

(1) Number of pages 28

(2) Date of repair 14. 2. 49

(3) Initials of the Referencer _____

MADRAS RECORD OFFICE.

Government of Madras.

Public Works DEPARTMENT.

G.O. No.	<u>451 W</u>	Press ~~Mis~~	<i>Original</i>
Dated	<u>18. 7. 18 77.</u>		

Not to be folded or roughly handled

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

18th July 1877, No. 451 W.

Buildings and Roads.

Civil Works.

Read the following papers:—

No. 269. From Major H. W. WOOD, R.E., District Engineer, Vizagapatam, to the Chief Engineer, Public Works Department, Buildings and Roads Branch, dated Waltair, 13th June 1877, No. 567.

I HAVE the honor to submit the following information in connection with the project for a harbour at Vizagapatam, and with the reclamation of the swamp in the backwater that is now in course of execution. It is possible that both these points may engage the future attention of Government, and I venture to hope in such a case that the present letter may be found to be useful.

2. In his report regarding the Vizagapatam river (*vide* Proceedings of Government, Public Works Department, 25th February 1873,) Major Beatty states as follows:—

"The depth of water in the deep channel at the bar probably now varies from a normal depth of 3 feet to an exceptional one of 7 feet at low water spring tides."

"On the 4th December 1869, about six weeks after the heavy freshes of the north-east monsoon, he, Captain Waters, the then Master Attendant, found 11 feet of water on the bar. Vessels drawing 6 to 7 feet of water now (November 1871) enter the Vizagapatam river to be laid up for repairs."

3. On the 7th — 8th October 1876, Vizagapatam was visited by a cyclone and 17½ inches of rain were registered within the twenty-four hours. Precipitation took place in great intensity the whole way up the valley of the Vizagapatam river; and an enormous body of flood water collected in the backwater west of the town, being prevented from flowing out to sea by the strong westerly current in the Bay of Bengal, which accompanied the progress of the cyclone.

4. Mr. J. Elliott, the Meteorological Reporter to the Government of Bengal, remarks in his report on the Vizagapatam cyclone of 1876, as follows:—

"The water action during the storm in scouring and denuding the coast was strikingly shown at Vizagapatam. Before the cyclone there was in the channel over the bar at high water 6 feet, and at low water 3 feet; it is now 9 feet 9 inches deep at high water, and 6 feet 9 inches at low water. A shoal opposite to the Commercial shed, which was formerly high and dry, has now a depth of 14 feet of water on it at low water." This is probably the shoal on which Captain Taylor reported (*vide* Proceedings of Government, Revenue Department, 2nd April 1875,) as follows:—

"The *Frank and Ada*, drawing 4 feet, passed over the bar, but it was only with great care and attention she was kept from grounding in the harbour itself."

feet, at low water spring tides.

On

5. The four first months of the year 1877 were characterized by an abnormal quantity of rain, as the following table will show:—

	1877.	Rain-fall in Inches.	Mean Rainfall for seven previous Years	Difference.
January	...	1-600	0-514	+ 1-086
February	...	1-600	0-171	+ 1-429
March	...	1-600	0-439	+ 1-170
April	...	0-000	1-200	- 1-200
May	...	13-200	1-843	+ 12-357

Total increased rainfall during above months of 1877, 14-842 inches.

6. At H.W. spring tides there is now a depth of 13½ feet, while at L.W. spring tides there is a depth of 9 feet 2 inches. These depths would correspond respectively to about 12½ and 8½ feet of mean high and low tides; so that a very considerable augmentation of water on the bar has taken place even since last October.

7. Major Beatty states that strong easterly winds during the five months, October to February, forced sand into the mouth of the river. But the facts I have cited show the great effect the out-flowing stream has had in nullifying this evil. He also records that the bar is still further disimproved on the setting in of the south west monsoon by deposits from the southern current driven in by the tide, and that it is at this epoch in its worst state. As the south-west monsoon has just set in, it will be interesting to observe how far such will be the case during the coming season.

8. But there is another circumstance which, I think, must be considered as having materially contributed to the augmentation of water on the bar. Not only has there been an increased out-going stream during the last eight months, but the power of that stream has been increased by the reclamation of the backwater that has been in progress during recent years. When in October 1876, the flood waters from inland were dammed up by the westerly current in the Bay of Bengal, the backwater acted as a high level scouring reservoir in immediate proximity to the mouth of the river. Whatever may be the actual average height to which the bed of the swamp has been raised by reclamation, the scouring action on the bar has been *pro tanto* augmented in power; and this reasoning points to a future possibility of the bar being more or less swept away into deep water (not by groynes or the breakwater which have been proposed but) by embanking the river in its lower course and concentrating the whole power of the out-flowing stream on the river's mouth, in lieu of allowing that power to be diminished by flooding the backwater and envirening swamp.

9. With the small difference of about 4½ feet only that exists between H.W. and L.W. of spring tides at Vizagapatam, the river may practically be said to fall into a tideless sea. It is utterly futile, therefore, to speak (as some people have done) of preserving the backwater "for a tidal reservoir" with the object of scouring out a deep channel such as that which exists at the mouth of the Thames, where there is a rise of from 20 to 24 feet at springs, or that in the Wye above its confluence with the Severn, where equinoctial springs are said to have reached a height of 72 feet!

10. At Vizagapatam the cardinal point to be kept in view is, I think, to economise the volume of the out-flowing stream, by placing it in the most favorable position possible for exercising its scouring action on the bar. In other words, the river should be prevented from dissipating its power in the backwater, and should be led to its mouth between embankments constructed through the valley it traverses in its lower course. Had such embankments existed in October last, it can scarcely be doubted that the power of the overflowing stream would have been considerably augmented, and that the bar would have been swept into still deeper water than it has actually been. In fact, the treatment that is indicated for the improvement of the harbour at Vizagapatam is nothing more than a hastening of the process which nature herself is carrying on, as the following considerations will show.

11. Reliable tradition asserts that the town of Vizagapatam was founded about five centuries ago, and the remains of this ancient town are now found in the sea, immediately to the north of the mouth of the river. However, on the other hand, at the commencement of this century, the inhabitants of the present town used to walk across the bar at the mouth of the river on their way to Yaradah, a village which is situated at a distance of a mile or two to the south of the Dolphin's Nose.

12. The people say that this passage of the bar on foot was rendered possible by the fact that a huge tank was formed at Naravah, some 8 miles up the valley; by throwing an earthen embankment across the river. I have visited the locality and found the old bund, through a gap in which the river now flows, to be about three quarters of a mile in length. When perfect it formed an artificial lake, having perhaps an area of from ten to twelve square miles. A shorter ruined embankment of greater cross section than the one at Naravah exists close to the famous Simhachellum temple; across an affluent which would have joined the Vizagapatam river about a mile or so below the Naravah tank.

13. It is quite certain that these old works would have intercepted nearly the whole of the drainage of an ordinary year that is now carried by the Vizagapatam river; and it is therefore clear that when the tanks existed there was a very weak out-flowing stream, and a sufficient explanation is thus given of the reason why there was so little water on the bar as to enable it to be crossed by men on foot.

14. Regarding the destruction of the ancient town of Vizagapatam the explanation would seem to be as follows:—

The waters of the Bay of Bengal washed, as we know, the foot of the Eastern Ghauts in prehistorical times. Relics have been found of the fishermen who formerly inhabited the islands which are now the detached portions of the outlying spurs of the ghauts. The present physical condition of the east coast of India is accounted for by geologists by the elevation of the land from the sea. But this assumption is entirely unproved, and the change may just as well be attributed to the falling of the sea level as to the raising of the land.

15. But, whether the sea level fell, or the land was elevated from the Bay of Bengal, is a question that need not be discussed here; nor indeed could it be usefully discussed until much more information shall be at our disposal. What is certain is that upon the surface of the plains stretching along the foot of the Eastern Ghauts, and which were formerly covered with water, depressions or basins were left, which nature is now actively working to fill up with the sediment brought down by streams from the plateau occupying the centre of the Indian Peninsula. We have the Chilka Lake, the Colair Lake, and a series of other smaller sized basins, which year by year are being gradually reclaimed, and brought into harmony with the general condition of the plains of the eastern coast.

16. The backwater at Vizagapatam and lower portion of the valley through which the river now passes was nothing more than one of these depressions, which has been in course of reclamation since the prehistoric epoch by the action alluded to. The sediment brought down by the streams flowing into this depression has gradually filled it up, and concurrently with its reclamation from a state of swamp the drainage has made for itself a more and more defined course through the swamp. In this manner a necessity grew up for an exit for the local rainfall into the Bay of Bengal, and the destruction of the ancient Vizagapatam may reasonably be attributed to the formation of a larger and more permanent out-flowing stream than that which existed at the date of the founding of the town. It may be said that all this is mere assertion, but no one acquainted with the localities will say that a period of five centuries is an unreasonably short space of time for the reclamation of such a land-locked swamp as that which must formerly have existed here. The soil of the valley nearly the whole way up to Naravah shows that it was formerly the bed of a more or less brackish swamp; and the littoral current, which for nearly nine months of the year is northerly, would have driven the out-flowing stream to the north and would so have gradually swept away the ground on which were the buildings of the ancient town.

feet, at low water spring tides.

17. The reclamation now being made by Monseigneur Tissot, the Roman Catholic Bishop of Vizagapatam, must have the effect of adding the elevation of the valley, which natural forces are slowly carrying on. Year by year the force of the out-flowing stream may be expected to be more efficient while the water on the bar will *pro tanto* be augmented. It is a question, therefore, whether some day a judicious expenditure of public money might not really improve the Vizagapatam harbour materially; and in this connection it seems worthwhile to consider whether the Government, in granting what will some day be a valuable property to the Roman Catholic establishment, might not now make such provisions with the grantees as would prevent any difficulties growing up in the way of executing such a project should it ever be found desirable.

No. 269-A.

Note by Chief Engineer, Public Works Department.

THE District Engineer attaches too much importance to the scouring action of the river when in flood. The scour produced by an occasional flood is no doubt beneficial and works may be devised for increasing the effect, but it is the tidal ebb that must be looked to at Vizagapatam as elsewhere for keeping the bar open. It is true that the difference between high and low tide there is only 4½ feet, but that should be enough, with a good tidal reservoir, to maintain a fair depth of water. To maintain the strength of the ebbing current the tidal reservoir should not be encroached on, and therefore the work of reclamation that has been commenced will need to be carefully watched. The different effects of floods and of tidal scour may be seen at Cuddalore, where three rivers fall into the sea within about two miles of each other. It is the mouth of the smallest of the three rivers that alone remains open permanently, because it has a tidal estuary of 15 or 16 miles in length. The other rivers which drain a much larger extent of country close soon after the subsidence of the floods. The tidal rise and fall at Cuddalore is considerably less than at Vizagapatam.

(Signed) E. A. FOORD, Colonel, R.E.,
Chief Engineer, P.W.D.

5th July 1877.

No. 270.

ORDER THEREON, 18th July 1877, No. 451 W.

RECORDED, and communicated to the Collector of Vizagapatam and the Master Attendant.

(True Extract.)

(Signed) E. A. FOORD, Colonel, R.E.,
Secretary to Government, P.W.D.

To the District Engineer, Vizagapatam.
" Collector of Vizagapatam.
" Marine Department.

Exd. E. C. Shunker.

Spare Copies

No. 567

District Engineer's Office
Wallair 13 June 1877

From

The District Engineer.
Vizagapatam

To

The Chief Engineer, P.W.D.
Buildings and Roads Branch
Madras.

Sir,

I have the honor to submit the following information, in connection with the project for a Harbour at Vizagapatam, and with the reclamation of the Swamp in the backwater, that is now in course of execution. It is possible, that both these points may engage the future attention of Government, and I venture to hope in such a case, that the present letter may be found to be useful.

2. In his report regarding the Vizagapatam River (vide Proceedings of Government P.W.D., 25th February 1873) Major Beatty states as follows:-

"The depth of water in the deep Channel at the bar probably now varies from a normal depth of three feet to an exceptional one of seven feet, at low water spring tides."

On

On the 4th December 1869, about six weeks "after the heavy freshes of the north-east" monsoon, he, (Captain Waters the then Master Attendant) found eleven feet of water on the bar. Vessels drawing six to seven feet of water "now (November 1871) enter the Vizagapatam" river to be laid up for repairs."

3. On the 7th-8th October 1876, Vizagapatam was visited by a cyclone and seventeen and a half inches of rain were registered within the twenty four hours. Precipitation took place in great intensity, the whole way up the valley of the Vizagapatam river; and an enormous body of flood water, collected in the backwater west of the town; being prevented from flowing out to sea, by the strong westerly current in the Bay of Bengal, which accompanied the progress of the cyclone.

4. Mr. J. Elliott, the Meteorological Reporter to the Government of Bengal, remarks in his Report on the Vizagapatam Cyclone of 1876, as follows:-

"The water action during the storm in" "scouring and denuding the coast was" "strikingly shown at Vizagapatam. Before" "the cyclone there was in the channel over" "the

the bar at High water six feet; and at" "Low water, three feet; it is now nine feet" "nine inches deep at high water, and six feet" "nine inches at low water." A shoal opposite to the Commercial shed, which was formerly "high and dry, has now a depth of fourteen feet" "of water on it at low water." This is probably the shoal on which Captain Taylor reported (vide Proceedings of Government, Revenue Department, 2^d April 1875) as follows:-

"The Frank and Ada, drawing four feet, "passed over the bar, but it was only with" "great care and attention she was kept from" "grounding in the harbour itself."

5. The four first months of the year 1877 were characterized by an abnormal quantity of rain as the following table will show:-

1877	Rain fall in Inches	Mean rain fall for seven previous years	Difference
January	1.600	0.514	+ 1.086
February	1.600	0.171	+ 1.429
March	1.600	0.430	+ 1.170
April	0.000	1.200	- 1.200
May	13.200	1.843	+ 12.357

Total

Total increased rain-fall during above months of 1877. 14.842 inches.

6. At H. W. spring tides, there is now a depth of thirteen and a quarter feet, while, at L. W. Spring Tides there is a depth of nine feet two inches. These depths would correspond respectively to about twelve and a half and eight and a half feet of mean High and Low tides, so that a very considerable augmentation of water on the bar, has taken place, even since last October.

7. Major Peatty, states that strong easterly winds during the five months, October to February, forces sand into the mouth of the river. But the facts I have cited, show the great effect, the out flowing stream has had in nullifying this evil. He also records that the bar is still further disimproved on the setting in of the South west monsoon by deposits from the Southern current, driven in by the tide, and that it is at this epoch in its worst state. As the S.W. monsoon has just set in, it will be interesting to observe, how far such will be

be the case during the coming season.

8. But there is another circumstance which I think must be considered, as having materially contributed to the augmentation of water on the bar. Not only has there been an increased out going stream during the last eight months, but the power of that stream, has been increased by the reclamation of the backwater that has been in progress during recent years. When in October 1876, the flood waters from inland, were dammed up by the westerly current in the Bay of Bengal, the backwater acted as a high level scouring reservoir in immediate proximity to the mouth of the river. Whatever may be the actual average height, to which the bed of the swamp has been raised, by reclamation, the scouring action on the bar, has been, pro tanto, augmented in power; and this reasoning points to a future possibility of the bar being more or less swept away into deep water, (not by groynes or the break water which have been proposed but), by embanking the river in its lower course and concentrating the whole power of

of the out flowing stream on the rivers' mouth;
in lieu of allowing that power to be diminished
by flooding the backwaters and environing
swamp.

9. With the small difference of about
four and a half feet only that exists
between H. W. and L. W. of Spring tides
at Vizagapatam, the river may practically
be said, to fall into a tideless sea. It is
utterly futile, therefore, to speak (as some
people have done) of preserving the back-
water "for a tidal reservoir", with the
object of scouring out a deep channel
such as that which exists at the mouth
of the Thames, where there is a rise of
from 20 to 24 feet at springs or that
in the Wyre above its confluence with
the Severn, where equinoctial springs,
are said to have reached a height of
72 feet!

10. At Vizagapatam, the cardinal
point to be kept in view, is, I think, to
economise the volume of the outflowing
stream, by placing it in the most favorable
position possible for exercising its scouring
action

64
action on the bar. In other words the river
should be prevented from dissipating its
power in the backwater and should be
led to its mouth between embankments,
constructed through the valley it traverses
in its lower course. Had such embank-
ments existed in October last, it can-
scarcely be doubted, that the power of the
overflowing stream would have been considerably
augmented and that the bar, would have
been swept into still deeper water, than it
has actually been. In fact, the treatment
that is indicated for the improvement of the
Harbour at Vizagapatam, is nothing more
than a hastening of the process which nature
herself is carrying on, as the following
considerations will show.

11. Reliable tradition asserts, that the
town of Vizagapatam was founded about
five Centuries ago, and the remains of this
ancient town are now found in the sea,
immediately to the north of the mouth of
the river. However, on the other hand
at the commencement of this century,
the inhabitants of the present town, used
to walk across the bar at the mouth of
the

be at our disposal. What is certain, is, that upon the surface of the plains stretching along the foot of the Eastern Ghats, and which were formerly covered with water, depressions or basins were left, which nature is now actively working to fill up with the sediment brought down by streams, from the plateau occupying the centre of the Indian peninsula. We have the Chilka Lake, the Colair Lake and a series of other smaller sized basins, which year by year are being gradually reclaimed and brought into harmony with the general condition of the plains of the Eastern Coast.

16. The backwater at Viragapatam and lower portion of the valley through which the river now passes, was nothing more than one of these depressions; which has been in course of reclamation since the prehistoric epoch by the action alluded to. The sediment brought down by the streams flowing into this depression, has gradually filled it up and concurrently with its reclamation from a state of swamp, the drainage has made for itself a more and more defined course through the swamp.

In

8
In this manner, a necessity grew up for an exit for the local rain-fall into the Bay of Bengal; and the destruction of the ancient Viragapatam, may reasonably be attributed to the formation of a larger and more permanent outflowing stream, than that which existed at the date of the founding of the town. It may be said, that all this is mere assertion, but no one acquainted with the localities, will say that a period of five centuries is an unreasonable short space of time for the reclamation of such a land locked swamp, as that which must formerly have existed here. The soil of the valley nearly the whole way up to Narain, shows that it was formerly the bed of a more or less brackish swamp; and the littoral current, which for nearly nine months of the year is northerly would have driven the outflowing stream to the north and would so have gradually swept away the ground, on which were the buildings of the ancient town.

17. The reclamation now being made by Monseigneur Tissot, the Roman Catholic Bishop of Viragapatam, must have the effect of aiding the elevation of the valley.

valley, which natural forces are slowly
carrying on. Year by year, the force of
the outflowing stream, may be expected to be
more efficient, while the water on the
bar will pro tanto be augmented. It is
a question, therefore, whether some day
a judicious expenditure of public money, might
not really improve the Viragapatam Harbour
materially; and in this connection, it seems
worthwhile to consider, whether the Govern-
ment, in granting what will some day be
a valuable property to the B. C. establish-
ment, might not now make such provisos
with the grantees, as would prevent any
difficulties growing up in the way of exe-
cuting such a project, should it ever be
found desirable.

I have the honor to be
Sir

Your most abdt. servt.

Arthur
Major R.E.
District Engineer, Viragapatam

25. Feb. 1872. No 603.
 16. Apr 1875. - 157-
 5 May - - 1271-
 17 - - - 156.
 18 Oct 1876. - 2794.

Buildings & Roads

Y
 From 18 JUN 77
 5969

The District Engineer
 Viragapatam

To
 The Chief Engineer
 Buildings & Roads Branch
 Madras.

No 567

Dated 13th June 1877.

At of Enclosures alone.

Viragapatam Harbour
 Project - Submitting
 certain information relative
 to the - and the reclamation
 of the Swamp in the back-
 water.

18 July 1877 No 569

R-C-2-7-77 11-1-77

PUBLIC WORKS DEPARTMENT.

Letter from the District Engineer Viragapatam
 No 567 dated 13th June 1877.

Note by the Chief Engineer P.W.D dated
 5th July 1877.

FOR ORDERS.

Spent the 14th of July
 in the fortification
 canals - second
 in the fortification
 will be done
 of a second water
 channel can be
 made

E A Ford Colonel R.E.

Sey. to Govt. P.W.D.
 known to D. S. V.
 C.S. with to Govt.
 Mr. Whitcomb Madras

18 July 1877

There is nothing to be
 as needed expression
 of opinion - and pro-
 bably will be for
 be any proposal to
 spend money one or

a few miles of
the little tide flow
is - it would be
and dredged the
the water in the
if kept open it
would be a valuable
feature

and even a supply
but depends along side
of the river. A tidal
service is a source of
value in keeping up - the
often feeling enough - the
breach in the bank effects
are reiterated of the river
flood and it is doubtless
an inexpensive means
of effecting partially what we
want between wharves
But I am not inclined
to under value argument
for continuing (if possible)
the primary operation - the
direct scour - against
the obstacle that the tidal
drift but feeble influence
It may be that no support
direct scour can be main-
tained in the hot weather
of the rainy season
perhaps we perhaps say
for the other operation - if
there is a scour it is a
little perhaps that we lose
it at the upper end of a
large tidal reservoir

12
instead of directing it against
the sand bank at the mouth
which the tidal scour fails
to deal with very effectually
an evidence of the difference
of depth of water between
the bar when the river
scour is on as compared
with that when it is not
we only a the tidal scour
of the ebb tide
I am not inclined
to adopt as an expedi-
ent expression of the
of Mr. the note of the Ch.
Chief - but probably it is
not intended to print
it as such
HJ

FOR ORDERS.

5969-

128
Note by Chief Engineer, P. D. D.
dated 5th July 1877

The District Engineer
attached too much im-
portance to the scouring
action of the river when
in flood. The scour pro-
duced by an occasional
flood is no doubt bene-
ficial and works may
be devised for increasing
the effect, but it is the
tidal ebb that must
be looked to at Vizaga-
patam as elsewhere for
keeping the bar open.
It is true that the dif-
ference between high
and low tide there is
only

only $4\frac{1}{2}$ feet; but that should be enough, with a good tidal reservoir, to maintain a fair depth of water. To maintain the strength of the ebbing current the tidal reservoir should not be encroached on, and therefore the work of reclamation that has been commenced will need to be carefully watched.

The different effects of floods and of tidal scour may be seen at Cuddalore where three rivers fall into the sea within about two miles of each other. It is the mouth of the smallest of the three rivers that alone

This point is very generally and is the mouth of the Cavery river. It is a very good channel for the river. It is the mouth of the river.

alone remains open permanently, because it has a tidal estuary of fifteen or sixteen miles in length. The other rivers which drain a much larger extent of country close soon after the subsidence of the floods. The tidal rise and fall at Cuddalore is considerably less than at Vizagapatam.

E A M. J. L. R.
Chief Engineer, P. N. S.

H. A. L.

[Faint handwritten text, likely bleed-through from the reverse side of the page]

18 July 77

R-11-7-77

No 451 W

Public Works Department.

PROCEEDINGS OF THE MADRAS GOVERNMENT.

Under date the 18 July 77

Read the following:-

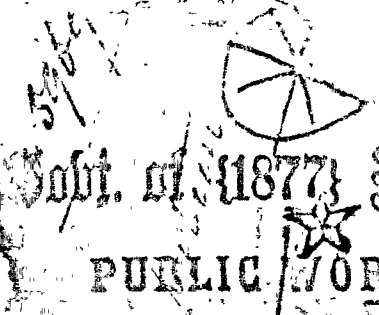
From the Dist. Eng. Vizagapatnam (H. C. 1st 567) dated 13th June 1877.
 Note by Chief Engineer R.W. (H. C. 1st - dated 5th July 1877).

Recorded and com-
 -municated to the Collector
 of Vizagapatnam and the
 Master Attendant.

CAF
 17/7

Dist. Vizagapatnam ✓
 to ✓
 Revenue Dept - 25.7.77
 26.7.77

7-7-77
26-2-19



Govt. of India
PUBLIC WORKS.

To

Dated

Issued

Recd.

Encl.

G. O. 18-July 1877, No. 4874

Nos. 269-270

Vizagapatam Harbours.

Subject. Papers regard-
ing relative to the —
and the reclamation of the
lump in the backwater.
Recorded & communicated
to the Collector of Vizagapa-
taram & the Master, Alton
and Madras.

2 Plans given
to Librarian

7-77