32

DOMESTIC.

EAST AFR. PROT.

No. 8159

C.O.
8159
4 MAR 07

Individual	(Subject.)
Lt Col. J. Hayes	Mombasa Water Supply
1907	Urges desirability and importance of a new water supply. The question should be considered as soon as financially practicable.
4 March	
Previous Paper	

(Minutes.)

Mr Read

We are all agreed that it would be a good thing for Mombasa to have a good water supply. But we think that it must wait until it can afford to provide, just as English towns of equal importance have had to. We do not see why it shd be done at the cost of the British taxpayer.

It shd be noted that an increased supply of water is nothing better than a new source of danger unless it is combined with a proper system of sewers to carry off the polluted water. Judging from the medical

Subsequent Paper

Comm 15367

provisions, it seems to me a question whether proper use of the mirage [?] grounds are not the more urgent need

MR 6/6

Mr. Antrobus [?]

It is not probable that the Adm would contemplate [illegible] the cost of the [illegible] in any case. We have not the necessary funds. When we are in a position to take the matter up, I think that we should get a proper report on the whole question of the [illegible] of [illegible] from a qualified expert like Mr Williams.

Inf. Col. Sadler privately that nothing can be done in the matter for the present?

[illegible] R

6/3

I see that Col. [illegible] in his last minute of the Bd. of [illegible] said that two of the [illegible] Insp. [illegible] should be further examined [illegible] by an expert is asked for from home. Has this been done? Any preliminary examination of that kind which can be [illegible] by the local people should

be prepared so, and then
an expert might be sent
out. But the inhabitants
of Mombasa cannot fairly
expect to have water pro-
vided for them at the
cost of anybody but
themselves, although the
Govt might help them to
[illegible] the capital required.
I think that is
what was done in Dar
es Salaam [illegible] leadership
[illegible] good precedent
[illegible]

C.O.
8159
4 [illegible] 07

34

Mr Read

These extracts from the "East African Standard" of the 1st Dec 1906 refer to the question of a water supply for Mombasa, & contain opinions as to the relative quality of the present sources from which the town draws its drinking water. The question is one of great importance to the health of the town & to the future of Mombasa as a port of call for steamers.

We have discussed the matter, & the [illegible] calls [illegible] for [illegible] [illegible] [illegible] [illegible] [illegible] of a supply & work being taken up during the forthcoming year. [illegible] [illegible] at the time [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] which would be [illegible] [illegible] to cost from £50,000 to £100,000 [illegible] be undertaken without a loan in any case.

The question is one upon which Works should be consulted as soon as it is found practicable to obtain the necessary

The Water-Supply of Mombasa.

The Opinions of Local Medical Authorities.

'Ankylo Stomasis' a Common Disease.

Last week we interviewed the medical authorities of Mombasa with a view of obtaining professional opinions on the subject of the well system of water supply on Mombasa Island. As a result of various questions put by our representative we have been able to secure valuable evidence which condemns the present system of water supply unconditionally. In order that the various opinions may be more easily compared, we have divided the subject into sections.

The following will explain:

OPINIONS.

Is our well Water Contaminated?

Dr W H B MacDonald, [illegible] Vaughan: I am not aware that a quantitive and qualitive analysis of our well water has ever been made. We have no apparatus at present as far as I am aware with which we could make the necessary tests. I am not prepared to say that there is sewage in our well water and I am of the opinion that our wells are too deep to be largely affected by the cesspools, although if a well is surrounded by cesspools in close proximity there would be a distinct danger of contamination. I would regard shallow wells with grave suspicion. Our well water contains lime and sodium salts in considerable quantities and I am of the opinion that skin diseases and bowel complaints are frequently apt to be caused by drinking water containing these salts. I consider the abolishment of all wells in the two Municipalities most desirable.

Dr A M Leys, Medical officer, Kenya Protectorate says: I know of no analysis having been made of the Mombasa well water. A detailed analysis of the water would prove the presence or absence of sewage. I [illegible] presume the presence of sewage. I presume this from the proximity of cesspools to our wells and the indiscriminate deposits of night soil. Depth of wells is no safeguard of pure water. The rock on the Island is not impervious. As the Island becomes more inhabited the danger of contamination under present conditions naturally increases in proportion.

The impurities of the water in the wells in Mombasa are of two kinds. One kind arises from the fact that especially in dry weather, part of the water filters through from the sea through coral containing sea salts. These sea salts in the water so far as I know, do not give rise to disease.

The other kind of impurity in the water is sewage. Cesspools are not cemented. Their contents are absorbed by soil and coral to which the walls are the chief drains. Surface pollution by bodies also of course will find its way into the wells especially just after rain. Hence outbreaks of dysentry at the beginning of the rains. One noticable disease, prevalent in Mombasa, and not infrequently fatal, is due to this polluted soil and water. The parisite is presumed to gain entrance to the body by the mouth but has also been proved to infect through the skin. There is presumably then some danger in using the water for washing.

Dr Shepard: I consider the wells as at present constructed are a possible source of mosquito breeding. Without pumps house tanks are unsanitary and mosquitoes can not be kept from breeding therein. Elephantiasis is caused by a mosquito the Stegomyia. It is a common disease in Mombasa.

Dr Goldie: With water tanks I consider the use of pumps most desirable. As under existing circumstances it is impossible to keep them mosquito proof.

'Ankylo Stomasis.

Dr Shepard: The disease of Ankylo Stomasis is well known to be [illegible] common in Mombasa. It is caused by a worm. I am of the opinion that by drinking well water the disease can be most successfully contracted. The natives use all sorts of vessels with which to draw their water. These vessels are not clean and the disease germs are undoubtedly introduced into all the wells of Mombasa by this means.

Dr Leys: The disease is prevalent in Mombasa and sometimes fatal. Infection is due to fecal contamination of soil and water.

Is a new Water supply urgently needed.

Dr MacDonald: It is highly desirable from a health point of view that fresh water from inland should be brought to Mombasa. I do not think the water at Shimba is good enough for this purpose. In my opinion, if there sufficient quantity to be obtained from that district. I have never seen better water in East Africa than the water at Teveta. This water is derived from springs close to Kilimanjaro.

Dr Leys: It is essential that the new supply of water should be abundant. Drains without plenty of water are worse than useless. And without drainage and the filling in of the present wells we cannot hope to get rid of [illegible] diseases such as Ankylo Stomasis.

Dr Shepard: A good supply of fresh drinking water would [illegible] improve the general condition of the people as to health at Mombasa. It [illegible] it.

Dr Goldie: A constant supply of pure water would undoubtedly go much towards improving the health and [illegible] of Mombasa.

Sub-Commissioner's Office,

Mombasa,

19th, November 1906.

No.

Your Excellency,

With reference to Your Excellency's minute of the 20th ultimo, I have the honour to transmit herewith a copy in triplicate of a Report by Mr. E. T. Wilkison on the proposed water scheme for Mombasa.

I have the Honour to be,

Your Excellency's,

Most obedient, humble Servant,

H.M. Sub-Commissioner.

H.E. The Commissioner and Commander-in-Chief,

East Africa Protectorate.

Mombasa,

November 16th, 1904.

Sir,

In connection with the enclosure marked by His Excellency the Commissioner I have now the honour to report as follows on the proposed water-supply for Mombasa:-

The population of Mombasa Island is

a. Europeans	800
Parsees	50
Goanese	450
Indians	3500
Africans	19600
b. Number of houses occupied by	
Europeans	88
Goanese	60
Indians	358
Arabs	144
Natives	3900

Assuming that an approximate annual revenue of £8,000 is required to be raised I would suggest as the simplest and most convenient method that the various communities be charged standard rates in respect

H. Sub-Commissioner

Mombasa.

respect of their house but irrespective of size or quality of house.

I would however except the Europeans from this arrangement as the bulk of them would probably have water laid on to their houses. I estimate that an average amount of 30 gallons of water per European per diem would be consumed. This gives a total daily consumption under this heading of 6000 gallons.

I would suggest that a fair rate to charge would be Rs. 2 per ton of 220 gallons. This would yield a revenue of Rs.19,909 per annum.

In the case of Indians Parsees Goanese and Arabs I would propose a charge of Rs. 2 per house per month and in the case of the Natives a charge of Re 1 per house per month.

These rates may appear to be small but it is necessary to make them so in order to cut in under the charges of the Wadhihiri who are the water suppliers for Mombasa. Their present charge to Natives and Indians is 2 pice per tin of four gallons, while some are paid Rs. 3 per month for supplying 10 tins or 40 gallons per diem.

I

I now come to the shipping. At present ships take in their water supply at Zanzibar under the following system:-

The water is farmed out to Messrs Smith Mackenzie and Company who pay the Zanzibar Government a royalty of Rs. 1-8-0 per ton of 220 gallons; and provide the ships with water at stated charges. As some such system would require to be adopted here I propose taking it as a basis for my estimate.

It would be necessary in order to attract ships to water here not to exceed the Zanzibar charges and I propose a similar royalty of Rs. 1-8-0 per ton payable by the person to whom the water is farmed out.

As to the amount of water likely to be taken I may again utilise Zanzibar as a basis.

The number of ships which visit Zanzibar is practically identical with the number which touches at Mombasa and the ships which touch here do so in most cases at Zanzibar.

Provided therefore that the price of water was not prohibitive and the water was of good quality it

may

may be taken for granted that outward bound ships would water here and homeward ones at Zanzibar.

It may therefore be accepted that we would equally share the water supply with Zanzibar.

From information kindly supplied to me by Mr. Wilson of B. M. & Co. it would appear that the shipping here approximately an average of 2,400 tons or 528,000 gallons monthly.

Of this 1,200 tons would come to us realising a revenue of Rs. 1,800 per month.

I give as follows a statement showing the approximate annual consumption of water and the accruing revenue.

		Galls. per annum.	Rate.	Annual Revenue.
200 European Houses		2,190,000	Rs.2 p. 220 Galls.	Rs. 19,964
Indians Arabs Parsees Goanese	762	21,900,000	Rs.2 p. House p. month	18,288
Natives	2,200	21,462,000	Rs.1 " "	18,480
Shipping		2,190,000	Rs.1/8 per 220 Galls.	1,827
	Total	48,720,000	Total	58,559

£ 6,549

Daily consumption 133,479 gallons.

The estimated consumption is based on the actual requirements of the people but it is probable that in the case of the Indians and Natives they would take

take advantage of an uncontrolled water supply to increase their consumption by possibly 50%.

I have not touched on a water supply for the Navy or Railway as I have no data on which to estimate

Any contribution from the Admiralty might conveniently take the form of an annual subsidy based on a forecast of their probable requirements.

As to whether an inter-departmental charge should be made against the Railway I leave for your consideration.

I have seen the heads of the various communities and they would welcome a water supply. They unhesitatingly state that they and their fellows would willingly contribute to Government on the scale I have suggested.

My estimate is of course based on existing conditions. As to the future the Native population has a tendency to slightly diminish and in my opinion will not increase unless new industries which would attract Native labour come into being.

On the other hand the European and Indian element is an increasing quantity.

Shipping also it may be taken will also increase

and

and in the not remote future it is conceivable that steamers may make Mombasa their terminal port.

I have the honour to be,

Sir,

Your most obedient Servant,

Sub-Commissioner,

Mombasa.

In connection with the scheme that was proposed some years ago to supply Mombasa I should be glad of information bearing on the population, the portion that might be expected to pay for water, how much would be probably required for shipping, and what rates could reasonably be charged.

The information of 1899 and 1900 is now out of date.

Particularly should be noted

(a) The European population at present in the Island.

How many houses are there occupied by Europeans?

(b) The Indian population and whether they would be prepared to pay for water laid on their houses: one or two to whom I have spoken on the subject would certainly do so.

How many houses are there occupied by Indians?

(c) The views of the Arabs and better class natives of the Island.

If the scheme is to be revived we must have some [illegible] data to proceed with so as to calculate to some extent the returns that may be expected.

When a Municipality is established a regular water rate could be laid on each house: but for the present we must consider the question apart from that of a Municipality.

(Sgd). J.H.Sadler,

20-10-08.

There are 6 (six) possible sources of water for Mombasa.

(1) Boreholes.

(2) Shimba Hills.

(3) Constructing a reservoir in Kasalla Hills.

(4) From the sources of the Voi River.

(5) Vdi.

(6) Chenze.

(1) Does not seem hopeful, but as we have a boring plant in the country it would be worth while spending say £1,000 to £2,000 in boring 2 wells 10.

(2) Is dealt with by Mr. Ross.

(3) Should be further investigated before being condemned.

(4) Is well worth investigation. The Voi River disappears in dry weather, but the springs in the hills are perpetual and may together contain as much as 1000 gallons per minute which is about what will be required.

(5) Vdi could be joined to [illegible] and between them it is possible that sufficient good water may be found to meet requirements for many years.

(6) Appears to me to be financially impossible in the present.

present state of the country.

The population of Mombasa is at present about 30,000 and the Sub-Commissioner estimates that 150,000 gallons per diem are required. We could put it at 200,000 gallons as a minimum, and the Railway will require say 200,000 gallons - a total of 500,000. To achieve this we should provide for more than 1,500,000 gallons per diem + say 1,000 gallons per minute to allow of future expansions &c. The Railway requirements will certainly increase to 500,000 gallons within a few years.

The mean gradient of the Railway between Voi and Kamburu is about 1 in 550; a 15" pipe would discharge about 1,000 gallons per minute on this gradient. Below Kamburu the hydraulic gradient could possibly be increased to 1 in 250 and the pipe reduced to 12" diameter, but for the purposes of this estimate I prefer to assume that the 15 inch pipe is carried through to Mombasa.

110 miles of 15-inch would cost:-

Miles		feet.				
110	x	5280	x 1 (cwt per foot run) x	3s.6	(per cwt)	£180,000.

Adding say £70,000 for laboir dams, &c. we get a total cost of £250,000.

Mr. Hamilton estimates present possible Revenue from Mombasa at £6,000. The Railway could contribute another £5,000 making a total of £11,000 of which certainly £8,500 could be spent in maintaining and working, leaving only £2,500 or 1% as net Revenue.

These figures are for water from near Voi; if we have to go to Tsavo i.e. probably some 50 miles further to get a gravity

gravity supply the cost would be about 50% more.

I am very doubtful whether water from the Tsavo could be carried in an open channel to the Taru. The soil is extraneous and by the time Voi was reached much of it would probably have disappeared, and to carry it in a masonry or iron channel is of course quite out of the question.

I see Mr. Pease mentions that the total flow in the Tsavo is about 2,000,000 gallons per hour. This is, I believe, Sir George Whitehouse's estimate.

2,000,000 gallons per hour = 180,000 gallons per minute

= 3,500 gallons per second

= say 400 cub. ft. per second.

In case I am much mistaken I cub. feet per second would [illegible] than 200 cusecs (a very liberal [illegible] the Taru. The whole Tsavo River at only [illegible]

400 x 800 = 40,000 acres

= 62 square miles.

The Tsavo flow would therefore only irrigate 30 square miles and not 80 as estimated by Mr. Pease.

I must confess that I look on the Tsavo scheme as at present financially quite out of the question.

Scheme (4) is bad enough and I could only advocate it because it solves the Railway difficulty as well as Mombasa, and later on if necessary the Tsavo scheme could be added to it.

It appears to me that (8) is the most likely to

give

give a fairly cheap solution for Mombasa only, but as I have already remarked (3) and (5) should be further examined before a report is asked for from home. It is quite possible that (3), (4) and (5) can be combined.

[illegible]

Nairobi,

December 3rd, 1908.