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MADRAS RECORD OFFICE.

Government of Madras.

Public DEPARTMENT.

G.O. No.	293	Press Mis.
Dated	10-3-	1870.

Not to be folded or roughly handled

(Signature)

Proceedings of the Madras Government, Public Department,
10th March 1870.

No. 54. Read the following letter from Surgeon-Major J. L. RANKING, Sanitary Commissioner for Madras, to the Chief Secretary to Government, Fort Saint George, dated Madras, 16th February 1870, No. 188.

On the 19th of August the Government submitted to the then Acting Sanitary Commissioner a correspondence regarding the insanitary influence exerted by the river Cooum upon the inmates of the General Hospital, directing him in communication with the Inspector-General of the Indian Medical Department, and the Physician of the General Hospital, to prepare a report "on the best means of alleviating the evils arising from the said river during seasons of drought."

2. The subject had not been disposed of when I resumed the duties of my office, and as it involved questions and measures which required the co-operation of an Engineer officer, it will be in the recollection of Government that I solicited that Captain Tulloch might be associated with myself and the gentleman above named in the inquiry.

3. It now devolves on me to report to Government the action that has been taken upon this order, and the result of the deliberations upon the subject.

In the first place we inspected, in company, the whole range of the Cooum river. This inspection we made from the river itself, and we thus became acquainted with the extent to which it is polluted by the numerous streams of sewage that flow into it, Captain Tulloch pointing out the different sewers, and explaining how far the sewage could be diverted by works of sewerage calculated to fit in eventually with his general scheme of drainage. We also inspected the banks of the river in the neighbourhood of the General Hospital and Penitentiary, and discussed the best means of reclaiming them.

Subsequently, after careful consideration of the correspondence submitted, and with the knowledge we had acquired of the state of the river, we unanimously adopted the following resolutions:—

i. That all sewage pouring into the river Cooum, between Harris' Bridge and Government House Bridge, and into the Cochrane's Canal, as far as the Elephant Gate Bridge, be intercepted.

ii. That measures be taken to maintain the water in the river at as uniform and high a level as may be practicable.

iii. That the banks of the river immediately surrounding the General Hospital and Penitentiary be so constructed that a considerable depth of water be maintained at the margin.

4. These resolutions, we unanimously agreed, met the main sanitary requirements of the question, and we equally unanimously resolved to request Captain Tulloch to favour us with a memorandum showing the practicability or otherwise of meeting these requirements by works or measures of Engineering skill.

This memorandum will be found appended.

5. We have not overlooked the magnitude of the question involved in the first proposition.

Captain Tulloch has, however, shown in his memorandum that there will be no Engineering difficulties in giving effect to the resolution. He purposes to carry

13. In regard to the third resolution "that the banks of the river immediately surrounding the General Hospital and Penitentiary be so constructed that a considerable depth of water be maintained at the margin;" there is no Engineering difficulty in carrying it out in any one of the ways that have been proposed; either by a wall as proposed by Dr. Duff, (though this, it is apprehended, will be very costly, much more so than Dr. Duff appears to anticipate,) or by a stone revetment, or simply by scarping the banks and planting a hedge. The question is one entirely of cost. The latter will be the less costly, and meet the object in view.

14. It will be necessary, however, to adopt some means of keeping people off the banks who now use them, especially when the river is low, as *places d'aisance*. This could be effected by running a wall or strong paling at each end of the compounds some way into the bed of the river. This provision will, however, only be of use if the river can be kept full up to the depth indicated by Captain Tulloch.

15. We duly considered the proposition made by Dr. George Smith in his communication of the 30th July 1869, No. 146, that the river and canal should be deepened by dredging under water and the bed of the river itself narrowed; but, on discussing the practicability of the measure, it was unanimously agreed that it would entail such an enormous cost as to be quite out of the question.

16. The practicability of filling the river by the double syphons suggested by Dr. Duff at the bridge near the bar was also discussed. Captain Tulloch satisfied us that the scheme was not so "simple" as it may at first sight appear to a non-professional mind.

17. The consideration of this and all other measures calculated to attain the desired end must be left for consideration in the Public Works Department.

The scope of the inquiry in the Sanitary Department is limited to general principles, and these are embodied in the resolutions given, and comprise—

- i. Interception of the sewage now flowing into the river;
- ii. Maintenance of the water at an uniform depth;
- iii. Re-construction of the banks of the river at the General Hospital and Penitentiary, so that they may slope directly into deep water; and

Lastly, the adoption of measures to prevent the access of people to the banks themselves.

Memorandum by Captain H. TULLOCH, R.E.

There would be no Engineering difficulties in giving effect to the wishes of the Committee. Regarding the first resolution, viz., that all sewage may be intercepted from entering the Cooum and the canal, what I would propose is this:—To carry out a small portion of my project for the drainage of Madras; placing the sewers, for the sake of economy, not quite so deep below the surface as they were originally intended to be put. The work would consist of a portion of the main sewer, a portion of one branch sewers and two earthenware drains. The portion of the main sewer would be that between the proposed Park at Chintadrepett and the north-west end of the People's Park. This sewer would, in the first place, intercept all the sewage which is at present discharged into the Cooum near the Government House bridge, by the large drain from Chintadrepett and Triplicane, skirting Chintadrepett; then, to the east, it would run along the south bank of the Cooum, and would intercept the sewage from the drains to the east of the Chintadrepett bridge. Arrived here, it would receive the sewage from the small earthenware drain proposed to run along

the south bank of the river. It would then cross the Cooum and receive all the sewage brought down by the large drain between the Penitentiary and Chintadrepett bridge, and also the sewage from the proposed earthenware drain running along the north bank of the river. From the bridge, the sewer would take a straight course along the road to the west of the People's Park. As a preliminary measure, the sewage from this sewer might be utilized on the Municipal farm, by a temporary drain connecting the sewer with the farm.

2. The portion of branch sewer, which I propose for construction, would lie between the General Hospital and Elephant Gate bridge. It would run along Wall Tax road, parallel with the course of the canal, and would intercept the numerous drains which issue from the western side of Black Town to discharge themselves into the canal. The sewage from this branch might be utilized temporarily to the north-west of Black Town where there is ground available for the purpose.

3. The earthenware pipes which have been referred to would start from above Harris' bridge, and, running along opposite banks of the Cooum, would meet the main sewer at Chintadrepett bridge.

4. There is nothing formidable in the works proposed above, and I believe them to be within the means of the Municipality. If carried out, they would be complete in themselves as an effectual preventive of the pollution of the Cooum and the canal. After some years, if a more comprehensive scheme of drainage were determined upon, these works would fit in admirably with any project which proposes to carry the sewage of Madras in a northerly direction, the absolute necessity of which, I think, nearly all Engineers will be disposed, after even a short study of the drainage question, to admit.

5. I have reason to believe that the Municipality are as fully alive as we are to the paramount importance of preventing the pollution of the Cooum and the canal, as the first step towards the amelioration of the insanitary condition of Madras; and I feel certain they will agree with us that, until this is done, it will be hopeless to expect any permanent improvement in the health of the community.

6. I have observed in the public reports of the proceedings of the Municipal Drainage Committee, that it is contemplated to utilize the sewage of each district in its immediate neighbourhood, and that this measure has been decided upon on grounds of economy. I take this opportunity to say a few words on the subject.

7. So long as the quantity of sewage brought down by each sewer continues small, there will be no difficulty in finding a sufficient extent of ground to utilize it upon. But as soon as the question of drainage is taken up systematically, and sewage works are carried out in different parts of the town, it will be found impossible to utilize the sewage in the immediate neighbourhood of the town. To judge of the quantity of sewage in the future by the quantity at present will be most fallacious. A great portion, indeed the greater portion, of the waste water in the town does not at present find its way into the sewers at all; but stands in drains, or soaks into the ground by the houses. Moreover, when the water works are carried out, and Madras, with its population of 450,000, is supplied with as much water as the inhabitants can consume, the quantity of sewage to be utilized will be out of all proportion with that now to be disposed of. Should this be the case, as I have not the least doubt in my mind that it will be, several hundreds of acres will be required by the Municipality before they will be able to render the sewage innocuous. My great anxiety, therefore, with regard to any works proposed, for the partial drainage of Madras, is that they should be designed with reference to the future; so that every work once carried out shall become ultimately an integral portion of a previously planned complete scheme. In fact that measures taken now may be effective, not only for the present, but hereafter. If sewers are laid out, with the simple object of utilizing the sewage temporarily on ground in the possession of the Municipality lying within the precincts of the thickly-inhabited parts of the town, and if the point is not consi-

dered—whether they will fit into a system hereafter—an immense deal of harm may be done, and the state of Madras, so far from being improved, may indeed become worse than what it is even now.

8. It is perfectly legitimate to assume that a town, possessing nearly half a million of inhabitants, will scarcely be able to find sufficient land within itself to utilize its sewage upon. With the fact then clearly before us, that, with a system of water supply and a system of drainage, Madras will be compelled ultimately to utilize its sewage beyond the precincts of the town, and where the Municipality will be able to get a sufficient area of ground, I think, we should draw the attention of Government to the advisability of all measures for the improvement of the Cooum and the canal, being considered prospectively.

9. With regard to the second resolution, viz., that the water in the river should be kept at as uniform and high a level as possible, I believe that, practically, the best level will be that at which you saw the river when we made our inspection of it. I will explain at what level it then stood. There is a gauge at the bar, and when the water stands at 4' 8" on this gauge, the bar is cut. Unless this is done, parts of the town become swamped. A day or two before we inspected the river, the water stood at about 3' 2"; but it had gone down a little in the interval. If we allow, say, two inches for the fall, the level of the water at the time of our inspection must have been very nearly at 3' on the gauge, i. e., about twenty inches below the level at which the bar is generally cut. It was clear to us all that no part of Madras could possibly be inconvenienced by the water being maintained at this level, and I think that, practically, such a level would answer every useful purpose. I am of opinion, therefore, that the Cooum should be kept full up to the three foot mark on the gauge at the bar. As to the means for doing this, I think the Municipality should discharge all their surplus water brought down by the channel from the Red Hill lake into the Cooum.

10. There will be many hours of the night during which no water will be used by the inhabitants. At this time, therefore, the stream might be diverted into the river. The cost of this would be very trifling. The water could first be run into the Spur tank, and then from the tank into the Cooum. Should there be an insufficiency of fresh water, and should we be compelled to fill the Cooum, from the sea, I think this could be done; but the cost would be more perhaps than the Municipality would feel themselves justified in incurring.

11. In this measure, the Municipality are quite as much interested as the Government, and I cannot conceive any objection that will be taken to my proposition; supposing, of course, that there is abundance of water in the Red Hill lake, and the supply required for the Cooum, which would be very small, does not trench upon the wants of the community.

12. The Cooum might be replenished with water from the sea; but I think you will be disposed to agree with me that fresh water would be preferable. Supposing the deficiency caused by evaporation were daily made good from the Red Hill lake, I believe the river would be free from all disagreeable smells, and that you would have no reason to complain of the position of the General Hospital.

13. With regard to the third resolution, viz., that the banks of the river immediately surrounding the Hospital and Penitentiary be so constructed that a considerable depth of water be maintained near the margin, I do not anticipate any difficulty in carrying out the idea. As it is, even now when the water stands at the three foot mark on the gauge, there is a fair depth near the margin of the river, and there is nothing like a swamp to be found anywhere. Of course, torevet the banks with stone or laterite would, beyond doubt, be the best plan; but such a work would entail a great deal of expense, and is really, in my opinion, unnecessary.

14. If the banks are sloped abruptly to the water's edge, and turfed with *hurriulu* grass, and if a thick low hedge is planted at the top, little else will be required.

MADRAS,
26th January 1870.

(Signed) H. TULLOCH, Captain,
Royal Engineers.

No. 55.

ORDER THEREON, 10th March 1870, No. 293.

In the above letter the Sanitary Commissioner forwards the Report of the Committee that was formed under the orders of Government, dated 19th August 1869, No. 1170, to report on the best means of improving the sanitary condition of the Cooum river during seasons of drought.

2. The Committee consisted of Captain Tulloch, the Acting Sanitary Commissioner, Dr. Mackenzie, and Dr. George Smith; and as Dr. Ranking joined his office before the Committee had completed their duty, he was added to their number, and the services of Captain Tulloch were retained. A separate memorandum by Captain Tulloch accompanies the report.

3. The recommendations of the Committee, as summarized by Dr. Ranking, consist of the adoption of measures for the interception of the sewage now flowing into the river;

2nd.—For the maintenance of the water at the present height; and

3rd.—For the re-construction of the banks of the river at the General Hospital and Penitentiary, so that they may slope directly into deep water, including measures to prevent the access of people to the banks.

4. Regarding the first measure, Captain Tulloch considers that there are no Engineering difficulties to prevent giving effect to the wishes of the Committee, and that the cost of the required works will not be beyond the resources of the Municipality. He considers that they should form part of the general scheme which he has proposed for the drainage of the Town of Madras northwards, and that nothing in the way of desultory effort at improvement should be permitted which will not fit into the general design for the ulterior drainage of Madras. In the importance of this consideration the Government concur, and trust that it will not be lost sight of in any works that may be carried out by the Municipality.

5. Captain Tulloch will be requested to frame a rough estimate of the cost of diverting the drainage from the Cooum, as proposed by the Committee. It will then be seen whether it can be done by the Madras Municipality unaided.

6. With a view to future requirements, Captain Tulloch, with the assistance of the Collector of the Madras District, will select and map out the tracts of land which will hereafter be required for the useful application of the increased town sewage. It seems very important that these tracts should be secured without delay. A report describing in whose possession the tracts of land now are, and the probable cost of securing it, will also be submitted to Government.

7. With regard to the proposal to maintain the water in the river at a certain height, which it has been suggested may be effected either by letting in the surplus fresh water from the Red Hill tank, when the Madras Water Project is completed, or by raising the level of the water from the sea, though how this is to be effected has not been explained, the Government concur with Dr. Ranking that, in a sanitary point of view, fresh water appears far more advisable for the purpose, and Dr. Ranking's remarks in paragraph 12 deserve serious consideration. Any project

for introducing sea water into the Cooum would appear on this ground to be objectionable.

8. The proposals of the Committee on the above two subjects intercepting the sewage from, and raising the level of the water in, the Cooum will be referred for the consideration of the Madras Municipality, who have already expressed their wish to reform the evils complained of, and to co-operate with the Committee whose report is now under consideration.

9. The third proposal for improving the banks of the river in the vicinity of the General Hospital and Penitentiary appears capable of being carried out at a very moderate outlay, and will consequently be referred for consideration in the Public Works Department. No expensive scheme is necessary for the required purpose, no masonry works or revetments are wanted, and it is only required to scarp the banks abruptly to the water's edge, to turf them with hurrialu grass, and plant a low hedge at the top, as described in the closing paragraph of Captain Tulloch's report.

(True Extract.)

R. S. ELLIS,
Chief Secretary.

To the Sanitary Commissioner for Madras.

„ President of the Madras Municipal Commission.

„ Public Works Department.

To Captain H. Tulloch, R.E.

To the Inspector-General of the Indian Medical Department.

„ Collector of the Madras District.

Memorandum
by Captain H. J. J. J. J.

There would be no engineering difficulties in giving effect to the wishes of the Committee. Regarding the first Resolution, vizt, that all sewage may be intercepted from entering the Cooum and the Canal, what I would propose is this: To carry out a small portion of my project for the drainage of Madras, placing the sewers, for the sake of economy, not quite so deep below the surface as they were originally intended to be put. The work would consist of a portion of the main sewer, a portion of one branch sewer and two earthenware drains. The portion of the main sewer would be that between the proposed park at Chintadripett and the north-west end of the Poplar park. This sewer would, in the first place, intercept all the sewage - which is at present discharged into the Cooum near the Government House bridge, by the large drain from Chintadripett and Triplicane. Thence, Chintadripett, then, to the East, it would run along the south bank of the Cooum and would intercept the sewage from the drains to the East of the Chintadripett bridge. Arrived here, it would receive the sewage from the small earthenware drain proposed to run along the south bank of the river. It would then cross the Cooum and receive all the sewage brought down by the large drain between the Prastitany and Chintadripett bridge and also the sewage from the proposed earthenware drain running along the north bank of the river. From the bridge, the sewer would take a straight course along the

road to

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PUBLIC.

To

THE SANITARY COMMISSIONER
FOR MADRAS
&c., &c., &c.

Dated March 10th.

Recd.

Encl.

G. O., 10th March 1870, No. 293.

MARCH
Nos. 54-55.

Passing orders on the report submitted by the Committee appointed to consider the best means of improving the sanitary condition of the Cooum river during seasons of drought.

road to the west of the People's park. As a preliminary measure, the sewage from this river might be utilized on the Municipal farm, by a temporary drain connecting the river with the farm.

The portion of branch sewer, which I propose for construction, would lie between the General Hospital and Elephant Gate bridge. It would run along Wall Tax Road, parallel with the course of the Canal and would intercept the numerous drains which issue from the western side of Black Town to discharge themselves into the Canal. The sewage from this branch might be utilized temporarily to the northward of Black Town where there is ground available for the purpose.

The earthenware pipes which have been referred to would start from above Harris' bridge, and, running along opposite banks of the Cooum, would meet the main sewer at Chintadripett bridge.

There is nothing formidable in the works proposed above, and I believe them to be within the means of the Municipality. If carried out, they would be complete in themselves as an effectual preventive of the pollution of the Cooum and the Canal. After some years, if a more comprehensive scheme of drainage were determined upon, these works would fit in admirably with any project which proposes to carry the sewage of Madras in a northerly direction, the absolute necessity of which I think nearly all Engineers will be disposed, after even a short study of the drainage question, to admit.

I have reason to believe that the Municipality are as fully alive as we are to the paramount importance of preventing the pollution of the Cooum

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and the Canal, as the first step towards the amelioration of the insalubrious condition of Madras; and I feel certain they will agree with us, that until this is done, it will be hopeless to expect any permanent improvement in the health of the Community.

I have observed in the public reports of the proceedings of the Municipal Drainage Committee, that it is contemplated to utilize the sewage of each district in its immediate neighbourhood, and that this measure has been decided upon on grounds of economy. I take this opportunity to say a few words on the subject:-

So long as the quantity of sewage brought down by each sewer continues small, there will be no difficulty in finding a sufficient extent of ground to utilize it upon. But as soon as the question of drainage is taken up systematically, and sewage works are carried out in different parts of the Town, it will be found impossible to utilize the sewage in the immediate neighbourhood of the town. To judge of the quantity of sewage in the future by the quantity at present, will be most fallacious. A great portion, indeed the greater portion, of the waste water in the town does not at present find its way into the sewers at all; but stands in drains, or soaks into the ground by the houses. Moreover, when the water works are carried out, and Madras, with its population of 450,000 is supplied with as much water as the inhabitants can consume, the quantity of sewage to be utilized will be out of all proportion with that now to be disposed of. Should this be the case, as I have not the least doubt in my mind that it will be, several hundreds of acres will be required by the Municipality before they will be able

to do so.

to render the sewage innoxious. My great anxiety, therefore, with regard to any works proposed, for the partial drainage of Madras, is that they should be designed, with reference to the future; so that every work once carried out shall become ultimately an integral portion of a previously planned complete scheme. In fact that measures taken now may be effective, not only for the present but hereafter. If drains are laid out, with the simple object of utilizing the sewage temporarily on ground in the possession of the Municipality, lying within the precincts of the thickly inhabited parts of the town, and if the point is not considered - whether they will fit into a system hereafter - an immense deal of harm may be done, and the state of Madras, so far from being improved, may indeed become worse than what it is now.

It is perfectly legitimate to assume that a town, possessing nearly half a million of inhabitants, will scarcely be able to find sufficient land within itself to utilize its sewage upon. With the fact then clearly before us, that, with a system of water supply and a system of drainage, Madras will be compelled ultimately to utilize its sewage beyond the precincts of the town and where the Municipality will be unable to get a sufficient area of ground, I think we should draw the attention of Government to the advisability of all measures for the improvement of the Cooum and the Canal, being considered prospectively -

With regard to the Second Resolution; viz, that the water in the river should be kept at as uniform and high a level as possible, I believe that practically, the best level will be that at which you saw the river when we made our inspection of it. I will explain at what level

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what level it then stood. There is a gauge at the bar, and when the water stands at 4' 8" on this gauge, the bar is cut. Unless this is done, parts of the town become swamped. A day or two before we inspected the river, the water stood at about 3' 2"; but it had gone down a little in the interval. If we allow, say, 2 inches for the fall, the level of the water at the time of our inspection, must have been very nearly at 3' on the gauge - i.e. about 20 inches below the level at which the bar is generally cut. It was clear to me, at that time, that no part of Madras could possibly be inconvenienced by the water being maintained at this level, and I think that, practically, such a level would answer every useful purpose. I am of opinion, therefore, that the Cooum should be kept full up to the 3-foot mark on the gauge at the bar. As to the means for doing this, I think the Municipality should discharge all their surplus water brought down by the channel from the Red Hill Lake into the Cooum.

There will be many hours of the night during which no water will be used by the inhabitants. At this time therefore, the stream might be diverted into the river. The cost of this would be very trifling. The water could first be run into the Spur Tank and then from the Tank into the Cooum. Should there be an insufficiency of fresh water, and should we be compelled to fill the Cooum from the sea, I think this could be done; but the cost would be more, perhaps than the Municipality would feel themselves justified in incurring.

In this measure, the Municipality are quite as much interested as the Government, and I cannot see any objection that will be taken to my proposition; I am, of course, that there is a certain amount of

17.

the Red Hill Lake and the supply required for the
Pool, which would be very small, does not turn out
upon the wants of the community.

The Pool might be replenished with
water from the sea; but I think you will be disposed
to agree with me, that fresh water would be preferable.
Supposing the deficiency caused by evaporation were
daily made good from the Red Hill Lake, I believe
the river would be free from all disagreeable smells
and that you would have no reason to complain of
the position of the General Hospital.

With regard to the third Resolution; viz.
that the banks of the river immediately surrounding
the Hospital and Prison be so constructed that a
considerable depth of water be maintained near the
margin, I do not anticipate any difficulty in carrying
out the idea. As it is, even now when the water stands
at the 3 foot mark on the gauge, there is a fair depth
near the margin of the river, and there is nothing like
a swamp to be found anywhere. Of course to revet the
banks with stone or laterite would, beyond doubt, be
the best plan; but such a work would entail a great
deal of expense and is really, in my opinion, unnecessary.

If the banks are sloped abruptly to the water's
edge, and turfed with hurriata grass, and if a thick
low hedge is planted at the top, little else will be re-
quired.

Madras
26th January 1870

Signed H. Tulloch
Capt. Royal Engs.

(True Copy)

S. Murray
Secretary Commissioner
for Madras

No. 188

Office of Sanitary Commissioner
+ 19
Madras 18th February 1870.

From, The Sanitary Commissioner
for Madras.

To, The Chief Secretary to Government,
Public Department,
Fort Saint George.

G.
Sir,

On the 19th of August the Government submitted to the then acting Sanitary Commissioner a correspondence regarding the insanitary influence exerted by the river Cooum upon the inmates of the General Hospital directing him in communication with the Inspector General of the Indian Medical Department and the Physician of the General Hospital to prepare a report "on the best means of alleviating the evils arising from the said river during seasons of drought."

2. The subject had not been disposed of when I resumed the duties of my office, and as it involved questions and measures which required the co-operation of an Engineer Officer, it will

In Pub: 234 of 1870.

resolution. He proposes to carry out a portion, (and this a very important portion in as much as that it is precisely that which touches the question at issue, the interception of all sewage now entering the Coomoo) of his general scheme of sewerage of the city. The work he states will consist of a portion of the main sewer, a part of one branch sewer, and two earthenware drains and branch sewers, and the districts they are destined to drain are fully described in the Memorandum to which I would beg to refer.

It may be noted that Captain Fulloch pronounces that there is nothing formidable in the works proposed and believes them to be within the means of the Municipality.

There is no question that without works of this nature the Coomoo can never be reclaimed, and costly as they may be, it is necessary to take them on hand as the first measure necessary to the object in view.

6. The great recommendation to the scheme is that we have Captain Fulloch's assurance that the works would fit in admirably with any project which proposes to carry the sewage of the whole city in a northerly direction, a measure the absolute necessity of which he thinks any Engineer after even a short study of the drainage

question must admit.

7. In connection with this subject, the general drainage of the city, Captain Fulloch in his Memorandum refers to an intention of the Municipality to utilize the sewage of each district in its immediate neighborhood.

I had myself expressed an opinion favourable to this project as a measure of economy and likely to save the municipality the great cost of Captain Fulloch's larger scheme. But it will be seen that Captain Fulloch advances that while at present the amount of sewage is not so large that it may not be thus utilized on limited areas; eventually when the water supply scheme is matured, the amount of waste waters and sewage will be so increased that such limited areas will not suffice for its consumption and that it will be necessary to provide "several hundreds of acres". It is necessary therefore in the interim to select localities, so situated in regard to the general levels that every work once carried out may eventually become an integral portion of a general drainage plan for the whole city. This suggestion is a most important one and should not be lost sight of.

8. The 2nd. resolution arrived at is that the water in the river should be kept at as

uniform

uniform and high a level as possible. Captain Fulloch also thinks this quite practicable. He proposes to maintain the water at about the same level as it stood on the day we went over the river, viz. at 3' in the gauge at the bar. We all concurred in the view that if the bed of the river could be kept covered to this depth the object would be met.

9. Captain Fulloch proposes that the Municipality, on completion of the water project, should discharge the surplus water brought down by the Channel from the Red Hill lake into the Coomur. He considers that there will be many hours of the night during which no water will be used by the people, and proposes that the stream ~~the~~ these hours directed into the Coomur, and advances that the cost would be very trifling.

This is a question that will have to be carefully considered. It is not quite certain that there will be such a surplus of water as will suffice ^{to supply} the daily evaporation from the surface of the Coomur when kept full to 3 feet above the gauge at the bar. This is however so purely a technical question for the decision of the Department of Public Works, that I do not enlarge upon it.

10. In the event of there being an insufficiency of fresh water derived from the source just referred to, Captain Fulloch considers that

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it would be possible to fill the Coomur to the depth indicated from the sea.

The precise way in which this is to be effected is not stated. He discussed generally the different measures that have been suggested, but it is not considered necessary or advisable to enter into the discussion here. In stating the broad measures that are considered necessary as embodied in the resolutions, the sanitary part of the enquiry is complied with. The measures necessary to give effect to these recommendations are entirely within the province of the Department of Public Works.

11. In connection with this subject I think it advisable to submit for consideration extracts from a communication recently received from Mr. G. H. Faulkner an Engineer in the Irrigation Department at Outback in which he refers to a project he suggested some years ago for keeping the Coomur always full, and which he appears to have submitted for the consideration of His Excellency the Governor. I am not competent to judge the merits of this scheme, nor of the adaptability of the works he has carried out in the Mahameddy to the case of the Coomur. I therefore content myself with submitting Mr. Faulkner's remarks for the consideration

of the advisers of Government in the Department of Public Works. He writes as follows: —

"I have at work here in the centre of the Maha"-
"muddy amicut a system which I proposed for
"the Coornu and which answers to perfection. It
"has cost 80 Rupees per running foot and I have
"500 feet in operation — total cost 40,000 Rupees."

"I have just finished a long descriptive
"report illustrated with drawings for the
"Governor"

"It would save cutting the Coornu bar"
"every year and keep up deep water to, or beyond"
"the Commander-in-Chief's Bridge and be no"
"obstruction to the fresher. At this present moment
"we have an opening 500 feet wide in the Maha"-
"muddy amicut, level with the bed of the river —"
"in 2 hours I can close the whole, have water 9 ft"
"deep and if necessary in $\frac{1}{2}$ an hour have again"
"the full discharge."

12. In regard to the sanitary aspect of
the question of the admission of sea or fresh water,
it is advisable that fresh water be secured if
possible. The admixture of salt and fresh water
is generally held to tend to a larger development
of malaria; but this applies more especially to
marshes, and the Coornu cannot be considered a

marsh.

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But although the admixture of sea water
may not give rise to malarious exhalations, it
undoubtedly causes the development of much
sulphuretted hydrogen gas, and it is this gas
that renders the Coornu so unsavoury. This gas
is not exhaled so long as tidal influence is felt.
At the time I write for instance, the river is not
unusually foul; but when the bar is closed and
the waters stagnate decomposition rapidly goes on.

13. In regard to the 3rd. resolution "that the
banks of the river immediately surrounding the
General Hospital and Penitentiary be so constructed
that a considerable depth of water be maintained
at the margin"; there is no engineering difficulty
in carrying it out, in any one of the ways that have
been proposed; either by a wall as proposed by
Dr. Duff (though this, it is apprehended, will be
very costly, much more so than Dr. Duff appears
to anticipate) or by a stone revetment, or simply
by scarping the banks and planting a hedge.
The question is one entirely of cost. The latter will
be the less costly, and meet the object in view.

14. It will be necessary, however, to adopt
some means of keeping people off the banks who
now use them, especially when the river is low,
at places d'aisance. This could be effected by
running a wall or string of poles at each end

of the compounds someway into the bed of the river. This provision will however only be of use if the river can be kept full up to the depth indicated by Captain Fullock.

15. We duly considered the proposition made by Dr. George Smith in his communication of the 30th July 1867 No. 140, that the river and canal should be deepened by dredging under water and the bed of the river itself narrowed; but on discussing the practicability of the measure it was unanimously agreed that it would entail such an enormous cost as to be quite out of the question.

16. The practicability of filling the river by the double siphons suggested by Dr. Duff ~~the~~ the bridge near the bar was also discussed. Captain Fullock satisfied us that the scheme was not so 'simple' as it may at first sight appear to a non-professional mind.

17. The consideration of this and all other measures calculated to attain the desired end must be left for consideration in the Public Works Department.

The scope of the enquiry in the Sanitary department is limited to general principles and these are embodied in the resolutions given, and comprise:-

i. Interception of the sewage now flowing

into the river.

ii. Maintenance of the water at an uniform depth.

iii. Reconstruction of the banks of the river at the General Hospital and Penitentiary, so that they may slope directly into deep water and lastly— The adoption of measures to prevent the access of people to the banks themselves.

I have the honor to be

Yours most obedient servant

J. Murray
Sanitary Commissioner for
Madras.

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Paid 15th 1870
 From, Treasurer's Office
 The County Commissioner
 for Roads

To The Chief Secretary
 to Government
 Public Department
 Secret. Genl.

Dated 16th Dec
 Recd 17th February 1870

No 234 No. 188

Enclosure 1.0
 In the Report called for
 on the last means of alleviating
 the evils arising from the
 Cornu river during season
 of draught.

24/2/70
 24/3/70
 54

Public Department

PROCEEDINGS of the MADRAS GOVERNMENT.

Read the following letter from the
Sanitary Commissioner
for Madras.
186. 16th Feb. 1870, No 189

Order them 10th March
February 1870, No 243

In the above letter
the Sanitary Commissioner
forwards the Report of the
Committee that was formed
under the orders of Govern-
ment dated 19th August
1869, to report on the best
means of improving
the sanitary condition of
the Cooum river, during
seasons of drought.

2. The Committee
consisted of Capt. D. S. S. S.
acting Sanitary Com-
missioner, Dr. S. S. S.
and Dr. S. S. S.
and as Dr. S. S. S.
joined

joined his office before
the Committee had
completed their duty,
he was added to their
number, and the services
of Capt. Tulloch were
retained. A separate
memo. by Captain Tulloch
accompanies the report.

3. The recommen-
dations of the Committee,
as summarized by Dr.
Ranking, consist of the
adoption of measures
for the interception of
the sewage now flowing
into the river;

2^d for the maintenance
of the water at the present
height;

and 3^d for the recon-
struction of the banks
of the river at the General
Hospital and Penitentiary
so that they may slope
directly into deep water,
including measures to
prevent the access of
people

I think that Captain
Tulloch should be requested
to frame a rough estimate
of the cost of diverting
the drainage from the Coom
as proposed by the Committee.

It will then be seen whether
it can be done by the Madras
Municipality unaided.

I also think that with a view
to future requirements Captain
Tulloch with the assistance of
the Collector of the Madras District
should be directed to select
a map out the parts of land
which will hereafter be required

of people at the banks.
4. Regarding the
first measure, Capt.
Tulloch considers that
there are no engineering
difficulties to prevent
giving effect to the
wishes of the Committee,
and that the cost
of the required works
will not be beyond the

resources of the Munici-
pality. We consider
that they should form
part of the general scheme
which he has proposed
for the drainage of the
Town of Madras north-
wards, and that nothing
in the way of devoting
effort at improvements
should be permitted
which will not fit into
the general design for
the ulterior drainage
of Madras. In the
importance of these
consideration the Govt.
consent

whose report is now
under consideration

7 The third proposal
for improving the
banks of the river in
the vicinity of the
General Hospital &
Penitentiary, appears
capable of being carried
out at a very moderate
outlay, and will con-
sequently be referred
for consideration in
the P. W. Department.

The expensive scheme
is necessary for the
required purpose,
no masonry works or
revetments are wanted,
and it is only required
to clear the banks ab-
solutely to the water edge
to keep them with the
river grass and plant
a low hedge at the top
described

Agree

described in the closing
para of Captain Sully's
report.

To the Sanitary Commr for Madras
— President Madras Sanitary Commr
— P. W. Department
— Capt. Sully & Co. A. E.
— Super. Gen. & Co. A. E. Dept.
— Collector of the Mad. Dist.

disptd 15/3

Box of 18 3 Quadr

To Public
of the County managers
for

Dated March 10 } 1870, No.
Recd. } 29.

Ms. 54. 55

Having ordered on the Report
submitted by the Committee,
appointed to consider the
best means of improving the
military condition of the
Army, during the course
of thought.