalore, I do not think that too much can be said in favour of any scheme for the collection and storage of pure water. The station occupies so high a plateau, and is growing so fast in extent and population on the higher grounds where the supply of water from the lake is impracticable, that it seems to me highly advisable that the collection of rain water from the roofs of houses, in underground cisterns, for domestic use, should be generally encouraged.

No. 6.

ORDER THEREON, 3rd October 1871, No. 1497.

Communicated to the Public Works and Military Departments.

(True Extract.)

R. S. ELLIS,
Chief Secretary.

To the Public Works Department,
,, Military Department.
,, Sanitary Commissioner,

Esd. J. Wright.

Subt. of 1871 **ST. ALGER**

PUBLIC.

To
THE PUBLIC WORKS DEPARTMENT,
Lg., &c., &c.

Dated October, 3rd.
Recd.

Ind.

G. O., 3rd October 1871, No. 1497.

OCTOBER.
Nos. 5-6.

Communicating letter from Sanitary Commis-
sioner affording full information in respect to the
Water Works Project at Bangalore.

From

The Sanitary Commissioner
in all adras.

Mr. Chief Secretary to Government
Public Works Department
Fort Saint George.

Sir,

I have the honor to acknowledge receipt of
your letter of 10th September 1891
containing certain reports on the quality of the
waters of the Ulloor Lake and other wells at
Mangalore.

2. To Government are aware, I visited Mangalore
in April last to make myself acquainted
with the water supply question, and during my
visit of the station in July and August, I
have kept the subject constantly before me.
I trust therefore that I shall be enabled in the
present communication to afford all the information
which is essential to enable Government
to take prompt action in the improvement of
the water supply.

3. The investigations of Dr. H. H. Nichols
have I think shown most conclusively
that the water of the Ulloor Lake when subjected

received with the contents of a letter of recommendation
and a description, which being absolutely so that the
elements of the matter could only infer that they
contained the matter.

eruptions is as early as possible for medical purposes
brought at rather high prices by the natives.
This being the case it is only folly to think
persons will imitate us of the high water, though
be so common as in other places, where natives
are in the habit of defiling water places, and
where they place no value on clean water.

It is affirmed that the Ulloor filtered water
is not a wholesome drinking water because
it compares unfavorably with the Dhobie well
water, as regards organic constituents. There
are very many wells and hand-drawn Boreholes
which contain much higher proportions of organic
matter than the Ulloor lake water. These
wells are habitually used by the population.
No one can tell how much organic matter
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Probably in this matter every body depends
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Dhobie well water is perfectly free of all
organic matter. It is no doubt a very good
water, ordinary for circumstances.

Then, such as may be safely assumed for
the use of troops or the native population, but
of the two, the Dhobie well water, owing to its freedom
from all organic matter, must necessarily be the
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The Dhobie well water is simply the
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The water from this well took 0004 germs of oxygen - do - from an unmineral well - 0002 - - of - -
and the former showed only traces of nitric acids, while the latter gave only the faintest evidence of its presence. This fouling of the wells is certainly due to the very crude method of raising the water, and it is liable to increase so long as the present practice is followed of bringing an army of dirty punkallies to the well day after day.

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The necessity of adopting such appliances for the raising and distribution of water as should effectively prevent the possibility of contamination.

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~~the water supply and the storage of it~~
by the Infantry. It would always be useful for bathing, washing, and cooking even if it were thought better to employ other water for drinking purposes, and although stored rain water is liable to suffer from organic developments, a very simple measure would at all times make it quite fit for drinking use. A reserve of locally stored water would always be most valuable and especially in the event of any accident to the distributing apparatus of the ~~the~~ water project.

Indeed in a place like Bangalore I do not think that too much can be said in favor of any scheme for the collection and storage of

offense water. The station occupies so high a plateau, and is growing so fast in extent and population, on the higher grounds where the supply of water from the lake is impracticable, that it seems to me highly advisable that the collection of rain water from the roofs of houses, in the grounds existing for domestic use should be generally encouraged.

I have the honor to be,
 Sir,
 Your most obedt. servt.
Wm. Forster J. R. Es.

1877
 Public Department
 The Hon. Secy. Genl.
 Secy. to the Govt.
 No. 2026
 for Madras.
 No. C. 57.
 Affording the information in respect to the State Bank for India at Bangalore.
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