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Observation made on a tour in Ganjam

1856

OBSERVATIONS MADE ON A TOUR IN GANJAM BY LIEUTENANT COLONEL A. C. COTTON, DEPUTY CHIEF ENGINEER IN MARCH AND APRIL 1856.

1. On the 3rd of March I anchored in the road-stead of Munsoorcottah, (alias Gopaulpore,) the position of which, the Captain of our ship ascertained, by enquiry from the masters of other vessels anchored off the coast, as he had no sailing instructions to guide him nor any light, or beacon, by which could determine his latitude, after noon of the previous day, while his dead reckoning was useless from the uncertain strength of the northerly current. It must have been an error on the part of the Agents of this ship, that the printed instructions for finding Munsoorcottah were not in the master's possession, and he was greatly to blame himself for not enquiring if such information was to be had, but under the supposition that neither the Agents of ships in general, nor the master of the one I sailed in, were peculiar of their kind, I think it might be well, if copies of these papers were kept in the Custom House, and given to Captains with their port clearances. The want in this case, lost a five hundred ton ship, a whole day, and had there been no ships at anchor in the road-stead, we should have sailed on to Ganjam, from which the vessel would have had to beat back against a violent southerly wind and strong current to the north, entailing a cost in demurrage of 500 Rupees at least.

Difficulty in finding the port Munsoorcottah.

Sailing instructions to be left at the Custom House.

2. A most important enquiry has I see been set on foot by the Marine Board, as to the Establishments required for the conservation of the Northern ports. This investigation will I hope, be followed up, and acted upon as from the absence of all power of control, the road-steads, are becoming every day even more dangerous than they were by nature.

The deterioration of the Road-steads.

3. Our first object being to communicate with the shore, we hoisted the usual signal for a boat, but no response was made. The little signal staff showed no flag in answer, nor did any boat come to our relief, till the master of a vessel in the port called up to the Captain of our ship, and lent us the boat in his employ, without which aid, we might have remained on board all day. The point of greatest interest to our Captain and the first subject of enquiry entered upon was where he could throw his ballast of which he had three hundred tons, in his ship. He thought of course, that it would have been necessary for him to have taken his vessel again into deep water, and I cannot say that he did not do so; but it is improbable that he did, after receiving the information given to him by his brother Captain, who said "there is an order against discharging ballast in the roads, but there is nothing that I know of, to prevent it," and such I find is exactly the case. There are two peons in the Port who receive as pay 2 Rupees a month each, and have the combined duties of Custom House Officers and Harbour Police, but they can hardly be expected to resist the persuasions, of a Captain, who has three hundred tons of ballast to discharge, by means of Coolies taken from the shore, as the loss of their time in pulling to and fro, as well as the charge for boat hire, would be greatly enhanced if the vessel was anchored in deep water.

Inefficient Harbour supervision.

4. This is a matter worthy of serious attention, the road-steads of Ganjam while the southerly winds are blowing, are never very safe. The bottom is not good holding-ground, the swell is exceedingly heavy, and if in getting under weigh, a ship's head is cast the wrong way, she is almost sure to go on shore. Under such circumstances, each heap of ballast, is an additional danger, and as every ship frequenting the Northern ports arrives in ballast, it may be imagined how rapidly the anchorages are now deteriorating.

5. On landing I made an effort to get a boat to bring on shore my baggage, but as the swell was increasing, this could not be done, although there was not such a surf as would be considered heavy in Madras. On enquiry, I find that during this season of the year, the surf and wind frequently prevent the shipping of cargo for many days together, and it is considered a favorable day, when the boats can be employed till 10 in the forenoon. The cause of this is clearly the inefficiency of the boats, which carry two tons, and are pulled by only four men, and they for the most part, are wretched specimens of their kind.

6. Though there is nothing to be done for the improvement of the road-steads of Munsoorcottah to give better shelter to the anchorage, much might be done to make the place a better port; Screw Moorings, might be laid down at a very moderate expense, which would give great additional security to the shipping, a pile pier could be carried through the surf, and the boats might be made more efficient, if they were manned as they are at Madras by twelve instead of four. The Harbour establishment might be increased and that of the Custom House made more effective, and means of communicating with the port by signal could also be supplied.

Practicable improvement of the Port.

Of these improvements, the Moorings and signals might be undertaken by the Government as of boats, pier works for the merchants to look after themselves. The pier, and the encouragement of a better class

7. The flag-staff, that would not respond to our signals, had sufficient excuse for it. ty in the want of flags, and this want will, I hope, be remedied by the Marine Board, wh... new establishment is formed, as at present, a ship in the greatest danger cannot communicate with the land. Boats from the shore as I have shewn, are not sent off on signal being made, and ships' boats cannot cross the surf. To make the signal staff of use, a signaller with a Telescope, Flags and a copy of the signal code, is required.

Custom House returns questionable.

* *Not printed.*

8. The accompanying statements* of the trade of the ports for the last 5 years and the duties and dues collected, is from the Collector's Office whether it is trustworthy or not, I cannot say but when I consider the probability of its accuracy, with the statement* of Custom House and Port establishment before me, I cannot suppose it to be of any value whatever.

I have seen too much of what is considered "fair play" between ship Captains and Custom House Officers to believe that in such a case as this Government dues are fairly collected, and I feel confident, that a better paid Agency at Munsoorcottah would recover its additional cost.

Principal approach to Munsoorcottah and cost of carriage.

9. There is one most valuable approach to Munsoorcottah from the interior, which is already of great use to the port.

This road leads from Berhampore, and is a continuation of the Russelcondah and Aska line, which will I hope be all finished and bridged by the end of the year.

...rival at Munsoorcottah, I found that the cost of carriage on this line of road had fallen, ... were carts working for the Aska factory at the rate of an Anna a ton a mile. This is ...oo low a rate while the Aska and Injily bridges are incomplete, and the contract failed in ...equence, but when the bridges are built and good arrangements are made for executing the repairs of the road without interfering with the traffic, I feel sure, that the line will be worked profitably at that rate ...en with the present rude vehicles in use, and looking to the time when suitable carts with ... axles are employed, the cost of carriage will be very considerably lower still. This cha... ...annot however be expected for a length of time, as the carts now employed, can be built in eve... illage for 8 or 10 Rs. each, while carts of the better sort would cost 35 Rupees, and could n... now be built by the artificers of Ganjam, the turned axle and box being quite beyond the skill of the country. The chief exports from Munsoorcottah are rice, oil seeds, and sugar, and the greater portion of the supply, is brought to the port by the road I have been speaking of, which, when completed from Russelcondah to the coast will be 36 miles in length.

Approach to Munsoorcottah from the North.

10. There is another line by which the produce of the country North of Munsoorcottah is brought to the Port, and although the road is still incomplete, the trade on it is rapidly increasing. By this line of communication, the grain, and oil seed of the country bordering on the Chilka lake, is brought to Munsoorcottah. The produce even of Cuttack finding its way there, by aid of the cheap water carriage on the lake, and on a branch of the Mahanuddy that falls into it. For this important line, something has been done, as carts are able to make use of the great North road from Rumbah (the Southern Port of the Chilka) to Chutterpore, a distance of 14 miles, which though not bridged or metalled throughout, is in excellent order for some miles, and will this year be metalled, from end to end. From near Chutterpore, the traffic has to find its way for 8 miles across a tract of sandy country, so deep that the load has to be regulated to suit it, and the charge between the port and lake is thus increased, till it is nearly double the rate on the Aska lines.*

* From Rumbah to Munsoorcottah 23 miles.
Carts containing 820lbs.
In dry weather R. I.
In wet do. ,, 1-4.

The best means of communication between the Chilka and Munsoorcottah would be by canals led from the lake to the Ganjam river, and from that river to the Gopaulpore backwater, for which there are evidently great facilities. On this subject, I shall be better informed, when I see the country North of Ganjam I shall then also I hope, be able to solve a question which is not by any means clear to me at present, i. e., why the comparatively new port of Munsoorcottah is superseding that of Ganjam which although it has a road-stead equally exposed has an entrance always open for boats which is not the case with its rival port.

Proceed south.

11. After seeing Mr. Knox at Chutterpore I determined to proceed to the South of the District, and meet Major Birdwood, who had just reached Chicacole from Vizagapatam. I had no difficulty in obtaining bearers between Chutterpore and Chicacole, although the rate paid, and cheerfully received, is only one 6th of an anna per mile per man.

Chicacole Bridge.

12. At Chicacole, I had an opportunity of inspecting the fine bridge of 25 arches now building under the management of Lieutenant Palmer. I found the work well advanced, only 3 arches remaining to be turned, and I was particularly struck not only with the goodness of the workmanship, but with the systematic way in which the work was done, under this young Officer, who takes a real interest in his duty, and having excellent ability, is undoubtedly a great acquisition to our depart-

ment, nor should I omit to mention the name of Mr. Lever, who has been engaged on this work, and is evidently a first rate Overseer quite capable of undertaking a separate charge. I have already addressed you about the Southern approach to this bridge, which will I hope, be completed before the rains, as the traffic over the Nangolea at this time is very great, and the stream at present a very serious impediment to it. The new bridge not only forms an approach from the South to the large town of Chicacole, but facilitates a very important line of traffic both in salt and grain between Bobilly and other ports North of Vizagapatam District, and the towns of Narsinapettah and Calingapatam. I came into the Ganjam District inclined to grudge the expenditure of large sums upon the North road, but I am convinced that the money and labour spent on this work has been well laid out, and the returns of the traffic upon the bridge when it is opened, will I am sure, satisfy the Government, that their sanction in this case, was not premature.

Expenditure on the Chicacole Bridge advisable.

13. From Chicacole, I also visited the head of the Doosey Channel, which is one of those about to be provided with Head Sluices. This channel's head is in a very bad position, and a better site cannot be chosen for it, without trespassing on the lands of the Bobilly Rajah, who is exceedingly tenacious of his rights, as well indeed he may be seeing that he has several channels lower down the river all craving for a supply, while the quantity of summer water in the Nangolea is very small, and quite insufficient for the lands dependant upon the river for a second crop. If it were not for the difficulty of satisfying the various parties concerned, I would advise that an Annicut should be thrown across this river below Paleondah, and that the whole of the irrigation on both sides of the river, should be dependant upon it, but as matters stand, a new general arrangement seems to be perfectly hopeless, and even a partial improvement of our own channels can only be made after the country (from Paleondah to the sea) has been carefully levelled. As soon as Major Birdwood is able to place Executive officers in charge of the Divisions of his District, the valley of the Nangolea and that of the Calingapatam river will form one charge, and the officer appointed to it, will take measures to have the whole levelled, in order that the practicability of such a change may be established. It is almost certain, when this is done, that a new course may be given to the Doosey and other channels, which run with too rapid a fall to command all the land that might be watered by them.

Bad site of the head of the Doosey channel and difficulty in improving it.

Paleondah Road.

14. I took an opportunity while in this neighbourhood of visiting Lieutenant Magnay's Camp on the Chicacole and Paleondah Road, which is making very satisfactory progress under that officer's management, and will be completed in the course of this year. This is a highly important road. By means of it Calingapatam will get a great quantity of produce at a very low charge for carriage, and salt will be taken as a return load through all that part of the country in which forage is dear, and the Brinjaries work to the greatest disadvantage. The Police of the country will also be much aided by this road, and it will facilitate intercourse between the people of the Hill country, and the inhabitants of the large towns, to the advancement of order and civilization, which have made but little progress yet in the frontier of Ganjam. On all accounts, this line is of great value, and much credit is due to Lieutenant Magnay for the way in which he is carrying out his orders.

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CALINGAPATAM.

19. Calingapatam is the only port of Ganjam which has any shelter. Indeed it is the only port which has not a perfectly open road-stead, and unprotected beach, between Coringa, (150 miles south) and Dhurmah in Orissa, (250 miles north). The accompanying Statement* will shew the supposed export and import duties at the port, as represented by the Custom House returns; but as I have said regarding the same returns from Munsoorcottah, I cannot bring myself to believe in their accuracy. The whole Establishment for the Collections of the Customs and the Harbour Police consists of one Goomastah with 14 Rupees and 2 peons on two Rupees a month each, while the Office of Customs is in a hut in the native village, quite out of sight of the line of beach. This only is certain, that the statement is not too great, and that we have in Calingapatam a port already sending away produce to the value at least of 4 or 5 lacs of Rupees, while the land approaches to it, as I shall hereafter shew, are all but impracticable.

Calingapatam Harbour and Custom Establishment.

* *Not printed.*

Calingapatam Trade.

20. As this is the season for shipping rice, I had an opportunity of seeing the trade of the port in its greatest activity, and a more curious sight I never remember to have witnessed. In spite of impracticability of the roads leading to Calingapatam, the want of store houses to collect the produce of the country, the most slovenly the management in the despatch of the grain on its arrival, and the absence of all effort to improve the most perfectly primitive and native mode of shipping it. No less than 11 square rigged vessels were taking in Cargoes, of which 4 were ships chartered for different ports in Europe. These vessels were taking the grain as it arrived from the interior from day to day, and as I rode from Chicacole by the principal approach to the port, I had an opportunity of seeing, what the difficulties were, that the grain contractors had to overcome, before they delivered their rice to the exporters on the Coast.

Road between Chicacole and Calingapatam and Traffic on it.

21. Some years ago, a road was made from Chicacole to Calingapatam, it was much too narrow for such a traffic as is in existence now, but it was bridged and for some distance metalled. This road is now in ruins, more than half its length being ploughed up axle deep. The Bridges are in some cases unapproachable, and the Carts have constantly to be driven off the road to make any progress at all. On my ride I must have passed 500 Carts, each drawn by 4 beasts and carrying 820 lbs. staggering, foundering and jerking on the Carts were dragged at about a mile and a half an hour. On approaching Calingapatam I fell in with another line of Carts similarly provided and numbering it might be about 300. These were coming from the North, while in and about the place were from 800 to 1000 more, waiting for the grain they brought to be received and measured.

Calingapatam Port and its mode of carrying on its trade.

22. Calingapatam is said to have been once a place of note, and it has more than once in later times been a well conditioned town; but the place is now as ragged and unsightly as the country around it is waste and dreary. There are some old European houses that tell of better times, but look just now like bankruptcy. Here and there a shed, or simply mats upon the sandy beach, with a spare mat or two in case of rain, now constitute the export stores of this Commercial Town, and in keeping with the place, the work is done sauntering and carelessly, as if the object was not to load but only to tantalize the shipping in the roads. The grain is brought in the carts loose and is thrown in heaps for measurement; not by tilting up the cart as would be done in other places, but by chatties carried and thrown down on mats. Round the heap a dozen idlers lounge, and one or two who seem to have the privilege and to enjoy it vastly, stand ankle deep amongst the rice, cleaning their feet in it, as if it gave the brutes delight to send the filth to Europe. The rice is then put into bags so placed that they must be moved two or three times before they are sewn up, and when that is done they are taken to some point upon the sand either too low for the advancing tide, or just too high for any boat to reach them; and so they must be moved again. But I need not follow up this description further, there must be energy somewhere which keeps this traffic moving, but where it exists it is difficult to say; the cost of labor wasted, would of itself make a fair profit on the rice when sold.

Aspect of the country round.

23. The country immediately around Calingapatam is barren in the extreme, on the land side all is salt swamp, and elsewhere nothing is to be seen but drifting sand without a blade of vegetation on it. This dreary scene, the morning of my visit could hardly be said to be enlivened by the cattle which lay in thousands about the plain, tied to their yokes, and motionless, or chewing the cud of deferred hope, while their carts remained unloaded. The plain and sand hills were covered by clusters of these carts, which as I have said must have numbered at least 800, so that I must have seen altogether that day about 1600 of these rude conveyances, and as I looked over the country destitute of forage, and admirably suited to canalling, I was naturally led to consider what change might be effected by that means of conveyance being brought into use, and it would be difficult to find a better exemplification of the difference between land and water carriage, than the result of the comparison.

Comparison between land & water carriage.

24. The 1600 Carts would bring to the port 550 tons of grain, and there were employed in moving them 6,400 cattle, and at least 1,600 men, 550 tons of stone is about the quantity cut away daily from the Dowlaishwaram quarry, and the boats that take it into the Delta by the canals are manned by from 80 to 100 men. A canal approach to Calingapatam therefore, would have removed from the scene that day no less than 6,400 cattle, and 1,500 men; or, as the boats go twice the distance daily that these carts can move, even on good roads, correctly stated, the saving in carriage on the 550 tons would be 12,800 cattle and 3,000 men. I need hardly say that when following out this comparison with Major Birdwood, we came to the conclusion that we ought if possible to open canals to Calingapatam, and I have not a doubt from the nature of the country, and the supply of water obtainable from the Nangalea and Calingapatam rivers, that canals may be cut, and locked, and kept up, for far less money than would be required to give the port good land carriage.

Probability of suitable lines of canals being found.

25. Three lines of canal leading to this port suggest themselves all of which appear perfectly; practicable one would run from Chicacole, or some point on the Nangolea river, and pass Chicacole; one from Narsinapettah, which is the place of residence of the most active rice merchants trading with Calingapatam river (or from a point, higher up passing Narsinapettah) and another from the Nowpada salt pans 20 miles North of Calingapatam. The two former of these lines will require lockage, and water for the purpose may be obtained from the rivers from which they are led. Their streams will afford sufficient water for this during 8 months of the year, and the quantity to be stored for the remaining months will be so exceedingly small, that very insignificant tanks will be necessary. The canal between Nowpada and Calingapatam will probably need no lockage; but should it do so, the canal led from the Calingapatam river may be made to supply that line also, by leading it from the left bank of the stream. These lines will all be examined by Major

Road to Calingapatam requiring immediate improvement.

Birdwood and his Assistants, when he returns to the south of the district. It will not however do to wait till canals are projected and cut, something more immediate is required for the relief of the Calingapatam trade, and the first step is to improve very greatly the Chicacole road, Major Birdwood has sent in an estimate for 7,480 Rupees for this purpose, but the sum is insufficient, and it is absolutely necessary that the width of the original road should be increased, and a heavy coating of gravel laid on, to stand the wear of 400 carts a day running upon loose and mis-shapen wheels.

Calingapatam port capable of improvement.

26. I have said that Calingapatam has an advantage not possessed by any other port from Vizagapatam to Dumrah in Orissa. The advantage consists of the shelter afforded by a head land south-westward of the anchorage, which reduces the swell and diminishes the surf very much during the season of the southerly winds. I had not time to examine this head land, to determine at what cost it might be prolonged to give a better shelter, but I do not doubt that if a canal was opened from the interior, so that stone could be brought at a low price, some extensive improvement might be made. A boat pier of timber would be of the greatest service to the port and might be constructed at once; but I must say I consider that such works as that should be built by the merchants themselves. Major Birdwood is fully aware of the importance of having one port at least on this part of the coast, in which a ship's boat could communicate with the land; and from which an anchor might be sent off at all times. He will therefore follow up the enquiry as to what may be done for Calingapatam and I shall look for the result of his investigation with the greatest interest.

Comeravilly Salt works.

27. The trade of Calingapatam has derived some advantage from the Salt manufactory at the Comeravilly pans which is carried by carts into the Bobilly Zemindary and up the Palcondah valley. The quantity sent inland from these pans annually is about 4,500 Tons, and its effect on the cost of carriage is very beneficial; but the salt stores should be in Calingapatam, and the merest ditch of a canal would afford means of carrying it there at the most trifling cost. Before closing my report I shall enter more fully upon the salt trade of Ganjam, considering it as I do the most valuable means we possess, of reducing the cost of carrying our exportable produce to the sea.

Santhoshapoor and Chicacole Roads.

28. I must not leave the neighbourhood without noticing that portion of the road which extends from Chicacole to Santhoshapoor a distance of 39½ miles. This road will I hope be completed and metalled by the end of this year, if the Budget estimate is sanctioned, and as it forms a main approach both to Chicacole, and the important trading village of Narsinapettah, as well as a connection between the two, I consider that it was no mistake to complete it as a first class road.

Road from Chicacole to Kimedy.

29. From Chicacole I proceeded by the road now opening under Lieutenant Phillips to Kimedy a distance of 38 miles. This road like all others which lead directly from the interior to a sea-port, will be of incalculable value and the traffic on the line is I am of opinion already sufficient to warrant its being thoroughly metalled as a first class road. Lieutenant Phillips has shown great energy in his work, and very good management of the people to get so much work done in a country thinly inhabited and in some localities very unhealthy. He accompanied Major Birdwood and myself to Kimedy and we had an opportunity of seeing an important improvement made by him in the suggested line of road. It appears that some mistake was made in the section of the river near Kimedy, and that the water-way of the projected bridge was insufficient. The error was so great, that it may have occurred from feet having been calculated instead of yards, but whatever the cause may have been, Major Birdwood has been obliged to defer the building of the bridge, and will prepare an entirely new Estimate.

Saravacottah Tank.

30. While travelling between Chicacole and Kimedy, I had an opportunity of inspecting the Saravacottah Tank a new work built for the Zemindar at Kimedy, which, as reported by Major Birdwood, was breached during the last rains. It was found on examination by Major Birdwood, that the bund in the centre of the valley, was not so high as the floor of calingulah, and that in consequence the water rose over the embankment and breached it in the broadest part. It is clear that Mr. Assistant Surveyor Walker who estimated for the bund, did so very carelessly; without the use of a level, nothing could be more incorrect than the laying out of the work, and Mr. Walker is to blame for the loss incurred.

Kimedy Estate and its wants.

31. The Kimedy Estate is now in the possession of a man quite unable from weak intellect to manage his own affairs, and the chief control is in consequence in the hands of the Collector of Ganjam, who has a fine opportunity of improving it. The Estate is one of great value, and capable of being raised in prosperity far above its present condition. Its chief wants are roads and works of irrigation. The fall of rain in Kimedy amounts to about 80 or 90 inches in a year, and from the forest covered hills scattered over it, hardly a month in the year passes without more or less rain falling. The surface of the country between the hills is not unfavorable for tanking; materials are close at hand, and labour is to be had at 1¼ Annas a day.

The irrigation on the Estate is very limited and incomplete, much rice is grown in land chiefly dependant on the rain that falls, but the crop is very light compared with the produce of irrigated land; and as there is no supply of water for the summer months, a sugar crop can only be matured by the aid of wells; good cart roads from Kimedy to the coast will add greatly to the value of its produce, and as they extend into the wild country to the westward, their effect in giving security to property will make them of greater importance still. The advisability of opening communications through this country has been admitted by every body; and there is no reason why a year should be lost in commencing operations on this portion of the frontier as there is a considerable surplus income which could not be better invested. The first line that suggests itself is from Kimedy to Buttely from which it should be carried on into the Jeypore country. From Battely a line more direct to Calingapatam is proposed by Major Birdwood joining the Chicacole and Kimedy road. This line will have a greater traffic than that from Buttely to Kimedy but the latter is the Rajah's residence the Cusbah station and the Cantonment of a detachment of Troops. It is highly desirable that other lines should be sought for, through the hills north west of Kimedy, and a line north would give the sugar growers of the estate, the means of carrying their produce to Aska.

Road from Kimedy to near Teckally on the North Road.

32. On leaving the town of Kimedy I travelled through a hilly tract of country in the direction of the coast passing the village of Malpetta and gained the north road near Teckally. Carts can travel by this line in the dry weather and little is required to make it practicable at all times. Besides leading in the shortest line to the coast it is the direct route to the Nowpada Salt pans I do not think that it is advisable to make any of these lines first class roads immediately, they should be levelled, and cleared of jungle and drained judiciously, not by continuous ditches on either side, but by drains so placed, as to carry the water as rapidly away from the line of road as possible. It is very essential that the roads should be bridged, but permanent works of masonry are not necessary for that purpose. There are admirable materials close at hand, and ready at any moment, in the roughstone of the hills and the timber of the forest, through which the roads will pass. It would require very little money, labor and time, to open such roads as these which would be passable by a moderate traffic in the rains, and a heavy traffic in the dry weather, and available for the Police and Troops at all times.

Corps of Coolies in Kimedy.

33. Taking into consideration the present condition of Kimedy its surplus revenue, disturbed frontier, and great capability of improvement, I would suggest that a corps of coolies should be raised on the estate for employment in the passes during the most healthy season of the year, and for work in the plains at other times. I am elsewhere recommending the employment of such a body of men in the Government Talooks of Ganjam and their want is as great or greater here.

Engineering of Kimedy to be under the Civil Engineer of Ganjam.

34. Another point I would strongly urge is that the Engineering of the country while it is under Government management should be left to the Civil Engineer of Ganjam and not to the local Revenue Officer in charge of the estate. Unless this is done the works in the two Districts will not be made to bear upon each other as they ought to do, to have their full effect. In the northern Districts the property of the Zemindars who have rarely the intelligence or the means to improve their estates is so mixed up with the Government lands, that complete systems of works cannot be arranged, but in this case, having the management in our own hands, we could not do better than lay out all the works under the control of the Government Engineers, who will see that neither the Kimedy works, nor those of the bordering Talooks, are incomplete from want of system.

Nowpada salt pans.

35. I am sorry to say that I was prevented visiting the Nowpada salt pans but I found from enquiry that they had no tolerable approach at any season of the year. During the rains they are surrounded by deep marshes and in the dry weather the country round has not a blade of forage for the droves of Brinjarry bullocks which carry the salt into the interior and are dependant entirely upon the grazing they find on the road sides. Not less than a hundred thousand head of these cattle are employed in carrying the salt of Nowpada during the dry months of the year, when the marshes are passable and the loss of bullocks from heat, drought, and want of food at that season is so great as to add very materially to the cost of salt to the consumer; whereas if the salt stores were at any of the shipping ports where it would form a return load for the grain brought down in carts, it would be carried at a very cheap rate to the foot of the hilly country from which point the Brinjarries work most advantageously. To take the salt of Nowpada on account of Government to a better position one or more canals should be opened, but as the trade cannot be entirely changed immediately by these means at least two good common roads should be opened in the direction of Nowpada and a store of salt should be either placed on the north road or at all events so clear of the swamps that the Brinjarries may load their cattle as soon as the monsoon ends, and never have to pass the swamps either while deep in mud or parched from drought. One of these roads should be opened with a view to its junction with the Buttely road and one as a continuation to the Malpettah line. Both should be well drained, cleared of jungle, levelled and bridged with timber, but neither expensive metal nor permanent masonry works should be employed at present.

Road from Itchapore to Santhoshapore. Question as to the best line, and as to the parts which shall be fully completed.

36. Major Birdwood and Lieutenant Harington are now both of them doubtful as to the propriety of changing the line of the north road from Itchapore to Santhoshapore, as has been proposed and estimated for; and it appears to me also very probable that it will be found better to keep nearly, if not quite, to the old line. The estimate sent in for this portion of the north road amounts to 46,000 Rupees and makes allowance for an entirely new line for a distance of 40 miles. The new trace is very little shorter than the other and will cross the Mahindra river where it is separated into two branches, but it is through a dense Bamboo jungle which in all probability will be found to be very feverish. It will be more difficult to obtain labour on that line and several large villages as well as 3 good public Bungalows will be thrown out if it is adopted. Major Birdwood will have these two lines carefully compared again before any thing is done and the result of his investigation will be reported. Another point that will be reconsidered by these officers is the advisability or otherwise of spending so large a sum on this portion of the north road. In my examination of this line, I find that there is but little traffic passing continuously on the line generally, and that the amount on the several parts of it is very variable. There is as might be expected, a great traffic on it near all the large trading villages, and in many places now the traffic is greater than it will be, when the direct lines from the interior to the coast are more numerous, as the carts which come upon it by the branch roads have to use it for some distance north or south in their search for roads from it to the ports. It is evident from this that each portion of the road should be considered separately and that instead of the whole line being made equally perfect, the outlay upon each part should be suited to the present or probable demands of trade. If this is done Major Birdwood agrees with me in thinking that the portion I am now speaking of, north of Santhoshapore, may be for the most part treated as a second class road. Near the town of Itchapore however this will not be the case and I may here observe that while travelling on the northern road I have not yet seen one single part of it which has been made more perfect than the traffic warranted, nor any bridge erected which it was not high time to build. There will however be some considerable modification of the estimates prepared last year, when they are examined with reference to the trade, and on a consideration of the comparative value of the cross roads which might be opened by the money and labour that would be required to make the north road perfect from end to end.

Port of Poondy.

37. From Cunchelly, I accompanied Major Birdwood, Lieutenant Harington, and Mr. Meyer to the Port of Poondy. The latter Officer is now employed in opening a road from Kimedy to this port which will be of great value when complete. It is quite in the right line for trade, and when bridged and metalled will reduce the cost of carriage to one anna a ton a mile. There is still however a good deal to be done, and the drainage will be a greater difficulty than was anticipated, metal has to be brought from a greater distance, but Major Birdwood hopes to use as the better material masses of oyster shell which are found in a very solid state in the bed of the back-water. If this is liberally covered with thick coating of gravel it will form an excellent road, but if the upper layer of gravel is thin its value will be lost. Till this line is complete, there will be no tolerable approach to Poondy. It has like the other ports an open roadstead and a river open to the sea, a part of the year. The village stands on a sand ridge and the aspect of the country round is as dreary as the neighbourhood of Calingapatam. There is said to be one Native Goomastah on 10 Rupees a month, and two Peons on 2 Rupees a month, each, the former Mr. Knox informs me can give any ship her port clearance under a Teloogoo signature, and such is said to be the case at all the ports in the District. The roadstead could not be improved at a small cost and there is nothing to warrant a heavy expenditure here; something might be done to facilitate the loading of boats in the back-water, but this is not a work for the Government to undertake; each rice shed should have its rude wooden jetty, which would be of use whether the rivers mouth is closed or open, for when the bar is impassable the goods have to be carried across the back-water to be put into other boats on the sea beach.

Change of position of the Poondy Bar and apparent consequences.

38. Formerly the mouth of the little river that falls into the sea near Poondy closed each year during the dry season but it has not now been closed for three seasons. This is an interesting fact and a careful enquiry leading to the detection of the cause might afford us the means of judging how the same effect might be produced elsewhere. The only change brought to our notice was in the outlet which is now much more direct from the river and in a more favorable position for supplying the whole back-water on each rise of the tide. It may be that the former opening did not bring the back-water to the level of the sea high-water, and that as that is the case now, the scour is more effectual and capable of securing a constant passage. This is not an improbable solution of the question, but further enquiry should be made on this subject, which is one of high interest to all who are engaged in attempts to deepen the passages through the river bars on both coasts of the Peninsula.

Bridges on the north road.

39. Between Cunchelly and Itchapore on the north road, I passed three fine bridges in different stages of construction. They are considered by the inhabitants as the greatest boon that could be conferred upon them as their approach to Itchapore from the south has hitherto been impracticable during heavy rains and accidents have frequently been the result of attempts to pass the streams when partially filled. These bridges have been building under the management of Mr. Assistant Overseer Hopkins,

and the greatest credit is due to him for the manner in which the work has been done. Mr. Hopkins will now be sent by Major Birdwood to superintend the Injilly bridge which can only be completed before the rains by such thorough good management as may be expected from this Overseer.

Port of Sonapore.

40. From Itchapore I went with Lieutenant Harington to visit the small shipping port of Sonapore a wretched looking village on a dreary shore. It has not one substantial building and its only store houses are temporary sheds pitched upon the drifting sand. The port has no tolerable approach to it from the land a heavy surf on the beach and a roadstead exposed to the full force of the southerly wind and yet the exports have amounted in some years to the value of 100,000 Rupees, as exhibited in the Custom House returns, to how much more no one can say. The establishment is even smaller here than in the other ports I have visited, consisting of one Goomastah whose pay is 10 Rupees a month, and one Peon who receives 2 Rupees a month. I made an effort for curiosity to see these functionaries but they were not to be found. It was said that the Goomastah lived in a hut in the village and the Peon was sometimes on the beach, but the latter was not there during my visit and when I went to the Goomastah's house he was reported absent too. It would appear to be out of the province of an Engineer to notice such matters but one of my objects of enquiry now is to what extent the export duty would repay the cost of the inland approaches to the ports to determine which it is absolutely necessary that the probable accuracy of the Custom house returns should be kept in view. The port of Sonapore has an open outlet to the sea during some months of the year, but it is now closed and shipments are made from the beach in the ordinary ill manned masulah boat in use in this District. No effort has been made here or any where on this part of the coast to reduce the cost of shipping goods, or expedite the loading of vessels. Every thing on shore is done by coolies, moving ankle deep in the sand and no attempt at a jetty or pier of any kind has been made in the back-water.

BERHAMPORE.

41. The north road from Itchapore to Berhampore should be made with all care as the traffic of the place is very great. Berhampore has not only a very large population employed in the manufacture of Tassa silk cloths, but it is the cantonment of a Regiment of Native Infantry and carries on a very extensive trade with the country round. The approaches to such a town should be kept in the highest order.

Russelcondah road to Munsoorcottah by Aska and Berhampore.

42. At Berhampore I came upon the Russelcondah, Aska and Munsoorcottah roads the most important line of communication in Ganjam not excepting the approach to Calingapatam of the importance of which I have already said so much. The road from Berhampore to the port of Munsoorcottah is complete with metal and bridges and an allowance of 100 Rupees a mile annually, has been granted for its maintenance. From Berhampore to Aska the work is in progress and the whole line has been coated with metal and gravel. The remaining six small Bridges are now completing, and all that remains to be done are the great bridges of Aska and Injilly the latter of which has been taken vigorously in hand and will I have no doubt be completed before the rains. The Aska bridge cannot be completed this season and from Aska to Russelcondah the road is at a stand, a doubt having arisen as to the line selected being the most suitable.

43. There is one portion of this valuable line of communication which has not been sufficiently provided for the passage through or round the town of Berhampore. The road has been made up to the outskirts of the place from both sides and it was intended to widen the main street a trifle, and carry the traffic through the town, but this was a mistaken arrangement. The traffic is already much too heavy for that and if a suitable road-way was made for it, it would be at great cost to the Government, and inconvenience to the inhabitants. As the town is very crowded, a good open thoroughfare would be advisable as a sanitary measure but there are great objections to leading a heavy distant traffic through any crowded town and as the inhabitants of Berhampore are very generally employed in weaving and dyeing, the filth and dust from the passage of four or five hundred carts daily would be a serious loss to them. Lieutenant Harington has traced a good line round the town and that line should be adopted. By means of it the town will be relieved from the dust and confusion of the carts, while their drivers escape in some degree the danger of diseases which when once they break out in Berhampore are said to cause great mortality and linger in the town for months. In recommending the removal of the line of the traffic, I hope, I shall not be the cause of the town continuing in its present confined and unhealthy condition. Though the main street is not converted into a thoroughfare it should be opened for ventilation, as should also more than one of the cross streets, the place as I have said is one of great importance and there is no good reason why it should be dreaded for its cholera, if means were taken to cleanse and open it.

Berhampore requiring ventilation.

Road from Berhampore to Aska and its probable great future cost in repairs.

44. The road from Berhampore to Aska has a coating of metal and gravel upon it but I fear that it will be found too thin to stand the trial it will be subjected to during the rains. The carts employed upon it have wheels put together very cleverly without tires but they are rather hexagonal than round and as each angle reaches the ground it scrapes up the surface in the most destructive way. The loss in draft occasioned by the use of this description of wheels is not so perceptible where the roads have not been made but as the roads improve the value of good wheels and axles will be apparent, and we may hope, as in Ceylon that their introduction will follow rapidly our advance in road making, in the meantime we must be prepared for a great expense in keeping up this, and all other similar, roads in Ganjam. We are not able to determine yet what will be required, but where material for the surface is distant, the expenditure will be excessive and it remains to be shown how it can be repaid to the Government.

The return from the Aska road.

45. The Aska road is one that leads for the most part, through a country in the possession of Government so that we may expect it to yield some indirect return by the improved condition of the cultivators. It will be the greatest assistance to the Aska Factory on which the prosperity of northern Ganjam in so great a degree depends, and the indirect return from the road from the encouragement that establishment will give to the growth of sugar, will be very considerable although it may be impossible to calculate its effect on the revenue. One direct profit from it will be received by the duties on exported produce shipped from the port of Munsoorcottah. These have amounted in a favourable year to 3,500 Rupees, a sum which though it would not keep up the Aska road, would go far towards it, and if for every additional bag of rice or oil seed, 2 annas was actually received (which is the present amount of export duty) the wear and tear caused by those articles would be much more than compensated; making then due allowance for the indirect returns, I hope that the increasing export duty from a more active trade will furnish the means of supporting the road without the imposition of a toll which would cause a serious impediment to the cart traffic on the line, as the cart owners, from whom the tax must be collected possess nothing but the vehicle and the beasts that drag it, and they cannot give money which they have not got.

Injilly bridge.

46. The Injilly bridge under the management of Mr. Mequoid has not made the progress it ought, nor has the work been done economically. This young Officer had the same difficulty to contend against that is felt by our unprofessional Executive Officers in general, a want of knowledge of his business; some succeed better under these circumstances than others, and Mr. Mequoid has I think been signally unsuccessful. I know myself what it is to work by means of superintendents, who have inaptness for engineering. In spite of every precaution, the cost of works varied in the Godavery Delta, as much as 50 per cent. owing to the skill of, or want of skill in other of the Officers employed. This is an evil resulting from our want of qualified men in the Department, but it is yet to be shewn, than even if the works cost 50 per cent. more than they might have done, under other circumstances, they are not worth all that is spent upon their immediate execution. It will be remembered that the whole of the new works constructed in the 14 years from 1835 to 1849, yielded 69½ per cent. yearly, so that had they cost 50 per cent. more by mismanagement, Government would still have been more than repaid that loss by the returns of the *first year*, while the benefit conferred on the inhabitants of the country, which was of far greater annual value still, would have been clear profit to them. I do not write this in support of Mr. Mequoid, but in the defence of the system we are pursuing, of doing all we can with the means at our disposal. I consider that Mr. Mequoid's work in this, and the Aska bridges (and I may add in the roads under his charge generally) shew him not to be an efficient or even a promising Executive Officer, and I would strongly recommend that he should be employed for some time under an Officer capable of instructing him. Major Birdwood has estimated the sum required for completing the Injilly bridge at 8,000 Rupees and as both he and Lieutenant Harington consider that the rates allowed in the original estimate were sufficient if carefully used, those rates have been again adopted and I have no doubt, as the work proceeds under Mr. Hopkins, that they will be found to be higher than is necessary.

Loss occasioned by an inexperienced Executive Officer.

47. The Aska bridge cannot be proceeded with till after the rains but every preparation will be made, and it will I trust be in use at the end of the year. The same remarks which have been made with regard to the Injilly bridge apply to that at Aska. It ought to have been completed this season and at a cost, not exceeding the estimate above 5,000 Rupees; full allowance being made for the change of site; whereas Major Birdwood now estimates the sum required to complete it at 16,600 Rupees. With regard to the site chosen for the bridge originally, and that on which it now stands, there is no doubt whatever that it has been well placed in its present position, and that had it been thrown across the river in the position first chosen, the most complete engineering blunder would have been made. That site may have had advantages that would have simplified the operation of building it and left its security less dependent on the skill of its builders, but as security was purchasable by an additional outlay far below the difference of the value of the two positions there can be no question that the increased expenditure was advisable.

48. The object of the Aska bridge is to give to the traffic and troops of Goomsoor a passage over the Rushkoolea river; and whether the high road passed above or below Aska, made no material difference to either except that it might be a trifle more convenient for the traffic to pass, as it now does, along the line of the town. No part of the trading town of Aska loses by the present site of the bridge, and the eastern portion of it, including the Aska Factory gains very greatly by the bridge being in its present position.

The value of its present position.

49. I am not able to calculate the actual gain to the native town, but as the whole traffic of the place added to the traffic of all Goomsoor, is the merest trifle compared with the traffic of that part of Aska, which contains the factory and is supported by the Sugar works, I may omit all else and content myself by shewing what is gained by the Aska Company and those who bring material to the factory. I find by reference to the Aska accounts, that there will this year pass over the Rushkoolea 8,000 tons, and that by crossing below the town instead of at the site first chosen above it, the saving in distance to that tonnage would be 3 miles. When the bridge is built the cost of carriage, will in all probability, be 1 anna a ton per mile, and at that low rate the saving would amount to $8{,}000 + \frac{3}{16} = 1{,}500$ Rupees. The capital of this sum at 5 per cent. or 30,000 Rupees is then the actual difference on that account of the value of the bridge in its present position, above the value it would have had, if placed in the site originally proposed. But the factory will extend its operations eventually, to full three times its present manufacture; and the real difference will be three fold what I have stated.

Aska Sugar Works.

50. Even if the whole of this profit came to the Aska Company I cannot suppose that the Government would deny to its European and Native shareholders a fair claim to partake of the boon conferred, in proportion to the extent of the trade they are engaged in. If they differ from the traders generally, it is only in their greater enterprize, and power of usefulness, and if half is to be given in due proportion to the risks incurred, the members of this company have not only an equal, but a far greater claim than all the other traders on the line from Russelcondah to the sea. But the profit in such a case is shared by all concerned, and as the chief bulk of the goods consists of raw material which is brought by the Ryots and delivered in the factory, the profit is more direct to the cultivators than to the manufacturing Company. Captain Rundall should have laid these facts before the Government and sought permission for the change of site, but his judgment in adopting the place he has chosen, was most undeniably good and needs no apology.

Claims of the Aska Company and those who supply it to a choice of site for the Aska Bridge.

51. My visit to Aska has enabled me to gain much information regarding the manufacture of sugar, while my tour through the country has admitted of my following up an enquiry I began in Rajahmundry as to the profits from its cultivation. The result of my observations is a conviction that it is, to the interest of Government to encourage the growth of this article to the utmost, and if that is done I am confident that it will become the great crop of the whole district of Ganjam, yielding, as it will, a profit far exceeding that from any of its other products.

Cultivation of sugar should be encouraged.

52. The Aska factory has been raised to its present state of perfection by the most indefatigable energy, through many years of difficulty and loss. It is now in very high order and capable of manufacturing more than 12,000 tons annually, a very much greater quantity of sugar than the district yields at present and the difficulty it has now to contend against, is the deficiency of supply. If my information is correct, the whole extent of land cultivated with sugar in the district is between 3 and 4,000 acres, which with a fair allowance for loss, occasioned by insufficient means of irrigation, floods, and other accidents, does not yield more than 4,50,000 pots of Goor; sufficient for the manufacture of about 4,500 tons of the fine yellow sugar exported. The Aska works have not the command even of this supply; there is not only a considerable home consumption, but there is a great demand for sugar in the south of Orissa and in Nagpore which leads to an active competition in the purchase, and although the price has been raised lately, and the quantity brought into the factory at the time I was there varied from 4,000 to 5,000 Rupees worth daily, there is still a fear, lest the quantity should be too small to make the work pay a fair profit for the season's working. The lowest quantity of sugar that should be turned out from these works should be 3,000 tons a year; which with the present low farming would be produced on 4,000 acres of land, but with the greater capacity of the Aska machinery and the native demand for consumption, and export by land, as we have evidently a market which can only be supplied by the Government giving every encouragement to the growth.

Aska works and their supply of goor.

53. It would answer well enough for Europeans to take up the cultivation of sugar, as the profit from a manageable area would be sufficient inducement. In this respect it differs from the cultivation of grains and seeds and from cotton also which are produced in so small quantity from each year that the cost of management would absorb too much of the profit, if an European undertook it. Nor has sugar the great disadvantage of being a precarious crop as Indigo is; only one precaution is necessary; and that in Ganjam is easily provided for, the supply of water throughout the year should be secure. It is difficult to understand why Europeans have not taken up this cultivation. I find that the land will yield an equal weight of sugar with land in the West Indies: there is a market for the produce at hand, and labour to be had at 2 pence a day. Yet the inhabitants of this country are emigrating, and some even going to the West Indies to work on the very same cultivation, with no one single advantage. The whole difference between the two countries that causes this remarkable state of things is that there is capital in the one country, and not in the other. If English settlers brought their money and intelligence to bear upon this cultivation, Ganjam could, I am convinced, undersell all the great sugar growing countries of the world; but we need not wait for them. There is a population sufficient and as much enterprize as could be expected, and if the Government acting in the capacity of land-lord, did all that is in its power to help the cultivators, it might without taking any part in the actual cultivation or advancing money, give such a stimulus to the growth of sugar, as would make it the great staple of the district.

Europeans might cultivate sugar with profit.

54. In looking through the expenses of sugar cultivation, I find that there is as much enterprize as could be expected where those who bear the toil and risk, have to pay the profits of their work, to those who supply the capital required. I am told by people of all classes that where the sugar grower works with borrowed money, his cane yields him no better profit than rice, and those who take up the growth of sugar are very often induced to do so by the trifle of ready money they obtain as an advance from the merchants to secure the crop. The several expenses of a sugar garden are, the cost of the cuttings (or seed cane.) The land revenue; preparing the land by manuring, &c., watering, and buying or hiring the mill and pans for manufacturing the Goor. The usual size of a garden is about 10 Burnums or 2 acres, the cuttings for which, cost usually 40 Rupees. The assessment on the land is, I believe, about 30 Rupees; I have an account of the cost of cultivation, but I do not trust it sufficiently to quote it. The cost of watering depends upon the position of the land, but sites are usually chosen where irrigation can be had a part of the year and where a very shallow well will supply water with the least labour when the irrigation fails. The purchase of cuttings is in most cases the greatest item of expense, and as the money has to be laid out a whole year before the crop is cut, the interest is very heavy upon that portion of the outlay. The revenue is also taken before the crop is sold, and money has to be advanced on that account. The cost of cultivation having in like manner to be advanced, the land is poorly worked and sparingly manured, and as the cost of watering must be kept down as low as possible for the same reason, land is chosen where water is near the surface, whether it is liable to flood, or is difficult to drain or in other respects unsuitable for a sugar crop. In short the cultivation generally is carried on under the disadvantages of the very cheapest farming, and as those who lend the money work upon the common Indian principle of taking all that they can get when they have a chance, without reference to the future; the growers find themselves with little profit even in the best seasons, and in case of accident, hopelessly in debt. Under such circumstances, it is no wonder that the extension of the growth of sugar is slow, although experiment has shown, that under good farming the profit from an acre is very moderately estimated at 100 Rupees.

Enterprize kept down by working with borrowed money.

55. The Government might do something to remove these difficulties, and the European purchasers might also help. The most important step the Government could take would be, to secure a certain supply of water to land suitable for sugar, so as to remove the cost of working wells and make water so cheap, that as much may be given to the cane as it can take up and convert into sugar. This will, if well managed, work favorably in more ways than one. The best land may then be chosen having soil suitable, and being capable of good drainage. In Rajahmundry where the wells were 15 feet deep, working them was so expensive, that a supply of water for an acre from a channel flowing through the year, was considered by the ryots worth 60 Rupees in the saving of labour only; so much as that, is not spent on water in Ganjam, because such deep wells are not used, and the farming altogether is poorer, but the water would be worth no less: this estimate, it must be remembered, is made by those who had to pay for the water, and who calculated only the cost of the quantity they raised from the wells, whereas the supply taken from the channels was at least double and it contained a manure not found in well water. In consequence of the very favorable climate of Ganjam in which rain falls in almost every month of the year, and for 7 or 8 months there is a stream in the rivers, the cost of a constant supply of water for the year would be smaller than it is in most districts, and as the monsoon there is hardly less certain than it is on the western coast, there would be nothing precarious in the supply of water.

Government might afford great assistance.

56. The works I would recommend for this cultivation are, annicuts on the considerable streams, and tanks on the smaller tributaries, so arranged that when the river failed the tank water might be thrown into the channels. The country seems well adapted for works of this kind and the land suitable for sugar, (if such irrigation is given to it) is unlimited. In speaking of this to a wealthy landholder, he thought the plan all very good, but he believed the whole soil of Ganjam to be so peculiar, that "bunds of tanks could never be made of it," I need not say that this was purely imaginary, and Major Birdwood will gladly undertake to prove to the country as soon as he has determined on suitable positions for his works and obtained sanction for the sums required to build them.

Description of irrigation works required.

57. Another relief that the Government might give to the sugar growers is to take the revenue from the land after the crop is sold, holding the land as security; I am quite aware that there is not one Sheristadar in the service who would not object to this; and it would be a most unpopular move with the influential people of the country, because it would help to relieve the ryots from the thraldom in which they are held by the capitalists. So much is this mode of relief objected to, that when a gentleman in Rajahmundry offered to pay the kists for the sugar growers, a party of Sowcars offered him 3,000 Rupees not to begin that system. If the security is good, the Government will not, I am sure, object to this innovation; and I am certain, if it was tried, it would be found that no native land-owner would allow the field to pass out of his possession that had once yielded him the full profits of a sugar crop. Land let on such favorable terms, and supplied with water for sugar the whole year through, might well be paid for at 15 Rupees the acre; it would be worth 50 Rupees, but 15 would pay the Government well. Where very high profits are received from the land, as there would be in this case, there will soon be an intermediate man in possession of it who will be the gainer by the reduced assessment, not the actual cultivator. Even with the assessment I name, the land would be saleable at a high price, and the man of capital would be the sugar grower; the cultivator would then be his servant, paid it may be from the crop, but he would not as now have risked the cost of cultivation. The owner who possesses land so valuable will not only secure its being cultivated, but will see that the right crop is grown, and to do this, his terms with the cultivator must be liberal. I believe that nothing would so certainly lead to a class of wealthy land-owners as an irrigation suited to the growth of sugar, and terms favorable to its introduction. And I have not yet seen any province of the Presidency better suited to the plant and its high cultivation than Ganjam.

Relief by the land, not the crop, being taken as security.

58. I have noticed the comparatively large sum required for the cuttings of a new sugar garden, and the want of money for purchasing them will be an impediment to the growth, when the Government has done all that I recommend. I am generally averse to Government attempting any cultivation of its own, simply because my experience leads me to expect that no good will result from it. I would otherwise suggest that a few acres of land should every year be planted with cane to be distributed as cuttings; I believe that great encouragement might be given by this means, and at no expense as the actual cost under tolerable management would make them very cheap to the purchaser, but the success of this would depend upon those who undertook the management, and I can't say who has either time or taste for that. I have however suggested this mode of giving an advance, to the owners of the Aska sugar factory and I am perfectly certain that it is worth their while to make the trial.

Cost of cuttings an impediment which might be overcome by Government on the manufacturers growing cane for distribution.

59. Before leaving the subject of sugar I must be allowed to call attention to the factory at Aska which is now the centre of a traffic on which the prosperity of a great portion of the Ganjam district depends. The variety of trades and manufactures to which it has given rise can only be understood by following the processes in the factory. But its effect may be in some degree estimated by a consideration of the facts, that the consumption of fuel is about 24,000 Rupees worth annually and 6,000 tons of Goor will, it is expected, be this season purchased from the ryots at a very remunerative rate. If this supply is obtained, more than 3,000 tons of sugar will be shipped, and the profits from the works will be satisfactory. But whether working to the profit anticipated or to loss such as it has hitherto had, it has equally a claim to every help from the Government. The enterprizing owners have run a great risk, and several have met with a loss not liking to go on in the venture. A capital has been sunk which would have made no insignificant appearance in our list of Public Works; very few of which indeed approach the Aska factory in cost, and it is more directly beneficial than almost any thing that has been done by the Engineer Department, excepting only our largest irrigation works; from the sum it annually circulates in the district and which will this season nearly equal in amount half the revenue of the Collectorate. I am induced to offer these remarks because I have met with a feeling here and there that such great works might very well be left to themselves. There is a very common notion that great manufacturers make great profits, and can fight their own battle, and moreover that they have rather a too determined way of asking for what they want. This may be true in some cases, and I hope it may be so with the Aska manufacturers. Their success will be a most valuable example; they will deserve all they earn, and if their demands are always as reasonable as they now are, they cannot be too resolute in making them. What they most want are,

Effect of the Aska works in the district consequent claim on Government.

encouragement to the growth of sugar, and such fine roads elsewhere as that which has been opened to their benefit, between Aska and the port of Munsoorcottah.

60. From Aska we proceeded to Russelcondah, and although travelling some portion of the road in my palankeen before day light, I had in going, and returning, opportunity sufficient to determine the question as to which is the best line of country for the great road, and I must say I give the preference to that suggested by Lieutenant Harrington. The present line might have been made to follow the highest ground between the two rivers: very much more strictly than it has; and had it done so, it would have answered tolerably, when the river embankments were raised; but there is no sufficiently good reason for that line being chosen, and the country south of the Lohurkundy has great advantages which should not have been overlooked. Even though a road may be secured through low ground cultivated with rice, such as the land between the two rivers, there are in this country great objections to such a line where, as is the case here, the cattle employed upon it are dependent on free grazing for their subsistence. The repair of the road as well as its first cost will be greatly reduced by taking it on the higher ground, and the position of the bridge over the Lohurkundy, which if placed suitably for the proposed line will be close to the town of Russelcondah, and will be very advantageous as a bridge is urgently required there. As I had not received the orders of Government regarding Captain Rundall's letter when I was in Goomsoor, I am not able to answer the question as to whether there is, or is not a ridge of high ground between the two rivers. There certainly is no such ridge for a considerable distance, and anomalous as it may seem, it is very probable that there may be a hollow instead of a ridge in that position from the point of junction of the two rivers to Russelcondah, though the distance is 6 miles. Such will invariably be found where the point of junction has become by degrees, lower and lower down the stream, by the extension of the point between them from deposits, and such actually is the case for some miles above the junction of the Lohurkundy and the Mahanuddy. In such cases the Delta form of the country is found to exist. The highest ground is close upon the bank of each river, and there is in consequence a hollow between them. Near Russelcondah this appears to me to be the shape of the surface, and Mr. Mequoid's road is in the valley. It was on this account that Lieutenant Harrington was led to think so many bridges necessary as the water stood along the line of road. The remedy required here was not additional bridges, but embankments, and if the case had been understood, the road would have either formed one of the embankments, or have run parallel to one of them. The work done will not however be altogether lost, as the road in the dry season will be a great convenience to the inhabitants of the space between the rivers and when the embankments are made, it will form an excellent approach for them to Russelcondah, even without being metalled. The accounts of money spent on each part of the work done, as well as that required for the completion of this important portion will be submitted by Major Birdwood; and Lieutenant Harrington, who is with that Officer now in Goomsoor, will trace the new line.

Road from Aska to Russelcondah.

61. The embankments of the Aska river were being laid out while I was there and one complete portion will be secured before the rains. They will be of great value, and I see no cause to apprehend their doing injury to any one. There will be a slight additional rise near the sea, but as the general fall is 4 feet a mile, and there is no length of Delta channel, the difference in level will be very inconsiderable any where. The cost of guarding the cross drainage where it falls into the river, will be greater than was anticipated; but as the rise in the surface is very trifling compared with that of the large streams that have been similarly treated, the sluices will be far more simple, and easily built.

Aska river embankments.

62. In Captain Rundall's Report upon the Irrigation of Ganjam (of 6th November 1854) some valuable suggestions are offered as to the works that should be immediately undertaken; but there will be a difficulty in carrying out these proposals, or indeed in making any great improvement in the irrigation of the District, if some steps are not taken to obtain information as to the area and condition of the wet land at the present time; and the value of a supply of water, for one or more crops. There is but little known on these subjects in many Districts, but in Ganjam there is the most profound ignorance on every point connected with the extent cultivated, and the value of its produce; nor under the present system, does there appear to be the least chance of any better information being obtained. Mr. Elliot in a letter to the then Collector, wrote in March 1850, suggesting that it would be advisable rather to fall back upon an ancient division and registry of the land which had been lost sight of, than to allow things to remain as they were, but this was not carried out, and when Captain Rundall proposed to open a channel from an annicut on the Aska river, to water the country between Aska and Munsoorcottah he was led to suppose by the Thasildar that an additional revenue of 50,000 Rupees might fairly be anticipated from the outlay of a lac. But when a project was prepared, and sent for an opinion, to the Collector, it was stated by the Thasildar of that time, that nothing could be expected beyond the saving of some small remissions of revenue. Now, although, the area of cultivable land had in the first instance been overrated, there was no doubt whatever that an immense increase of produce would result from the works proposed and why there should be no revenue in proportion does not appear; but the truth is, that the word "wet land" has so indefinite a meaning, that it may be given to lands ir-

Irrigation works suggested.

rigated, or not irrigated, or partially supplied with water, or flooded, and besides that there is no knowledge whatever what the produce is from lands under any one of these conditions. Land capable of producing by the help of some rain, a tolerable crop of rice is "wet land"; and so is that which has water for two crops or is so well provided, that it might have a crop of sugar grown upon it: and if there is a Cutcherry "mamool" of what an acre produces, such has been established without any reference to the use made of the land. Whether it is well farmed, or cultivated with the poorest means, the mamool is the same; and if it has any foundation at all, it has no reference whatever to the capability or real value of the land. While this state of things exists, the Engineer Department may spend all the money possessed by the Government with no certainty of any direct returns from their works. The Engineer may survey the land, shew the measured area of what he waters, and point out what is drained, and what secured from flood; but when this is done, a statement may be found to prove that it was all "wet lands" before, and no extra revenue can be expected from it. The fact of the land not being watered before, will not alter the case, for what is *called* in the accounts wet or dry, no one can point out on the ground. It is said in the general way, that there is no use in irrigating for a second crop, because the ryots grow a second crop, and never had been taxed for it. Whether that crop is rice, or oil seed, scanty or abundant, secure, or precarious, still the people like to have it without tax. They would not, (it is supposed) like to have a crop worth 15 Rupees an acre, if they have to pay an assessment of 2 Rupees, so well as a crop of the value of 5 Rupees, for which they pay nothing. Such is the supposition and a most mistaken one it is.

The Ryots know the real value of irrigation.

63. I have seen a good deal of the Hindoo cultivators of the country, and the high price that they are ready to pay when dry land is irrigated has frequently astonished me. But the fact is that they are not so ignorant as we are. They live in their fields and see all that is going on from day to day, and know right well the exact effect of water on their crops. They dont confuse between a crop that has yielded a poor harvest, and a heavy crop, they see the risk that each field runs, and know the cause of the mischief that they dread, and although there may be a fear when any new work is proposed, that it will not succeed, and that they will be taxed, nevertheless, yet when the work does succeed, they see the change, and know the value of it; and if they do not say all they know, they are willing enough to own the Government claim to additional revenue, and to give it, if too much is not demanded. It is for us to determine what the value of the improvements are, and to take only such portion of the increase of produce as shall pay us a liberal profit, and leave the Ryots, as they will be in all cases, very much greater gainers than the Government. But to do this, some trouble must be taken to learn what the land will yield according to the treatment it receives. Mr. Elliot began an enquiry in Rajahmundry with a view to this, which if followed up would have been invaluable, but the information he obtained was thought insufficient, and therefore it was not added to till it was made sufficient, but it was laid aside as useless.

*Irrigation works will not be carried on vigorously till their real value is determined.

64. The Ganjam District has, from the very favorable distribution of the rain and the form of its surface, and the goodness of its soil-capabilities beyond most parts of the presidency, and there are admirable opportunities for constructing the most effective and profitable works of irrigation, and as soon as the probable result of them has been determined on the best data procurable by the Revenue Officers, they may be undertaken. Captain Rundall has suggested some of very good promise, and Major Birdwood is searching for sites in which he can place works especially suited to the cultivation of sugar; but the Revenue Officer must work with the Engineer, each in his own province, or the Government will not get the return it should from the money spent; the upshot of which must be, that the irrigation of the country will be suspended. So completely has the value of irrigation been ignored in Rajahmundry, that in one report it has been shewn, that a talook without irrigation has yielded a greater increase of revenue than those thoroughly watered. And though it is not probable that such an assertion will be made in Ganjam, I maintain that no money can be securely spent, till such results of revenue management or revenue statement are rendered impossible by the produce from irrigation being determined by actual trial. It is absurd to suppose that there can be any real difficulty in obtaining such information. If it could have been had at no less cost, it would have been worth while to have spent 20 lacs of Rupees in procuring it in 1853; for since that time, far more than that sum has been lost to the Government by the doubt which has led to the watered lands of Rajahmundry remaining untaxed.

Proceeded to Chatterpore, and missed seeing the port of Ganjam from ill health.

65. From Russelcondah I returned through Aska to Chatterpore, and on reaching that place my knee was so much swelled from an accident I had met with near Chicacole, that I was unable to leave the house for a fortnight and missed in consequence seeing the port of Ganjam, which as I have said elsewhere, I was particularly anxious to compare with Munsoorcottah.

Lake.

66. At Chatterpore there is a very curious lake of fresh water which must have risen to its present height by artificial embanking, though there is no decided bund to be found. This collection of water, which extends along the line of coast for about three miles, occupies the hollow almost invariably met with within the sandridges of the coast, but instead of being on the sea level, and open to the tide during the rains as is usually the case; its surface is 10 feet above high water mark and there is no channel by which it is ever drained. The surface water in the monsoon flows off into the Munsoorcottah backwater, and as no rock is said to cross the line, I feel confident that the constant construction of small earthen banks, as in the course of time not only prevented the existence of a drain to the level of the bottom of the backwater, but has by degrees raised the surface of the water to the height at which it now stands. Major Birdwood and Lieutenant Harrington spent what time they could spare in the examination of this lake, but I was unable to join them, and there is still much to be learnt about it, as on it depends the plan adopted for connecting the Chilka lake and Ganjam river with the port of Munsoorcottah.

Question as to the assessment of certain areas difficult to obtain in Ganjam.

67. If a canal is opened from Ganjam southwards, it must pass through this hollow, and it becomes a question whether it would be advisable to drain the lake and allow the tide to flow through it, or whether it would be better to lock up to the surface of the lake, and down again to the tide level. There is now some cultivation dependent upon this collection of fresh water and a revenue of 1,000 Rupees is said to be received from it but more information is required on this subject,

Mode of carrying a canal through the Chatterpore lake a question.

68. The points to be decided before a canal is projected through the small lake at Chatterpore are, whether it is advisable to keep up the water to the present height or to increase the quantity for lockage or for extended irrigation; whether the land irrigated might be better watered from another source, and the lake drained; or whether the great body of fresh water now applied to no purpose might not be usefully employed, either for irrigation or to produce water power that might be applied to machinery, I am inclined to think that it will be better to lock from tide level to the present height at least, if it is not necessary to rise a yard higher, but the enquiry into these particulars will occupy sometime, and I must leave them to Major Birdwood who agrees with me in the advisability of connecting the Ganjam river with Munsoorcottah river, if only to reduce as far as possible the injury done to the north road by the heavy and increasing traffic between the Chilka and Munsoorcottah.

Ganjam river navigable.

69. The Ganjam river has been navigated experimentally from Aska to Ganjam, by Mr. Minchin of the Aska Sugar Factory, who took a large raft of Rum casks down the stream during the rains; the voyage was very successful, and had there been a canal from Ganjam to Munsoorcottah, the venture would have answered perfectly; but on reaching Ganjam, land carriage was not available, and the casks remained so long in the river, that there was some considerable loss in their contents. If suitable boats were brought into use, this river might be navigated for several months of each year, and as soon as the more pressing necessities of the Aska works are supplied, I have no doubt that the able and energetic gentlemen who have now charge of that establishment, will turn their attention to this means of reducing the heavy charges now incurred by the Company, in the carriage of Rum and Sugar to Munsoorcottah.

North road from Berhampore to Rumbah.

70. The North road from Berhampore to Rumbah (28 miles) has now a heavy traffic on it. There is a great consumption in the towns of Berhampore, Ganjam and Chatterpore, besides which there is an active trade between Munsoorcottah, Ganjam and the Southern ports of the Chilka lake. The thorough repair of the north road was therefore very necessary here, and it is in very good order from Berhampore as far as the Ganjam river, but between Chatterpore and Ganjam there are still a good many small bridges required, where nullahs are now passed, by those wretched substitutes for them, road dams. From Ganjam to Rumbah the road is now being made, and in the present state of the trade it is very much required. From Rumbah to the frontiers of the Madras Presidency, is a distance of 13 miles, and the road is said to be in very bad order, but it is of less importance there, as the Chilka lake affords a much cheaper carriage than the road would, if made ever so perfect.

Too much has no where been done to the road.

71. After completing my inspection of the north road, through the Ganjam District, I can safely say that no part of it has as yet been made which was not urgently required, either as an approach to towns of importance, or as parts of lines leading to the sea ports. Major Birdwood will report again upon that portion of the line where a question has risen as to the course that should be chosen, and will reduce the breadth of metal on all those parts on which the traffic is light.

Rumbah on the Chilka lake.

* *Note.—Subliah in the Callicote Zemindary.*

72. Rumbah is a small village near the south end of the Chilka lake, and is the principal place of landing for the goods which seek a market in the Ganjam district. There is another small * village the name of which I have lost, that has a landing place also, and the traffic passing through the two villages is altogether very great, and, if I am rightly informed, rapidly increasing, in consequence,

chiefly, of the demand for oil seeds in the port of Munsoorcottah. As the villages are in the country of a Zemindar, I was unable to get an account of the quantity of rice and oil seeds landed there, though an account must be kept, as the Zemindar levies a toll upon them, neither could I ascertain with accuracy the rate of duty paid, but it is evidently very light as the boat people make no complaint either of the amount taken, or the means used, in collecting it. A Memorandum was given to me as the rate, but it was not considered trust-worthy.

Boats on the Chilka.

73. The trade of the Chilka is carried on in boats quite peculiar to the lake, and in some respects well suited to it. They are made of planks without ribs or keels, and are perfectly flatbottomed with prependicular sides. This form is necessary in the unimproved state of the landing places, as the lake is very shallow at the edges, except where a rocky knoll forms the bank; and in such positions goods cannot be landed with safety from the breaking of the waves. The bed of the lake is all of the softest mud, for the slope from the shore is so slight, that but for the rise and fall of the tide, loaded boats could not approach the most favorable landing places within several hundred yards, and when the rise of tide is slight, as it is at the South end of the Chilka at this season, the boats can only be unloaded by the carts being driven into the lake to meet them. These boats are pointed against the wind, and have mat sails when the wind is fair, set upon two loose bamboos which come down upon the heads of the crew, if the sail is by accident shaken in the wind, I never saw any boats so rude in their rig and consequently difficult to manage, but even with these drawbacks and most lazy working, the carriage on the lake is very moderate, as the accompanying Memorandum will shew. There appear to be a great number of these rude boats which have been kept up principally by the demand for firewood from the western side of the lake, for the manufacture of salt on the north shore; and on the strip of land between the lake and the sea; but of late years the demand for oil seeds in Europe has led to its increased cultivation in Orissa, as well as elsewhere, and as there are no exporters there, for a reason sufficiently cogent, which I shall remark upon hereafter, the crop now finds its way to the ports of Ganjam for shipment. There has always been also an active trade in rice on the lake and the quantity landing at the village of Rumbah during my stay, could not be less than 50 tons a day.

Cumrasa to Rumbah by boat 3¼ annas a ton for 50 miles, less than 1 pice a mile.

No active shipping port in Orissa.

74. The produce of Orissa is evidently driven to the ports south of the Chilka, from the total absence of all means of carrying it from the interior direct to the sea. Had this been the case there must have been great export trade from the Delta of the Mahanuddee which is one of the most fertile countries in the world; with no greater impediments to the loading of the ships than are overcome at all the small ports on the coast of Ganjam. Indeed there is one natural port in that part of the coast, which might be made a place of great trade, and give life and wealth to all the finest parts of Orissa. The place I allude to is Dumrah, which only wants approaches from the land to become of great importance as the shipping port of that highly productive and already densely peopled Delta.

Road from Cuttack to Pooree N. Road beyond the Madras frontier not metalled.

75. But the only road from the interior to the coast is from Cuttack, to Pooree or Juggernaut, which perhaps because they are Collector's Stations have this means of communication afforded them. But this road having no metal upon it, and being of pure delta mud, is so deep after the slightest rain, that carts can hardly travel on it, and I may here observe, that from our frontier to Calcutta, the great road, though made with great cost on a high embankment is no where metalled, and in consequence is hardly passable for carts excepting in the driest weather.

Water communication between the Chilka and the Ports.

76. During the rains a branch of the Mahanuddee which falls into the Chilka, is navigable as far as Cuttack by the lake boats, and much use is made of it, but if the Chilka was joined by a canal with Munsoorcottah, or even Ganjam, the traffic on that line would be greatly increased, for when once afloat, the cost of carriage for each mile is so small that distance is of little consideration.

Regarding the Chilka lake.

77. Before I make my proposal for turning the navigation of the Chilka to better account I must make some remarks upon the capabilities of the lake with reference to the several purposes to which it might be applied; but I regret to say that I am unable to go into the subject so fully as I had hoped to do, in consequence of my lameness having prevented my getting to all parts of it, for a complete examination. I might be induced in consequence to withhold my remarks which must necessarily be crude and unsatisfactory, but as I have said with regard to the Bimlipatam river, I am always glad myself when making enquiries upon such subjects, to have the advantage of all the opinions and suggestions that have ever been given upon it, and I record mine in this case, to be of whatever use they may to those who take up the subject hereafter.

Comparison between the Chilka and Colair lakes.

78. The Chilka might be turned into a fresh water lake without the slightest difficulty, and in that case, a vast area of the finest land might be brought under cultivation and irrigated. We have in the Colair lake a case precisely similar. The bed of that lake is below the level of the sea high water, indeed in parts it is below low water mark, and such is the case with the Chilka. The Colair is connected with the sea by a channel open to the tide and but for artificial means its waters would be like those of the Chilka, or any ordinary backwater, salt in the dry season, and fresh or nearly so during the rains. From time immemorial (I believe) the Colair has been secured against the tide by embankments which have every year been cut to allow the passage of the floods from the river that fall into it. The openings for this purpose were closed after the floods had passed, and before the water in the outlets had become salt. This was an expensive operation, and a constant source of anxiety, but the return from the lake land was enormous; and the skill of those employed upon it had become such that currents which would have appeared perfectly uncontrollable to those who were unacquainted with works of the kind, were brought under restraint at the time required. This rude mode of management has been now permanently superseded by the construction of a weir which allows the escape of the water while it prevents the ingress of the tide, the crest of the work being above high water mark.

Comparison continued.

79. Such a work is quite practicable between the sea and the Chilka. The rocky islands would afford admirable material for the purpose, which with the water carriage of the lake could be employed in any quantity at an exceedingly cheap rate. The original mode of cultivating the Colair was to plant those parts of the bed which were left bare by evaporation or with shallow water over them, and the cultivation extended lower and lower as the water receded during the hot weather; the richest land was at the lowest level that was cultivated, but when the lake dried below a certain point the water became brackish and unfit for irrigation. There was great gambling in this cultivation and every year some portion was lost; but the profit from what was saved was so great that every available acre was taken up, not by the inhabitants of the neighbourhood, but by people from a distance who every year came to bid against each other and scrambled for a share of the lake. The Godavery Annicut has put an end to this, and with the permanent outlet the cultivation is secured. The whole bed of the lake above the level of the brackish water can be always cultivated and the crops watered without the slightest risk by water from the Godavery; and this change might as readily be brought about in the Chilka, the bed of which would no doubt be found equally fertile, while the area of available land would be infinitely greater. That the bed though salt now, would be soon fit for cultivation, there can be no reasonable doubt, as we are constantly recovering land from the Malabar backwaters, the beds of which are as salt as that of the Chilka, but it is found that in the second year the soil has been so well washed, that it suits rice perfectly, and yields abundant crops. The water for its irrigation could be stored on the small streams that fall into the lake, or it might become a portion of that great irrigation which ought to exist under an annicut thrown across the Mahanuddee above Cuttack.

Fitting the bed of the lake for cultivation.

80. The Chilka might thus be made to produce either rice or sugar and as Orissa has so dense a population there can be little doubt that a crop would be raised on the whole of it, but whose property the land of the lake would be considered I do not know. I have pointed out the way in which it may be made use of; by excluding the sea and I will now venture an opinion as to what might be done with it if it was considered more advisable to make it a place of shelter for sea-going vessels.

Improving the entrance of the lake from the sea.

81. The management of the outlets from the rivers and backwater on our coasts is still puzzling all who are attempting it, and whatever may be the correct theory of the deposits, which invariably form bars across them immediately beyond the line of Coast, it appears probable that it will only be found practicable to keep a deep passage to the sea by artificial means, at moderate cost, where there is a set of the ocean currents upon the shore, and a consequent tendency to encroach upon the land from a steep beach: where this is found, it is highly probable that by fixing the breadth of the outlet, a certain depth may be obtained and secured; greater or less in proportion to the quantity of water flowing through the passage. In some of our rivers which have a constant drainage from the country, a navigable passage through the bar is kept open of depth sufficient for large cargo boats, even when the area of backwater is very small; but some of the best outlets for navigation are those which are mainly dependent for their depth or a great area of backwater where the tidal action throughout the year is powerful and constant.

The supply of drainage water to the lake.

82. The Chilka lake is supplied by a number of small streams, and only one of great capacity which carries a large volume of water from the Mahanuddee in the monsoon and I believe conveys little or no water into the lake in the dry weather. The very great area of the lake is against a deep passage being cut by the monsoon drainage, as its wide surface rises very gradually and a broad outlet will open, whereas had the lake been small a greater head of water would have been raised by the first sudden flood, and the outlet would have been deepened, I have elsewhere observed this dif-

ference between large and small backwaters, in some situations the effect is observable throughout the year, in others the depth is so much more dependent on the tide than on the drainage, that the temporary depth obtained during the first flood of the mousoon is comparatively of little importance, as however our knowledge of the whole subject is very incomplete, it is evidently advisable in attempts to improve these outlets, to turn every current to account as far as possible. In the case of this lake, which is very much larger than any of the backwaters on either coasts of the peninsula, we have at our command a much greater tidal scour than is to be had elsewhere, not only from the greater area but from the rise and fall being greater also, we ought therefore ceteris paribus to have a greater depth of water through the bar. What the depth is I am not informed, as I was not able to examine it; but there are reasons why the quantity of water entering and leaving the Chilka with each change of tide is not what it might be; and whatever it is, I feel sure that it might be considerably increased.

83. That the quantity of water entering the lake is from some cause greatly deficient, is proved by the rise and fall at the south end of it, being far less than the rise and fall in the sea, whereas had the supply been complete, there would have been no less a change of level within and without the bar; it seems probable therefore, that if we can detect the cause of this and correct it even partially we might add so great a volume of water to the tidal current, as materially to affect the section of the outlet and if in doing this we regulated the breadth judiciously we should secure the most favorable form of section, i. e. that which would convey the whole amount of water required with the greatest depth. The cause of the deficient supply of water is, I think, attributable to the position of the present outlet which is the most unfavorable that could be found if the object be to deepen the passage. It is at one end of the lake, and the passage within is neither direct nor free from obstruction, and if a map * of that portion of the lake is examined it will be easily imagined that long before a full supply of water could be made to reach the south extremity of the lake the tide will have turned. If no other cause existed this alone would reduce the ingress of water very greatly, but there is another cause which aids this in a very remarkable degree. During the dry season the wind blows in a strong continuous gale from the south for months together, and it is clear that the level of the lake water is so greatly disturbed by it, that the surface is much higher at the north end of it than the south. I am sorry to say I was unable myself to determine what the difference in level was, but the effect of continuous gales in such cases is noticed by Mr. Ellet in his work upon the Mississippi and the result of such an action of the wind is registered in figures on the houses of Saint Petersburgh, where a steady gale blowing up the gulf of Finland, checks the current of the Neva and swamps the delta city. This accumulation of the water near the entrance of the Chilka, must reduce greatly the quantity entering the lake; and this doubtless accounts for the very trifling tide at Rhumbah, which, when I was there in April, did not amount to more than 1½ foot at the height of the springs, while the tide in the sea is said to rise and fall 5 feet. At the time I speak of the level of the southern end of the lake was at least 8 feet lower than its surface level is. During the north East monsoon, when the water is somewhat increased by the streams falling into the lake, but still more by the wind, which then is as steady and almost as violent from the north, as it is from the south in April.

The lake very partially supplied by the tide.

A plan of the Lake.

* Appendix D.

The water of the lake held above its proper level by the prevailing winds.

84. A great ingress and egress of salt water would be effected by two openings one in the north and one in the south, as the action of the prevailing winds would then cause currents through the lake, but the best effect from the tidal current would probably be obtained by opening an outlet midway between the ends of the lake, and if this could be done through a part of the spit of land which separates the sea and lake where it is not so wide as to make the passage too long, I feel confident that the tide could be raised easily to its full height in all parts of the lake, and the scour increased to its maximum, and if at such a point it was found that the sea shore was tolerably steep, i. e. having no tendency to "form out" I feel assured that an outlet might be made and kept deep enough for ships to enter. I wont presume to say what depth might be obtained, but we have at Cochin both tide and extent of backwater far less favorable, and there the depth at spring tides is 14 feet, and the vessels of 1000 tons built inside the river are taken to the sea over the bar.

Current produced through the lake, by outlets at both ends of the lake.

Vide Appendix D.

85. Whether it would be advisable at the present time to lay out the sum required for either cultivating the bed of the Chilka, or improving its entrance from the sea in order that it might be made of some use to our shipping is another question. I am not inclined to urge one improvement or the other, at the present time, as there is so much to be done of more immediate necessity in Ganjam, that I would not employ the labour of that district in the work, and while Orissa is at the mercy of the Mahanuddee without the means of carrying its produce to the sea, flooded at one season, parched with drought at another, and almost as far beyond the reach

The Chilka should not take up the attention of Engineers at present.

of a market as if it lay in the interior of the Continent, the Chilka lake is not a fit subject for the attention of the authorities of that country; at present the inhabitants of those wonderfully capable districts, Pooree, and Cuttack; European as well as Native, seem to speak and act as if they only lived there at the sufference of the Mahanuddee whose rule is as arbitrary as their submission is pitiable.

86. Crops are gathered with thankfulness when the floods spare them, streams are navigated till some drift or sand bank forbids their further use; villages rise and fall with each change in the set of the current and it is said that the town of Cuttack itself is under orders to quit its present site, if the waters of the tyrant river should ever again reach the point they did last year. It is not probable that this state of things will last for many years, although the alarm caused by the Damooda river has for the present thrown a doubt upon the utility of embankments in the minds of those who have not had the advantage of seeing what has been done by their means in the southern deltas. That the Damooda is too big for its bed there is no doubt, and that such vast volumes of water and mud, as are poured down the valley of the Ganges, will cause anxiety to those on whom the duty devolves of controlling them, is little to be wondered at too. That there should be failures and losses here and there under any management is not surprising either, but that such occasional losses should be made the reason, for the rivers of India generally, being left uncontrolled, as beyond the power of human skill to manage, is most incomprehensible, and this too, when we have Tanjore as an example of what good may result from the strict confinement of a delta river, and an artificial disposal of its waters, with the experience of its working for a hundred years. It would be absurd to limit the advantages which that country receives from its modern hydraulic works to the revenue it pays to Government; but taking that as a means of comparing the unimproved district of Cuttack, with the well regulated delta of the Cauvery, we find the revenue of the former to be 8 lacs of Rupees, while the latter pays more steadily, 45 lacs from an area very considerably less. Taking it for granted that the time is not far distant when the Mahanuddee will have its annicut, and the delta be secured against flood and drought, its lands irrigated, its produce carried almost without cost, and a water power nearly equal to the strength of its working population, added to its effective labour, as has been done for the deltas of the Godavery and the Kistna in the last ten years, the employment of the Chilka in one of the ways suggested, may not be far in the future. A possibility that must be my apology for wandering beyond my own limits, and leaving the immediate object of my tour, the Budget for the coming years.

87. There is a small work which I am very anxious to see commenced at the Ganjam end of the Chilka lake, a Canal connecting it with the Ganjam river. While at Rhumbah, I made an excursion to Pyragee, a village situated on the land which separates the lake from the sea. Major Birdwood and Mr. Harington were with me, and we were all struck with the facility that existed for opening this communication. A good lithographed map of the Orissa Provinces, on a scale of 4 miles to the inch, sent to me by Captain Thullier, the Deputy Surveyor General of Bengal, gave a fair promise of an unobstructed line being found. Our observations during our visit to Pyragee confirmed our belief; and since leaving Ganjam, I have received a most satisfactory notice of the line from Major Birdwood, who has had the country levelled and sends so favorable an account on all points, that I hope a mere trifle will be wanted to open the communication. On this being done, the Port of Ganjam will have the full advantage of water carriage from all the borders of the lake, and during the mousoon much of the produce of Cuttack and Pooree will be carried through at a very cheap rate. Munsoorcottah will still have to pay for 12 miles of land carriage, but by the time we are allowed to proceed with new works for the improvement of the country, I hope a project will be prepared for completing the line from Ganjam through the Chutterpore Backwater. If the cost of the Ganjam and Chilka cut is as small as I expect it to be, it would be better to leave it quite unobstructed by tolls, but the canal to Munsoorcottah will be more expensive, and there is no reason why a light toll should not be raised upon it.

Chilka and Ganjam canal proposed.

88. As the success of the efforts we are now making to reduce the cost of carriage from the interior to the sea, depends in no slight degree upon the salt trade, I shall offer some remarks upon it, and in so doing it is possible that I may notice several errors in the mode of management which have already attracted the attention of Government and are either under investigation or in the course of correction in other parts of the Presidency.

The success of Civil Engineer's efforts to reduce the cost of carriage effected by the salt trade.

89. That the profits derived by the Government from the Ganjam salt is not what it might be is proved by its very limited sale in comparison with the extensive area of country demanding it. Ganjam supplies not only a breadth of country for greater than that provided with salt from the western coast, but has also an extensive country to supply inland from Orissa, which I suppose to be the consequence of salt being made in the coast districts north of Ganjam at much greater expense, by the use of fuel, instead of by solar heat only. I cannot say what the actual area of country dependent upon Ganjam may be, but I may safely say that it is not less than three times that dependent for salt on Canara, while the sale in Ganjam is rather less than in that district, and it is evident that

The profit from Ganjam salt not what they might be.

even there the demand would be greatly increased if the price to the inland consumers could be reduced. The financial results therefore may fairly be anticipated from the removal of every impediment to the sales of salt in Ganjam, renders the subject of the highest interest, and seems to call for an investigation more searching than can be given it by the local Officers, who are already overwhelmed with business.

90. I need not dwell upon the direct profits derivable from an extension of the sale of salt, they have been sufficiently discussed already. The importance of the trade to an Engineer is in its beneficial effects on the cost of carriage, which although it has been long admitted and of late years has led to arrangement being made in some ports of the Presidency with that in view. The effect that may be produced by it has not even yet I think, been fully appreciated any where, and seems hardly to have been thought of at all in Ganjam.

The effect of the salt trade on the cost of carriage not fully appreciated.

91. There can be no doubt that the cause of the very small consumption of salt in the country obtaining its supply from Ganjam is mainly attributable to the great cost of carriage, and only in a very slight degree to the amount of duty levied upon it by the Government. It will be seen by the map that the area of the distant country to be supplied is so much greater than the district of Ganjam, that if the wants of the whole population were fully provided for, the home consumption of that collectorate would be comparatively of little importance, and certainly would not be such as to make the amount of tax, or monopoly price, the first object of consideration as it seems to have hitherto been. This will be apparent from the fact that the monopoly price, is now doubled by the cost of carriage in the first 45 miles, while much of the salt has to be carried 300 miles.

The sale of salt more dependent upon the cost of carriage than on the monopoly price.

92. In making any arrangement with a view to increase the revenue from salt, it is I think incumbent on the Government to keep in view the fact that whatever is done to facilitate the sale and reduce the cost, the great body of the consumers will never obtain so much as they require. The inhabitants of the inland districts will never be able to afford the same quantity in proportion to their numbers as is now consumed by the people of the coast, and as they, one and all, pay the tax on salt they are dependents of the British Government whether inhabiting British territories or not. Apart therefore from considerations of humanity, they have a claim upon the Government which should induce it to make such arrangements as shall lead to the salt revenue being derived, from the sale of the *greatest possible quantity*. But this has not been by any means the case heretofore. The present state of things in Ganjam shows indeed a total absence of this consideration. The salt stores are close to the places of manufacture, however inaccessible they may be. The approaches to them are unimproved. The quantity manufactured is kept so low that a bad season leaves the consumers with a supply more than ever scanty and consequently at a famine price. The quality of the salt offered for sale may, or may not be fit for distant carriage, and there has been no sufficient economy of the time of those who come from the interior to purchase. The principle upon which the salt monopoly in passed years has been managed, has been such as might have been expected from a trader who had no capital and looked to obtain what profit he could without it from those who were driven by necessity to purchase from him.

The revenue on salt should be raised from the sale of the greatest quantity which is not the case at present.

Impediments to extensive sale.

93. This system has been unfair to the inhabitants and most impolitic as a measure of economy on the part of Government whose interest would have been better served if every effort had been made to suit the want of its customers, and extend the sale. If in short, the sale had been carried on with the vigour and enterprise of a private trade with all the capital required at hand. I am quite aware that it is the wish of the Government to act upon the opposite principle now, and that it is anxious to remove the existing impediments to the trade, and increase, as far as circumstances will admit, the quantity sold, and I am most anxious to see that principle acted upon in Ganjam for the reasons above stated.

The Government anxious to increase the quantity sold.

94. To reduce the cost of carriage into the interior the communications must be improved where water carriage cannot be had, cart roads must be opened and either these communications must terminate at the places of manufacture, or the stores of salt must be removed from them to the lines of communication. The latter will I have no doubt in all cases be found most advisable, as the salt is made in swamps, where, even if practicable communications are opened, no interchange of goods is likely to take place, and it never can be advisable to have wholesale shops so situated.

Communications required & the removal of the salt stores advisable.

95. I have elsewhere said that salt is required as a return load for the produce of the interior brought to the coast. This is no where more remarkably the case than it is in Ganjam,

which has an active export trade, and no important, nor any coast manufacture but salt, which is in sufficient demand to balance the weight of goods brought to the ports for shipment, a return load where water carriage is used would probably reduce the actual cost of carriage about half a pie a ton a mile, and it would even in that case be worthy of consideration, but in the case of cart carriage, which will be the best means of conveyance for the goods passing between the interior and the coast for many years to come, the saving will not be less than 4 pice per mile even when the roads are placed in a thoroughly efficient state. And as the saving bears a proportion to the expense of carriage, till the roads are in order, it will be greater still. Even 4 pice is a difference greater than would be effected by the change from good common roads to the cheapest Railway or by any expenditure in perfecting the vehicle used. And it is thus evident that the provision of a return load is one of the most important remedies that can be applied to the present depressed state of the interior of the country.

Salt required as a return load for goods brought from the interior to the coast of Ganjam.

Actual saving by a return load.

96. As salt will be a return load for the produce of the interior, so that produce will be a return for salt, and when the interchange is complete, the cost of carriage will be at its minimum, and the sale of salt at its maximum. To this end I propose that there should be depôts of salt at all the ports, and that eventually, none should be kept either in the swamps, or off the main lines of trade.

Salt to be stored in the ports.

97. At present the great carriers of salt are the Binjarries, upon whom the people of the country beyond the Ganjam frontier are entirely dependent for their supply. These people now bring very little of the produce of the interior to the coast, and the whole charge for their going and coming has to be paid by the consumers of salt, who have also to pay for the loss of time occasioned by the swamps being impassable after the rains end, frequently many thousand head of cattle are then brought together, which are detained for weeks while the swamps dry. I have no account of the numbers that have been so collected near the pans of Ganjam; but on one occasion at Buntamilly (a pan similarly circumstanced in Masulipatam) 40,000 head were waiting for several weeks, and on the swamp becoming passable, two months were occupied in loading them.

Salt sold by Binjarries who bring very little produce into Ganjam.

98. This peculiar race of people travel very short marches daily, and trust entirely to the forage they find in the waste lands of the country they traverse. On some few lines of road, where they are engaged in carrying cotton and other produce from a distance, the inhabitants oblige them to purchase forage, by cutting and stacking the grass when the monsoon ends, and destroying all they cannot cut, but the Binjarries are not so ill-treated in general, and in countries dependent upon them for salt they are rather a privileged race. Carriage by the pack oxen of the Binjarries is more expensive than by the worst country carts, on the worst roads, which appears at first, as a comparison of the men and cattle employed, unaccountable; but on further investigation it is evident that the mode of working the cattle without artificial forage is bad economy. To give them time to supply themselves with food, the march is rarely made more rapidly than at the rate of 5 miles daily, so that the time of the cattle is lost, and with it the time of the men also, and although any amount of consideration for the cattle is shown when rest and additional grazing time are supposed to be wanted, whole droves of hundreds are sacrificed from parsimony in the use of purchased forage when the grazing fails.

Carriage by Binjarries bullock expensive.

99. The number of cattle that load at Nowpada annually must be about 1,00,000 and as there is always a great press for salt at the end of the monsoon, they must accumulate in like manner in that neighbourhood also, when the season is late. But a still greater loss, and consequent charge as carriage results from the state of the country a few weeks later in the season, when the forage fails from draught, and fresh water is scarce. Then vast numbers of cattle die before they can reach again their grazing ground in the hills, and many more become unfit to bear their loads.

Loss of time and loss of cattle by the position of the salt stores.

100. In the means of conveyance here described we have sufficient to account for the very limited sale of Ganjam salt, and the best promise of greatly enhanced receipts from this important source of Revenue where we take steps to improve them. We have this promise realized in Canara, where a judicious outlay on roads has led to the carriage of salt on carts, with such an increase in the quantity sold, that the profit pays a fair interest on the outlay; while the trade of the country has the advantage of the roads.

Promise of extended sale realized in Canara.

101. In Canara, the salt being imported by sea, was always stored in the ports, and as the produce of the country beyond the Ghauts was brought to them, by those who carried the salt as a return load the trade had always that advantage also: yet every step taken to facilitate the carriage and reduce its cost, was found to act beneficially on the sales. Thus the removal of the salt from the ports to the foot of the passes was found to answer: and even a change of position of six miles was in one case productiv of profitable results. This was near the coast where

Every impediment removed increased the sale of salt in Canara.

forage was expensive, and in such localities every mile saved is of importance to the Binjarrie carriers. If such changes effected so much in Canara with its limited field of demand, it may be supposed how great the annual loss of Revenue has been in Ganjam while the salt has been shut up in the swamps.

102. Eventually the trade in salt will be independent of the pack oxen of the Binjarries but that will not be till the passes have been made practicable for wheels; and capital and enterprise have been found to construct carts capable of carrying some 20,000 tons a year, an average distance of about 200 miles. We cannot make our arrangements to suit that time, for the present we must look to the Binjarries as our principal customers, as they have been hitherto such as the people are, they are all important in the salt trade and if we study the interests of Government, and those of the people requiring salt far from the sea, we must suit our arrangements to them, and to do that, salt should if possible be supplied to them, not where it is now offered for sale, but at the foot of the passes, which are from thirty to fifty miles inland.

Salt will eventually be carried by carts but not immediately.

103. The opening of roads from the ports to the hill-country has commenced, and even now salt might be stored in several places most favorably for the Binjarries, if Government or private enterprise undertook the carriage so far, I have little hope from private enterprise in Ganjam at present. Salt is a perishable article and one that requires a considerable capital to trade in profitably; I have no doubt that it will some day be as much an article of general sale as grain, but the question is what can be done immediately to supply the millions waiting for salt, and give them the advantage of the roads as soon as they are opened. To do this I think the Government must set the example of enterprise, and employ its capital. If this is done instead of its interfering with trade objectionably, it will, I am sure, give new life to it, and as private individuals can work more economically than the Government, it may fairly be expected that the profits derived by Government will lead to a successful competition; on the establishment of which the Government may quit the field.

Carts could carry salt to the foot of the hills but capital and enterprise are wanting.

104. If stores were built by Government on the frontiers of the hill country they might be placed at the disposal of private traders who might be induced to purchase salt if it was not taxed till its leaving the inland stores. In former times contracts of great amount were made between the Government and the Binjarry Chiefs who were proverbial for their good faith, and I think it probable that it would answer for the Government to enter into agreements with these people to give them salt at a fixed rate at the inland stores if they would take large quantities, the rate either covering the cost of carriage or not as seemed in each case advisable. The Binjarries who have a natural antipathy to the Engineers and consider themselves a doomed race in consequence of cart roads being opened through the country, are quite aware of the benefit they would derive by their journey ending at the foot of the hills, and while I was in Ganjam they begged that a road for carts might be opened so far, in order that they might obtain salt without leaving their grazing grounds.

Stores to be built by Government and used either by Government or by private traders.

105. If the Government do not consider it advisable to give so much direct help as I suggest it will, I trust, at all events erect stores in all the sea ports, and as a temporary measure store salt also well clear of the swamps, with good branch roads to the depots; or place it on the great north road where the roads from the interior cross that line.

Salt stores in the sea ports and out of the swamps.

106. As the roads and passes improve, the Binjarries will bring more of the products of the interior to the coast; and if salt is not supplied to them near the hills, they will deliver their loads in the ports, and salt will be purchased there, unless there are other depôts on the line they travel, further from the sea, in which case they will quit the ports and load there, for they will not remain near the coast longer than they can possibly help. In Canara wherever the Government established a depôt of salt the coast merchants located agents to purchase the produce brought from the interior. There was usually a combination of these agents against the Binjarries but their chance of good prices was little better in the ports, and they were in general too happy to change their loads and get into the Hills again. Wherever there is a change in the mode of carriage in such a trade as I am speaking of, there must be a transfer of the goods to a new owner, as the carriers from the interior are themselves owners and will never hire carriage however well it might answer to them to do so. In the selection of sites for stores it is therefore advisable to choose spots near large trading villages or Bazars, if such can be found, and it might be worth while to place the stores even a few miles out of the direct line of trade to take advantage of such positions. On the line of the north road there must be many such commercial villages favorably situated for the Binjarries, nearly if not quite, on the lines of road leading to the ports, and very fairly provided as to forage and water where such villages cannot be found, sites for building might be given to merchants or their agents.

Commercial villages use wherever salt is stored on the trading lines.

A change of carriage will only take place where there is change of ownership.

107. If the Government form such depôts as I am now speaking of, which will be at no great distance from the pans, I imagine that the cost of carriage would not be added to the price of the salt, but a question might be raised as to whether that addition should be made if salt was stored far in the interior. This question may generally be treated simply as a question of economy, but where the extra sale caused by keeping the price down, will bring as good a profit to the Government as a less quantity sold at the enhanced price, it is I think incumbent on the Government to give the inhabitants the benefit of the reduced price. If the gain is the same in either case it would be denying the people a costless benefit to add to the price, and lessen the consumption, such an arrangement would be entirely contrary to the liberal principle upon which the Government is working in opening roads into the interior, the objects of which are to give the inhabitants of the inland Countries the advantages possessed by the people of the Coast District.

108. Where salt is carried by water I am confident that it might be stored free of all extra charge for carriage, trusting to the extra sale for repayment even if the depots were in the very heart of the continent, but where the ordinary land carriage is employed the charge for carriage might be made, so that the Government would enter upon the trade on an equal footing with private dealers who would have the advantage resulting from their more economical mode of working and eventually taken the trade out of the hands of Government. In treating the two cases differently, my object is to give the consumers all the advantage that can be given to them without loss to the Government; with water carriage they need not be dependent upon private carriers and pay for carriage, with land carriage the Government may work to a loss if the charge is not made and the Government charge may be even greater than that of private traders. But as I have before said that charge should be determined upon the spot and on the principle of giving all the advantage possible to the consumers.

109. The Engineer Officer could give a good suggestion as to the most advisable positions for the stores and none should be built without his opinion being obtained, as his operations must regulate eventually the course of trade.

110. To give new vigour to the trade in salt it should be the sole duty of some Officers to study the impediments now existing to its sale and suggest the means most suitable in each locality for reducing the cost of it. If the Ganjam salt trade were taken up in this spirit and energetically pursued, it would be an act of charity to several millions and would undoubtedly bring its own reward in an immediate increase of revenue.

111. To do the best for the inhabitants inland, a new capital must be brought into use between the sea and the Hills. The Binjarries confining the use of their money and labour to the country within and beyond the Hills. To supply this new capital the Government might give salt to private traders at the cost of manufacture, leaving the extra cost or excise to be levied on the sale of the salt to the Binjarries. If such a contract was entered into with the Government by the merchants who purchase produce, they would barter salt for grain on the frontier, and pay the Government in money on the coast a very moderate security would be necessary in such a case and the extra sale of salt would cover all occasional losses.

112. There are many minor inconveniences and annoyances to which the purchasers of salt are now subjected and which might be removed by the appointment of an agent to manage the trade, who had no other duty to attend to. If such an Officer was fully impressed with the idea that his success was dependent upon his making himself agreeable to his customers, the arbitrary measures that have been forced at times would never again be resorted to. If I am rightly informed large numbers of Binjarries have been refused the salt of Nowpada till a stock in hand at Omeravilly was sold, though that salt was so inferior and unfit for carriage to the market they supplied, that they preferred waiting any length of time rather than load their cattle with it. There are many less palpable losses and inconveniences to which the purchasers of salt are subjected; the sum of which must make every material reduction in the quantity sold, and it cannot be expected that the Collector or his Assistants can give up so much of their time to the details of the trade as to meet the wants of the purchasers. They cannot as an agent should, place himself in the position of a private trader and study from day to day the wishes of his customers, and till that is done neither the Government nor the consumers will be treated as they ought. In recommending the appointment of an agent, I must however be understood to mean not one who would occupy himself in measuring heaps of salt but who would look into the trade far and near, that he might ensure every facility being given and every impediment removed.

113. My tour through Ganjam has impressed me most favorably as to the capabilities of the district, which far exceed those of the Presidency in general. It has a good soil, a formation of surface that not only gives tolerable security of abundance of rain but tends to a continuance of the supply in seasons when the less hilly countries are entirely without it. If it has not good harbours, it has a roadstead throughout its whole length, from which goods are shipped inexpensively, and one port at least is capable of great improvements. The rivers offer facilities for irrigation on a great scale, and will, if they cannot be navigated themselves, feed canals that will lead directly inland from the principal ports. On the coast, salt can be prepared in any quantity, at the cheapest rate, and there is a

Great capabilities of Ganjam.

114. The climate and soil of nearly the whole district is suited to the growth of sugar, for which there is even now a demand (for both home consumption and for manufacture for export) that would ensure the sale of all that was grown at the present highly remunerative price, even if four or five times the present quantity were produced. There is a certainty also of the demand increasing to meet any extension of growth, because there are few countries in the world that can produce sugar at the price it bears in Ganjam. Inland from this district, is a country little known; but all recent accounts of it lead us to the conclusion that its importance has been greatly underrated. Bustar is now for the first time, under European supervision, and has already been visited, by a member of the Nagpore Commission, whose interest in it is sure to lead to its becoming an active and good neighbour. It will now be to Ganjam, what Mysore is to Canara, and all that is required to bring that about, are roads to connect the two districts; works which would, I have no doubt, well repay their cost to either one country or the other.

115. The roads I speak of, are only second in importance to the irrigation. It is true that the coast district might become rich without any trade with Bustar, and roads into that country, are not so absolutely essential to its prosperity, as communication with the sea is to the inland province. But there is an urgent call for these roads, to change the character of the bordering country; to give security of life and property to the inhabitants of the frontier Talooks, and to extend the sale of salt. The Government of Madras has three reasons for opening roads from the coast of Ganjam, to the plains of Bustar, and even though that country did not join in paying the cost of them, their effect on the salt trade alone, would make them advisable undertakings as investments for the Government money. But as the value of them would be so much greater to Bustar and other parts of Nagpore, and the doubt which hung over the value of such roads in the minds of some (before the Canara passes were opened for the benefit of Mysore) no longer exists, we may begin our portion of the work with a certainty of its completion by our neighbours. It is difficult to understand why a greater effort has not already been made to open roads through the Goomsoor and Kimedy Hills. Every one has allowed that they are the only remedy for the brutal customs of the Khonds, to counteract which we are every year spending large sums upon the Meriah Agency, and every fresh out-break in the Hills shows that without them, our police, and even our troops, are almost powerless. One grant was made for money to open a pass from Russelcondah, but the unhealthiness of the country sent the Officer employed upon the work to Europe; and since that time no further steps have been taken to carry on the road.

Road leading into Bustar required for the benefit of both districts.

If roads are made by the Madras Government, they will be carried on by Nagpore.

Roads through the Hills have always been considered necessary.

116. The true reason for the absence of these important works is probably to be found, in the same cause which closed the last attempt. The terrible fever in the Hills has been too much for the zeal of those who have traced the roads in the plains, and the difficulty of finding labourers who would risk their lives in the execution of the work, has satisfied them that there was no use in making the attempt. The fever in that part of the country, is indeed of the most fatal character, and the climate is only free from malaria during a very brief period yearly. This will no doubt be found a great executive difficulty, but I have had much experience in the jungle of Malabar and Coimbatore, and I feel confident that money may be made to remove this difficulty as well as others; and I believe that by management the passes may be opened without the sacrifice of life. I have never recommended an attempt to work in spite of fever; my plan has always been to press on the work when the jungles were safe, and though the healthy season is shorter here than it is in Malabar, I would do the same here, calculating that the cost of the work would be somewhat greater than on the Western Coast; what I propose is, that a body of coolies should be enlisted and organized, for the public works of Ganjam; and that they should be employed on the passes only when the hills are most healthy. Having such a body of men at command, they could be brought to the pass on the day appointed, and leave it when the season ended, and in the unimproved condition of Ganjam, there will be employment enough for them in healthy parts of the district throughout the year; so that there need be no great loss of their services at any time.

The fever in the Hills the reason why roads have not been opened.

Proposal that a corps of coolies should be raised.

117. I am quite aware that corps of coolies have been declared a failure, as more expensive than the common labourers of the country, employed as occasion required upon the public works, I am not however prepared to admit this. I do not think that any corps has been sufficiently well organized, and disciplined, to make the trial a complete one. I have seen gangs of prisoners, under good management, become so skilled in road making that their services were of more value than an equal number of coolies, even when the latter were paid by the quantity of work done; and I have not a doubt that the superior skill of practised men in such a corps as I suggest, would more than counterbalance the skulking and malingering, which I admit to be inseparable from such a corps. At all events, I am confident that by such means the Ganjam passes might be opened,

The skill of a disciplined corps will counterbalance the loss from idleness.

and that the extra cost (if there was any) would be less in amount than the expense occasioned by loss of time, waste of superintendence, and risk of life, that would be occasioned by attempting the works with common coolies collected on the spot. I would at once enlist 500 men for the Government talooks, and 300 men for the Kimedy estate, and when they were at work, I would employ with them, all the volunteers from the hill country that could be induced to join the working parties. This I think would lead in the course of time to the Sowrahs and others taking service in the corps, which would gradually weaken their attachment to their chiefs, whose influence over them is productive of nothing but evil. The success of the corps would depend in no slight degree upon their officers and I have great confidence in recommending their trial at the present time in Ganjam, for I know no one who could be better entrusted with the general control of them, than Major Birdwood, whose temper and judgment in the management of men has always made him a most effective and popular commanding officer. He has several officers under his orders who could assist him to organize them, though he would require distinct officers for the command of them permanently; and if he gave his assistants, or executive officers, for that purpose, he would require others to replace them.

In the passes, a corps of coolies would be economical.

Strength of the corps suggested.

118. Since I left Ganjam I have received a letter from Lieutenant Harrington saying that Lieutenant McNeil who is in charge of the Meriah sacrifice agency, is willing to undertake the opening of a road from Russelcondah to the foot of the Coorminghia Ghaut, if money can be given to him for the purpose. Major Birdwood will address the Chief Engineer on the subject and I hope the sum required can be allowed, for the work is of the greatest importance: and Mr. McNeil (who was in the Sapper corps for a time) having some local knowledge, and influence, may be able to get the work done well, and expeditiously. This agency has now been at work for many years, and the sum spent upon it has been enormous. It was appointed from true humanity and kept up on the same account, with unbounded liberality; the sum spent may too, for all I can say to the contrary, have been laid out with judgment; and a temporary check has, I believe, been given to the abominable practice it was instituted to suppress. If there is any truth in the voice of the country, no material effect has been produced by it on the character of the Hill people; and if such is the case, it may be found that the present will have taken its first step towards the permanent correction of the brutal customs of the Khonds, when he has up his time to road making.

Mr. McNeil proposes to open a road from Russelcondah to the foot of the Coorminghia Ghaut.

119. The passes most urgently required are, one or perhaps two at the head of the Russelcondah valley (these are I suppose in Vizagapatam;) one in the Kimedy estate above Buteley; one North-west of Kimedy, and two from Russelcondah; one of which is the Coorminghia Ghaut above alluded to. Passes fit for carts should be opened immediately at these points as soon as good lines can be traced, and the first employment of the Corps might be on the Buteley and Coorminghy lines. I may here express my conviction that the presence of such a body of Government labourers would be as effective as a Sibbundy Corps, in the prevention of such outbreaks as that which is now causing a loss of life and property in Kimedy. Had such an organized body of men been engaged upon the Buteley road, in all probability the Sowrahs would have been working with them, and indifferent to the call of the Dundasuna, or if not, they would never have attempted to rise, so weak as they were in numbers, while so large a party, well acquainted with the country, was close at hand. The effect of these roads through the Hills, will be to destroy the power of the petty chiefs, and give freedom to their dependants; which will lead to an inter-communication with the plains and an introduction of new habits. The Chiefs will not at first approve of the roads being opened, as they will see correctly enough what their effect upon themselves will be. They will imagine too a thousand consequences as terrible in their minds as the "Zillah Court" that the Coorgs pictured to themselves as the first procession that would ascend the Perimbaddy pass; but some trifling luxury brought more cheaply into their country, will make them forgetful of their original fears; and as a reduction in the cost of saltfish, on one Ghaut being opened, made the Coorgs urgent for more passes, in spite of the dreaded Judge; so the Sowrahs and Khonds will shortly take an interest in the roads, and be no less anxious than their neighbours to turn them to account.

The Passes most immediately required.

The power of the Hill Chiefs will be reduced, but they will ere long approve of the Roads.

120. In a former part of my notes, I have alluded to the export duty as a means of paying the cost of working, and repairing the roads: and I think that a continuance of that tax would

Export duty more advisable than a toll for the repair of Roads.

be more advisable than a toll, if any direct receipt from them is necessary. There will be a great outlay on the roads of Ganjam, and their effect on the land revenue will be very slow, indeed that source is much too uncertain to be trusted in districts so circumstanced; and some other returns must be sought for. The objection to a toll is that the carriers who are of a poor class, have no money, and the effect of it may be the same as was caused by the transit duties in Mysore, where the produce could not be moved by the producers. The merchants on the coast have money, and it will make no difference to them whether they pay for the roads by an increase on the cost of carriage or on an export duty. I admit the advisability of free trade, but as money must be raised to pay for roads, and the trade cannot be free of all charge, it will in my opinion cause less interference with the traffic of the country, if every restriction is removed from its carriage to the ports. But I hope in Ganjam it will not be long before a better arrangement of the salt trade, and the further extension of the sale of that article; by improved communications, will make the Government independent of all direct tax upon other goods carried by land, or by sea. When the passes are open, I am confident that we may trust to the salt in that district, for an increase of revenue, so far exceeding the cost of the roads and canals, that we need not impose either a toll or an export duty; and I hope till then we may have the latter as it now exists, rather than any toll however light. Now that each Civil Engineer has only one district to give his attention to, the capabilities of the country will be soon learnt. Major Birdwood has already a clear view of the wants of Ganjam, and will I am sure supply them as fast as money is placed at his disposal.

Sub-division of the Collectorate for the Engineer executive.

121. While travelling through Ganjam, I discussed with Major Birdwood the most advisable subdivision of the district for the Executive Officers, when the work is taken up by the Engineer Department; and it was determined, that one Officer should take charge of the valleys of the two southern rivers (the Nagalea and Calingapatam river;) one Officer Kimedy and the Talook that lies between it and the sea while it is in the hands of Government. One or two, (if two are to be had) for the valleys of the rivers Rushkoolea, and Mahanuddy, and for the Government lands in the north. This is a well defined division, and would ensure the works both of irrigation and communication being carried out systematically. Major Birdwood has already several very valuable Executive Officers, and he could I think take up the work at once, with a very moderate additional subordinate establishment. Though Lieutenant Harrington would manage one of these divisions admirably, I should be sorry to see him relieved from the general duties of the district, as he has a thorough knowledge of it, and he would be an invaluable Assistant to Major Birdwood in the organization of his new department, and the instruction of the local Officers on their taking charge of the subdivision.

Fort St. George,
12th July, 1856.

(Signed) F. C. COTTON,

Deputy Chief Engineer.

(True Copy)

C. E. FABER, COLONEL,

Chief Engineer.

9f

REPORT

ON THE IRRIGATION AND COMMUNICATIONS

OF THE DISTRICT

OF

GANJAM.

1. IN considering the state of the Public Works in the Ganjam District, it will be most convenient to divide it into the Northern and Southern portions, as there is a long strip of intermediate country which is entirely composed of petty Zemindaries:—

2. The Northern portion contains 6 Amany Talooks viz., Goomsur, Hautgur, Sooradah, Moherry, Poobacondah, and Itchapore; of these the Moherry Talook has been but 3 years the property of Government, while that of Hautgur* has only just been purchased. The Southern portion forming the Sub Collectorate contains the Wadadah Talook.

* Surrendered by Government to the next highest bidder, Zemindar of Callicote.

3. Out of a total land revenue of about 6 lacs of Rupees,* Rs. 4,18,000 is derived from irrigated lands, Rs. 1,50,000 from other lands, and Rupees 32,000 from other sources.

The means of Irrigation described.

4. The means of Irrigation consist of channels taken from the rivers, which traverse the district, some of which are led to reservoirs, which store the water brought by the freshes, and some irrigate the fields at once.

5. Of the two portions the Southern is the best furnished with river channels, as it has the advantage of two large rivers from whence to draw its supply. From the Nangoolea* or Chicacole river, one large channel is taken off near the village of Nimtoorladah, which runs for a distance of 20 miles, and waters land yielding a revenue of Rs. 31,000. From the Wumshadaura or Calingapatam river there are 4 channels taken off the right and 4 off the left bank. The former water land to the amount of Rs. 34,600, the latter to that of Rs. 60,000.

* Nagavali.

	Rs.
Supplying Channel to Poorshotpore Tank	9,918
Byree Dasey Buttay	15,448
The Garra and Omravilly	8,262
The Calingapatam Channel	990
	34,618
The Polaki Channel	32,000
The Looklam Do	5,000
The Jullmoor Do	16,488
The Nagaricutticum Channel	6,804
Total	60,292

6. On the left or Northern side of the Calingapatam river whatever land is not irrigated by the above mentioned channels is supplied from tanks wholly dependant on the local rains, with the exception of a small irrigation work lately constructed across the hill stream called the Gareeboola gedda, from which a channel has been taken off supplying the tanks lying between the village of Paltalagam and the coast at Magaveram, affecting at present land assessed at 4,500 Rs. and calculated to redeem a large quantity of waste and jungle.

7. The Itchapore talook, the next in order, to the northward contains about Rs. 30,000 irrigated land, which is supplied principally by 3 small channels taken off the Itchapore river, and the rest by tanks fed from hill streams of which that at the village of Montereddy is the largest.

8. The Moherry talook has no river irrigation at all. There are very few large tanks in it, the principal one being close under the hills to the west of Berhampore at the village of Lauty. Its wet lands however are assessed at 60,500 Rs.

9. The Poobacoudah talook contains the principal irrigation work in the northern part of the district. This is the large channel taken off the Godhalo nullah one of the feeders of the Ganjam river. Under this channel which runs nearly parallel to the southern bank of the river, there are according to the talook accounts 9,292 acres of land yielding a revenue of Rs. 26,372.

10. On the northern bank there is a small channel taken off the Ganjam river, at the village of Anamanpilly Agraharum for the supply of the Dollabilli tank at Poorshotpore and intended to irrigate 9 villages besides, the total revenue being Rs. 7,000. The rest of the lands in this talook are watered by tanks dependant on the local rains.

11. The Goomsur talook, the most extensive of all, has no main supplying channel, but a number of small ones taken off from the different streams that traverse it, there are no masonry Annicuts or sluices, the method hitherto pursued being to erect sand banks just after and before the rains, so as to catch the earliest rising of the river, a most precarious and unsatisfactory proceeding.

12. The principal channels are in the Pilapadah and Vistnoochakrum mootahs, each said to water about 10,000 Rs. worth of land, but as I have no authentic statement of the amount I cannot be sure. The rest of the channels affect comparatively small areas of land.

13. Of the Hautgur talook, I am unable to speak, as having only lately become the property of Government, I have never had an opportunity of inspecting it.

The actual condition of the Works.

14. Having thus briefly sketched the *means* of irrigation possessed by each talook, I will now proceed to state the actual *condition* of the principal of these works as far as I have been able to inspect them.

15. The large channels in the Wadadah talook taken off the Nangoolea and Wumshadara rivers, are all old native works, they have been excavated with a great fall in their beds, and having been unprovided with head sluices or any masonry works to regulate the quantity of water entering them, these channels have gradually become much enlarged beyond their origin dimensions, and consequently in high freshes convey a much greater quantity of water than required, which is of course productive only of injury to the crops. Such of the channels as have had already surveyed and levelled, have a fall of about 70 feet in a course of 20 miles, and for want of attention have at their lower ends become very crooked and winding.

16. Though very important works, as may be seen from the marginal* statement of the revenue dependant on them, their usefulness has been contracted by giving them so great a fall, for had advantage been taken of carrying them on, as a high level as possible, a great many more reservoirs might have been filled, which now only derive their supply from the local rains.

* Not given in the original Report.

17. The tanks also in this talook, both those filled by the river channels, and those dependant only on the rains are mostly unprovided with either calingulahs or sluices, in consequence of which the bunds are liable to be breached, while the ryots are obliged to cut holes in the bank in order to obtain the water, and as these holes are seldom strongly repaired, they are almost sure to become large breaches during the ensuing monsoon. There are no annicuts across these two rivers, so that the water in very low freshes and in the summer season is lost to the country.

18. Exactly the same may be said of the channel and tanks in the northern talooks. The largest work there viz. the irrigating channel taken off the Goodhalo nullah just from a want of knowledge of the simplest principles of Engineering is at times a source of great injury to the country affected by it on account of the enormous body of water which it conveys to the lower lands. The fall along this channel is also 3 feet a mile, and in one place 6 feet. The width at the head has enlarged to 60 yards, while at 2 miles lower down it is 40 yards. This is altogether disproportionate to the quantity of land requiring to be watered, and the bed has become so scoured out that sluices originally constructed in it have their floors 3 feet above the level of the bed.

19. The Heradaroo channel is the only one taken off the Rooshkoolea river itself. It is intended to fill the Dollabilli tank at Poorshotpore and to water 9 other villages; but these last complain that they are not properly supplied while the people at Poorshotpore complain of having too much water.

20. The principal channels in Goomsur, viz., the Dummarumma gedda and Mahanudee, are similar to the rest just described, invaluable in moderate freshes, but productive of injury in the high ones.

21. The defects of this system of irrigation thus are apparent. In the Wadadah talook a number of channels have been excavated independently one of another, each having a separate head, and taken off from the level of the bed of the river. By this arrangement owing to the constant changes which take place in the bed of the river itself, while one channel is over

The defects of the present system.

abundantly supplied while another cannot get any water into it until the river has risen some 5 or 6 feet, the velocity acquired by the great fall given to these channels, has the effect of deepening their beds continually, which renders the necessity of cross banks being raised every here and there to bring the surface of the water to the level of the fields. These cross banks while they are injurious to the channel by occasioning breaches are also the cause of many disputes between the different villagers. Another defect is that, in their present state they cannot take advantage of the small freshes in the river, which in the event of a late or a scanty monsoon is the cause of the whole cultivation being thrown back, which of course is prejudicial to the proper growth of the crop if not sometimes endangering its failure altogether. The result of this uncertainty must necessarily be not only a considerable fluctuation in the revenue, but a source of hardship to the ryot, who after having engaged for the land is obliged to run the risk of the season being unable to calculate on the production of his crop.

22. Seeing then that such are the defects of the present system, the remedies by which these are to be overcome must be stated, and in the improvements I am about to suggest, I have been guided by the consideration of what is required to secure the present extent of cultivation under the existing channels as well as what will tend to bring a larger quantity of land under the influence of river irrigation.

The remedies and improvements proposed.

23. I would therefore recommend first bringing all the present channels as far as possible under control by supplying them from one main head. For this purpose, I propose throwing an annicut across the Calingapatam river just above the village of Heeramundalum, where there is a favorable site for such a work, and lead a channel from thence, which shall follow the highest level attainable with a fall of one foot per mile, which will I think allow it to terminate in the backwater at Nowpadah. From this main head I would supply all the four other channels on the northern bank, and by thus regulating the quantity of water allow the land to have just as much water as was needed; and at the same time not interfere with the proper drainage of the country.

To bring the several channels under the control of one head led off from a proposed annicut near Heeramundalum.

24. The four channels on the south bank of the river may likewise be supplied from the same source, but as lands belonging to the Vizianagrum estate intervene, there may be some objections to carrying out this project which do not at present appear, and therefore I have not laid the line of this channel down on the map.

25. The Wadadah channel taken from the Nangoolea river being the only one on that side, all that will be necessary at present is to construct a head sluice to regulate the water during the high freshes of the river, to repair the banks where necessary, and to straighten the course of the channel by cutting away some of the most intricate windings. By taking off a high level branch on a small fall, more land might be brought under its influence, but as I have not yet the exact levels for this taken yet, I could not mark out the course it would follow.

26. Between these two rivers there is a high ridge of country extending from 2 to 4 miles in width, at present lying almost wholly waste from want of means of irrigation. A great deal of this however would be commanded by a high level channel from the proposed annicut at Heeramundalum, and by making new and restoring the old tanks I doubt not a great portion of this tract, containing about 20 square miles, will be redeemed.

27. Besides supplying the existing channels in the northern side, the proposed new main channel would convey water to a number of tanks hitherto dependant on the local rains, convert a good quantity of dry land into wet, and allow of a large extent of waste and jungle being redeemed, as it would command the whole country between it and the sea.

28. The heads of the present channels I would not close up but protect with head sluices, as in the event of more water being required than the main channel could convey, or of some unforeseen accident happening at the head, these channels would not then be deprived altogether of water, but draw their supply, as now, direct from the river.

29. But with this project, I have also had in view the feasibility of establishing a water communication for at least 6 months in the year between the village of Buttely in the confines of the Kimedy Zemindary, a great emporium for trade, and the Salt pans at Nowpadah. The whole rich valley of the Purlah Kimedy Zemindary would thus be opened up, and an incalculable saving effected in the transport of produce, which would tell with especial force on the item of seeds, as the principal crop ripens in the month of September, when there is the greatest quantity of water in the river, and when carriage by land is most expensive. The great demand for seeds has caused such a rise in the prices that any saving that can be effected in the cost of carriage will tend to increase the export, and give additional stimulus to the cultivation, as the present prices are very remunerative. I have limited the time of navigation to 6 months, but from what I have seen of the Calingapatam river, I should say that there was enough water in it to supply a navigable canal for 8 months in the year. The supply for the remaining 4 months could without doubt be obtained by having reservoirs in the Kimedy Hills, but this is a point I

Combining navigation with irrigation from the proposed canal.

have not yet attempted to investigate. With this the subject of the desirability of establishing a salt depot at the foot of the Hills, bordering the Jeypore country naturally suggests itself, and there can be but little doubt that the establishment of such a depot would cause a very extensive increase in the export of that article, as the diminished cost of carriage would enable it to be supplied so much more cheaply to the inhabitants in the interior, and become one of the most effectual means of putting an end to the illicit manufacture, which it is now almost impossible to prevent.

30. I do not here enter into the details of this project, and the enumeration of the several works required to carry it into effect, but as far as I am able to calculate roughly, I think the cost will be about 50,000 Rupees. As soon as the country is more passable, I purpose having a careful survey and levels taken, the particulars of which will be submitted together with the estimate.

31. Besides the above, the tanks must all be provided with Calingulahs and sluices, but as these are mere ordinary works, they require no special notice.

32. In the Itchapore talook there is so small a breadth of land between the hills and the sea, that only a very limited extent can be affected by channels from the river, and therefore the improvements to be made must consist in rendering the existing channels more secure, and preventing their being breached, as they now are, during the high freshes of the river.

Project for supplying the Moherry taluk with an irrigating channel led off from the Rooshikoolea.

33. The Moherry talook although having 60,000 Rupees of wet land is, as stated above, entirely dependant on the local rains, and this talook has therefore required careful consideration. The chief means by which it can be benefited with river irrigation, would appear to be by the construction of an annicut across the Rooshikoolea near Aska, a mile below the junction of the two rivers, from whence a channel must be led on the right bank skirting the highest ground up to the Godholo Nullah which it must cross either by an aqueduct or by the annicut hereafter proposed, and passing the village of Injelly be carried, as the levels allow, across the highest country towards Munsurcottah, terminating in the backwater at that place, and filling all the reservoirs that lie below it.

Proposal to render the above navigable as well as irrigating canal.

34. The benefit accruing from this work will necessarily be very great, as it will convey water to a hitherto wholly unirrigated tract of country, rendering certain what has till now been very precarious, and converting large extents of land into wet cultivation which have hitherto yielded only dry crops or lain altogether fallow. The channel would, like the one in Wadadah, be also available for navigation for 6 months of the year, but of the possibility of extending it over a further period, I cannot speak positively, as I know that the supply in the river after December is generally very small, and I do not know enough of the country to say where extensive reservoirs might be constructed, though the general aspect of the country would seem to indicate that many such localities exist among the basins formed in the different ranges of hills that are scattered throughout it.

35. The increase of revenue derivable from the increased irrigation would, as the Tahsildar once stated to me, amount to Rupees 50,000, and which I myself think might safely be taken. The cost of the work on a rough calculation would amount to a lac of Rupees.

36. From this same point also, a channel can be taken which shall provide for the irrigation of all the Poobacondah talook lying to the north of the Ganjam river.

Canal from same annicut to supply northern portion of Poobaconda talook.

37. For supplying the portion which lies to the south of that river, it will be only necessary to improve the existing channel from the Godhalo Nullah, by constructing an annicut across the latter, cutting a new head to the channel, and protecting it with head and undersluices, correcting the fall in the bed with masonry dams at the requisite spots, and thus enabling it to be of more extensive use than it even now is.

Gumsur talook must be treated differently owing to the peculiar features of the country.

38. The Gumsur talook will require a different system altogether, the peculiar features of the country will not admit of the irrigation works being brought under the control of one main feeder, consisting as it does of a succession of narrow valleys separated from each other by ranges of hills, the drainage from which is discharged down the centre of each valley, as will be perceived by a reference to the map,—a more minute and detached system of works will be required, and which it will require some little time and care to carry out so as to allow of the country being properly supplied, while at the same time the drainage is not intercepted. As yet I have not had sufficient time to devote to the consideration of this question, and am therefore unprepared to lay before the Board any suggestion except that of improving the existing channels, and of embanking the rivers. This last appears to be a most necessary measure for the preservation of this talook, and will require careful execution as the levels along the banks of these several rivers vary considerably at intervals. This project, as entered in my Budget for 1854-55 lately submitted, I estimate would cost Rs. 75,000, and I think that a competent officer should be appointed to carry out the works. The loss from floods in this

talook are stated to be considerable, being, as a Tahsildar informed me, from as much as 10 to 20,000 Rupees.

39. For the Hautghur talook, I am not able to suggest any thing at present from the reasons stated above; and the talook of Sooradah comprising comparatively so small an extent, I have deferred visiting until I had more leisure.

Minor works have lately been improved especially in Wadadah talook.

40. Before concluding my remarks on the irrigation works of the district, I would beg to state that the minor works such as tanks &c. have been considerably improved within the last 3 years. The amount of repairs annually executed is five and six fold what it used to be in former years, and the most important of these have generally received the inspection of some member of the Department. The Wadadah talook has received the most attention and necessarily so, as it is the most important, having the largest and most valuable works of irrigation in it and containing the greatest extent of irrigated land, viz., $\frac{2}{5}$ of the whole district. The more extensive works I have recommended in this report, I have long thought necessary, but have felt that it was useless to propose them until I should be certain of having means at my command to carry them out. There are few artificers in the Ganjam district, and till lately, the ryots and villagers were unaccustomed to seek for employment on the Public Works. The prejudice is gradually, I hope, being overcome, as the presence of the various European Officers and Overseers employed on the construction of the different lines of Road, and the regular payment made by them, seem to have given confidence to the people. These works are thus preparing the way for more extensive ones, and not only will the artificers whom I have sent from the Vizagapatam district find continued employment as the new projects are successively sanctioned, but, doubtless, the class will increase amongst the people of the district also, the higher pay serving as a stimulus to increased exertion.

Remarks on the communications.

41. While submitting this memoir on the irrigation of the Ganjam District, I have thought it may not be out of place and unacceptable to the Board to state, at the same time, a few words regarding the communications of the District. I have therefore entered on the map, the roads, already sanctioned, in the different stages of progress, and such as are still proposed to be made.

42. The Districts of Ganjam and Vizagapatam are necessarily, by their formation, rendered independant of connected projects with other districts, the only point to be considered being the opening of lines from the interior to the coast; completing the communication with Nagpore, and a few lines of intercommunication between the principal towns. A reference to the map will shew that nearly all has been provided for, the proposed Roads marked yellow being for opening such tracts as have hitherto been shut up, such as that from Aska to Cheekaty and thence to the port of Sonapore; and from Aska to Rumbah on the north; and on the south from Sarvacottah to Calingapatam; from Palkondah to Nowpaudah—a track greatly frequented by Brinjarries; from Varanasy to Kimedy; and from Buttely to Nagaricuttacum to join the road, already sanctioned, to Byrce. The two last run almost, if not entirely, through the Kimedy Zemindary, and could be executed with the funds available for that purpose.

43. The Road from Palcondah towards Nowpadah would branch from that already sanctioned, and in the event of the channel from Heeramundalum being available for navigation, need be carried only to the most convenient point in the channel to which Salt from the Pans would be brought.

Facilities for carrying out the coast Canal.

44. I cannot close my remarks on the communications, without pointing out, in reference to the Report by the Committee lately assembled for systematizing the Public Works in the Presidency, the extremely favorable nature of the country in the Ganjam district for carrying out the coast Canal. Perhaps in no district does the line present so few difficulties, or could be opened sooner than between Calingapatam and the Chilka Lake, and even in this detached portion would prove of much value to the commerce of the country, by enabling produce to be carried to the most favorable shipping port. The Roadstead of Munsoorcottah is very often for days inaccessible on account of the high surf, while a few miles lower down, produce can be shipped without risk at Sonapore, and the difference of transit by water to the two places would

be insignificant, compared with the delay and anxiety caused by the detention of a vessel in rough weather. There are a number of hollows, called Tumparahs or tanks, extending for miles parallel to the beach, and just at the back of the sand hills, containing several feet of water in the centre. These only require short cuts to be connected one with the other, and these again with the Backwaters and long swamps, which last, would require but a very small amount of excavation to render them navigable.

45. In conclusion I would beg to sum up in one view the principal works mentioned in the report, which are as follows.

An Annicut across the Wumshadara river at Heeramundalum, with channels on the northern side to be rendered navigable, also as far as circumstances will permit...Rs.	55,000
An Annicut across the Rooshkoolea river below Aska, with channels to water the Moherry and Poobacondah talooks, also to be rendered navigable as far as circumstances will admit.....	1,00,000
An Annicut across the Godhalo Nullah head and undersluices, and a new head to the channel.....	11,000
The embanking of the Rooshkoolea, Loharakundee and Mahanaddee rivers.....	75,000
Calingulahs and sluices to the different tanks.....	1,00,000
Improvements in Gumsur and Hautgur talooks not yet ascertained, but from the revenue of each being a lac of Rupees, the probability is, the required expenditure will amount to one year's revenue, as there have been no extensive works ever yet undertaken in them.....	2,00,000
Superintendence for the whole.....	50,000
Total Rupees ..	5,91,000

46. The time required for the execution of these projects will depend of course on the amount of labour that can be obtained, and probably they would extend over a period of 5 years, as at the same time the various Roads from the interior are being opened, and the necessary masonry works connected with them will demand a proportionate number of artificers.

47. The particulars for the talooks of Gumsur and Hautgur must be stated in another report whenever I have had sufficient time to devote to a proper inspection of them.

48. The projects I have already brought forward, I trust, will tend to the improvement of a large proportion of the district, and afford means for the development of its resources, and as such, I hope will meet with the favorable consideration of the Board and Government.

Civil Engineer's Office, 9th Division,
Camp at Waltair, 6th November 1851.

(Signed.) F. H. RUNDALL, Captain,
Civil Engineer 9th Division.

17

PRELIMINARY REPORT UPON PROPOSED IRRIGATION WORKS IN NORTH GANJAM.

The principal physical feature of North Ganjam is the Rooshkoolia. This river rises in the Khond Hills above Goomsoor; near Aska it is joined by the Mahanuddy, with a stream larger than its own also flowing from the Eastern Ghauts; 5 miles lower down the Donaye falls in on the left bank, and 10 miles below Aska the stream is augmented by the Godahallow flowing in on right bank from the range of Hills situated to the west of the Military Station of Berhampore. The Rooshkoolia enters the sea at Ganjam, formerly a most flourishing Port and chief Civil and Military Station in the Northern Circars, still a place of considerable trade, but shunned both by Europeans and Natives on account of its unhealthiness; the causes of sickness are happily removeable, and as no other place in the vicinity possesses equal natural suitableness for trade, not much will be done towards improving the District before it will become evident that works must be undertaken to restore to Ganjam its former supremacy over the numerous small ports dotted along an extensive line of coast.

2. The basin of the Rooshkoolia comprises an area of 2400 square miles: of which perhaps 1000 square miles is mountainous, the remaining 1400 square miles consisting of undulating ridges and valleys broken by numerous isolated Hills composed for the most part of gigantic gneiss and granite boulders. In this large area is contained the Government Taluqs of Berhampore and Goomsoor and Zemindaries of Darakota, Hautghur, Callicote, Beridi, Shargada, Coorla, and Pedda and Chinna Kimedy.

3. The people subsist principally upon rice; and on the success of the rice cultivation the general welfare of the District depends. The cultivation of raggy has been of late wisely increased, some of the ryots being warned by the last famine not to depend entirely on their rice fields for support: gram and oil seeds are grown on the highlands. No cholum is grown; this is to be regretted as it requires but little rain, is more nourishing than rice, and for cattle both grain and stalks constitute excellent food. Sugar-cane gardens are very numerous, and great trouble and expense are lavished on its culture.

4. The entire rice crop is dependent upon the local rains, a considerable portion receiving little more than what actually falls upon it. The *best* rice ground is imperfectly irrigated by natural drainages and hill streams, the supply of water being sometimes supplemented by means of small tanks, mostly without sluices or calingulahs, but very useful in enabling large areas of cultivation to tide over a short cessation of rain. Of important tanks or river channels the District is all but destitute, there are, I think, but two Irrigation works that would in the Bellary District yield Rs. 500 revenue; under these circumstances the yield of grain on the uplands is at the best but scanty, in favourable years fair crops are obtained in the valleys; during average seasons the ryots after much anxiety have to mourn over the crops lost, and make the most of those saved; in bad years nearly the whole crop is lost, and a scarcity or famine of greater or less intensity results.

5. The Sugar-cane, though often injured by drought, is seldom altogether lost; the gardens being usually close to the river and receiving from the villagers every care and attention. The total cost of cultivating an acre of sugar appears to be about Rupees 150, and its value on the ground about Rupees 200.

6. The District is tolerably well off for roads, but difficulty is experienced in keeping them in repair, no good gravel being obtainable, the rocks being almost exclusively felspathic. The draught cattle are nearly all agricultural animals, very small and weak. In fact I have not seen a single bullock here, fit to be yoked to a cart; buffaloes are much used for drawing bandies: they are not adapted for the work, being very slow and soon knocking up in the sun when unable to bathe or wallow in the mire; the introduction into the District of a better breed of cattle and of cholum to feed them with, is most desirable and should receive attention.

7. The general condition of the District must, I think, be pronounced unhappy and such as to demand amelioration: the prevailing custom of growing rice upon lands depending solely on the rains for irrigation must always be a source of anxiety to the people and to Government, and must produce famines periodically, perhaps, the oftener now that high prices and other causes have given a great impetus to the export grain trade. The soil is rich and fertile, there is little barren or stony land, the hills rising abruptly from the plains; the rain-fall is very large though not excessive, and though variable never appears to fail; all parts have short easy access to the sea; but,

notwithstanding all these advantages, Kurnool and parts of the Bellary District evince signs of far greater prosperity than Ganjam; doubtless much of the squalor and wretchedness, observable around is due to the apathetic character of the Ooriahs, and one great argument in favour of large Public Works is, that through them the people would be trained to labour and their indolence gradually overcome.

8. But though appearances might lead one to form a contrary opinion, undoubtedly the general welfare of the District has advanced considerably during the last 12 years; the revenue has risen from Rupees 15,74,143 to 27,29,045, the increase being chiefly obtained from larger salt sales. The trade in this article still admits of further expansion, much of the increase of Rs. 9 lacs revenue from this source during the last 12 years is attributable to the formation of roads; and it can hardly be questioned that the few lacs expended on communications between the coast and the interior have yielded cent. per cent. through the salt trade alone. The recent famine has of course seriously checked this progress, and the recurrence of such calamities can hardly be prevented except by very extensive irrigation works. The people are naturally disinclined to change their ideas on agriculture, and grow other crops on land specially prepared for rice, in such a manner as to represent a capital of at least a million sterling. The importance of Irrigation works in this District must be measured not only by the prosperity they will induce, but also by the misery and loss they will prevent. The immediate cost to Government of the late Famine was estimated by Mr. Grigg. C. S. at 6 lacs of Rupees; but this did not include loss by decrease in consumption of salt and many other indirect and remote losses such as a permanent rise of nearly 20 per cent. on labour upon Public Works, a rise due not to any wholesome cause but to the worst of all possible causes, death by starvation of the labourers. We should probably very considerably under-estimate loss to Government of the late Famine in setting it down at 10 lacs.

Vide Famine Report.

Vide Famine Report.

9. Whilst considering Ganjam Famine years, it is quite necessary to bear in mind that, a rain-fall there constituting a year of drought would, in most parts of India, be regarded as ample. I have no reliable data of rain-fall previous to 1863; and probably the accompanying register does not include a very wet year, when the average fall over the District might reach 60 inches: a fall of 46 is sufficient to ensure a satisfactory season if distributed over both monsoons. In the so called years of drought, 1864 and 1865, that preceded the last Famine, the register shews falls of 33.5 and 31.2 respectively. In both years, especially in the latter, the deficiency is mostly accounted for by the failure of the October rains, *i-e-* the North East monsoon. A perusal of this Rain register affords us two important facts, viz. that in the worst years sufficient rain falls to fill tanks or reservoirs ordinarily well situated; and, secondly, that rice crops would be safe under reservoirs holding in reserve as little as one month's supply of water.

10. That nearly all the irrigation works fail to alleviate the general distress during Famine years is due to their insignificant dimensions; and being intended for ordinary years, in very bad seasons a small tank capable of saving 50 acres of paddy is rendered entirely useless by water being drawn off for 100 acres until the tank is empty. The only two important works in the neighbourhood that I know of, and to which I have alluded, have answered perfectly. (1) The Koratholy tank, an old work, is fed by a channel from the Godahallow which has recently been improved, and a weir thrown across the river; the crops under this tank have never suffered; no remission on a revenue of Rs. 15,000 has ever been made; and the ryots during bad years make very large profits.

(2.) The Boary Reservoir was constructed by the British Government in the year 1861 at a cost of Rupees 10,749. The total area deriving water from this tank is 1632 acres, paying a revenue of Rs. 10,172; an increase of Rs. 1845 on the old revenue due to a water-rate of little more than one Rupee per acre. The average yearly repairs amount to Rs. 70; so that 17 per cent. is derived upon the original cost of construction. The lands under it had an ample supply of water during the famine year, and there was no remission of rent or water rate.

11. The most remunerative manner of laying out a few lacs of Rupees would probably be to construct several Reservoirs in well chosen sites, and trust mainly to existing channels for distribution of the water. But to irrigate extensive areas by means of Reservoirs, long and expensive distributing channels must be excavated; and this being the case, it is obviously wise and economical to lead them from or through the principal rivers from which, throughout a great portion of the irrigation season, they will convey water that has not undergone the expense of storage, and which would otherwise flow unheeded to the sea, the Reservoirs being drawn upon when the river's supply begins to fail. I consider also that, any channel that will for many months in the year consecutively convey a large body of water should, if possible, be made navigable. Irrigation works alone, though they will afford sufficient food for the people, will not, unaided by Railways or Canals, civilize the country, nor awaken the minds of the Oorias from the wretched apathy that now debases them. Neither will the waste lands be taken up, nor any land be properly cultivated, so long as there is a constant demand against the agricultural cattle for draught work. Much of the rice crop [illegible] this year lost, would have been saved had it been planted a month earlier, which it would [illegible] been, had not the Ryots been tempted to hire out their cattle to the very last moment that appeared to give them time for ploughing.

12. In a country like Ganjam where the natural supply of water is almost, though indubitably not, sufficient for irrigation, water artificially stored is unquestionably of the highest value. In the Godavery, where the soil is not more fertile than here, an acre of land pay Rs. 2 kist and 4 for water, and it is universally admitted that this total rent of Rs. 6 is very light and might well be increased to Rs. 10.

In Ganjam the kist levied is as follows—

On artificially imperfectly irrigated land. Rs. 2- 15- 4.
On wet lands depending on local rain. ... Rs. 1- 14- 7.
Dry land..... .... Rs. 1- 5- 9.

But we may assume that, land thoroughly irrigated and fertilized by river water would bear a total charge of Rs. 6 per acre, and that land irrigated to a less degree could afford to pay Rs. 3, communication through the country being improved. The channels in the Godavery are now usually made so as to discharge a maximum of 2 cubic yards per hour per acre for the land they irrigate, but for many years Sir A. Cotton's rule of 1 cubic yard per acre was followed and generally found sufficient, 2 cubic yards only being required at the commencement of the season just to enable all the fields to be ploughed and planted at the same moment. I believe in the Godavery Delta 1½ yards per hour per acre to be sufficient for a channel to convey; and that here, where the rainfall is much greater and the configuration of the country so favorable to irrigation by drainage, a channel need only be required to be of a capacity to discharge ¾ cubic yard per acre per hour, and that with this quantity supplied when wanted, crops will reach perfection.

13. The Irrigation scheme I propose consists of channels contoured on as high a level as is convenient down either slope of the valley of the Rooshkoolia, leading from weirs built across the Mahanuddy and Rooshkoolia. During moderate weather these channels will convey the river water direct to the fields; during wet weather they will fill the small tanks lying below; and when the water in the River falls low will be supplied by Reservoirs from above. My observations and levels have hitherto been chiefly directed to the right bank and Doab. The guiding difficulty in contouring this channel is the obstacle offered by a considerable mass of Hills situated between Aska and Injelly approaching so close to the Rooshkoolia, that the upper part of the broad valley of the Godahallow could not be reached by working round on that side except by a very long and difficult route, and not then probably without serious loss of level. We are consequently forced to enter on the Godahollow through a ridge joining the Aska to a still higher range of Hills (the summit level of this ridge is M. S. L. + 200 feet) by constructing a weir on the Rooshkoolia immediately below the confluence of the Janemilly nullah upon a granite barrier there met with, its crest being level with highest flood Line or M. S. L. + 175 feet; and allowing a fall of 6″ per mile, the cutting under the summit level will not exceed 30 feet + 5 feet depth of channel, say 35 feet. From the Rooshkoolia weir I would lead a channel to the Mahanuddy below the confluence of the Barata nullah, and there place a weir with crest up to level of highest flood or M. S. L. + 183 feet so that this channel primarily intended to supplement the supply in the Rooshkoolia would have a fall of 8 feet in 17 miles. Between the two weirs a somewhat formidable cutting appears necessary which further exploration may possibly shew may be avoided.

14. Every facility exists for constructing the two weirs, and very little masonry will be required on the channel that connects them; the cutting above alluded to being the only expensive portion of this Section. Below the Rooshkoolia weir, the levels are favourable until the Sharagadah ridge is reached near Soonamoe. Cutting through this ridge will cost a large [illegible], and occupy much time and labour, as much rock will probably have to be removed: still the cost need not be extravagant if the work be done systematically, and suitable and powerful machinery employed; the blasting might perhaps be facilitated by the use of Dynamite. The stone blasted would certainly be valuable, as building stone is seldom to be picked up in this District but has to be quarried. Immediately below the cutting, the Sharagadah nullah must be crossed: and a little further on, the main stream of the Godahallow. This river is spanned near Injelly by nine 30 feet arches. The rest of the line on to Chetterpore is quite free from formidable obstacles, from the Mahanuddy to where the channel crosses the Berhampore road, the channel bed might have a continuous slope not exceeding 6 inches per mile so as to be well adapted for navigation; near the point where the road [illegible], to drop the channel bed may be found advisable, and then continue it with a uniform slope on to Chetterpore, where it would command the low land to the south of Ganjam and might terminate for the present.

15. The drainages crossing the line of canal will be received into the channel or passed under according to circumstances. Streams irrigating considerable areas of land would mostly be passed under, especially through the Zemindary Estates, as the most economical arrangement and also to avoid water disputes. We should throughout the scheme interfere as little as possible with existing irrigation. Godahallow might be crossed by a weir; probably an Aqueduct, with weir and supply channel above, would be preferable, constructed so as to prevent sand from entering the channel, the removal of which would be an endless source of trouble and expense.

16. I should propose that the canal should be from 5 feet to 6 feet deep and that it should be entirely within soil where the excavation is easy for the reasons usually assigned in favour of such a mode of construction. To avoid rock, however, it would for portions of its length be taken partly or entirely within embankment.

17. From the returns received from the Collector it appears that, belonging to the Government Taluqs, there are commanded by the proposed channel—

17,369 Acres of irrigated Land.

102,852 Acres rain irrigated or Dry.

20,000 Do. waste that can be cultivated.

This is only a rough calculation, and the Revenue Survey now in progress will probably shew a considerable excess over this estimate. In addition to this Government land, there are under the proposed channel 142 square miles of Zemindary estates, so that probably we might have to irrigate immediately about 2,00,000 Acres more or less thoroughly.

18. I propose that the canal joining the two annicuts shall be constructed to carry 60,000 cubic yards per hour, and that the main canal from the Rooshkoolia be of capacity to convey 1,20,000 cubic yards per hour through the Sharagadah cutting: this quantity to be gradually reduced after passing Degoopoody as we approach the termination at Chetterpore.

19. To attempt to make an Estimate of the cost of the project would be mere waste of time until the general approval of Government has been accorded to the proposed works; nor has the proper moment arrived for determining the quantity of water that it is desirable to store upon each of the principal Rivers; there appears no reason to doubt, but there would be an increase of revenue of Rs. 5 lacs per annum from the South bank channel alone; and the works might be credited with 5 lacs on account of ⅓ the cost of a single Famine, also with at least ½ a lac per annum on account of increased Salt sales. The Reservoirs, although quite a necessary adjunct to the scheme, need not be taken into account in the first Estimate. The cost of constructing them would be amply repaid by the revenue they would yield on the second crop, as in ordinary years they would be full in the beginning of November. After a failure of the North East Monsoon this would not of course be the case, as they would have been emptied saving the first crop.

20. Navigation canals and other important works in the District should be pushed on with now, as the irrigation works when once commenced will require all the labour available. (1) The canal from the Chilka Lake to Ganjam though not perfected is completed and navigated, and the Survey and Estimate for continuing this canal on to Gopaulpore are nearly ready. (2) A still more important canal would be one from Ganjam to Aska where it would join the main irrigation canal and finally terminate at Russelkonda. I would recommend that orders be issued for Surveys and Estimates, for the first section of this work; viz. from Ganjam up to Injelly. This canal would pass through a highly cultivated tract of country, at present quite impassable for carts or even laden bullocks for more than six months in the year; and it would also be the means of draining a considerable area of marsh land. From the imperfect returns before me, I should estimate that the traffic upon it would be about 40,000 tons annually, now carried on roads at 2 annas and 6 pice per ton per mile. The cost of carriage by canal would be 6 pice; so that, if another were charged as a toll, the return on a length of 20 miles would be 25,000 Rs. per annum. The cheap inland water communication would give an impetus to the Salt trade, and there would be a considerable saving in cost of road maintenance; taking advantage of existing channels, the cost of excavation would not exceed 1 lac of Rupees, the rise of 80 feet would be attained by ten 8 feet lift locks 60' x 10', costing Rs. 80,000. Total cost of work certainly not more than two lacs.

21. A copy of this report will be forwarded to the Agent and Collector of Ganjam, from whom I have received every assistance applied for, will doubtless strenuously advocate the execution of works calculated to promote the prosperity of the District and to raise the depressed condition of the people.

Special Executive Engineer's Office,
Chetterpore, 28th October 1868.

(Signed) H. BECKLEY, Captain R. E.
Executive Engineer on Special Duty, Ganjam.

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