

*Proceedings of the Madras Government, Public Works Department,
22nd April 1870.*

Read the following letters —

No 282 From the Master Attendant, Madras, to the Acting Chief Secretary to Government, dated Madras, 18th January 1870, No. 234.

I HAVE the honour to acknowledge receipt of report of the Assistant Engineer in charge of the Public Works at Cochin, dated 23rd November 1869, No 103, and the Government Order thereon. I have previously been furnished likewise with a copy of the Assistant Engineer's letter, dated 27th September 1869, and the orders passed thereon.

2 I regret that these reports were not, before passing the orders, sent to the Marine Department for remarks, as I then could have afforded information, which might have materially altered the decision of Government.

3. After carefully perusing these reports, and comparing them with the trustworthy information I have, from time to time, received from Cochin, and with my personal knowledge of the requirements of that port, it is my duty to point out to Government the grave inaccuracies of these reports, and the information submitted therein

4. I have also to remark on the reticence preserved by the Assistant Engineer in these reports, regarding certain experiments which have been tried by him, and which have proved utter failures.

5. I respectfully beg to remind Government that, in the reports of the Cochin Harbour Committee, dated 26th October* and 9th December 1868,† all the protective works recommended were to

* No 4,208.
† „ 445.

be entirely of stone, and that Government approved “of all the suggestions and recommendations” of the Committee, with the exception of the proposed construction of stone groynes, Nos. 15 and 16, intended for the closing up of the “Cruz Milagree” Gap, the Secretary to Government, Department of Public Works, having recommended that the modussil system should be tried “before adopting the more costly expedient of constructing stone groynes.” Pending the decision of the Government of India, however, all the works were to be stopped, excepting the extension of the main groyne at Vypeen Point, and the closing up of the gap “Cruz Milagree,” which latter work was to be effected as speedily as possible, and since then the imperative necessity of closing up that gap has been insisted on in various orders of Government.

6 I must now report to Government that the Assistant Engineer at Cochin, instead of carrying out the extension of the Vypeen Main Groyne, has, for months past, been trying expensive experiments in attempting to curb the ocean-wave with

† One groyne entirely disappeared, the other a wreck—*Vide* Order of Government, (Civil Works, No 129,) Public Works Department, dated 31st May 1869, No 1,785.

tatties, bamboos, and banks of sand, all of which have been entirely swept away, leaving no traces behind, the wooden groynes having, nearly to the same extent, shared the same fate ‡

7. In these reports under notice, no information is given regarding the complete failure of these experiments, and yet the State will have to pay for them in some shape or other.

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8 I have further to report on all that has been done by the Assistant Engineer, in obedience of these imperative orders of Government, as aforesaid. The Vypeen Main Groyne, the work of paramount importance, has been extended only forty feet, part of the materials (108 tons) used in the extension of that groyne having been previously collected by the Master Attendant, and the remainder of the materials having, without permission, been taken off the completed portion of the groyne which had been constructed by Captain Castor, and was approved of by the Harbour Committee. The consequences of this interference with the main groyne have been pernicious. The water at high tides now washes over it, thereby impairing its efficiency.

9. With the exception of this small extension of the main groyne, partly at the expense of its efficiency, little has been done in accordance with the orders of Government based on the report of the Harbour Committee, the "Cruz Milagree" Gap still being left untouched, although since the orders of Government to close it up, passed eleven months ago, it has extended to the width of 800 yards.

10. I now beg respectfully to draw the attention of Government to the accompanying reports from the Master Attendant, Cochin, and letter from Mr. Brunton, C. E. resident there, and as these papers completely refute the theories and assumed facts brought forward by the Assistant Engineer in charge of the works, I need not weary Government by analyzing too minutely his assumptions and conclusions founded thereon, but will only point out the most apparent contradictions in his official reports.

• No 103.

11. In his letter of the 23rd November 1869, * he touches on the advantage of local experience, meaning his own, and compares it with that of casual visitors, but when we come to facts, we find that when he writes his experience consists of a sojourn at Cochin of six months; the experience of those who differ with him extending over periods of 12, 20, and 40 years.

12. I must now respectfully point out to Government that the futile experiments tried by the Assistant Engineer in attempting to control the ocean-wave with batties, bamboos, banks of sand, and wooden groynes, all of which have proved utter failures, and which were predicted by the initiated to be failures, prove that the Assistant Engineer must be entirely at fault in his theories of the action of the sea on the west coast of India; and that his opinions, in opposition to those of the Harbour Committee and of all men of experience who know the coast, ought not to be entertained, nor his recommendations adopted.

13 Another grave inconsistency in the action of the Assistant Engineer must be prominently brought forward. At the time he was witnessing the gradual sinking of groynes Nos 1 and 2, he lowered the height of the Vypeen Main Groyne, which had been raised to a proper height (having then sufficient funds) to allow of a certain amount of depression; and, in consequence of thus lowering it, the sea waves now wash over the groyne at high tides.

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14. Again in parts of the Assistant Engineer's report he deprecates the construction of groynes, and in other parts recommends them; he also proposes sea-walls or revetments. I have not the slightest objection to revetments after the coast is made safe by the action of groynes, but where is the money to come from? The Assistant Engineer persistently alludes to "short groynes," denying their utility. I am not aware of any short groynes having been recommended by the Harbour Committee. The required lengths recommended in their reports ranged from 150 to 600 feet.

Note—In Madras the North Beach revetment or "De-Haviland's Bulwark" was sufficient for the protection of the beach road and the town, until the sea encroached, then it proved insufficient, and for the safety of the town of Madras the present groynes were run out and well they have done their work.

or revetments. I have not the slightest objection to revetments after the coast is made safe by the action of groynes, but where is the money to come from? The Assistant Engineer persistently alludes to "short groynes," denying their utility. I am not aware of any short groynes having been recommended by the Harbour Committee. The required lengths recommended in their reports ranged from 150 to 600 feet.

15. In regard to the question of littoral currents his statement in the first sentence of paragraph 14 of his report* is contradicted in the third, and as long as we accept the testimony of the great Navigator and Hydrographer, "Horsburgh," and of those who know the west coast of India, it is a waste of time to argue this question.

16 I now respectfully request that a statement showing the entire cost of the operations at Cochin, since the Department of Public Works took charge of them, be furnished to the Marine Department for information, so that the port may not suffer afterwards by unnecessary outlay being debited to Port Funds.

17. According to the orders of Government, dated 11th February 1869,† it is taken for granted that, when the Executive Engineer was appointed to Cochin, it was for the express purpose of carrying out the recommendations of the Harbour Committee,‡ which were adopted by Government, and it was not contemplated that he should strike out a line of his own, and try costly experiments at the expense of the State, and I most respectfully protest against any sum of money being alienated from the General Port Funds, even on a loan, for the execution of any work at Cochin, unless that work is approved of either by the Cochin Harbour Committee or the head of the Marine Department, who was a member of that body.

† Major Shaw Stewart, Madras Engineer
Beresford Anderson, Esq., Chief Engineer,
Madras Railway
H D E Dalrymple, Esq., Master Attendant,
Madras

18. Before closing this letter, I consider it my duty to inform Government that the change of tone and opinions of late apparent in the Assistant Engineer's report, regarding the existing protective works at Cochin,§ can be traced from the date of his quarrels with Captain Castor, Master Attendant, Mr Brunton,

§ *Vide* letters from the Assistant Engineer, dated 28th June 1869, paragraphs 4 and 5, and 16th August 1869, paragraph 2.

Civil Engineer, and in fact with the whole Cochin community.

19. His insinuations cannot alter the facts that not a single experimental work of Captain Castor's has failed, and that he, acting under the orders of Government, saved the town of Cochin.

20. The two southernmost Groynes, though they have sunk, have held the beach together, and money is only required to restore their efficiency to the full extent.

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FORWARDED to the Public Works Department for disposal.

FORT SAINT GEORGE,
24th January 1870.

(Signed) J I MINCHIN,
Acting Chief Secretary.

From J CASTOR, Esq, Master Attendant, Cochin, to H D E DALRYMPLE, Esq, Master Attendant, Administrative Department, Madras, dated Cochin, 7th January 1870, No 3

I HAVE the honour to acknowledge receipt of the Proceedings of Government, * Public Works Department, dated 21st December 1869, and order thereon, No 4,004, forwarded to me for report

* Herewith returned under a separate cover

2 The report of Mr O'Shaughnessy, the Officer in charge of Public Works Operations in Cochin, abounds with theories and assumptions so antagonistic to the views that have hitherto been recognized and acted upon, that I approach the subject with no little difficulty. Much as I desire to avoid any antagonism of opinion with Mr O'Shaughnessy, I feel constrained from a sense of duty when this harbour is in question, to submit my own deliberate convictions based upon more lengthened experience and observation than could have been acquired within the compass of nine months, in order that Government may be in possession of the fullest information on the subject

3 I am unable to offer any opinion on the plans submitted with the report, having merely had a cursory view of them, while in an imperfect state of preparation, for a few minutes

I cannot, however, allow the insinuation as to my reluctance to co-operate with him in taking soundings, to pass without remark. I never sent a pilot to Mr O'Shaughnessy "for a few mornings to heave the lead," as is stated in the report. Mr O'Shaughnessy had, in the first instance, applied direct to the Senior Pilot† for assistance in his operations, and it was subsequently when such aid was being afforded, and at

† See letters from the Pilots and Mr O'Shaughnessy

an unexpected meeting one morning on the public road, I was asked whether I would wish to be present while soundings were taken. I naturally considered that my presence at that stage was unnecessary. In this alone consists the invitation for co-operation. Moreover, I could not willingly have been a party to the operations, in the way in which they were carried on, as the buoys were continually shifting their position and travelling about the harbour. I herewith enclose a letter from the Pilots

4. The last survey of the line of coast extending from this harbour to Narrakul and its roadstead, which was undertaken by me in the height of the monsoon, the duty consisting almost entirely of ocean work, cost Rupees 69-12-9. I state this simply by way of information, to enable you to judge of the comparative cost of the surveys of this coast. The two charts I prepared on that occasion were lithographed by order of Government and are now being sold

5 In paragraph 8 of the report it is argued that there was really no unusual encroachment of the sea at all, that the alarm felt in 1867 and subsequently was unfounded, no cause of apprehension having existed at any time, that the disappearance and reformation of the beach is the normal state of things, and that there exists nothing but the bare possibility of the sea affecting property on the Cochin side of the coast. This is simply hazarding assertions which are not borne out by facts and run counter to the experience of competent judges on the spot. That a public road and a vast extent of breach that formed for years a place of public resort and recreation should have been engulfed within a few months, and that the sea actually entered private dwellings, are by no means a phenomena of an ordinary character, and if this did not give cause for alarm it would be difficult to find occasions that call for earnestness of action. I will venture to say that never before were the foundations of the old fortifications laid bare by the scouring away of the superincumbent mass of sand in which they were imbedded. And it would be impossible to say why the uncontrollable forces that have gradually swept away one-half of the Vypeen side within the last twenty years, should not exert a similar disastrous influence on the town side.

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The threatening indications in the latter direction in 1867 were obvious to the view of the most casual observer, and it is the firm conviction of able judges that the remedial measures then adopted have been the means of saving the town. The advance of the sea in 1850 was merely superficial, but no scouring effects were visible as at present, and it is this dangerous feature that has rendered the late encroachment permanent and alarming. At least some data should be assigned to the alleged occasional deposit of "the spur of sand" and its rapid disappearance, but no deposit or abrasion is known to any one since 1850. If, however, the theory be correct that nothing beyond the ordinary fluctuations of the sea have occurred, it is difficult to conceive the expediency of laying out Rupees 10,000 to stave off a bare possibility of contingencies, which are declared to be improbable

6 With reference to paragraph 9, I cannot agree that no efforts were made for the last "thirty years" to prevent encroachments on the Vypeen coast. It was only as late as 1862 that Sir William Denison accompanied by Mr Franklin, Superintendent of Marine, Captain Bean, then District Engineer, and Mr Kennedy of the Engineer Department, visited Vypeen. The two latter Officers reported and suggested remedial measures, and subsequently some works were undertaken under the direction of the Public Works Department. The experiment, however, proved entirely futile, and the frail nature of the work and consequent failure were brought to notice in my Annual Reports of 1863-64 and 1864-65. I am unable to conceive any motive on the part of the Sircar to have a harbour of its own beyond the control and supervision of the British Government. It certainly could not be desired for political objects, and in a commercial point of view it has now no interests that are not interwoven with those of our Government. Even if a knowledge of the interportal relations subsisting between the two Governments did not point out the utter inutilty to the Sircar of having a harbour of its own in close proximity to ours, ordinary intelligence could not have failed to show the physical obstructions to the formation of any harbour near the gap, and the gratuitous nature of the assumption as to the Sircar's motives. I am bound to say that in the course of my communications with the Dewan of Cochin on the subject of these encroachments, I have always observed the greatest anxiety on his part to co-operate in carrying out any practical scheme that might be approved of. At his interviews with the members of the Harbour Committee, I believe he expressed the desire of His Highness' Government to contribute one-half of the cost of filling up the Cruz Milagree Gap.

7 In paragraph 11, Mr O'Shaughnessy dwells on the unreliable nature of the opinions that may be formed by casual visitors to the port. But I must be permitted to say that the members of the Harbour Committee and other Officers who reported on the requirements of this port were competent professional men, who did not base their conclusions upon an ephemeral view of things, but upon careful comparison of the former and present condition of the coast, a consideration of the local and general laws that govern tidal action, and deductions drawn from the result of protective harbour works in other places. Such opinions must be entitled to much weight

I am of course at issue with Mr O'Shaughnessy as to the comparative merits of groynes, as recommended by the Harbour Committee, and Colonel Walker's plan of a revetment of rough stone. The sea-wall commenced by Colonel Walker in front of the lighthouse, by throwing rough stones at the foot of the rampart over a distance of about 80 yards had advanced considerably at the time of His Excellency the Governor's visit, and it was apparently so ineffectual to resist the encroachment that the sea actually swept above it and carried away a portion of the rampart, and it was consequently resolved to construct groynes which all experience proved to offer the best resistance to Marine action. I maintain, and many will bear me out, that while the groynes have checked the encroachment on the town and rampart in a serious crisis, not a vestige of the sea wall alluded to can now be seen, it is only occasionally visible and there is nothing to show that it contributed in any way to the safety of the lighthouse or the town. My experience entirely negatives the statements in the 11th paragraph of the report that in "rough weather the coast is cut away from between the groynes, quite as speedily as where there are no groynes, if not more so." I am also unable to accept the statement "that when deposits form between the groynes, they generally form all along the coast

to a similar extent," as it is an obvious fact that when silt was largely thrown up in the locality of the groynes, a cocoanut tope a mile to the south of the groynes was being rapidly cut away and the beach eroded to a very great extent

8 In the 14th paragraph of the report the existence of littoral currents is entirely denied, but after many years of practical experience I entirely disagree with this denial. A very strong in-shore current prevails in the neighbourhood of this harbour, sometimes with the regular tides, and at other times in an opposite direction. For instance, as the flood sets in from the North-West, there is a strong eddy along the shore running from the southward, varying in velocity from two to three miles. This is very perceptible on the southern side of the harbour. But the northern side being formed of shallows and banks with small boat channels between them, the eddy tide is not so equable, but merges with the regular tides. I am unable to realize the idea that the good effect of the current acting against a groyne in one direction would be counteracted by the change of the current in another. Where no groyne existed and the tide has a clear sway the accumulation of silt at any particular point cannot of course be reckoned upon, but when a groyne of sufficient length intercepts the course of the tides, the deposit formed on one side of it cannot be effected by a counter stream.

9 The theory of "tidal currents" enunciated in the 14th paragraph, if it has any intelligent meaning, would seem to overthrow the former part of Mr O'Shaughnessy's position in the same paragraph, and prove the unquestionable existence of a littoral current sufficiently close in shore to take up the abraded soil of the coast. The ocean swell everywhere beats directly and exhausts itself on shore by an immutable law of nature, and no current or tide can ever change the direction of the swell thus exhausting itself, but if it be the case as asserted, that the "swell drives the currents before it so close in shore" as to catch up the loosened silt, there can be no doubt as to the utility of the groynes to intercept the currents so driven and gather up silt so carried about, and favour the formation of deposits. The existence of a shore current can no longer be questioned by this theory.

A sea-wall or revetment is recommended as "the cheapest and most effectual way" to protect the coast from erosion, but this opinion will not I think, bear close examination. It will hardly be disputed that it is most difficult to offer direct resistance to the overwhelming action of the sea. In combating forces that are not subject to any precise calculation, it would be more judicious to divert them into less prejudicial directions or take advantage of known natural laws and local peculiarities. The simple erection of a sea-wall parallel with the line of coast will certainly not create a beach or restore submerged land, while even its resisting powers against the force of the ocean are by no means certain. If nothing can prevent "the sea from coming on to this wall," as is asserted, there is no data, or guarantee, or reason, but simple assertion that it will "go no further" and cut no deeper than "two or three yards," but leave the sands at the bottom undisturbed. If the sea comes up to the "wall," it must exhaust itself by breaking against it, but not on the "water underneath." I submit whether a question of such vital importance and involving so many difficulties should be disposed of by mere arbitrary assumptions, and I respectfully commend the 14th paragraph to a close scrutiny, as any further analysis of it here would give it the appearance of antagonistic criticism.

10 Though the construction of groynes finds no favour with Mr O'Shaughnessy, and the plan is persistently condemned in many parts of the report, yet it is remarkable that the only remedy suggested in paragraph 15 to increase the depth of water on the bar and to cause the reformation of the submerged lands, is no other than the construction of two groynes in continuation of the river banks. The idea, however, is by no means original, as will be seen from the annexed extract of my letter to the Marine Board, dated so far back as the 14th February 1856,

* See papers in the Appendix

No 22, paragraph 8,* wherein a very similar proposition was submitted. I am nevertheless not disposed to view the problem in so simple a light as it is represented in the report, and the whole question would be more fitly and appropriately dealt with by the professional gentleman expected from England.

I would particularly draw your attention to paragraph 16, as I regret to observe that it contains assumptions utterly at variance with well established facts, and such as are likely to mislead and bewilder any one who may take them as data for their guidance. How such hazardous statements and erroneous information which a little local inquiry might have rectified, could have been laid before Government, I do not feel called upon to decide, but I feel it my duty, with a view to counteract their injurious tendency even at the risk of being somewhat prolix, to join issue with some of the more important statements put forth in this paragraph on the subject of this harbour.

It is asserted that but "little deposit" is brought down by the freshes from the backwater, which acts "like a huge settling reservoir," and that the water flows comparatively clear into the sea. This is nothing less than reversing the existing order of things. If the backwater had the characteristic of a "settling reservoir," all its deep channels would long since have been shallowed, and navigation rendered impracticable, but experience shows that this is not the case. The navigation continues unimpeded, no new banks have made their appearance, and the depths remain in the same normal condition in which they have been for years. No one with any knowledge of the ebbs in this harbour can hazard an opinion that the water passes over the bar in a clear stream. The contrary is proved by the fact that during the rainy season, when the volume of land water is at its utmost, the soundings over the bar decrease, showing that deposits take place on it to a more considerable extent than when the subsidence of the monsoon floods slackens the velocity of the scouring stream. I have stated my own experience of the bar, the result of annual examinations made during the last 14 years, but it receives confirmation from the observations of Captain A. D. Taylor, I. N., who surveyed and reported on this bar at the close of 1858. I shall quote from his report dated 6th January 1859: "When the freshes run out of the river, we may be sure there is a great quantity of earthy matter, sand or mud, held in suspension, and much of this must be deposited on the bar where the strength of the ebb is nullified by the heavy swell, thus is the bar at such times piled up and made shoaler."

Another point that is contended for in paragraph 16 of the report is that the discharge over the bar and the velocity of the tides are "almost constant and unvarying throughout the year," whereas one of the most singular facts connected with this harbour is the great irregularity of its tides, and a reference to Captain Taylor's report will confirm this.* This irregularity

* See Appendix

cannot but exist from the nature of things, where there is a heavy rain-fall for about eight months in the year, and Cochin is one of the embouchures of the impetuous freshes that descend in a continuous stream from the Travancore and Cochin Ghats to this part of the coast. At such times, the ordinary course of flood and ebb is suspended, and for days together the flood is scarcely perceptible. But the least cessation of rain diminishes the velocity of the tides, whilst the return of the fall increases it in proportion during the monsoon. Hence it is impossible to expect an equable force and volume of the tidal stream throughout the year. It is a great mistake to suppose, (as is asserted), however, that an "extent of country not less than 5,000 square miles" is drained by

† The extent of Cochin is 1,100 square miles, that of Travancore is 4,300 square miles

the Cochin river. This† figure would embrace the entire area of the Travancore and Cochin States, land and water, hill and dale, but it is

utterly erroneous to state that the Cochin harbour offers the only means of escape for all the waters of this vast region. There are two large and permanent openings between Cochin and the Vurkalay barrier where the backwater is cut off to the south, namely, the outlets at Kayencolum and

Nundacara,‡ and to the north, at Ponany, Chowghaut, Villengode, and Cranganore. If

‡ There is a third opening at Paroor, but it is closed during three months in the year

I include Cochin and Cruz Milagree Gap, there

are no less than eight principal outlets for the discharge of the backwater streams, besides several very impetuous minor ones that are open only during the rainy season. With the incontestable existence of so many outlets to the sea for draining off the backwater through its entire extent, the calculation as to the escape of "forty millions of cubic yards per hour" through the Cochin Harbour seems to admit of considerable modification.

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11 In paragraph 17 a phenomenon is mentioned, that of the flow and ebb not occurring simultaneously over the whole course of the river, this is not peculiar to Cochin, but an universal feature in all tidal rivers. How the continuation of the one and the same tide beyond a given radius can increase the velocity so as to impede navigation, I am unable to perceive. The reclamations alluded to in this paragraph are carried on only along the shallow borders of the river face in narrow strips, leaving the bed of the river itself undisturbed and the area of the backwater undiminished in any sensible manner, they are beneficial, inasmuch as they give a good direction to the tides and rather concentrate their force by preventing them from diffusing themselves among the shallows flanking the margin of the backwater streams. The interference of the Cochin or Travancore Sircars in this direction does, therefore, not appear to be called for.

12 The harbour works have been continuously progressing here since April last, and the chief remedial measures employed were, I believe, the construction of groynes. Even recently, when the yard of Messrs Pierce, Leslie and Co was seriously threatened, the ultimate expedient was a stone groyne. If, according to the opinion expressed in the report, "the cheapest and most effectual" method of preventing erosion is a "sea-wall," it is difficult to account why it was not adopted in this instance. A sea-wall was attempted on the Vypeen side, but it consisted of sand heaped up from the sea-shore and protected with bamboo trellis work towards the margin of the sea, but this proved a futile experiment as might well have been foreseen. The trial of wooden groynes at Vypeen shared the same fate.

13 I cannot agree with Mr O'Shaughnessy that the danger is past, and that there is no cause for anxiety for the safety of Cochin or the further deterioration of the harbour. I respectfully adhere to the opinion that the defensive works recommended by the Harbour Committee should be carried out in their integrity as early as practicable, and that the question of improvements to the harbour, reserved for the professional judgment of the Engineering Officer expected from England.

14 Meanwhile the immediate measures I would most strongly urge are the restoration of the two groynes south of the light-house that have subsided, for this part of the town demands protection before the setting in of the south-west monsoon, the construction of groyne No 7, recommended by the Harbour Committee, and the necessary urgent works at Vypeen.

*Extracts from Report on the Bar of Cochin by Captain A. D. TAYLOR, I.N., dated
6th January 1859, No 4*

Paragraph 4—"I explain this extraordinary fact thus: one high-water is caused by the wave which, passing eastward of the Maldives, rolls into the Bay of Bengal, and six hours afterwards comes that wave whose course we have just been tracing, thus there is no proper low-water, for, when the first-mentioned tide has ebbed only three hours, the flood of the second tide begins to come in, thus is the small lift or rise and fall of tide accounted for, and it is my firm belief that the great irregularity of the tide at Cochin is also attributable to the same cause, though in a less degree, as here the two tides, that is, the one from the north-west and the one from the south are more nearly, though not completely, coincident in their arrival at Cochin."

Paragraph 6—"Another, and the primary cause of the irregularity in the Cochin tides, must be the evaporation from, and the precipitation upon, that immense extent of backwater region, north, south, and east of Cochin, for it is reasonable to suppose that the water of the backwaters, so quiescent and shallow as it, must suffer more evaporation than does the sea with its nearly equable temperature."

Paragraph 9—"When the fishes run out of the river we may be sure there is a great quantity of earthy matter, sand or mud, held in suspension, and much of this must be deposited on the bar where the strength of the ebb is nullified by the heavy swell, this is the bar at such times piled up and made shoaler."

Paragraph 10—"Now, the extreme rise and fall of tide is 3 feet, which would give 16 feet at highest tide, but the rise is generally not more than 1½ feet, so that 14½ feet is the depth we

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may calculate upon as the average, but at high water there is frequently no wind, or the ebb stream is too strong for a vessel to get in, for here as elsewhere the stream of ebb frequently runs for hours whilst the water is actually rising."

Paragraph 12.—"I have stated above that the tides are irregular, this is the case not only with respect to the streams of ebb and flood, but to the rise and fall, for the flood-stream some times lasts four hours, yet we find the perpendicular rise to be absolutely nothing. I would explain this by supposing that all the flood or in-coming water had gone to compensate for some great amount of evaporation from the extensive surface of the backwaters whose embouchure is at Cochin. This deficiency in the rise is a source of great anxiety to the Master Attendant, for one should naturally expect a rise coincident with an in-going stream of several hours' duration."

(True Extracts)

(Signed) J CASTOR,
Master Attendant

*Extract from a letter from the Master Attendant, Cochin, to the Marine Board, Madras,
dated 14th February 1856, No 22*

Paragraph 8—"The only plan which occurs to me as being the most feasible for carrying out the contemplated object is, in addition to the removal of obstructions in the inner harbour and drawing other streams into it if possible, I would respectfully suggest the advisability of running out two groynes or embankments on the flanks of the channel to the height of the surface of high water, so as to prevent the tides dispersing over the banks or shallows and thus bring them with undiminished force into the fair channel and right over the Bar, which will, in my humble opinion, increase the force of the tides. Besides this, when the ebb tides run with the greatest impetuosity, a small steamer with a ploughing or dredging rake might be worked over the bar for the purpose of loosening the firm sand, and the large body of water running over it with the greatest force would, I think, gradually clear away the sand rendered loose by the rake, and the bar will by this means soon cease to exist. I would, however, incidentally observe that, as the proposed groynes or embankments will require to be run out to some little distance, the execution of the work will necessarily involve a considerable outlay. The feasibility of the plan I have proposed will perhaps scarcely admit of question, as the various appliances that would be requisite for carrying out the design are all within reach."

(True Extract)

(Signed) J CASTOR,
Master Attendant

From Messrs C MEYER and E PINTO, Government Pilots, to Captain J CASTOR, Master Attendant, Cochin, dated Cochin, 28th December 1869

IN reply to your memorandum of this day's date we beg to inform you that we have rendered our assistance to Mr O'Shaughnessy in taking soundings while that officer was surveying the harbour under the following circumstances.—On the 27th September last Mr O'Shaughnessy wrote to one of us, Mr Meyer, a note asking Mr Meyer to call at his office on business, and, on doing so, Mr O'Shaughnessy asked whether we could assist him in taking soundings of the Bar, and promised us ample remuneration for our trouble. After this interview with Mr O'Shaughnessy we at once reported the circumstance to you and solicited your permission to do the work which was granted, but some days expired before our assistance was required. We were again, after about ten days, called by Mr O'Shaughnessy, and he asked us again to assist him in the work of soundings, promising remuneration after it was over. Having been permitted by you to do the work, one or other of us was constantly engaged by turns with Mr O'Shaughnessy, and on two or three occasions when he did not come with his Native Surveyor in taking soundings from the commencement of the work to its completion, we sounded the bar and the outer harbour as far as the north bank of the Cruz Milage gap, and the soundings were altogether given by us. The distance to which soundings were taken was every day indicated by Mr O'Shaughnessy or his Surveyor by his placing small buoys, but we have frequently found the next morning the buoys considerably shifted from their position and scattered about the harbour, having been insufficiently moored.

*Proceedings of the Madras Government, Public Works Department,
22nd April 1870*

2 We beg to enclose the note we received from Mr O'Shaughnessy, and to state that we have not as yet been remunerated as promised by him

From J O'SHAUGHNESSY, Esq., to Mr C MEYER, dated 27th September 1869

I WILL be obliged to you if you will make it convenient to call at my office for a few minutes I want to see you on business

(True Copy)

(Signed) J CASTOR,
Master Attendant

From G BRUNTON, Esq., MICE, to H D E DALRYMPLE, Esq., Madras, dated Cochin,
7th January 1870.

In compliance with the wish expressed by you to Captain Castor, I have much pleasure in giving you my opinion of Mr. O'Shaughnessy's report

2 Constantly occupied as I am, I really cannot spare the time to go into all the details of this report, though I could point out many things which appear to me to be gratuitous assumptions on Mr. O'Shaughnessy's part, and based on no solid foundation of careful and continued observation, but I must leave these matters to be dealt with by Captain Castor, and confine myself to a short general opinion

3 The most noticeable feature is Mr. O'Shaughnessy's persistent depreciation of all previous operations, and his endeavours to show that there never was anything to be feared when other people were alarmed, but that somehow there is even now something which demands outlay, and his further employment in Cochin has led him into some singular contradictions, e g, in paragraph 8 he doubts if any real cause of alarm ever at any time existed, and insinuates that we were all a parcel of fools for fearing what was "no unusual occurrence," (though he can only point out one instance of any similar encroachment of the sea,) while at paragraph 20 he asks for Rupees 10,000 for further works, which are so emergent that their execution "should not be deferred either on account of the state of the finances, or for further professional advice!"

4 In his report Mr O'Shaughnessy harps most unjustly, and I would even venture to say untruthfully, on the inefficiency of the groynes carried out by Captain Castor, at the same time it is a fact that he himself, after trying a lot of childish experiments in mud, sand, and rubbish, has constructed more groynes, and still advocates groynes for the future! Need I say more?

5 I have little to add to the letter I wrote officially to Captain Castor at his request last July My firm opinion is that, when our Governor visited us, and, going out of the usual red tape course, met the emergency with promptness and decision, we were saved And when I say that, though encroachment was making swift strides and had been doing so continuously for months previously, and that the groynes thrown out by Captain Castor stopped that encroachment, I only say what I am sure will be corroborated by every unbiassed individual who was in Cochin at the time

6 What has been done by Mr O'Shaughnessy since has amounted to no more than the imperfect carrying out of the extra groynes and extension of groynes asked for from Government by the merchants and others, and I maintain that, had that work been left in Captain Castor's hands, it would have been done better, more expeditiously, and at less cost

7 As the survey which has cost Rupees 2,000, all I can say is that to me it appears to be just Rupees 2,000 more thrown away, and being doubly tried for the faults of the Department Public Works I am naturally indignant at it What is the value of a minute survey of a coast whose outline is continually shifting? or the record of the depths of water which do not remain accurate for a week?

*Proceedings of the Madras Government, Public Works Department,
22nd April 1870.*

8 I am only interested in the matter as it affects my property in this town Were the sea to come in much further I should be ruined along with many others, and that makes me speak out Naturally I want the "right man in the right place," and I believe I am a tolerably good judge of what is best for myself, and consequently best for others in the same predicament

(True Copy)

(Signed) H. D. E DALRYMPLE,
Master Attendant.

No. 283. From H. D. E. DALRYMPLE, Esq., Master Attendant, Madras, to the Chief Secretary to Government, dated Madras, 14th March 1870, No. 1,221.

I HAVE the honour to report my return to Madras on the 4th instant from

* In letter, dated 17th November 1869, No. 6,384

† Committee

Peresford Anderson, Esq., Chief Engineer,
Madras Railway
Major Shaw Stewart, Royal (Madras) Engineers
H D E Dalrymple, Esq., Master Attendant,
Madras

Cochin, which port I visited in accordance with my proposal to Government,* for the purpose of inspecting and reporting on the works recommended by the Committee† sent there by Government in 1868.

2. During my residence of six days at Bolghotty I daily inspected minutely all the works carried out by the Marine Department as well as those by the Department of Public Works

3. I have now the honour to submit the following report —

No. 1 — The southernmost groyne, which is now covered up with sand, having settled down has gained a width of beach of ninety (90) feet.

References can be made to charts now in the possession of Government, in which the groynes are delineated In this report they are numbered consecutively from the southernmost groyne

No. 2 — Having also settled down is, with the exception of a few stones, in a like manner covered with sand, but has,

notwithstanding this, regained width of beach 200 feet.

No. 3 — Off the Light-house, 170 feet.

Nos. 4, 5, and 6 — 100 feet each.

4. At low-water spring tides you can walk round the outer ends of the four latter groynes, and nothing is required but to lengthen them and the two others,† as recommended by the Harbour Committee As far as they go, they have fully answered the purpose for which they were intended.

5. The short groyne (No. 7) carried out by the Assistant Engineer from the south side of Messrs Pierce, Leslie's yard, and which was originally recommended by the Committee, has been equally successful.

6. I now regret to be obliged to report that, on leaving the south side of the harbour to go over the works on the other side, there is an end to any satisfactory information I can lay before Government On the south side of the harbour the works carried out by the Marine Department have been allowed to remain intact, and they have all proved eminently successful, as I have shown; but on the north side it has been very different.

*Proceedings of the Madras Government, Public Works Department,
22nd April 1870.*

7 When the works were handed over to the Assistant Engineer, the Vypeen

EXTRACT of report from Captain Castor, dated 5th June 1869, after the monsoon had set in with unusual violence —

"The Vypeen groyne has stood immovable. It is rapidly accomplishing what I looked forward to at the commencement of the work, namely, the silting up of the surrounding shallows." This is corroborated by the Assistant Engineer in letter dated 12th June 1869, No 22

the Assistant Engineer dismantled the small groyne No 8, destroying it altogether, and after, according to orders, carrying out the Vypeen main groyne No 9 forty feet, he not only stopped further extension of the work but lowered it so much in height as to enable the sea at high water to wash clean over it. The consequences of these operations have been disastrous, all the reclaimed land having been lost and the houses washed away.

8. In regard to the experimental works to the northward of the Vypeen point, it is not within my province to report on them, but it is my duty to inform Government regarding the channel reported to have been closed in the Assistant Engineer's letter to Government dated 27th September 1869, No 78.

9. I have twice, in company with Captain Castor, passed through the channel in question in the port boat, taking soundings with the hand lead and bamboos, and the results are the following —

Width of channel, between the experimental ballast and bamboo groyne* and

* Note —The sea washes over this groyne sand-bank or "foreshore," 480 feet, even at low water, and, after the south-west monsoon sets in, it will disappear altogether depths at low water, varying from 6 to 5 feet.

Width of channel, between Vypeen main groyne and sand-bank or "foreshore," 580 feet; depths varying at low water from 16 to 6 feet.

10. By these figures it will appear that, instead of this boat channel being closed, it is wider than in October 1868, and the depth close to the Vypeen main groyne greater by 3 feet.

11. If the money which must have been spent on the experimental works had been laid out, according to the orders of Government, on the extension of the

Note —Not a stone on any groyne laid down by the Marine Department has been moved by the action of the sea Vypeen main groyne, all would have prospered, and every rupee would have been well laid out, instead of, as now, the whole of the disbursement on the experimental works being a dead loss to Government.

12. In regard to the Cruz Milagre gap I have twice inspected it, and I regret to report that its extreme width is now about 800 feet—the depths of water increased in some places to 26 and 27 feet

13. If action had been taken a year ago in closing it up with stone as recommended by the Committee, a large sum of money would have been saved, and by this time it would have been closed

14. I now earnestly recommend that measures be taken, as soon as possible, to close it up

*Proceedings of the Madras Government, Public Works Department,
22nd April 1870.*

15. During an interview I had with the Dewan, he readily promised Rupees 30,000 out of the Cochin Exchequer for the purpose of closing the gap, the British Government being answerable for the same amount; and now is the time to begin operations before it is too late.

16. It is now my duty to report to Government respecting the alleged breach on the Vypeen side, which was reported to Government by telegram from the Assistant Engineer in charge, and which was afterwards officially described in letter dated 15th January 1870,† as closed up.

† No 126

17. When a copy of that telegram was furnished me, thinking it strange that a sudden encroachment of the sea should have occurred at that season of the year and I should have heard nothing of it, I immediately telegraphed to Captain Castor for report, and, in his reply by telegram, he informed me that no fresh breach existed.

18. I afterwards received by post a full report informing me that, after he had inspected the whole line of coast from Vypeen point to Cruz Milagre gap, he could find no fresh breach of any description, and that none had occurred

19. After due consideration I deferred making any report to Government till I had visited the place, which I did on the 24th ultimo

20. After having inspected the whole line of coast on the Vypeen side, both in boat and on shore, without finding any traces of late encroachment or gap, I assembled the villagers residing there and interrogated them through an interpreter, and the result was the following.

21. They, one and all, including the headman of the village, declared that there had been no breach of any sort whatever in that locality since the one existed, which was closed by Captain Castor eighteen months ago

22. Before closing this report I consider it my duty, as it affects the safety of the port of Cochin, to call the attention of Government to an operation lately undertaken on the Vypeen side of the harbour.

23. I beg to refer Government to the chart of the harbour and backwater, termed plan No. 2, in which is delineated a canal cut into the Peninsula, now the island of Vypeen. I inspected this canal and found that it had been carried

* Note —I measured twelve paces, but have through the strip of land to within less than forty feet* of the ocean wave My given a margin of four feet remark on the spot was, "Here is a breach made easy," and I do not think I can now characterize the work more truly.

24. A sudden encroachment of the sea in this locality having only this narrow space to cross would carry everything before it, destroying a whole village through which the canal has been cut, and another Cruz Milagre gap would be the result.

25. I asked the Dewan why he had permitted this canal to be cut through the Rajah's territory, and his reply was that leave to cut it had neither been asked

*Proceedings of the Madras Government, Public Works Department,
22nd April 1870.*

nor obtained, and that he could not complain against an Engineer acting under the orders of the British Government. Nothing could have been easier than to have laid down a wooden tramway (which could at any time have been removed at a trifling cost) across the strip of land, whereas the expense of cutting this canal, and that of filling it up, which must be done some day, will cost a good deal of money.

26 Trusting that in the foregoing report I have confined myself as much as possible to a plain statement of facts regarding the works vitally affecting the interest of the port of Cochin.

No 284.

ORDER THEREON, 22nd April 1870, No. 1,062.

CIVIL WORKS, No. 31.

ON a careful perusal of these papers the Government remark that great discrepancies appear on matters of fact between the statements sent in by Mr. O'Shaughnessy and Mr. Dalrymple in regard to the operations undertaken for the protection of the Vypeen Island under the direction of the Department of Public Works, with reference particularly to the alleged occurrence, or apprehension of a breach in the island, as well as to the closing of a channel between the end of the groyne No 9, to the north of the harbour passage, and the shoal lying off the coast at that point.

2. The Government consider it necessary that an inquiry should be instituted with the view of reconciling these contradictory statements, if possible, or, if not, of determining the exact facts of the case. For the duty of making this inquiry His Excellency the Governor in Council resolves to select Colonel Carpendale, R. E. These Proceedings, with all previous papers relating to recent protective operations at Cochin, will accordingly be communicated to that officer, whose particular attention will be called to paragraphs 8 to 10 and to paragraphs 16 to 21 of Mr. Dalrymple's letter of the 14th March 1870, No. 1,221, and he will report on the discrepancies between the statements there made and those in Mr. O'Shaughnessy's letter of the 27th September 1869, No. 78, his telegram of the 4th January 1870, and his letter of the 15th January 1870, No. 126.

(True Extract.)

Colonel, R. E.,

Secretary to Government.

To Colonel J Carpendale, R E
,, the Marine Department
,, Officer in charge of Public Works Operations at Cochin
,, Controller of Public Works Accounts.

Exl A S Rogers.

*List showing the Orders of Government sent to Colonel
regarding the Cochin Harbour.*

*G.O. No. 1021. Dated 31st March 1868.
" 1133 " 15th April 1868.
" 1886 " 15th June 1868.
" 1991 " 25th " "
" 2272 " 17th July 1868.
" 2967-42968 " 19th September 1868.
" 453 " 11th February 1869.
" 462 " 12th " "
" 1003 " 24th March 1869.
" 1261 " 15th April 1869.
" 1785 " 31st May 1869.
" 1877 " 2nd June 1869.
" 2086 " 28th June 1869.
" 2694 " 15th August 1869.
" 2814 " 27th " "
" 3407 " 22nd October 1869.
" 4004 " 21st December 1869.
" 35A " 5th January 1870.
" 353 " 28th " 1870.*

No 3.

Master Attendants office
Cochin 7th January 1870

H. D. & Dalrymple, Esquire
Master Attendant
Administrative Department
Madras

Sir,

I have the honor to acknowledge receipt of the Proceedings of Government, Public Works Department, herewith returned under a separate cover dated 21st December 1869, and order thereon, to Rs 4004, forwarded to me for report.

2. — The report of Mr. O'Shaughnessy, the officer in charge of Public Works operations in Cochin, abounds with theories and assumptions to antagonize to the views that have hitherto been recognized and acted upon, that I approach the subject with no little difficulty. — Much as I desire to avoid any antagonism of opinion with Mr.

O'Shaughnessy, I feel constrained from a sense of duty when the harbour is in question, to submit my own deliberate conclusions based upon more lengthened experience and observation than could have been required within the compass of nine months, in order that Government may be in possession of the fullest information on the subject.

3 — I am unable to offer any opinion on the plans submitted with the report, having merely had a cursory view of them, while in an imperfect state of preparation, for a few minutes.

I cannot, however, allow the information as to my reluctance to cooperate with him in taking soundings, to pass without remark. I never sent a pilot to Mr. O'Shaughnessy "for a few mornings to heave the lead," as is stated in the report. Mr. O'Shaughnessy had, in the first instance, applied direct to the

Senior Pilot for assistance in his operations, and it was subsequently when letters from such and was being afforded, and at the pilots and an unexpected meeting one morning on the public road, I was asked whether I would wish to be present while soundings were taken. I naturally considered that my presence at that stage was unnecessary. — In this alone consists the invitation for co-operation. Moreover, I could not willingly have been a party to the operations, in the way in which they were carried on, as the boats were continually shifting their position and travelling about the harbour. I herewith enclose a letter from the pilots —

4 — The last survey of the line of coast extending from the harbour to Terrakil and its roadstead, which was undertaken by me in the height of the Monsoon, the duty consisting almost entirely of ocean work, cost Rupees 69. 12. 9. — I state this

simply by way of information, to enable you to judge of the comparative cost of the surveys of this coast. — The two charts I prepared on that occasion were lithographed by order of Government and are now being sold.

5 — In para 8 of the report it is argued that there was really no unusual encroachment of the sea at all, that the alarm felt in 1867 and subsequently was unfounded, no cause of apprehension having existed at any time, that the disappearance and reformation of the beach is the normal state of things, and that there exists nothing but the bare possibility of the sea affecting property on the Cochon side of the coast. — This is simply hazarding assertions which are not borne out by facts and are counter to the experience of competent judges on the spot. — That a public road and a vast extent

of beach, that formed for years a place of public resort and recreation, should have been ingulfed within a few months, and that the sea actually entered private dwellings, are by no means a phenomena of an ordinary character, and if this did not give cause for alarm it would be difficult to find occasions that call for earnestness of action — I will venture to say that never before were the foundations of the old fortifications laid bare, by the scouring away of the superincumbent mass of sand in which they were imbedded. — And it would be impossible to say why the uncontrollable forces that have gradually swept away one half of the Tyrrhen side within the last 20 years, should not exert a similar disastrous influence on the Corn side. — The threatening indications in the latter direction in 1867 were obvious to the view of the most casual observer, and it is the firm conviction of able judges

6
that the remedial measures then adopted have been the means of saving the Town. — The advance of the sea in 1850 was merely superficial, but no scouring effects were visible as at present; and it is this dangerous feature that has rendered the late encroachment permanent and alarming. — At least some data should be assigned to the alleged occasional deposit of "the spur of sand" and its rapid disappearance, but no deposit or abrasion is known to any one since 1850. — If, however, the theory be correct that nothing beyond the ordinary fluctuations of the sea have occurred, it is difficult to conceive the expediency of laying out Charges 10,000 to stave off a bare possibility of contingencies, which are declared to be improbable —

6 — With reference to para 9, I cannot agree that no efforts were made for the last "30 years" to prevent encroachments on the Tyneen coast. — It was only as

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late as 1862 that Sir William Barron accompanied by Mr. Franklin, Superintendent of Marine, Capt. Bear, then District Engineer, and Mr. Kennedy of the Engineer Department, visited Tyneen. — The two latter officers reported and suggested remedial measures, and subsequently some works were undertaken under the direction of the P.W.D. — The expenditure, however, proved entirely futile, and the final nature of the work and consequent failure were brought to notice in my Annual Reports of 1863, '64, and 1864, '65. — I am unable to conceive any motive on the part of the Government to have a harbour of its own beyond the control and supervision of the British Government. — It certainly could not be issued for political objects, and on a commercial point of view it has now no interests that are not interwoven with those of our Government. — Even with a knowledge of the interportal relations subsisting

between the two Governments did not point out the utter inutilty to the dream of having a harbour of its own in close proximity to ours, ordinary intelligence could not have failed to show the physical obstructions to the formation of any harbour near the gap, and the gratuitous nature of the assumption as to the dreamer's motives. I am bound to say that in the course of my communications with the Dewan of Cochin on the subject of these encroachments, I have always observed the greatest anxiety on his part to co-operate in carrying out any practical scheme that might be approved of. At his interviews with the members of the Harbour Committee, I believe he expressed the desire of His Highness' Government to contribute one half of the cost of filling up the Cruz Milagres Gap.

— In para 11 Mr. O'Shaughnessy dwells on the unreliable nature of the opinions that may be formed by casual visitors to the port. But I must be permitted to say that, the members of the Harbour Committee and other officers who reported on the requirements of this port were competent professional men, who did not base their conclusions upon an ephemeral view of things, but upon careful comparison of the former and present condition of the coast, a consideration of the local and general laws that govern tidal action, and deductions drawn from the result of protective harbour works in other places. — Such opinions must be entitled to much weight.

— I am of course at issue with Mr. O'Shaughnessy as to the comparative merits of groynes, as recommended by the Harbour Committee, and Colonel Walker's plan of a revetment of rough stone. — The

sea wall commenced by Colonel Walker in front of the Light-house, by throwing rough stones at the foot of the rampart over a distance of about 80 yards had advanced considerably at the time of His Excellency the Governor's visit, and it was apparently so ineffectual to resist the encroachment that the sea actually swept above it and carried away a portion of the rampart, and it was consequently resolved to construct groynes which all experience proved to offer the best resistance to marine action. I maintain, and many will bear me out, that while the groynes have checked the encroachment on the town and rampart in a serious crisis, not a vestige of the sea wall alluded to can now be seen; it is only occasionally visible and there is nothing to show that it contributed in any way to the safety of the Light-house or the town. — My experience entirely negatives the statements in the 11th para of the report that in "rough weather

the coast is cut away, however between the groynes, quite as speedily as where there are no groynes, if not more so." — I am also unable to accept the statement "that when deposits form between the groynes, they generally form all along the coast to a similar extent" as it is an obvious fact that when silt was largely thrown up in the locality of the groynes, a cocoanut tree a mile to the south of the groynes was being rapidly cut away and the beach eroded to a very great extent —

8 — In the 14th para of the report the existence of littoral currents is entirely denied, but after many years of practical experience I entirely disagree with this denial. A very strong in-shore current prevails in the neighbourhood of this harbour sometimes with the regular tides and at other times in an opposite direction. For instance, as the flood sets in from

the N.W., there is a strong eddy along the shore running from the southward, varying in velocity from two to three miles — This is very perceptible on the southern side of the harbour — But the northern side being formed of shallows and banks with small boat channels between them, the eddy tide is not so equable, but merges with the regular tides — I am unable to realize the idea that the good effect of the current acting against a groyne in one direction would be counteracted by the change of the current in another. — Where no groyne existed and the tide has a clear sway the accumulation of silt at any particular point cannot of course be reckoned upon; but when a groyne of sufficient length intercepts the course of the tides, the deposit formed on one side of it cannot be effected by a counter stream.

— The theory of "tidal currents" —

enunciated in the 14th para, if it has any intelligent meaning, would seem to overthrow the former part of Mr. O'Shaughnessy's position in the same para, and prove the unquestionable existence of a littoral current sufficiently close in shore to take up the abraded soil of the coast — The ocean swell every where beats directly and exhausts itself on shore by an immutable law of nature, and no current or tide can ever change the direction of the swell thus exhausting itself, but if it be the case as asserted, that the "swell drives the currents before it so close in shore" as to catch up the loosened silt, there can be no doubt as to the utility of the groynes to intercept the currents so driven and gather up silt so carried about, and favor the formation of deposits. The existence of a shore current can no longer be questioned by this theory.

— A sea wall or revetment is recommended as "the cheapest and

most effectual way" to protect the coast from erosion, but this opinion will not I think bear close examination — It will hardly be disputed that it is most difficult to offer direct resistance to the overwhelming action of the sea. — In combating forces that are not subject to any precise calculation, it would be more judicious to divert them into less prejudicial directions or take advantage of known natural laws and local peculiarities. — The simple erection of a sea-wall, parallel with the line of coast will certainly not create a beach or restore submerged land, while even its resisting powers against the force of the ocean are by no means certain — If nothing can prevent "the sea from coming on to this wall," as is asserted, there is no data, or guarantee, or reason, but simple assertion that it will "go no further" and cut no deeper than "two or three yards," but leave the sands at the bottom undisturbed. If the sea comes up to the "wall,"

it must exhaust itself by creating against it, not on the "water underneath." I submit whether a question of such vital importance and involving so many difficulties should be disposed of by mere arbitrary assumptions, and I respectfully commend the 14th para to a close scrutiny as any further analysis of it here would give it the appearance of antagonistic criticism. —

10 — Though the construction of groynes finds no favor with Mr. O'Shaughnessy, and the plan is persistently condemned in many parts of the report, yet it is remarkable that the only remedy suggested in para 15 to increase the depth of water on the bar and to cause the re-formation of the submerged lands, is no other than the construction of two groynes in continuation of the river banks — The idea, however, is by no means original, as will be seen

from the annexed extract of my letter to the Marine Board dated so far back as the 14th February 1856, No 22, para 8, wherein a very similar proposition was submitted — I am nevertheless not disposed to view the problem in so simple a light as it is represented in the report, and the whole question would be more fitly and appropriately dealt with by the professional gentlemen expected from England

* See Papers in the Appendix.

10 — I would particularly draw your attention to para 16, as I regret to observe that it contains assumptions utterly at variance with well established facts, and such as are likely to mislead and bewildered any one who may take them as data for their guidance — How such hap. hazard statements and erroneous information which a little local enquiry might have rectified,

could have been laid before Government, I do not feel called upon to decide, but I feel it my duty, with a view to counteract their injurious tendency even at the risk of being somewhat prolix, to join issue with some of the more important statements put forth in this para on the subject of this harbour.

— It is asserted that but "little deposit" is brought down by the fresher from the backwater, which acts "like a huge settling reservoir", and that the water flows comparatively clear into the sea — This is nothing less than reversing the existing order of things. If the backwater had the characteristics of a "settling reservoir", all its deep channels would long since have been shallowed and navigation rendered impracticable; but experience shows that this is not the case — The navigation continues unimpeded, no new banks have made their appearance, and the depths remain in the same normal condition as

which they have been for years - No one with any knowledge of the ebbs in this harbour can hazard an opinion that the water passes over the bar in a clear stream - The contrary is proved by the fact that during the rainy season, when the volume of land water is at its utmost, the soundings over the bar decrease, showing that deposits take place on it to a more considerable extent than when the subsidence of the monsoon floods slackens the velocity of the scouring stream. - I have stated my own experience of the bar, the result of annual examinations made during the last 14 years, but it receives confirmations from the observations of Captain A D Taylor & N, who surveyed and reported on this bar at the close of 1858 - I shall quote from his report dated 16th January 1859 - "When the freshes run out of the river we may be sure there is "a great quantity of earthy matter," "sand or mud, held in suspension," "and much of this must be deposited" "on the Bar where the strength of the"

"ebb is nullified by the heavy swell, thus" "is the bar at such times piled up and" "made shoaler" -

Another point that is contended for in para 16 of the report is that the discharge over the bar and the velocity of the tides are "almost constant and unvarying throughout the year," whereas one of the most singular facts connected with this harbour is the great irregularity of its tides, and a reference to Captain Taylor's report will confirm this - This irregularity cannot but arise from the nature of things, where there is a heavy rain fall for about eight months in the year, and which is one of the embouchures of the numerous freshes that descend in a continuous stream from the Travancore and Cochin ghats to this part of the coast. - At such times the ordinary course of flood and ebb is suspended, and for days together the flood is scarcely perceptible - But the least cessation of rain diminishes the velocity of the tides, whilst the return of the full

* See Appendix

increases it in proportion, during the monsoon. Hence it is impossible to expect an equable force and volume of the tidal stream throughout the year. — It is a great mistake to suppose, (as is asserted) however, that an "extent of country not less than 5000 square miles" is drained by the Cochin river. — This figure would embrace the entire area of the Travancore and Cochin States, land and water, hill and dale, but it is utterly erroneous to state that the Cochin harbour offers the only means of escape for all the waters of this vast region. — There are two large and permanent openings between Cochin and the Turkalay barrier where the backwater is cut off to the south, namely the outlets at Korym and Mundaeara; and to the north, at Porany, Chougheent, Thilengode, and Pranganore. — If I include Cochin and Cruz Malagree Gap, there are no less than eight principal outlets for the discharge of the backwater streams, besides

* The extent of Cochin is 1100 sq. miles, that of Travancore is 4360 sq. miles

* There is a third opening at Panori, but it is closed during three months in the year

several very impetuous minor ones that are open only during the rainy season. With the incontestable existence of so many outlets to the sea for draining off the backwater, through its entire extent, the calculations as to the escape of "forty millions of cubic yards per hour" through the Cochin Harbour seems to admit of considerable modification.

11 — In para 17 a phenomenon is mentioned, that of the flow and ebb not occurring simultaneously over the whole course of the river, this is not peculiar to Cochin, but a universal feature in all tidal rivers. How the continuation of the one and the same tide beyond a given radius can increase the velocity so as to impede navigation, I am unable to perceive. The reclamations alluded to in this para, are carried on only along the shallow borders of the river face in narrow strips, leaving the bed of the river

itself undisturbed, and the area of the backwater undiminished in any sensible manner, they are beneficial, inasmuch as they give a good direction to the tides and rather concentrate their force by preventing them from diffusing themselves among the shallows flanking the margin of the backwater streams — The interference of the Bochu or Spawancore Tiers in this direction does therefore not appear to be called for —

12 — The Harbour Works has been continuously progressing here since April last, and the chief remedial measures employed were, I believe, the construction of groynes. Even recently when the yard of Messrs Perce, Leslie & Co was seriously threatened, the ultimate expedient was a stone groyne. — If, according to the opinion expressed in the report, "the cheapest and most effectual" method of preventing erosion is a "sea wall,"

it is difficult to account why it was not adopted in this instance. A sea wall was attempted on the Tyneen side, but it consisted of sand heaped up from the sea-shore, and protected with bamboo trellis work towards the margin of the sea, but this proved a futile experiment as might well have been foreseen — The trial of wooden groynes at Tyneen shared the same fate. —

13. — I cannot agree with Mr. O'Shaughnessy that the danger is past and that there is no cause for anxiety for the safety of Bochu or the further deterioration of the harbour — I respectfully adhere to the opinion that the defensive works recommended by the Harbour Committee should be carried out in their integrity as early as practicable, and that the question of improvements to the harbour reserved for the professional judgment

of the Engineering Officer expected
from England

14. — Meanwhile the immediate
measures I would most strongly
urge are the restoration of the two
groynes south of the light house
that have subsided, for this part
of the town demands protection
before the setting in of the S.W. Mon-
soon, the construction of groyne
No 7. recommended by the Har-
bour Committee, and the necessary
urgent works at Dyreen.

I have the honor to be

Sr,

Your most obedient servant

Wm Astor
Master Attendant

85.17
Extracts from Report on the
Bar of Cochin by Captain A D
Jaylor S.N. dated 6th January
1859. No 4.

3
Para 4. — "I explain this extraor-
dinary fact thus; one high water is
caused by the wave which passing
Eastward of the Maldives rolls
into the Bay of Bengal; and six
hours afterwards comes that wave
whose course we have just been
tracing; thus there is no proper
low water, for when the first
mentioned tide has ebbed only
3 hours, the flood of the second
tide begins to come in; thus is the
small left or rise and fall of tide
accounted for, and it is my firm
belief that the great irregularity
of the tide at Cochin is also
attributable to the same cause
though in a less degree, as here
the two tides, that is the one
from the NW and the one from
the South are more nearly though

not completely coincident in their arrival at Cochin."

Para 6 — "Another and the primary cause of the irregularity in the Cochin tides must be the evaporation from and the precipitation upon that immense extent of backwater region, North, South, and East of Cochin; for it is reasonable to suppose that the water of the backwaters, so quiescent and shallow as it must suffer more evaporation than does the sea with its nearly equable temperature."

Para 9 — "When the freshes run out of the river we may be sure there is a great quantity of earthy matter, sand or mud held in suspension, and much of this must be deposited on the Bar where the strength of the ebb is nullified by the heavy swell; thus is the Bar at such times piled up and made shoaler."

Para 10 — "Now the extreme rise and fall of tide is 3 feet which

would give 16 feet at highest tide, but the rise is generally not more than $1\frac{1}{2}$ feet; so that $14\frac{1}{2}$ feet is the depth we may calculate upon as the average; but at high water there is frequently no wind, or the Ebb stream is strong for a vessel to get in; for here as elsewhere the stream of Ebb frequently runs for hours whilst the water is actually rising."

Para 12 — "I have stated above that the tides are irregular, this is the case not only with respect to the streams of Ebb and Flood but to the rise and fall; for the flood stream sometimes lasts four hours, yet we find the perpendicular rise to be absolutely nothing. I would explain this by supposing that all the flood or incoming water had gone to compensate for some great amount of evaporation from the extensive surface of the backwaters whose embouchure is at Cochin. This deficiency in the rise is a source of great

anxiety to the Master-Attendant
for one should naturally expect
a rise coincident with an incoming
stream of several hours' duration.

(Two Extracts)

Shu-fu

Master Attendant

80 215
— Extract from a letter from the
Master Attendant, Cochin, to the
Marine Board, Madras, dated 14th
February 1856. No 22. —

Para 8 — "The only plan which oc-
curs to me as being the most feasible
for carrying out the contemplated ob-
ject is, in addition to the removal
of obstructions in the inner harbour
and drawing other streams into it, if
possible I would respectfully sug-
gest the advisability of running out
two groynes or embankments on the
flanks of the Channel to the height
of the surface of high water, so as to
prevent the tides dispersing over
the banks or shallows, and thus
bring them with undiminished force
into the fair channel and right
over the Bar, which will, in my
humble opinion, increase the force
of the tides. Besides this, when

the ebb tides run with the greatest impetuosity, a small Steamer with a ploughing or dredging rake might be worked over the Bar for the purpose of loosening the firm sand, and the large body of water running over it with the greatest force would, I think, gradually clear away the sand rendered loose by the rake, and the Bar will, by the means, soon cease to exist. I would however incidentally observe that, as the proposed groynes or embankments will require to be run out to some little distance, the execution of the work will necessarily involve a considerable outlay. The feasibility of the plan I have proposed will, perhaps, scarcely admit of question, as the various appliances that would be requisite for carrying out the design, are all within reach.

(True Extract)

John Foster

Master Attendant

Cochin 28th December 1869
To Captain Castor,
Master Attendant,
Cochin.

Sir,
In reply to your Memo of this day's date, we beg to inform you that we have rendered our assistance to Mr O'Shaughnessy in taking soundings while that Officer was surveying the harbour under the following circumstances. On the 27th September last, Mr O'Shaughnessy wrote to one of us, Mr. Meyer, a note asking Mr Meyer to call at his Office on business and in doing so, Mr O'Shaughnessy asked whether we could assist him in taking soundings of the bar and promised us ample remuneration for our trouble. After this interview with Mr O'Shaughnessy we at once reported the circumstance to you and solicited your permission to do the work which was granted, but some days expired before our assistance was required. We were again after about ten days called by Mr O'Shaughnessy and he asked us again to assist him in the work of soundings, promising remuneration after it was over. Having been permitted by you to do the work one or other of us was constantly engaged by turns with Mr O'Shaughnessy, and on two or three occasions when he did not come, with his native surveyor, in taking soundings from the commencement of the work to its completion.

14
He sounded the bar, and the outer harbour
as far as the North bank of the bar,
Malaga Gap, and the soundings were
altogether given by us. The distance to which
soundings were taken was every day in-
dicated by Mr O'Shaughnessy or his surveyor
by his placing small buoys but we have
frequently found the next morning
the buoys considerably shifted from
their position and scattered about
the harbour having been insufficiently
moored

We beg to enclose the note we re-
ceived from Mr O'Shaughnessy and
to state that we have not as yet been
remunerated as promised by him

We beg to

Signed / C. Meyer - Senior Govt Pilot
/ E. Pinto - Junior Govt Pilot

Mr. Meyers

Sir,

I will be obliged to you if you
will make it convenient to call at my
office for a few minutes. I want to see
you on business.

27-9-69.

Yours faithfully
Signed / O'Shaughnessy

(True Copies)

Satisfactor
Master Attendant

Cochin 7th Jan. 1870.

Dear Sir

In compliance with the wish expressed by you to Captain Castor, I have much pleasure in giving you my opinion of Mr. O'Shaughnessy's Report.

Constantly occupied as I am, I really cannot spare the time to go into all the details of this report, though I could point out many things, which appear to me to be gratuitous assumptions on Mr. O'Shaughnessy's part, and based on no solid foundation of careful and continued observation, but I must leave these matters to be dealt with by Captain Castor, and confine myself to a short general opinion.

The most noticeable feature is Mr. O'Shaughnessy's persistent depreciation of all previous operations, and his endeavours to shew that there never was any

In a letter from the Master
Attendant at Cochin dated
18th January 1870 at 2.34

From

The Master Attendant
Cochin

Dated 7th January 1870

No. 3

1870/1/10

Explaining in view of the
objection of Mr. O'Shaughnessy
regarding the Cochin Harbour
works.

1870

anything to be feared when other people were alarmed, but that somehow there is even now something which demands outlay, and his further employment in Cochin has led him into some singular contradictions, e.g. in para 8 he doubts if any real cause of alarm ever at any time existed, and insinuates that we were all a parcel of fools for fearing what was "no unusual occurrence" (though he can only point out one instance of any similar encroachment of the Sea) while at Para 20 he asks for Rupees 10,000 for further works which are so emergent that their "execution" should not be deferred either "on account of the state of the finances, or for further professional advice!!"

In his report Mr. O Sharpe most unjustly, and I would even venture to say untruthfully, on the inefficiency of the groynes carried out by Captain Castor, at the same time it is a fact that he himself after trying a lot of childish experiments in mud, sand, and

3
and rubbish has constructed more groynes, and still advocates Groynes for the future!! Need I say more?

I have little to add to the letter I wrote officially to Captain Castor at his request last July. My firm opinion is that, when our Governor visited us and going out of the usual red tape course met the emergency with promptness and decision we were saved. And when I say that though encroachment was making swift strides, and had been doing so continuously for months previously, and that the Groynes thrown out by Captain Castor stopped that encroachment, I only say what I am sure will be corroborated by every unbiased individual who was in Cochin at the time.

What has been done by Mr. O Sharpe has amounted to no more than the imperfect carrying out of the extra Groynes and extension of Groynes asked for from Government by the Merchants and

and others, and I maintain that had that work been left in Captain Castor's hands it would have been done better, more expeditiously, and at less cost.

As the survey which has cost Rupees 2000, all I can say is that to me it appears to be just Rupees 2000 more thrown away, and being doubly taxed for the faults of the D.D.W. I am naturally indignant at it. What is the value of a minute survey of a coast whose outline is continually shifting? Or the record of the depths of water which do not remain accurate for a week?

I am only interested in the matter, as it affects my property in this town. Were the sea to come in much further, I should be ruined along with many others, and that makes me speak out. Naturally, I want the "right man in the right place," and I believe I am a tolerably good judge of what is best for myself, and consequently

best

best for others in the same predicament.

I remain Dear

(Signed) Geo: Brimton M. J. C. E.

H. Dalrymple Esq^r
Madras

(True Copy)

H. D. S. Dalrymple
Master Attendant
Administrative Department

Administrative Department.

Madras

Marine Office

18th January 1870.

N^o 234

From

H. D. Dalrymple Esq^r

Master Attendant

Administrative Department.

To

Madras

J. I. Minchin Esq^r

Acting Chief Secretary to Government

Marine Department

Fort Saint George.

Sir

I have the honour to acknowledge receipt of Report of the Assistant Engineer in charge of the Public Works at Cochin dated 23^d November 1869, and the Government order thereon. I have previously been furnished likewise with a copy of the Assistant Engineer's letter dated 27th September 1869, and the orders passed thereon.

I regret that these Reports were not, before passing the Orders, sent to the Marine Department for remarks, as

In a letter from the Assistant
Master Attendant dated
18 January 1870 at 234

from

H. D. Dalrymple Esq^r C.E.
Cochin

dated 7 January 1870

M. D. 18/1/70.

Also his opinion on the
Marine Department's report
by the Cochin Harbour works.

In from 1870.

as I then could have afforded information, which might have materially altered the decision of Government.

3 After carefully perusing these reports and comparing them with the trustworthy information I have from time to time received from Cochin, and with my personal knowledge of the requirements of that port it is my duty to point out to Government the grave inaccuracies of these reports and the information submitted therein.

4 I have also to remark on the reticence preserved by the Assistant Engineer in these reports regarding certain experiments which have been tried by him and which have proved utter failures.

5 I respectfully beg to remind Government that in the Reports of the Cochin Harbour Committee dated 26th October and 9th December 1868, all the protective works recommended were to be entirely of stone, and that Government approved

x N. 4208
* N. 445

57
approved "of all the suggestions and recommendations" of the Committee, with the exception of the proposed construction of stone groynes. Nos. 15 and 16, intended for the closing up of the "Cruz Melagree" gap, the Secretary to Government, Department of Public Works, having recommended that the Modussil system should be tried before adopting the more costly expedient of constructing stone groynes. Pending the decision of the Government of India, however, all the works were to be stopped, excepting the extension of the Main Groyne at Tyreen point, and the closing up of the Gap "Cruz Melagree" which latter work was to be effected as speedily as possible, and since then the imperative necessity of closing up that gap has been insisted on in various Orders of Government.

6. I must now report to Government that the Assistant Engineer at Cochin, instead of carrying out the extensions

extension of the Vypeen Main groyne, has, for months past, been trying expensive experiments in attempting to curb the Ocean wave with batties, bamboos and banks of sand, all of which having been entirely swept away, leaving no traces behind, the wooden groynes having, nearly to the same extent, shared the same fate.

* One groyne entirely disappeared, the other a wreck. vide Order of Govt. (Civil works) No. 129, dated 31st May 1869 N. 1785

7 In these reports under notice, no information is given regarding the complete failure of these experiments, and yet the State will have to pay for them in some shape or other.

8 I have further to report on all that has been done by the Assistant Engineer, in obedience of these imperative Orders of Government, as aforesaid. The Vypeen Main Groyne, the work of paramount importance, has been extended only 100 feet, part of the materials (108 tons) used in the extension of that groyne having been previously collected by the Master Attendant, and

and the remainder of the materials having, without permission, been taken off the completed portion of the groyne, which had been constructed by Captain Castor, and was approved of by the Harbour Committee. The consequences of this interference with the Main groyne have been pernicious. The water at high tides now washes over it, thereby impairing its efficiency.

9 With the exception of this small extension of the Main groyne, partly at the expense of its efficiency, little has been done in accordance with the orders of Government based on the Report of the Harbour Committee, the "Cray Milagree" Gap still being left untouched, although since the Orders of Government to close it up, passed eleven months ago, it has extended to the width of 800 yards.

10 I now beg respectfully to draw the attention of Government to the accompanying reports from the

Master

Letter from the Master Attendant Cochin to the Master Attendant Administration Department Madras dated 7th Jan. 1870 No. 3. original. J. B. E. to H. B. E. from Gen. Brumton Esq. 4th Feb. 1870. J. B. E. to Esq. dated Cochin 7th Jan. 1870. Copy

Master Attendant Cochin, and letter from Mr. Drimton, Civil Engineer, resident there, and as these papers completely refute the theories and assumed facts brought forward by the Assistant Engineer in charge of the works, I need not weary Government by analyzing too minutely his assumptions and conclusions founded thereon, but will only point out the most apparent contradictions in his Official Reports.

11 In his letter of the 23^d Novem-
ber 1869 he touches on the advantage of local experience, meaning his own, and compares it with that of casual visitors, but when we come to facts, we find that when he writes his experience consists of a sojourn at Cochin of six months — the experience of those, who differ with him, extending over periods of 12-20 and 40 years.

12 I must now respectfully point out to Government that the futile experiments tried by the Assistant Engineer in attempting to control the ocean wave with lathies, Bamboos, banks of sand

63
sand and wooden groynes, all of which have proved utter failures, and which were predicted by the initiated to be failures, prove that the Assistant Engineer must be entirely at fault in his theories of the action of the Sea on the West Coast of India, and that his opinions, in opposition to those of the Harbour Committee and of all men of experience, who know the Coast ought not to be entertained, nor his recommendations adopted.

13 Another grave inconsistency in the action of the Assistant Engineer must be prominently brought forward. At the time he was witnessing the gradual sinking of groynes Nos 1 and 2, he lowered the height of the Vyppen Main Groyne, which had been raised to a proper height (having then sufficient funds) to allow of a certain amount of depression — and in consequence of thus lowering it, the sea waves now wash over the groyne at high tides.

Again

14 Again in parts of the As-
-sistant Engineer's report he depreciates
the construction of groynes, and in
other parts recommends them - he
also proposes sea walls or revetments.
I have not the slightest objection
to revetments after the
Coast is made safe by
the action of groynes -
but where is the money
to come from? The As-
-sistant Engineer per-

Note.
In Madras the North Beach
revetment or De Cavilands Bulwark
was sufficient for the protection
of the beach road and the town
until the sea encroached; - then
it proved insufficient for the
safety of the town of Madras
the present groynes were run
out and well they have done
their work.

-sistently alludes to "Short Groynes" deny-
-ing their utility. I am not aware
of any short groynes having been
recommended by the Harbour Com-
-mittee, the required lengths recom-
-mended in their reports ranged from
150 to 600 feet

15 In regard to the question
of littoral currents his statement in the
first sentence of Para 14 of his Report
is contradicted in the third, and as long
as we accept the testimony of the great
Navigator

* dated 23rd
November
1869 Mr. 103

67
Navigator and Hydrographer, Horsburgh,
and of those who know the West Coast
of India, it is a waste of time to argue
this question.

16 I now respectfully request
that a statement showing the entire
cost of the operations at Cochin, since
the Department of Public Works took
charge of them, be furnished to the
Marine Department for information,
so that the port may not suffer after-
-wards by unnecessary outlay being
debited to Port Funds.

17 According to the orders of
No. 453 Government dated 11th February 1869,
it is taken for granted that, when the
Executive Engineer was appointed
to Cochin, it was for the express
purpose of carrying out the recom-
-mendations of the
Major Shaw Stewart, Madras Engineers, Harbour Committee,
Beresford Anderson Esqre, Chief Engineer Madras Railway, which were adopted
H. D. E. Dalrymple Esqre, Master Attendant Madras, by Government, and
it was not contemplated that he should
Strike

strike out a line of his own and try
costly experiments at the expense of
the State; and I most respectfully pro-
test against any sum of money being
alienated from the General Port Funds,
even on a loan for the execution of any
work at Cochin unless that work is
approved of either by the Cochin Har-
bour Committee or the Head of the
Marine Department who was a Mem-
ber of that Body.

18 Before closing this letter
I consider it my duty to inform
Government that the change of tone and
opinions of late apparent in the As-
sistant Engineer's Report regarding
the existing protective works at Cochin
can be traced from the date of his quarrels with
Captain Castor Master Attendant, Mr. Branton Civil Engineer
and in fact with the whole Cochin
Community.

19 His insinuations cannot
alter

57 6
alter the facts that not a single ex-
perimental work of Captain Castor's
has failed, and that he, acting under
the orders of Government, saved the
Town of Cochin.

20 The two Southernmost
Groynes, though they have sunk, have
held the Beach together and money
is only required to restore their ef-
ficiency to the full extent.

I have the honour to be
Sir

Your most obedient Servant

M. D. S. Dabrymple

Master Attendant
Administrative Department

Having read these papers carefully I come to the conclusion that the creation of groynes at right angles to the coast has not had the good effect anticipated from it. The Master attendant at Corker tho it may in some degree have averted the impending danger to the border of the Linn which I instructed in 1867. I don't regret the experiment. I apprehend that sea works of this nature are always more a help than a hindrance & I think the exp. were justified in making the experiment of a method which has proved to be successful at Madras. The balance of evidence appears to be against the existence of

upon the coast -

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a lot of current near the shore so,
regular & powerful as that which
sweeps the face of the Madras Sea
beach.

I would have considered it the proper
essence of the report of J. that
the discussion should have assumed
a controversial character and that
the tone of Mr. Dalrymple's
communication should be such as to
create irritation where you desire
nothing but the calm and
temperate elucidation of the
facts of the case.

As there are no funds available
in the Dept. of Public Works
we must proceed with great

73
caution in the application of the
Port funds, especially where the
opinion of the Marine Authorities
is so diametrically opposed to the
opinion of the Officer of the S.D.W.
I would call upon Mr. S. S. S. S. S.
for a report of the state of the
shore since the date of his
last communication and of
the results of any measures of
a temporary character which he
has undertaken for its protection,
especially for the arrest of the
sea on the Vytheen beach.
I would also ~~ask~~ direct
him to report immediately
upon the condition of the Long

Indrapati gap which Mr. Delaplace
reports to have increased to the
extent of 800 yards. It appears
to me not improbable that we
might attempt something towards
closing the gap before the
commencement of the next or the
West Monsoon. We may not be
able to wait for the report of
a maritime Engineer in that
point. If the gap is enlarging
all agree that it might have
a serious effect on the outlet at
Cochin and, pending the arrival of
the Engineer, who has not started
for England & who may go to many
places before reaching the gap, may
become very serious.

73.
This letter has been to be signed
of in connection with the Master.
Atkinson's more recent report
based on his visit to Cochin.
The Committee is positively advised
on the latter communication
whether it is my opinion regarding
but the Government should
pass any measure on the Master
Atkinson in the present stage
of the proceedings.
The course to be taken with reference
to the further prosecution of the
works should be discussed in
Committee.
17th April 1870 R. D.
I am King this case

Providence as a whole - (i.e. including
 Marine No 82 / I see no alternative
 but deputation some important &
 competent officer - to assist him
 in the same - what has been
 done & undone - what has failed -
 what is to be done - has been in-
 correct & so.

J. D. S.

means of
 become irremediable!!

Council and Council
 Mr. Dalglish's report to
 the Dept. of the Interior
 only business a number of
 contracts that the
 reports made by the
 a sample of the
 the Dept. of the Interior
 I want to see the papers
 what is the report
 I know the Shortland
 the log guys are
 made in circumstances
 large & small
 because of the
 I am engaged in
 Mr. O. Thompson

Memo for orders

The Cochin work has
 been entirely transferred
 to the Department of
 Public Works, and the
 Marine Department
 have nothing further
 to do with it -
 The present report must
 be regarded as sub-
 mitted by the Marine
 Attaché as ex-officio
 Conservator of all our

Administrative Department

Madras
Marine Office

№ 1221

14th March 1870

From

H. D. C. Dalrymple Esq^r

Master Attendant

Administrative Department

Madras.

To

The Hon^{ble} R. S. Ellis. C.B.

Chief Secretary to Government

Marine Department

Fort Saint George

Sir,

Sir, I have the honour to report my return to Madras on the 4th instant from Cochin; which port I visited in accordance with my proposal to Government for the purpose of inspecting and reporting on the

works recommended by the

committee⁷ sent there by

Government, in 1868.

During my residence

days at Bolghatty, I

...all the works can

Department, as

Department of Public

the Department of

to submit the

the honor to the following:

following

* in letter, dated
17th November
1869, N^o 6384

Committee

Beresford Anderson 'Eggs'

Chief Engineer, Madras Railway

Major Shaw Stewart

Royal (Madras) Engineers

D. & Dalrymple Esqre

Master Attendant, Madras.

become ^uirremediable

दिने

Chittagong

6

11 June 1977 - 7:00 PM

References can be made to Charts numbered session of Government, in which the groynes are delineated.

In this ^{rept} they are numbered consecutively for the Southernmost groyne.

of 1000
these two must
be raised in
weight several
times.

These two must
be raised in
height several
feet.

Extract of report from Cap-
tain Castor, dated 5 June 1869,
after the monsoon had set in,
with unusual violence.

"The Tyneen groyne has stood immoveable. It is rapidly accomplishing what I looked forward to at the commencement of the work; namely the setting up of the surrounding shallows.

This is corroborated by the Assistant Engineer in letter, dated 12 June 1869, No 22.

groyne (No 9) was doing its work admirably; the beach subsequently gained by it on the Vytheen point being so extensive, that native houses were actually built on the reclaimed land, and were assisted by the Municipality, and all looked promising, but here the success ended. Under whose know not, the Assistant Engineer led the small groyne, No 8, it altogether, and, after, according

6. I now regret to be obliged to report that, on leaving the South side of the Harbour to go over the works on the other side, there is an end to any satisfactory information I can lay before Government. On the South side of the Harbour, the works carried out by the Marine Department, have been allowed to remain intact, and they have all proved eminently successful, as I have shewn, but on the North side it has been very different.

7 When the works were handed over to the Assistant Engineer, the Vykeen main

groyne (No 9) was doing its work admirably; the beach subsequently gained by it on the Vytheen point being so extensive, that native houses were actually built on the reclaimed land, and were assisted by the Municipality, and all looked promising, but here the success ended. Under whose know not, the Assistant Engineer led the small groyne, No 8, it altogether, and, after, according

No 22. orders I know not, the Assistant Engineer dismantled the small groyne; No 8, destroying it altogether; and, after, according

C. 282 1870 A. 9. 10. 11. 12.

W. 1000 - 1000

11

according to orders, carrying out the Vypeen main groyne, No. 9, 40 feet, he not only stopped further extension of the work, but lowered it so much in height as to enable the sea, at high water, to wash clean over it. — The consequences of these operations have been disastrous, all the reclaimed land having been lost, and the houses washed away.

In regard to the experimental works to the Northward of the Vypeen point, it is not within my province to report on them, but it is my duty to inform Government regarding the channel reported to have been closed in the Assistant Engineers letter to Government dated 27th September 1869, No. 460.

9 I have twice, in company with Captain Bastor, passed through the channel in question in the Port boat, taking soundings with the hand lead, and bamboos, and the results are the following.

Width of channel, between the experimental

experimental ballast and bamboo groyne and sand bank, or "foreshore",

Note
The sea washes over this groyne even at low water, and after the S.W. Monsoon sets in, it will disappear altogether.

180 feet depths at low water varying from 6 to 5 feet. Width of channel, between Vypeen main groyne and sand bank, or "foreshore", 580 feet, depths, varying at low water from 16 to 6 feet.

10 By these figures, it will appear that, instead of this boat channel being closed, it is wider than in October 1868, and the depth close to the Vypeen main groyne greater by 3 feet.

11 If the money, which must have been spent on the experimental works had been laid out, according to the orders of Government, on the extension of the Vypeen main groyne, all would

Note
Not a stone on any groyne laid down by the Marine Department has been moved by the action of the sea.

have prospered, and every rupee would have been well laid out, instead of, as now, the whole of the disbursement on the experimental works being a dead loss to Government.

In

11 In regard to the Cruz Milagres gap... I have twice inspected it, and I regret to report that its extreme width is now about 800 feet - the depths of water increased in some places to 26 and 27 feet.

12 If action had been taken a year ago in closing it up with stone, as recommended by the Committee, a large sum of money would have been saved, and by this time it would have been closed.

13 I now earnestly recommend that measures be taken, as soon as possible, to close it up.

14 During an interview I had with the Dewan, he readily promised Rupees 30,000 out of the Cochin Exchequer for the purpose of closing the gap - the British Government being answerable for the same amount, and now is the time to begin operations before it is too late.

15 It is now my duty to report to

N. 126

to Government, respecting the alleged breach on the Vytheen side, which was reported to Government, by Telegram from the Assistant Engineer in charge, and which was afterwards officially described in letter, dated 15th January 1870, as closed up.

16 When a copy of that Telegram was furnished me, thinking it strange that a sudden encroachment of the sea should have occurred at that season of the year, and I should have heard nothing of it, I immediately telegraphed to Captain Castor for report, and in his reply, by Telegram, he informed me that no fresh breach existed.

17 Afterwards received, by post, a full report, informing me that after he had inspected the whole line of Coast from Vytheen point to Cruz Milagres gap, he could find no fresh breach of any description, and that none had occurred.

18 After due consideration, I deferred making

making any report to Government, till I had visited the place, which I did on the 24th ultimo.

19 After having inspected the whole line of coast on the Vypeen side, both in boat and on shore, without finding any traces of late encroachment, or gap, I assembled the villagers residing there, and interrogated them, through an interpreter, and the result was the following.

20 They, one and all including the Head man of the village, declared that there had been no breach of any sort whatever in that locality, since the one existed, which was closed by Captain Bastor 18 months ago.

21 Before closing this report, I consider it my duty, as it affects the safety of the Port of Cochin to call the attention of Government to an operation lately undertaken on the Vypeen side of the Harbour.

22 I beg to refer Government to the chart of the Harbour, and backwater, termed plan No. 2, in which is delineated a canal cut into the Peninsula, now the island of Vypeen. I inspected this canal, and found that it had been carried through the strip of land to within less than 40 feet of the Ocean wave, my remark on the spot, was "here is a breach made easy," and I do not think I can now characterize the work more truly.

Note
I measured twelve paces, but have given a margin of 4 feet

23 A sudden encroachment of the sea in this locality, having only this narrow space to cross, would carry everything before it, destroying a whole village, through which the canal has been cut, and another Cruz Milagree gap would be the result.

24 I asked the Dewan why he had permitted this canal to be cut through the Rajah's Territory, and his reply was that leave to cut it had neither been

C. 287. 15700A-4-10/11/12

been asked, nor obtained, and that he could not complain against an Engineer acting under the orders of the British Government. Nothing could have been easier than to have laid down a wooden tramway (which could at any time, have been removed at a trifling cost) across the strip of land - whereas the expense of cutting this canal, and that of filling it up, which must be done some day, will cost a good deal of money.

Note
All the stones for the Vespene groynes, constructed by Captain Carter, were run across the strip of land in carts on wooden tramways.

25 Trusting that in the foregoing report, I have confined myself, as much as possible, to a plain statement of facts regarding the works vitally affecting the interest of the Port of Cochin -

I have the honour to be Sir,

Your most obedient servant,

H. D. Dalmayple
Master Attendant
Administrative Department

[Faint, mostly illegible handwritten notes and signatures in the right margin.]

63
1874/6/20

C No. 476 + 130 of 1870.
 Nos 14 Dec 1869. 14.17
 Nos 20 Jan 1870. 28.29
 " 7 Feb 1870. 28.28
 " 29 Oct 1869 27.28

From
 The Master Attendant
 Administrative Dept
 Madras
 To
 The Honble Chief Secy to Govt
 Marine Department
 Fort Saint George.

dated 11th March 1870
 recd. 15th April
 No. 1062-22 April 1870
 Reports his having visited
 the port of Cochin, and furnished
 information respecting the pro-
 tective works carried out at
 that place.

A. 283
 24/3.
 C. G. April 1870 No 12

1062 P.H. Rept. 9. 3. 1870

Proceedings of the Madras Government.
 Under date the 22 April 1870.
 Read the following:

From the Master Attendant
 Madras. { N.E. No. 234 Dated 18th Jan 1871

Do - Do - Do - { 1221 - - - 14th March 1870

On a careful perusal
 of these papers the Govern-
 ment remark that great
 discrepancies appear in
 matters of fact between
 the statements sent in
 by Mr Ashaighnery and
 Mr Nairymple in regard
 to the operations under-
 taken for the protection
 of the Tycoon island under
 the direction of the Dept.
 of Public Works, with

1 Report of the
 Master Attendant
 1 Report of the
 Master Attendant

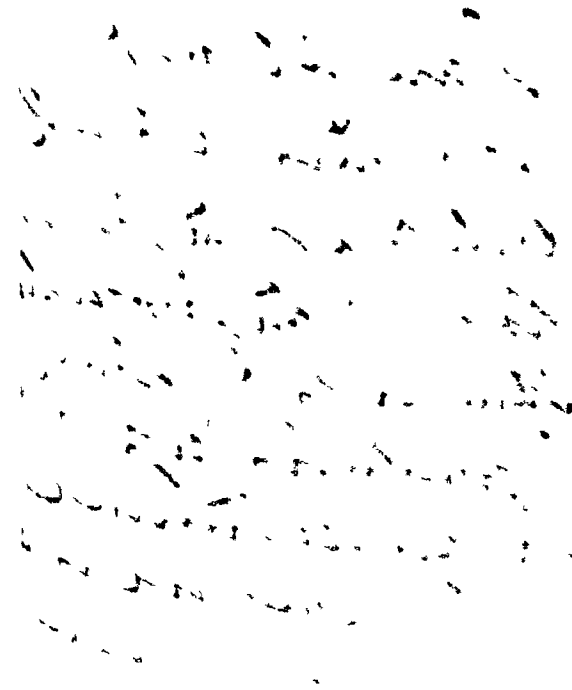
Re-

reference particularly to
the alleged occurrence or
apprehension of a breach
in the island, as well as
to the closing of a channel
between the end of the
fringe of the north
of the harbour passage,
and the shoal lying off
the coast at that point.

It is considered des-
irable that an inquiry
should be instituted
with the view of recon-
ciling these contradictory
statements, if possible,
or, if not, of determining

the

I would say "The
fact considered to
be necessary -"



exact facts of the case. For
the duty of making this
inquiry, His Excellency
the Governor in Council
resolves to select Col.
Larpenteur, R.N. These
proceedings, with all pre-
vious papers relating to
recent protective operations
at Lochin, will accordingly
be communicated to that
Officer, whose particular
attention will be called to
paras 8 to 10 and to paras
15 to 20 of Mr. Dalrymple's
letter of the 14th March 1870,
No 1221, and he will report
on the discrepancies between

the

the statements there made
and those in Mr. O'Shaughnessy's
letter of the 27th September 1870,
No. 78, his telegram of the
4th Jan'y/70, and his letter
of the 15th Jan'y/70, No. 126.

The Govt. cannot
close these proceedings
without remarking that
Mr. Dalrymple, on the
occasion of his late visit
to Fochin, would have done
well to have placed himself
at once in personal com-
munication with Mr.
O'Shaughnessy, from whom
he might have derived

in-

I must not
say this at all
events at the present
stage of the proceedings.
When we get Colonel
Carpenter's report
we can determine
whether course is to
be pursued & as
shown.

A. A.

J. D. S. The

whole matter is
sub judice.

These words
practically
justify the position
which Colonel
Carpenter takes
in his report.

A. A.

information most valuable
concerning the inquiry
which he had under-
taken.

A. A.

Colonel J. Carpenter, R. E. Linton
The Marine Dept. ^{previous papers as per list attached}

— Officer in charge of
P. W. Operations at Fochin ✓
— a list of ✓

Dec 25/4/70.

Public Works Departt.

N^o 1062

Proceedings of the
Madras Government

Dated 22nd April 1870 -

C. 25

N^o 282-283 + 284.

Vypren Island - Tapping -
Orders in papers relative to the
operations undertaken for the
protection of the - under the
direction of ^{the} Department of
Public Works. -