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MADRAS RECORD OFFICE

Government of Madras

Public Works DEPARTMENT

G.O. No.	2138	Press
B.P. No.		Mis.
4446448		
Dated	24-8	1893

Not to be folded or roughly handled

No.

Inspecting Engineer Office for
Ports and Communications
Canton 600 in
12th July 1873.

From

Lieut. Colonel W. A. C. Lawrence

Inspecting Engineer for
Ports & Communications

To

Colonel G. W. Walker R.E.

Secretary to Government

Public Works Department

Cantonment.

per

With reference to L.O. No. 1323

Enclosures:-

- 1. Location of Survey marked A
- 1. Survey marked B
- 1. Location of Survey marked C
- 1. Survey marked D
- 1. Attachment marked E

dated 13th of May 1873. I have the honor
to report that the District Engineer of
Malabar having furnished me with a
copy of his letter printed with the L.O.
above quoted, which reached me on my
return to Madras from the East Coast
on the 5th of May. Left Madras
on the 12th of the same month en route
for Cochin to satisfy myself by personal
inspection

By this E is
received in the
12-1873

inspection of the actual condition of the work there.

2. On my arrival I received the L.O. above referred to and immediately communicated with the Officiating District Engineer of Malabar requesting his early presence at Cochin, in the meantime, after a careful inspection of the work, knowing that the sand bags could not be relied upon to last for more than three or four months at the outside, and that there was therefore no time to be lost, I took upon myself the responsibility of at once commencing the dam across the Coora Milagrie Gap, the advisability of which proceeding, the Officiating District Engineer, after inspection of the work, fully concurred in.

3. To give a correct idea of the Coora Milagrie Gap which remained to be placed, it is necessary that I should give

2
give a short resume of all that has transpired on the subject, its original size, its gradual reduction in width, sectional area of discharge &c. &c.

4. In 1840 an estimate prepared under the direction of the Secretary to Government was sanctioned by Government for closing the Gap with a masonry dam, as fully described by Mr. Robertson in his report on Indian Harbours. The materials were prepared for the work, which Government subsequently directed should be held in abeyance until reported on by the Harbour Engineer, so the person passed without anything being done. In February 1841, Mr. Robertson C.E. the Harbour Engineer, in my company, inspected the Gap. its width then at low water of springs was said to be 42 feet and its deepest point 24 feet, while at high water of springs it was 84 feet broad and 30 feet deep in the deepest

deeper portion, in the first place its sectional area was 5779 square feet, and in the latter 8143 square feet; this section however was taken by Mr. Assistant Engineer Grimes in the month of February when the mouths of most of the Western Coast Rivers are filled in by the sea, which frequently closes some of them altogether; sections previously and subsequently taken show, though no greater depth i.e. not below the blue clay or 20 feet, a great increase in sectional area, the width and average depth fluctuating considerably, thus, in 1869 it was reported to be 900 feet in width and again in the same year 820, but now, it is found on actual measurement taken after the completion of the dam, that the Gap, which in my report furnished with G. O. No. 1452 dated 24th of July 1872, was noted as 415 feet in



in width as shown in the Sketch Survey furnished to me was actually at that time 511 feet. In Mr. Robertson's report he noted that when he visited Cochui the depth of water on the bar outside the Gap (described by him as a "pothole") was only two feet, and therefore, he argued, the escape of water at the Gap had comparatively a trivial effect on the main outlet at Cochui, he added however, "matters might get much worse", which, I will presently show, has really taken place. Mr. Robertson recommended before any attempt at actual closing the Gap by a dam of sand bags riveted with stone, should be made, that the materials collected for the nodnacil dam, which he condemned, should be used in the construction of a grout or training wall to the north East of the Gap to shallow it; the work was sanctioned and.

and about 100 feet of the groyne completed
and washed away by the first fresh in
the river. A stone groyne was then pro-
posed and sanctioned and at an
expenditure of Rs 24,601 was completed
to 230 feet in length in May 1842, in-
cluding the 30 feet of the groyne built
on the existing shore; the effect of this
stone groyne was to throw out a spit
of sand behind it one fourth longer
than its own length gaining an extensive
width of beach; up to a certain point
this groyne acted so well that it was
thought it would, by being increased
in length, so deflect the current as to
allow of sand being deposited in the
same ratio as at first, and finally re-
duce the Gap to such small dimensions
as to render its being closed an easy
task. A report on the subject was sub-
mitted to Government on the 2nd of
May and Government approved of
the project. In the middle of April 1842,
suddenly

suddenly, as reported in my letter printed
with G. O. No 1457 of the 24th of July,
the groyne ceased to act as desired. The
perimeter of the Gap was at once lined
to secure it from cutting, and the beach
was well protected and the work post-
poned for another season. Observing the
effect of a small temporary sand
bag groyne, placed at the end of the
spit of sand gained by the stone groyne,
to secure and protect it from erosion,
to be exactly similar to that produced
by the stone groyne, I designed and
submitted the project for closing the
Gap by a system of ^{sand bag} groyne en echelon;
the portion remaining open after
the construction of the groyne being
closed by a sand bag dam in the
mode in which the work has now
been effected. And Government in
G. O. No 1457 dated 24th July 1842
sanctioned the sum of Rs. 15,244 made
available for the old design being
spent

Spent on the new one, the insufficiency of which, now being entirely due to the altered condition of the work as herein reported; though I felt very confident of the success of this project, I was particular to call it an experimental one, and indeed, the whole work has been so treated from the very first. I will here remark that this project premised that the Gap was simply a "pot hole", that no change had taken place on the bar outside, and that the perimeter of the Gap should be properly protected and maintained; this latter point, however, has been lost sight of, and now I find, that in addition to the water which flowed seawards spreading over shallower depths of great extent, two bars of 4 and 6 feet in depth at low water and 12 and 14



5
at high tide respectively, quite 300 feet each in length, have apparently existed for some time past. I clearly see the cause of its failure. viz that instead of dealing with what was termed a "pot hole" we were, in fact, actually closing the mouth of a great river. I regret I am unable to give anything like the correct discharge of the ebb flow through the Gap as owing to freshes in the backwater and a variety of other causes the observations taken differ so considerably that I believe, none can be sufficiently relied upon to allow of the correct discharge being computed. The District Engineer of Malabar has, in his letter printed with the G. O. under reply, shown the mode in which the work was carried out, namely by the plan proposed by me with the addition of returns or indeed double returns or regular sand traps, a system forced on the Executive Officer by the failure

failure of that designed by me; had the necessity of constructing these returns been reported to me, I would have at once recommended the course, which has now been adopted, to have been followed, however, with the exception of the stone groyne, which, if constructed of sand bags, would have been just as effective and much cheaper, all these works have, in my opinion, assisted much towards the success of the work in the end; they have given a well protected base to start from, and have proved by their stability, that sand bags can really be relied upon. The state of the work on my arrival was as follows. No. 1 sand bag groyne and return had been completed, No. 2 groyne was also completed and the return was in hand and this was completed in about ten days; the depth of water at low spring tide was $25\frac{1}{2}$ feet

6
feet at high water $28\frac{1}{2}$ feet, the section of the remaining Gap of 293 feet in width having proportionately thereto considerably increased since I saw it in December, and the current at full ebb and flood very violent. The sections enclosed marked A show the changes in sectional area of the Gap on the dates noted thereon.

5 Having so far given the history and condition of the work up to the 20th of May 1843, on that day, in the manner ordered in G. O. No. 1323 dated the 13th May 1843, I directed the sand bag dam to be commenced, and feeling that it was improper to throw the heavy responsibility of so hazardous, onerous, and troublesome a work on the Range Officer, I remained with him to advise and direct him throughout its construction. The work has been one that has tested the perseverance and

and diligence of the Range Officer and his Overseer to the utmost. I cannot too much praise Mr. Assistant Engineer James James for the great energy, good temper and great tact he has shown in managing the troublesome work people he has throughout had to deal with, in which his Overseer, Nedamotto, has done his best to assist him.

The dam was finished a few feet above low tide level, at which height it was left for some little time to allow of its settling, and when it appeared to have thoroughly consolidated it was raised to spring tide level, in which state, I propose it should be left for the present. The dam is not perfectly water tight, this is due to some percolation taking place at the southern end where stones were thrown

known in to protect that point from rising. measures are being taken to stop these leaks, a slight flow takes place through the interstices of the sand bags at several points about 4 feet below low tide level when there is a head in the backwater, these leaks also are being gradually discovered and stopped. none are of any consequence and once the sand commences to rise against the dam, as has been the case with the groynes, all leaks will cease. I do not at present recommend that the dam be protected by a rough stone revetment inside the backwater, as I am in hopes that from its position at least 8 or 9 feet of clay will probably in a short space of time, fill in in front of it, on the backwater side, and then its toe will here be well secured. Above this, till a good sand bank has formed seaward, I would simply add fresh sand bags where required to

to protect the contents of the old bags,
to when they commence to rot from the
to action of the inner current, and eventually
to when a broad beach is secured seawards,
to it will be only necessary torevet with
to small stones the portion of the dam
to inside between high and low tides,
to while outside a groyne will have to be
to constructed to hold the newly formed
to beach from erosion at the point marked
to Q on the survey marked B.

to At present the alteration sea-
to ward of the dam is very marked, one
to bar has closed, the other is reduced
to a foot in depth and very much in width
to and the sand in front of, and north of
to the dam, is gradually moving towards
to and filling the hole in front of it.
to I calculate, that the front of the dam
to will be filled straight across in about
to fifty or sixty days; the only contemp,

I fear, being that the beach may form
on its old line, and thus leave the dam
in a hole, which would take a long time
to fill in, and necessitate the dam being
strengthened seawards, and revetted
with stone to protect it from wave action.

The enclosed survey marked B gives
a plan of the work, the depth seawards
of the Gap just after it was closed
and the hatched portion shows how
the sand has already collected and
is moving inwards. The sections marked
to show the dam as it now is, immediately
after the dam was completed some
tendency at erosion of the shore at
the point marked AA north of the
dam was observed, as the beach between
the backwater and sea here is very
narrow, this has been closely watched;
however, the cutting threatened has,
I am glad to say, ceased and the sea

in front is gradually shallowing, so much so, that I hope it will all fill in between the spit of sand marked R to groynes P, but this will take time.

8 The mere closing of the Cruz Milagie Gap, which has for so many years deprived the main outlet at Cochin of a vast amount of its scouring force on the bar at the entrance of the Harbour, can, I fear, have but little effect in restoring the Harbour even to its former condition, and therefore, it is still necessary to provide the outlet at Cochin with the training walls recommended by Mr. Robertson, which, in addition to directing the ebb current on the bar and deepening it, will, it is hoped, tend to protect a great length of the shore from encroachment by the sea.

9 Though the trade of Cochin may never increase to such an extent,



as to render remunerative the heavy outlay necessary for improving and maintaining its beautiful Harbour by the construction of these training walls, deepening of its present shallow bar &c &c. yet its importance, as a Harbour of refuge alone, is sufficient to justify the expenditure contemplated, which will doubtless extend its capabilities as such, and thus, it might fairly be considered an Imperial work of great utility, and the cost of the Harbour and protective works in British Territory met from Imperial funds; I must, however, bring to the notice of Government the alarming condition of the coast for several miles, north and south of Cochin, which, in my opinion, is so great, that until some general system for its preservation has been decided on,

and adopted, it would be futile to spend any more money on the Harbour of Cochin. For many years past, the sea has steadily continued to advance inland. Since last year, from 50 to 60 feet of gardens north of the Cruz Milagie dam have been swept away, and the sea, for fully a mile, has overtopped the crest of the beach left, and flowed into or towards the backwater to the imminent risk of several huge gaps, irrespective of the danger to the existence of Cochin as a harbour, the ruin thus caused to the people is very lamentable, and is the more to be deplored, since, had the Cochin Government adopted the remedy suggested and constructed groynes, the coast like that south of the dams protected, would have been saved; if matters are allowed to remain as they are, I believe, in two or three years at the latest, we may expect

10
expect to see the whole strip of coast between the sea and the backwater north of the Cruz Milagie dam to Varrakal swept away, and the sea flooding the country in all directions. 10. South of the town of Cochin, (from Sleppy to Undavally, twenty miles north of it, in the Travancore State, and fifteen miles north of Undavally in the Cochin State to Cochin), I understand from the people, great encroachments have also been made by the sea. I walked some distance down the coast in the Cochin State, and found the shore strewn with fallen coconut trees, and that the sea had overflowed the low crest of the beach frequently, and here also there is every reason to fear breaches into the backwater. It is admitted that to preserve the Harbour of Cochin it is indispensable, that the strength of the

ebb

the current, flowing through its entrance
and scouring its bar, should be secured
to the utmost, and this can only be
effected by maintaining free from other
obstacles the magnificent tidal basins
in its vicinity; the imminent danger
to these tidal basins by encroachments
of the sea, is now such as to render
it imperative, that protective mea-
-sures be at once taken in hand to
arrest them, and these involve the
protection of a long line of coast
apparently at a greater outlay, than
the mere preservation of a seaport
would seem to demand; but, let
alone the misery caused by the destruction
of numerous homesteads, when the
value of the land and property now
annually engulfed by the sea be
taken into consideration, and that
once the sea destroys the outer line of
coast



coast which it is rapidly accomplishing,
and breaks headlong into these backwaters,
one of which may certainly be likened
to an inland sea. There is no reason
why further encroachments, on what
will then become the seashore, should
not continue and the sea finally take
possession of the whole of the low-lying
lands in its vicinity, destroying all before
it, and thus, the question becomes one, not
simply of the preservation of a port,
but that of large and valuable Districts,
and the absolute necessity of early action
in securing the strip of coast between the
backwaters, and the sea becomes more
and more apparent.

11. The mode in which coasts, as a
rule, are protected from erosion namely
by groynes placed according to the
length determined for them at certain
fixed distances apart at right angles
to the shore, would, for so great a length
of

of coast as that under notice, doubtless
cost a vast amount of money; but I
think, that at first, at all events, it
would be quite sufficient if groups of
groynes, each group consisting say, of
3 or 4, 5 or 6 groynes of 200 feet in
length be placed at all the weakest points
of the strip of land between the sea
and the backwaters, I believe, if this system
be carefully carried out, that the shore
between these groups of groynes, when not
more than a mile or two apart, will
again reform and be held by the
groynes; they would anyhow immediately
secure the weak points, and if not
acting quite to the greater extent hoped
for, would in no way enhance the
cost of the work required. While if they
do succeed, the economy effected by this
arrangement is unquestionable. In
constructing these groups of groynes, I
consider it very essential that each group
should be built simultaneously at first
only

only to a length of 100 feet and eventually,
if found requisite, continued to 200 feet.
12 The groynes constructed by this
Department at Cochin have, with the
exceptions noted below, turned out most
effective; groynes A and B, side survey
marked D. herewith forwarded,
south of Cochin, have been a good
deal knocked about by the heavy
sea that has troubled a good part of them
and require to be repaired, they have held
the beach between them very fairly, but
beyond groyne A, to the top to its point
in British Territory, the beach gained
last year has been a good deal cut
away; until, however, some regular
system for the general protection of
the coast is decided on, I cannot re-
commend anything further be done,
when the general project is taken up,
should the construction of the training
wall south of the Harbour not be
sufficient to protect this point, a group
of

of 2 or 3 groynes opposite the top in British Territory should be constructed; a portion of groyne C has sunk and most of the groynes require slight repairs, for which an annual maintenance grant of one rupee per running foot of groyne should, I think, be sanctioned for at least 2 or 3 years till all have thoroughly settled and consolidated.

13. The sea still continues to attack the shore between groynes G. L¹ L² at Texen point, the main groyne G, not being at right angles with the shore, is little more than a training wall and does not shelter the shore to the north of it, in the same way, as the other groynes; a back wash from the strong ebb current passing out of the mouth of the Harbour runs round the point of this groyne and dashes with considerable violence on the beach between it and the two L¹ L² groynes; at flood tide again when the wind is from the north



13
with west, a tremendous sea is caught in the reentering angle formed by groyne G with the shore, so until the main training wall here is constructed, part of the beach between these groynes must be protected by a heavy rough stone sea wall, hitherto stone pitching has been used but this is unable to resist the violence of the waves, it will however form a good foundation for the wall now recommended, the whole of the material used in the construction of which, can, if the wall in the end be found unnecessary, be used on the training wall; I have therefore directed the Range Officer to submit for sanction, through the usual channel, an estimate for the work amounting to Rs 2295, this work is of an emergent nature and should be taken in hand at once.

14. Statement E enclosed, exclusive of

of some expenditure incurred by the Marine Department of which there is no record in the Cochin Range Office, shows, in detail, the locality of the work done and the amount spent by the Public Works Department on the coast protective works at Cochin, from their commencement up to the 11th of July 1873. viz Rs. 1,35,494-15-0

In British Territory — 30,486-1-10

In Cochin Territory — 1,05,008-13-2.

15 The cost of closing the Cochin Milagré Gap (846 feet in width) including maintenance and all expenditure, from first to last, is Rs. 83,827-5-1, or excluding fractions about 95 Rs per foot run, the actual cost of the Dam which finally closed the Gap is Rs. 24,613-13-9 or about 84 Rs per foot. The District Engineer in his report noted, that in addition to the 15,277 Rs already spent on the sanctioned sand bag groyne project, he supposed the work could be completed for 15,000 Rs more. Thus, including

monsoon

59,226.5.1
7434-5-1
51792

14
monsoon repairs of 1872-73 Rs. 7,530 the whole work was expected to cost Rs. 34,827. I am convinced however that even had the southern bank remained intact, which being much doubt, it would have been found compulsory to construct a third return at Rs. 5,950, and still, a width of 75 feet of the Gap would have remained open, to have closed which with a dam would have cost Rs. 3,300 making a total of Rs. 50,077, again it is found that the District Engineer's estimate for a 2nd return was exceeded by Rs. 2,657 while the maintenance of the work, superintendence, sundries would come to at least 3,000 Rs more making a final total of Rs. 55,728. while the work now finished and the little still to be done amounts to Rs. 57,226.5.1. The regular estimate for the work with allotment required to meet the expenditure in 1873-74 will be submitted by the District Engineer of Malabar.

16. In conclusion, I regret exceedingly to find by the G. A. under reply, I am the supposed cause of disappointment to Government, as also, that tardiness of action resulting in jeopardising the closing of the Coma Milague Gap has been attributed to me, and I beg very respectfully to hope, that under the following explanation, Government will, on reconsideration, absolve me from blame in the matter.

Government will remember that I ceased to be Superintending Engineer of the 7th Division on the 1st of December, on which date, I handed over the Malabar District, in which the work is situated, to the District Engineer, who, I was anxious before leaving this coast, should accompany me to Lerchin and ~~with me~~ see what was to be done there; I arranged to meet the District Engineer for this purpose early in December, but not having been relieved of ~~my~~ ^{my} and charge of the Comibakara District

District until the 12th of 15 December, I was unable to do so until the 13th of that month, when we proceeded to Lerchin together and inspected all the works there. I do not remember, at this distance of time, what passed in reference to the actual commencement of the work, but I certainly was under the impression it was to be put in hand as early as possible, and knowing what work had to be done, I felt sure, there was ample time to do it in, as is fully proved by the work that has now been carried out in a few days over a month. I left Kasras for the Wazapattam District on the 22nd of January not returning until the 22nd of March. Owing, I believe, to the recent re-organization of the Department, and my being for some time in localities remote from regular postal communication, the Progress Reports of the Malabar District only reached me as noted above that

- 16
16
16
- that for December 1872 in the end of February 73
 - for January in the end of March 1873
 - for February in the end of April
 - for March in May

In December's Progreso Report it was remarked that tenders for materials had been called for, and having in February received private information from good authorities that the work was progressing as desired,

I took no action in regard to the Progreso Report, received by me so long after. It was not until the middle of April I learnt that matters were far from being as satisfactory as I had anticipated, and then demissively requested the District Engineer to report officially on the project, which report reached me as already noted:-

I have the honor to be

Sir

Your most Obedt Servt.

Wm. H. Linnell

Inspecting Engineer for
Ports & Communications

100

St. Ed. W. J. J. Arnold

Yours truly,
J. M. Smith

John G. Robinson

Herbert Hoover

Wieder von der Tafel

Lathyrus maritimus

October 12th 1893

19 June 1971

10

1

Debt to the Crown

Miss Anne

100

Chas. H. ...

...the Commission

1864

at present and at

Don't forget to call
conclusion of the exam.

15/8/77

2138.27 aug 67

Q2. 72-8-23

Cochin and West Coast Canal Range

Statement showing the expenditure incurred on all the Harbour Works at Cochin.

Names of Work	Amount of Estimate	Contributions by Cochin Government	Expenditure																Remarks
			1870/71		1871/72		1872/73		1873/74		Total		Grand Total						
			British Government	Native Cochin	British Government	Native Cochin	British Government	Native Cochin	British Government	Native Cochin	British Government	Native Cochin		British Government	Native Cochin				
1 Paving the North Bank at Vypren Dec 1757 - 24 Dec 172	3000	"	1185 6 8	"	1966 1	"	"	"	"	"	"	"	3151 13 8	"	3151 13 8	Completed			
2 Closing the Cruz Milage Gap at Cochin 40 Dec 172 - 170	15277	15000	"	"	"	"	"	20101 13 4	"	30348 7 6	"	"	50450 4 10	50450 4 10	50450 4 10	187434-4-10 spent for masonry repairs in 1872/73 is included in this. Completed not paid in full, about Rs 7000 to pay			
3 Groynes at the Cruz Milage Gap at Cochin 65 4 Dec 71 - 1855	24824	21106 1	"	"	"	"	"	24601 4	"	"	"	"	24601 3	24601 3	24601 3	Completed			
4 Cochin Harbour Protection 155 12 Dec 72 - 72	23380	"	"	"	16130 3	7889 2	"	"	"	"	"	"	16130 3	7889 2	24019 3 2	do			
5 do 101125 - 20 Dec 72 Emergent repairs	30360	"	"	"	"	"	"	10635 9 10	19123 14 10	"	"	"	1316 7 4	10635 9 10	20440 6 2	31076	do		
6 Paving the beach between Groyne 1 and 2, a portion between 2 and 3 16 Dec 72 - 1 Feb 73	1003	"	"	"	"	"	"	753 10 8	"	2495 4	"	"	1003	"	1003	do			
7 Preliminary experiments for improving the Harbour of Cochin 15 18 Dec 72 - 13002	2000	"	"	"	"	"	"	2957 8	2957 8	272 15 8	272 15 8	568 7 4	568 7 4	1136 14 8	1136 14 8	In progress			
8 Repairing the Pavement between Groyne 1 and 2 15 Dec 72	22295	"	"	"	"	"	"	5610 5	"	"	"	"	5610 5	5610 5	5610 5	do			
30486 1 10 105008 13 2																			

Cochin 3
11th July 1873

Rupces 30,000 is the amount promised by the Cochin Sircar for closing the Cruz Milage Gap, of which Rs 8893. 15. has been deducted for Mallipuram Dam and the balance Rs 21,106. 1. is the amount actually received by this Department. Forwarded with reference to the Inspecting Engineer's for Ports and Communications letter No 1 of 4th July 1873 to the District Engineer of Malabar.

Given
Assistant Engineer & PW

E

From the Office in charge
Archibald M. L. Bond
& George

At the inspecting Engineer
for Portland & Lawrence

Dated 11th } July 1875
P. #

Statement showing the
expenditures incurred on all
the Harbor Works at Cochin

P. N. 4483/75

0012-0710

Handwritten notes at the top of the page, including "The Bureau" and "epistolary".

19

Ordered that the following telegram be sent -

To Lt. Col. Farnwell
Cochin -

I congratulate you on
your success -

rw464-2138773

Reporting
the closing
of the long
Milage Gap -

With an @ -

Mr. W. H. Farnwell
The Bureau - W.H.

with an @ -

Statement showing the
expenditures incurred on all
the Arabian Works at Cochin

P.R. 14183/10

0012-0710

(Copies)

S D 24



N 403

Residents Office.

Permacoe, 4 June 1872.

To,

The Dewan of
Cochin

Sir,

You are aware that the breach at Cruz Milage Gap has entailed the necessity of considerable expenditure on the British Government and that considerable farther expenditure will probably be necessary to maintain the harbour of British Cochin in an efficient state. The question however not only of maintaining but of permanently improving the harbour is I believe under serious consideration and probably one of the first and most important steps to take to that end will be to secure the Coast line in the vicinity of Cochin from the danger of being breached so that the discharge from the backwaters and tidal currents may pass by the harbour outlet only.

Unless

2. Unless due precautions are taken it is not improbable that other breaches, similar to the one now I hope being satisfactorily dealt with at Cruz Milagro, may be caused at other neighbouring points on the coast on the occasion of any severe storm, - and so the whole work of closing may have to be undertaken again & again, or the previous money & labor expended will go for naught.

3. The strip of land between the sea & the Backwaters between Cruz Milagro & Narakel is very undefined & irregular towards the Backwaters. It is believed that a good deal of land might be reclaimed so as to straighten it & define the backwaters shores, confine & direct the current, & deepen the backwater channel as well as the harbour of Cochin & the passage of the bar.

No doubt the works required would involve considerable expenditure. The reclaimed land would in time probably recoup some of this, tho' it is impossible to say what proportion.

4. On the Ordnance Map is a place marked Nair Umbalou. I believe the coast strip from Cruz Milagro to Nair Umbalou or thereabouts is all more or less liable to danger of being breached, & all belongs to Cochin. If the British Govern-
ment

Government determine on undertaking works to secure the Coast & improve the harbour, would it be necessary Government be prepared to transfer the Coast strip for such equivalent in British territory to the north or on the border as might be determined by mutual agreement?

5. I am aware that the ports of Malapparam & Narakel occur in this tract, - but in the event of an exchange of territory being carried out for the purposes indicated above it might be arranged that postal rights should remain with the Cochin Arkhar or that Cochin Arkhar vessels should be allowed to use the British Cochin harbour on certain recognized conditions to be mutually agreed upon. I request your attention to the subject and shall be glad to hear from you with regard to it in due course.

I have the honor to be,
Signed / G. A. Ballard
Resident

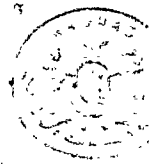
Resident's Office
Trevandrum, 17 June 1872
No 446.
To, The Dewan of Cochin
Sir,
Adverting to the correspondence notes, I have the honor to observe that from your very brief letter of the 11th I think the

From Resident No 403 of 4 June 1872
D. Dewan "398 of 11 - - -"

the Cochin Government can hardly have realized the importance of the subject mooted in my letter to you of the 4th Instant.

2. I request your careful attention to paras 1, 2 & 3 of that letter. It seems probable that for the stability of the Cochin harbour considerable works may have to be undertaken to strengthen the Coast strip north of Nypeen as far as Vair Ambalum or thereabouts.

The easiest way probably these works to be carried out by the British Government would be to arrange for a transfer of territory. If that should not eventually be agreed, upon other arrangement must be made between the British Government and



23
and the Sirkar. - For the works will probably whilst entailing considerable expenditure result also in considerable reclamation of land and it is only equitable and reasonable that the authority incurring the expenditure should reap a fair proportion of the profits accruing from the reclaimed land.

3. I believe the British Government may look for His Highness the Rajah's hearty co-operation in carrying out an important public scheme which must affect the interests of the Cochin Sirkar very considerably. How this co-operation can best be given is the question for mature consideration. The matter must not be considered disposed of by your letter under reply, - but will I hope receive your careful attention.

Yours faithfully,
J. J. [Signature]

If a suggestion of possible exchange
of territory is unpalatable I shall be
glad to have the views of His Highness's Go-
vernment as to other possible arrange-
ment.

I have &c.
/Sigs/ G. A. Ballard
Resident.

Kuzoor Butcherry
Ernaculum in Cochin
11 June 1872.

N^o 398
1872

To
G. A. Ballard Esq.
British Resident of
Travancore & Cochin

Sir, I have the honor to acknowledge
the receipt of your letter No 403 of the
4th Inst: and beg to inform you in reply
that His Highness's Government is not
prepared to transfer the Coast strip between
the Cruz Milagre Gap & Vair Umbalom
for an equivalent in British Territory elsewhere.
I have &c.
/Sigs/ S. Mungaray Menon
Dewan

N^o 187. Malabar District Engineer's Office,
Calicut 9th June 1872.
From, The District Engineer
Malabar.

To,
The Resident of Travancore & Cochin.

Sir,
Having inspected the Coast at Mal-
puram, I have the honor to bring to your notice
that owing to nothing having been done to-
wards carrying out the suggestions made
in letter No 174 of the 30th October 1872 from
the Supg. Engineer 7th Division to the Se-
cretary to Government dt. 11th Communicated to
you with G.O. N^o 3016 of the 15th Decr. 1872 the
danger of another gap being made is becom-
ing imminent.

I should say that at least 100 yards
of the Beach has been washed away and during
the late heavy weather the waves have overtopped
it in many places the opening of a gap seems
therefore a mere question of time unless the
groynes recommended be commenced at once.

From the appearance of the Beach
I believe that a much greater number than
would have been required to protect it when
the

The Supt. Engineer's report was written will
now be required.

The Inspecting Engineer for Ports &
Communications having inspected the Coast
agrees with me in this matter.

Yours, Sir

/Sgt. H. Bailey Capt.

Ag. District Engineer, Malabar.

/True Copies/

Gassanah
Resident

Am B L

1873. Dept

Enclosed in a letter
from the Resident
in Travancore & Cochin
to the Chief Secretary
to Government, Subj. No.
P. 48.
dated 18 June 1873

Correspondence on
the subject of the
Breach at Cruz Milagro
Supt. W. 4481/73.
P. 314/73

No 48. Resident's Office,
Tevandrum, 18 June 1873.

From
C. A. Ballard Esquire
Resident in Travancore & Cochin
To
The Honorable W. Huddleston
Chief Secretary to Government
Fort Saint George
Cotacamund.

Sir

It will be remembered that
in his letter to Government of 24th February
1872 the then ^{Edg.} Superintending Engineer
of Division pointed out the desirability
of taking steps to guard against sea encroachment
on the narrow strip of land between
the backwater and the sea in the vicinity
of Cruz Milage Gap and the Cochin side
port of Malapporam.

I subjoin extract of his letter for
easy reference.

"b." I have inspected the embankment
constructed at Malapporam by the Cochin
Government. The bank in my opinion will
tend but little to avert the danger of a
breach.

P.W.D. No 246. Order
G.O. d/2 May
1872. No. 1125.

discharging their cargoes at Ennaculum
in the Cochin territory which would really
be a great advantage to the Cochin State
saving the breaking of bulk, land
carriage and re-shipment now necessary.
altogether I think that the Cochin
Government would be gainers in getting
rid of a strip of land which is left
unprotected as it is now, is in imminent
danger of being ~~at any time~~ ^{any time} ~~and~~ ^{and} while being a dead
weight ~~also~~ ^{and} ~~and~~ ^{and} while being a dead
loss to that ~~Government~~ ^{Government} would render
negatory all ~~the~~ ^{the} attempts of the
British Government to improve the
Coast. Your ~~that~~ ^{that} exists on the
Coast north of Sedichaghar
or Bombay.

The Government received
the subject for my consideration and
I addressed the Dewan of Cochin
on the subject. I pointed out that
the circumstances of the Cochin
Harbour necessitated steps being
taken to secure the discharge of
tidal currents and freshes from the
backwater

Copies of my
letter of 11th June 1872 - and
Dewan's letter
of the 11th Idem
are enclosed.

* dated 11 June 1872.
4/17 June

backwater passing by the harbour outlet
only that the British Government
had gone to considerable expense in
closing the Cruz Milagre Gap on which
work its officers were engaged; but that
it was clear the coast strip some distance
northwards required strengthening or
fresh gaps would be likely to open. I
observed that the protective works would
probably be very expensive although there
might be some return eventually from
reclaimed lands. I suggested that perhaps
an exchange of territory might be made
as I knew the Cochin Sarkar would be
unconquerably averse to parting with
territory save by territorial exchange. The
Dewan's reply did not advance matters.
I addressed him again and have requested
the Sarkar's attention to the subject on
different occasions since.
In para 6 of the proceedings of
Government of the 19 December it is observed
the subject of para 10 of a letter from Colonel
Surrell then reviewed pointing out sea
encroachment will be brought before the
Resident of Cochin to the notice of that
Government

he worth while giving it. But from
experience in Malabar as well as since
I believe the State will never willing
ly consent to sell territory.

I doubt reasonable exchange
being palatable. Though perhaps the
Sirkar may be induced to exchange if
Government desires to press such
measure. An exchange however is
always a difficult matter to arrange.

Probably, the real exigencies of
the case may be sufficiently and most
easily met by an agreement between
the Government and the Sirkar
to somewhat the following effect.

The British Government
to be at liberty to undertake such
defensive works as it deems necessary
on the coast between Vypeen and
Nair Ambalum, at its own cost.

The Sirkar to give free oc-
cupation of the ground required
for the works.

The Government to pay
compensation at the usual local
rates



dated 9 June 1873
No 187.

30 22
rates for cocoanut trees taken up or
destroyed - or loss of occupancy rights by
Tenants, in connection with the works.

Any lands reclaimed, off Cochin
Sirkar limits, to be Sirkar territory; but
to be under occupancy by the British
Government as long as it desires to retain
them on the usual terms of tenancy
of such lands in the State.

8. Enclose copy of a letter lately
received for the Ag. District Engineer
Malabar. An expression of the views
of Government will expedite settlement
of the question.

Have the honor to be,
Sir,

Your most Obedt Servant,
Sasarc
President.

J. V.
M. B. C.

25 June 1873
 L. Johnston
 Cuddery
 J. Johnston & Co.

25 June 1873
 No. 314
 In the subject of
 sea encroachment
 on the strip of
 land in the vicinity
 of the Sans building
 2738-2748
 2745-
 2745-

No. 3
 Resident's Office
 Travancore 14 July 1873
 From
 G. A. Ballard Esquire
 Resident in Travancore & Cochin
 To
 The Honorable W. H. Cardleston,
 Chief Secretary to Government
 Fort St. George.
 Ootacamund
 Sir,
 In continuation of my letter
 No. 48 of the 18th Ult^o, I beg to forward a communication from the Dewan of Cochin on the subject of the Coast defence works north of British Cochin Harbour.
 2. The Cochin Sirkar objects to the idea of parting with territory and deprecates further requisition of funds for the works that it may be found necessary to undertake.
 3. The Dewan writes "In your letter of the 17th June 1872 you say that 'if a suggestion of possible exchange of Territory be unpalatable' other arrangements must be made between the British Government and the Sirkar, and I believe that regarding this
 *to Resident

20 31
"this you had in view a contribution from the
"Government towards the expenses of the
"Coast defensive works, owing to those
"works being likely to confer some benefit
"on the Government also."

He is mistaken in supposing
I had in view farther contribution from
Sirhar Roohin to any great extent. My
views as to the best disposal of the ques-
tion were given in para 7 of my letter of
the 18th ult viz that the sites of works
should be given by the Sirhar (when
they are ~~land~~ property or on compensa-
tion when they are not) and the British
Government occupy as perpetual tenants -
The British Government undertaking the
works at their own expense.

I have the honor to be,
Sir
Your most Obedt Servant
S. R. S. R.
Resident

J. S.
M. D. L.

Transferred to the Public Works
Department in continuation of previous.
: went dated the 25 June 1873.

Enclosed
21st July 1873
L. K. M. S. S.
Chief Secretary
with an origl. Enclosure

P. M. S. S. 1873
No. 4482
The Resident in
Travancore & Cochin
To
The Chief Secretary
to Government
at St. George
Cochin command

Dated 14th July 1873
Received 19th July 1873
Recd 12th August 1873
N. 60

Enclosure one
in original

Forwarding a commun-
ication from the Director
of Cochin on the sub-
ject of the Coast defence
works North of British
Cochin Harbour.

No. 4482, 27th Aug 73

Dated 14th June 1873 No. 446
" 14th June 1873 " 423.

No. 439
1873

34 S 80 31
Muzoor Cutchery
Ernakulam in Cochin
7th July 1873.

G. A. Ballard, Esq^{re}
British Resident of
Travancore and Cochin

Sir,
With reference to your letter noted
in the margin I beg to observe that although your
letter No. 403 of the 1st June 1872 gave a good deal
of information regarding the Cochin Harbour
and Coast defensive works, the only point on which
an expression was requested of the views of His
Highness' Government seemed to me to be that
regarding the exchange of Territories. To this
point therefore I confined my reply.

Our Ports of Mallipooram and
Narakal are situated on the tract of Terri-
tory which the British Government appeared
to be desirous of obtaining. A great portion
of the Sea Coast which, from the position of the
Country, should have belonged to this State
is already in the possession of the British and
Travancore Governments. Travancore lays
claim also to certain portions of the Territory
between Typpen and Nairampalam, which makes
it difficult to arrange an exchange even if this
Government were willing to accept the proposal.
Owing to these and other causes which it is im-
necessary to particularize, my answer on the
point in question could not but be in the negative.

In

M. D. L.

3. In your letter of the 17th June 1872 you say that if a suggestion of possible exchange of Territory be "unpalatable" other arrangements must be made between the British Government and the Sherar, and I believe that in writing this you had in view a contribution from this Government towards the expenses of the Coast defensive Works, owing to those works being likely to confer some benefit on this Government also.

4. From the correspondence noted in the margin you will perceive that this Government has already contributed no less than 30,000 Rupees towards these works, and from the conditions on which this amount was granted I was under the impression that no further requisition would be made on this Government on account of these works. However, if you will be so good as to inform me of the particulars of the works already carried out within Cochin Territory, the expenses incurred, the nature of the works which it is now proposed to undertake, and an Estimate of the probable outlay required, I shall submit the question of a further contribution towards these works for the consideration and orders of His Highness.

5. You are no doubt aware that changes are constantly taking place on the Coast to the North of Cochin, the sea encroaching on certain portions while it recedes from others giving up valuable land for sowing and planting purposes. I doubt whether the reclamations resulting within a reasonable period, from the works undertaken by the British Government would be of

of amount Rs. 38,802-8-0. 1870-1871.
 Date 17th Oct 1871. 1931
 Debit 26th Oct 1871. 683
 Credit 1st Nov 1871. 193
 Date 22nd Dec 1871. 697
 Debit 15th Jan 1872. 42
 Credit 16th Feb 1872. 925

of such magnitude as to exceed in proprietary value the 30,000 Rs. already advanced.

6. On the receipt of the letter from your Office N^o 951 of the 31st December last and of the Government Order which accompanied it, I forwarded a copy of the 10th para of the Superintending Engineer's letter, to Mr. Macdonald, with a request that he will prepare and submit plans and estimates for the works therein mentioned, intending to obtain sanction for them should the estimates be moderate in amount. I thought the progress recommended by Col. Farewell were of the description mentioned in his letter to the Acting Resident dated 31st October 1870 N^o 36, slight and cheap. Mr. Macdonald, however, recommends a rather expensive description of groynes and his estimate, Rs. 38,802-8-0, was too great to be sanctioned by this Government. I was moreover of opinion that all the coast defensive works should be carried out by the British Officers, as any work done by the Cochin Public Works Department was likely, as in the case of the Mallipoorum bund, to be declared quite useless by the British Officials.

7. Entertaining as I do every respect for the opinion of Col. Farewell, I must still in justice to this Government and its Officers say that the embankment lately constructed by this Government in the Backwater at Mallipoorum, which that Officer pronounces to be "of no possible use", was put up to stop a gap which then existed and that it has answered the

the purpose most admirably. The breach occurred across a narrow ridge of sand connecting the lands on both sides which were much more extensive, being about 900 yards in breadth and planted with cocoanut trees. It would have been easy to strengthen the ridge above mentioned but such works run the risk of being undermined and washed away during every Monsoon. An embankment was therefore thrown across the arm of the backwater at some distance from the sea coast, and this has stopped the gap and conduced to strengthen the ridge. The ridge is still low, and occasionally some waves pass over it into the basin thus created. but as the water has no free outlet into the backwater, no harm is done. About three quarters of a mile to the North of Mallipoorom as well as to the South of it, the land is very low and the sea occasionally washes over it at different points into the narrow strip of paddy land on the East, and thence into the Backwater. Mr. Macdonald's Estimate for Groynes provided also for a bund along the sea coast. This part of his Estimate has been sanctioned. The amount mentioned in the Estimate is only Rs 825 but Mr. Macdonald told me that this was a mistake and that the work would cost upwards of 2,000 Rs. A bund about 200 yards in length was actually put up to the North of the said basin, but I am sorry to say that the greater part of it has been washed away.

I have the honor to be

Sir
Your Most Obedient Servant

Here comes
D. H. Fraser
Dewan

P. M. 4482/73.

36
Inspecting Engineer's Office
for Porto Communications
Camp Combarone
28th July 1873

From

The Inspecting Engineer for
Porto Communications.

To
The Secretary to Government.
Public Works Department.
Colacannund

Sir,

I have the honor to report that I have just discovered that there is a clerical error in the figures entered in the end of para 15 of my letter No. 107 A dated 12th July 1873, which I request may be corrected to Rs. 59,226-5-1 the addition of the figures Rs. 74,34-5-1 expended in 1872-73 having been accidentally omitted here though they are correctly included in the total cost

cost of closing the Gap wire.

Rs 83,827-5-1; thus

the allotment required

in 1873-74 amounts to

close upon Rs 30,000.

Stone Groyne & preliminary work	Rs. 24,601
Lining Gap & ironwork repairs 1872-73	7,345-1
Small Bag work &c. &c. &c.	51,792----

and I will, as soon as I hear Total Rs 83,827-5-1

from the several District Engineers who have large allotments in the Provincial Budget of 1873-74, with whom I have communicated on the subject, report to you the transfers I propose to cover this amount.

I have the honor to be
Sir

Your most Obedt Servt

Wm. Lintell
Inspecting Engineer for
Ports & Communications

P.W. 1873 Depart
 from Govt for August
 from No. 4484
 The Inspector for
 Ports & Harbours
 to the Secy to Govt
 of Madras
 Dated 12th Aug 1873

Reports that he has
 just discovered that there
 is a clerical error in the
 figures entered in the
 end of para 15 of his
 letter No. 107 of 12th July
 1873 & requests that
 it may be corrected
 to R.S.P. 226.5-1.

No. 2138. 27th Aug 1873

No 447

No. 2138. 27th Aug 1873
 Pro. of the Madras Port
 News the following

From the Inspr: Supr for
 Ports & Harbours
 President in Transire
 & Cochin
 Do - Do -
 Inspr: Supr for Ports & Harbours

The Government

see no cause for re-
 consideration of the
 wording of their Order
 No. 1323 of 13th May
 as it has had the
 happiest effect
 eliciting such vigorous
 action as has not
 only secured the com-
 plete success of the

God
 late at the end

work of closing the
Cruz Malabar ~~has~~ ^{at} ^{1/2} ^{of} ^{10/1}
that has ~~recovered~~
greatly to the credit
of Lieut Col. Farewell
that Officer must ~~indeed~~
bear in mind that
the Government had
every expectation of
the work being comple-
ted before the new
year of 1842-43, but
made the fullest al-
lowances for its being
delayed in para 6
of their Order No. 1125
of 2nd May 1842. And
that a twelve months
later, finding its com-
pletion again threatened
with indefinite

39 34
postponement, pro-
bably at enhanced
cost, it was ~~thought~~ ^{required}
time for them to speak
out and express their
dissatisfaction with
the management of
affairs, which rested
between the Suspecting
Engineer of Porto and
the District Engineer
of Malabar. ^{Report of}
and extremely satis-
fied with the man-
ner in which Lieut
Col. Farewell has
responded to the
call made on him,
and attributes his
unwearied perseverance

and ready resources,
the successful result
of operations which
at one time threatened
to come to a standstill.

~~They are~~ ^{glad} to re-
ceive from ~~him~~ ^{Mr. Daniel Turner}

assurances of the zeal
and activity shown
by Mr. Grimes and his
overseer Vedamootoo,
but they are well
assured that his
own presence on
the work alone
ensured its success.

I would suggest...
of them...
from the...
with...
has been...
and...
to...

The cost of closing
the Loring Millage
Gap has been con-
siderable, but the
experience gained
at

at such cost will
enable similar op-
erations to be car-
ried out with cer-
tainty and com-
parative economy.
One of the two outlets
of the Mangalore
Backwater has to
be similarly opera-
ted out, and the
sum of Rs 7000 has
been allotted for the
purpose in the
Provincial Budget
of the Current year.
The Inspecting Engineer
will prepare from
Surveys and Sections

12

which he will cause
to be taken of the
locality in all September,
a reliable estimate
of the cost of closing
the Koorpoor River
mouth in order that
the Government
may be in a posi-
tion to issue orders
for early execution
of such work as may
appear necessary.

The paper marked
C shewing sections
of the Dam will
be returned to the
Range Officer for
re-submission soon
after the 1st October

36
* And Colonel Darnwell will
ascertain from the Engineers
of those States what assistance
it may be in their power to give
towards obtaining a correct
knowledge of the exact state
of the beach between the Hook
water and the Sea, from Co-
chin, Northward & South.
He would state that he
has indicated as manifest -
The Indian Engineers might be
requested, especially, to lay down
beach marks between Long
Mileage and Normal, and
to take a survey ~~and~~ ^{ascertainment}
of the coast line with occasional
sections, referred to such marks.
In the case of such assistance
not being available, the
existing Engineers will apply
for the services of such Survey
Establishment as, working
under the supervision of the
Officer in charge of the Work.

Canal Service, ~~will~~ be ^{able} to provide all the information he may deem necessary to enable him to report what further precautions should be taken - Providing receipt of such detailed information, he may profitably absorb in maturing the details of the Cochon Harbor Improvement proposed by Mr. Robertson; the two extensive training walls contemplated in which will ~~eventually~~ ^{effectively} protect the coast in the immediate vicinity of Bristol Beach, from further abrasion -

Y.M.W.

42 38
with fresh sections, taken about that date, marked on it. The lamentable view taken by the Inspecting Engineer of the state of the coast for miles above and below Cochon, will be communicated for the information of that State and of Hawaiian. It is vain to suppose that the British Government can attempt to do more than to watch the evidently corrupt Council and the Engineering

shores of its own. While I have been
a territory and the which is needed
immediate vicinity, for planning that
but it would not be ^{with} - when we
too much to expect ^{have the estimate}
of the John Hook ^{in the same respect}
that it would cause ^{in the country}
beach marks to be ^{not} laid down between
Lorny Milagre and ^{from the latter}
Karabul and ^{It was} ^{Erskine}
- very of the coast ^{the line}
line on a large scale ^{run}
with occasional sec- ^{day}
- tions, referred to such ^{time}
marks, taken by its ^{lost}
officers from time to ^{time}
time; and tracing ^{before}
communicated to the ^{Govt}
Govt for information.

I agree with ^{the}
the new ^{land}
appears from St
Farewell's letter
that the sea may
certainly be ^{run}
run up of ^{perfect}
& after ^{up}
the ^{actual} population
& under ^{local}
the ^{best}
been spent a large
sum and which I
understand might some
be an excellent
harbour of refuge.

39
43
It had been the in-
tention of Hook to
show in the 6th
part of their order
No 3016 of 19th Decem-
ber 1872 that pro-
- tective work to
the north of Oriz
Milagre should
have been designed
by Lieut St Farewell,
but it would ap-
- pear from the
Dewan's letter to the
Resident of 7th July
that such had been
done by the local
Agency available
and their estimated
cost viz Rs 38,800

their views with refer-
 -ence to the arrange-
 -ments which he
 has suggested in
 cases where work
 may have been under-
 -taken by the British
 Govt within Cochin
 limits at the same
 time it should be
 pressed on the notice
 of the Cochin Govt
 that they have a
 direct interest in
 the maintenance
 and improvement
 of the Cochin Harbour
 seeing that a certain
 portion of their

Revenue ⁴⁵ is derived
 from a share of
 the dues levied on
 the produce and
 shipping using
 that Port.

G.M.W.

35-

4

J. 20

4 I. Ess. for Pats. & Comm

D. S. Amalapuram with J. P. Amalapuram

Resident Amalapuram, Cochin

J. C. 20th 5/9/73

*Nos. 4481, 4482, 4483 and
4484*
Govt. of 1873 Madras.

PUBLIC WORKS.

*The Inspecting Eng. for
Public Works*

Date

Recd.

Encl. 6

G. O. 27th Sept No. 2138.

Nos. 444 @ 448

Cruz Milagre Gap -

Paying orders in ~~the~~
~~letter~~ correspondence
relating to the closing
of the Gap.