



"No," sturdily answered the much-pressed engineer; "I was quite right, and I call the chief railway engineer to witness."

"How can you be right [when you say it is an absolute failure] if it paid ten per cent.?"

"I say it does not carry the quantity, and it does not carry so cheaply as the country requires; that I call a failure. When the chief railway engineer says, 'Here is a railway which leaves nine-tenths of the passengers and goods behind,' if that is not a failure, what in the world is?"

Over and over again it was sought to overcome the witness by an array of authorities, whose good intentions and honour no one could doubt.

"Are you really serious in stating that you believe successive Governors-General have given their sanction" to this, that, and the other thing?

"I only mention facts," pleaded the witness, and he never budged one inch.

The defects of the rivers—particularly the Ganges and the Jumna—were fully discussed, or perhaps "wrangled over" would be the more correct term, such twistings and turnings marked the questions which were put.

As to the damage done by efflorescence of reh, Sir Arthur declared it to be of little importance. "There are twenty million acres of irrigated land in India. How much of that is covered with reh? Not a thousandth part."

Considerations of space—and, maybe, but I hope not, the reader's patience—forbid anything like adequate treatment of the many aspects of irrigation and navigation which the varied needs of India call forth.

On the great storage reservoir in the centre of India—a project which, it is trusted, may be undertaken as one of the consequences of the present disastrous famine¹—Lord George Hamilton was particularly antagonistic.

¹ It is pitiable, but it is the fact, that, only on paying the terrible price of famine, are great irrigation works undertaken. Mr. Deakin was struck by this, and, in his *Irrigated India*, p. 143, he says:—



THE SUEZ CANAL "IMPRACTICABLE"! 289

"You never surveyed that scheme?"

"There is an officer now in England who has surveyed it thoroughly; and I know all the papers about it. I have been up to that part of the country. I know the country; I have seen all the papers and reports about it, and I have talked it over with the officer who has seen every bit of it."

"Do you think that it would add to your undoubted reputation as a successful engineer if you advocated the construction of a great reservoir in a district you have never seen?"

"But I have seen it; I have been up there, as I say, at the very spot."

Such an emphatic statement should have been decisive, but it was not.

"Are you aware that that scheme has been very severely criticised and pronounced utterly impossible?"

"Yes, like everything else. The Suez Canal was denounced as impracticable, and that it would be of no use when it was done."

[In this connection, attention may be directed to Sir Arthur's truly noble scheme of a great central reservoir, by quoting what, on another occasion, he put forth in detail concerning this project. He wrote:—

"It is indeed surprising that it is only quite of late years

"The immediate relation between famine and irrigation is perfectly evident in every presidency. The dearth in Madras in the early part of the present century lead to the construction of the anicuts which supply its deltas; that of 1837-38 in Bengal induced the preparation of the project for the Ganges canal; that of 1859-60 in the North-West Provinces determined the State to undertake all future works, so that in 1867-68 Lord Lawrence definitely inaugurated what is known as the policy of Extraordinary Public Works. Altogether there were seven severe famines in Southern India in the first seventy years of this century, all disastrous within varying limits. The terrible famine of 1876-77-78, for which a large relief fund was generously raised throughout Australia, marked the culmination of these awful visitations, 5,250,000 persons dying in the lingering agonies of starvation, although the Government lavished £11,000,000 in relief. The indirect losses occasioned would render this hideous total more imposing still."



that this grand discovery has been made, that the Presidency possesses a basin for a reservoir of stupendous dimensions at a level commanding the whole Peninsula,¹ so favourable in all respects that it can be constructed at a perfectly nominal price compared with the value of water.

"In the evidence given by Colonel Fischer (who has levelled and estimated for this work), he allows for a bund one hundred feet high, retaining the water, ninety miles in length, with the contents of the basin three thousand millions of cubic yards, and the cost £300,000. The river for seventy miles has a fall of only seven inches a mile, and above that ten feet with a broad and long plain on each side, of very little value for cultivation. This must certainly be one of the finest sites in the world for a tank.

"It must be remembered that the quantity of water provided by a tank is not measured by its contents, because water may be drawn from it all the five months in which there is a large body of water in the river, while it is left full at the end of the monsoon, so that such a tank would supply at least twelve thousand million cubic yards, that is eight thousand million during monsoon, and four thousand million in the dry season.

"With respect to the supply of water, all the sources of the Tungabudra are in the Western Ghats, where the rainfall is from one hundred to one hundred and fifty inches. The area drained is stated to be twelve thousand square miles; allowing only one yard of rain to flow off this area, it would supply thirty-six thousand million cubic yards, or three times the quantity proposed to be drawn from the tank, and twelve times its contents."

¹ "The whole Peninsula" does not mean the Empire from Kashmir to Cape Comorin. During the last century the term Peninsula was applied to that part of India which is south of the Godavari; the expression was in common use in Sir Arthur Cotton's time. For want of properly understanding the term, critics have charged Sir Arthur Cotton with having stated that a reservoir in the Madras Presidency would be of service in the far North of India as well as in the near South.



There is salvation for beast as well as man in India if this project be carried out. Will not the British people insist upon their Indian fellow subjects being saved from all the suffering and loss which the chronic famines now cause ?]

A little later, retorting upon the Chairman, the witness gave himself the satisfaction of saying: "The last time I was examined before a Committee of the House of Commons it was, in the way of a taunt, said to me, 'Yes, you would cut a canal from the Sutlej to the Jumna!' *That very thing is done.*"

Sir George Campbell, too, was treated to as pretty a bit of sarcasm as seldom comes in the way of a House of Commons questioner: "Is it not the case that in those famines the rain so far failed that the rivers were not full at the time when they were wanted for irrigation?"

"The Godavari was not full; it *only contained fifty times as much water as we would use.* IT WAS AS EMPTY AS THAT."

The end of the first day's enquiry came appropriately with that and two other questions put by the Chairman:—

"Then the general purport of your evidence is that you have not altered your opinions in the least?"

"Not the slightest in the world," was the cheery retort; "the whole thing that has been done has confirmed me more completely."

"You are not in the least deterred by that admitted failure to which we have alluded both in the case of Madras irrigation and the Orissa works?"

"*Not the least in the world.*"

An interval of a week elapsed, and on Thursday, June 27, the witness was once more in the chair. Thirteen out of the sixteen members were present. The absentees were Mr. Balfour, Sir Joseph M'Kenna, and Mr. Grant Duff. Mr. Ernest Noel appears among the Committee on this occasion.

Sir Arthur Cotton started early with a definite statement: "No one line of canal navigation has ever been



completed." To ask, therefore, for satisfactory navigation returns was to ask for the impossible.

Sir George Campbell began the examination. He was particularly curious as to canals, and asked no fewer than one hundred and one questions, with a short break of two from Mr. Fawcett. Then he started again, and asked one hundred and twenty more! Not only navigating canals in India, but also in England, Scotland, France, the United States, were laid under contribution. Sir Arthur advanced a fair argument when he suggested no tolls should be charged in irrigation-navigation canals. "As the irrigation pays over and over again the interest of all the expenditure, and as there is no wear and tear of the water in navigating the canal, of course the interest of the State is that these canals should be used to the utmost, and should be perfectly free."

Sir George tried a fresh break on the old question as to river navigation being available for only a certain part of the year.

"So," he queried, "it would be a broken and imperfect navigation?"

"Yes," was the cheerful assent, "unless you supply it with water [which could be done with ease in the vast majority of cases]. It is like everything else. If you build nine arches of a bridge and leave the tenth unfinished, you cannot go along it." "When I propose a project," he went on to say, "instead of working according to the project you [meaning the officials] leave out this, and leave out that, and stop it in the middle, and then say, 'Look at your project.'"

The size of a reservoir to hold the water for the maintenance of the necessary height in canals troubled Sir George. "Would it not require an enormous quantity of water?"

"No; all that has been calculated. We know just as well as we know how much water it would take to fill a bucket . . . we have abundant data now for knowing what it would cost to store the water in large reservoirs in



the upper part of the district. It is all a matter of calculation—as simple as possible.”

One strong point was that an enormous sum of money would have been saved if the Godavari works had been treated as a railway would have been, while the Presidency Treasury would have greatly benefited year by year.

The questioner was not always discreet, and sometimes elicited facts he did not want, as, for example, when it happened (Questions 2561, 2562, and 2563) that it was proved that while the Hyderabad side of the river was “exceedingly fertile, populous, and thriving,” the other side (the British Provinces) was “an almost uninhabited and deserted country, little more than a jungle.”

Out of Sir George's persistent questioning some good came. Sir Arthur Cotton was afforded an opportunity of setting forth in detail his scheme for canals for affording communication over nearly the whole of India, with many intermediate connections. On the map [*in pocket at end of book*] the whole of these canals will be found. They are commended to the careful consideration of every reader of this book who wishes well to impoverished and suffering India.

“What are these main lines of navigation which you think might be established?”

The answer was :—

1. From Calcutta to Kurrachee—up the valley of the Ganges, across the watershed of the Jumna and the Sutlej, down the valley of the Indus to Kurrachee. The worst part is already cut, the Sirhind canal, across from the Sutlej to the Jumna.
2. By the line of the Godavari and the Tapti from Cocanada to Surat.
3. Up the valley of the Tungabudra and the valley of the Kala Nuddee, crossing the watershed near Darwar, which is the worst one, two thousand feet, reaching the sea at Karwar.
4. By Palghaut, a breach south of the Neilgherries, up the valley of the Ponang and down the valley of



Ambravatty, crossing the watershed near Coimbatore, on a level of about one thousand four hundred feet. Two coast lines would meet at Cape Comorin.¹

In another place the witness thus comments on some details:—"The remarkable fact in connection with the West Coast canal is that a very small State, under a native

¹ In his *Public Works for India*, published in 1881, he elaborates his proposals as hereafter given. These particulars, so far as was possible, have been indicated on the accompanying map:—

1. The completion of the Coast canal from the Godavari to Madras—380 miles.
2. The completion of the Godavari and Kistna Delta works.
3. The completion of the Upper Godavari and Wurda navigation to near Chanda on the Wurda—150 miles.
4. The Junction canal from the Tungabudra canal at Cuddapah to the North Coast canal at Nellore—80 miles.
5. The construction of a great tank on the Tungabudra, west of Bellary, to contain at least 3,000,000,000 cubic yards.
6. The canal from it to the Irrigation Company's canal—200 miles, irrigating 500,000 acres.
7. The complete examination of the whole system of old tanks, perfecting, enlarging, etc.
8. A nearly level canal from the great Tungabudra tank, south to the Cauveri, near Seringapatam, and north across the Kistna and Bheema, passing near Hyderabad to the Godavari—800 miles.
9. Canals leading the water from this main canal to multitudes of old tanks in the Carnatic.
10. A canal from the above main canal in Bellary across the watershed of the Huggry and the Pennair to convey water into the latter river.
11. A bund across the Pennair where it leaves the hills forty miles above Nellore, with canals leading north to the Kistna and south through the Carnatic, to supply old tanks and for irrigation—about 400 miles.
12. The extension of the East Coast canal from the Pallaur, forty miles south of Madras to Cape Comorin—400 miles.
13. The completion of the West Coast canal from Cape Comorin to Karwar—400 miles.
14. The construction of a canal from Madras through the heart of the Carnatic to Ponany on the West Coast through the



Government, has utterly shamed us by making the canal almost through the whole length of Travancore; while we, with our unbounded means and immense interests, have not had the energy to execute the part in our provinces. The only difficult part of the whole line from Cape Comorin to Karwar is in Travancore, but this has thus been done for us. The rest of the line will be very expensive.¹ How sad it is to see this necessity for our being shamed into the execution of works necessary for the well being of the country by a petty Indian State setting us the example.

“There are already small canals on some parts of this

Palghat Pass, of which the canal from the Pennair would form a branch.

15. The continuation of the high level canal from the Kistna anicut south to the Pennair at Nellore—200 miles.
16. The construction of the two great tanks on the Penek and the Kanhan rivers, north of Nagpur.
17. A canal from them to the Warda, near Chanda, for navigation, irrigating 250,000 acres in Nagpur, and supplying water to keep the Godavari navigable and fill the Delta canals in the dry season.
18. The extension of the East Coast canal from Cocanada to meet the Orissa canals (now being extended to the Chilka lake) at Ganjam, from which there is a canal to the lake—250 miles.
19. A canal for navigation, west of the Tungabudra at the proposed tank to Karwar on the west coast—180 miles.
20. A canal from the Wurda down the valley of the Taptee to Sura—300 miles.
21. The improvement of the navigation of the Kistna and Bheema above the level of the proposed tank, viz. :—Kistna, 150 miles, and Bheema, 200 miles.
22. A breakwater at Ponany, on the west coast.
23. A breakwater at Cape Comorin.
24. A tank on the branch of the Bhowani river in the Neilgherries, fully examined and estimated by the Madras Government many years ago and of great capacity.
25. A tank on the west side of the Ghauts near the source of the Vigny river in Madura, with a tunnel through the Ghauts for the better supply of that river.

¹ That is, because it has been put off until the cost of materials, labour, etc., have greatly risen.



line, but they are much too narrow and too shallow. The whole distance is five hundred and fifty miles. Allowing something for the part executed in Travancore (though it is probable that this also will require enlarging when it forms part of an extensive system), the cost may be, at £2,000 per mile, £1,000,000 in all.

"Now the most remarkable point with reference to this is, that the openings for works are really wonderful. As respects water transit, the whole Presidency is perfectly capable of first-class water transit on all the important lines, and this almost everywhere, in combination with irrigation.

"The Coast canal from Bengal, by Cape Comorin to Karwar on the Western Coast, is all perfectly practicable at quite an insignificant cost. The main lines across the Peninsula from Madras through the heart of the Carnatic to Ponany, and from the same city by Nellore through the Ceded Districts to Karwar, and that up the Godavari and Wurda, and by the line of the Tapti to Surat, are also all perfectly practicable at a small cost compared with their effect.

"From these, thousands of miles of branch canals may be led so as fully to open up this populous country.

"Further, a contour line may be led from the Cauveri near Seringapatam, through Mysore, the Ceded Districts, and Hyderabad, to the Godavari, in the heart of the upper country, thus putting the whole of the interior by means of the east and west canals and rivers and the coast canals, in effective communication with the ports on both coasts, and with Calcutta and the plains of the Ganges and the Punjab. The conveyance of one ton from Lahore to Karwar, three thousand miles, would thus, at one-twentieth of a penny per ton per mile, cost only Rs. 6—about ten per cent. on the value of a ton of grain.

"Take a single item: Coal. What would be the effect of supplying the whole country from the Chanda mines, and making every port on the East and West coasts a coaling port for steamers?



"Take one other item : Salt. The consumption of salt is at present nine pounds per head. Where it is cheapest and the people are in good circumstances the consumption is twenty pounds. An increase of eleven pounds per head for sixty millions would be three hundred thousand tons. What would be the benefit of this to a vegetarian people? And the revenue from this alone would be, at the present rate of tax, three-farthings per pound, equal to two millions a year, which is the interest on sixty millions at three-and-a-half per cent.—more than what the whole of these canals would cost, including a vast system of irrigation from them.

"This alone will help us to judge what a manly, energetic, extension of public works would do for India and its finances, if it were carried out,—

"1. To secure and turn to use for navigation and irrigation many millions of cubic yards of water, which at present carry to the sea an incalculable treasure of fertilizing matter ;

"2. To improve and supply from the great rivers many thousands of the old tanks ;

"3. To pervade the whole Presidency with a complete system of water transit, carrying any quantity at a nominal price, both of goods and passengers, connecting the whole interior and the valley of the Ganges and Indus with Cape Comorin and the West coast, the best points for the shipping of goods for Africa, Europe, and America ; and

"4. The provision of a large extent of irrigation in every district of Madras, and many of Mysore and Hyderabad, from the great rivers, thus securing them against failure of the local rains."

Sir George's penultimate question in that day's enquiry was almost of equal value to that concerning the Central Reservoir. The witness had opportunity, on challenge, to state his matured views as to what parts of India could still be irrigated.

"Will you just point out, generally, what are the parts of



India which you think are now most favourable to the extension of irrigation ? ”

It must have been with something of the feeling of an old seer testifying to a heedless generation, that Sir Arthur Cotton replied :—

- “ There is an enormous proportion of all India ;
- “ There is all the Punjab ;
- “ All the remaining portion of the North West ;
- “ Almost all of Oudh ;
- “ All Rohilkund ;
- “ All Bengal ;
- “ All the delta country ;
- “ All the plains of the Kistna and the Tungabudra, and
- “ The vast extent of the Carnatic still unirrigated.
- “ Many hundred millions of acres are perfectly fit for irrigation.”

[Lord Curzon, the present Governor-General of India, has been advised in this year of grace (1900) that only four millions of acres remain which can be “ productively ” irrigated. An examination of the '98 *Famine Commission Report* shows on what basis the Viceroy's statement was made. It is to be regretted that statement was made without other illustrative particulars. In paras. 574-576 are recommended :—

	Acres.
The Punjab projects	4,000,000
The Sind projects	660,563
The Upper Burma projects	334,000
Total	4,994,563

Nothing is allowed for all the Presidencies and the other Provinces and Commissionerships throughout the Empire. But, it is admitted, other works “ may, no doubt, be sooner or later proposed in these and other provinces.” On this point there can be no doubt. There is much land still capable of being irrigated, and it is regrettable Lord Curzon should seem to have minimized the great develop-



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ment which must take place, and take place soon, if India is to be rescued from its present deplorable condition.

On the extensions as a whole, the Commissioners express themselves in this cordial manner:—

“The new works will therefore tend to reduce the pressure of future famines, and to counteract in some degree the effect of the growth of population, while at the same time adding in ordinary years to the general wealth of the country. Their construction may also be recommended as a financial investment, and as strengthening the financial resources of the State. We have already shown that the surplus revenue realized by productive irrigation works, after all interest charges at four per cent. had been paid, amounted in 1896-97 to Rx. 809,173. This was higher than usual on account of drought, but the actual surplus for 1897-98, was even higher, and when the stimulus afforded by famine has passed away the normal surplus will probably not be less than Rx. 700,000, or nearly half the amount of the famine grant. If the new works are as profitable, taken as a whole, as those already constructed, a surplus revenue of £660,000 may be eventually anticipated, or in other words the nett direct financial profit on productive irrigation will be sufficient to meet two-thirds of the whole estimated cost of famine. The value of these works, and in a less degree of protective and minor irrigation works, in strengthening the financial position of the country may, however, be shown in another way. During the years 1896-97 and 1897-98, famine necessitated remissions of land revenues to the amount of Rx. 1,448,000, and there was great loss of revenue under other heads directly or indirectly attributable to famine. The remissions of land revenue and the whole cost of relief would of course have been infinitely greater if these works had not been constructed, but apart from the value of the works in this respect, the revenue earned by irrigation works of all kinds in these two years showed an excess over the normal of Rx. 981,600 which has been directly attributed to famine. It is therefore a special recommendation of these works that while almost all other sources of revenue are certain to be largely reduced in years of famine, irrigation revenue may be expected to increase, while it will be short only in years of abundant and favourable rainfall, where there is an expansion



of other sources of revenue consequent on agricultural prosperity,"¹

Mr. Childers took up Sir George Campbell's running, and tried hard to pin Sir Arthur Cotton to an exposition of the financial arrangements required to carry through the big scheme promulgated.

Finance was not the witness's forte. He declined to be fixed to any statement of the kind. It was not his business.

"I must beg to say," he remarked, "that all these are entirely out of my line. I am not a statesman or a man of business. I am an engineer, and, therefore, I have no opinion on these matters. If I am asked I have certain floating ideas about them. I would give much more liberty to the local governments than they have at present. I would have much less interference on the part of the supreme government with the local governments. I see that one misjudging Viceroy can paralyse all India."

On the third occasion of his occupancy of the position of a witness (July 4, 1878), Mr. Onslow asked the early questions, basing them upon a pamphlet which Sir Arthur Cotton, after his preceding examination, had circulated amongst the committee. When dealing, in later pages, with Sir Arthur's views on the opium traffic and the salt tax, reference may be made to some of Mr. Onslow's questions.

It came out that the large scheme previously outlined was intended to join the following rivers and canals :—

The Ravee,	The Orissa,
The Sirhind,	The Godavari,
The Ganges,	The Kistna,
The Lower Ganges,	The Tungabudra, and
The Sone,	others.

Little else of freshness or importance was asked, and the long examination came to an end.

¹ *Famine Commission Report*, 1898, p. 352.



The whole set of works he sketched out was roughly estimated by him, in detail, as follows :—

	£
1. North Coast canal—450 miles, at £1,000 additional	500,000
2. Completion of Godavari and Kistna Delta Works	1,000,000
3. Completion of the Godavari Navigation to Coalfields, exclusive of tanks	1,000,000
4. Cuddapah and Nellore canal	500,000
5. The Tungabudra tank	250,000
6. The canal thence to Kurnool, with 500,000 acres irrigation	2,750,000
7. Complete examination, repairs and improvements of the native tanks in Madras, adding 1,000,000 acres irrigation	3,000,000
8. The Contour canal, north and south from the Toombudra tank—800 miles at £8,000, irrigating 1,000,000 acres	7,500,000
9. Canals from this main canal to many tanks	1,000,000
10. Canal from the same main canal across the Huggry to throw water into the Pennair—50 miles at £6,000, say	250,000
11. Bund across the Pennair, west of Nellore, with canals north and south—400 miles at £6,000, irrigating 250,000 acres	2,750,000
12. Coast canal from the Pallaur to Cape Comorin—400 miles at £3,000	1,250,000
13. Completion of West Coast canal from Cape Comorin to Karwar—400 miles at £3,000	1,250,000



14. Canal from Madras to Ponany on the West Coast—450 miles at £8,000, with 500,000 acres of irrigation at £1 per acre . . .	£ 4,000,000
15. Continuation of high level canal from Kistna anicut to Nellore—200 miles at £6,000, to irrigate 250,000 acres . . .	1,250,000
16. Two great tanks on the Pench and Kanhan rivers in Nagpur . . .	500,000
17. Canal from them to the Wurda near Chanda—120 miles at £8,000, with 500,000 acres local irrigation . . .	1,500,000
18. Extension of East Coast canal, north from Cocanada to Chilka Lake—250 miles at £6,000 . . .	1,500,000
19. Canal from Tungabudra tank to Karwar on the West Coast—180 miles, with 2,400 feet of lockage on inclined plains . . .	2,250,000
20. Canal from Wurda to the West Coast—300 miles at £8,000, with improvement of the Wurda—100 miles at £2,000 . . .	2,500,000
21. Canal from Surat to Bombay . . .	500,000
22. Improvement of Kistna—150 miles, and Bheema—200 miles, for navigation, at £2,000 . . .	750,000
23. Breakwaters at Cape Comorin and Ponany . . .	500,000
24. Periyar tank in Travancore, for the supply of Madura ¹ . . .	1,000,000
25. Tanks in the Neilgherries with extension of old canals in Coimbatore . . .	2,000,000
	£41,500,000

¹ Done. To end of 1898-99, nearly completed, cost little more than half of estimate.



	£
Brought forward	41,500,000
Add 20 per cent. for interest while under construction, and coming into operation	8,500,000
Total	£50,000,000

Once, in the course of his own examination, Sir George Campbell conceded the whole of Sir Arthur Cotton's case for irrigation as a preventive of famine. "I do not doubt," he remarked, "that if you could have irrigation works extended all over India, all India would be protected from famine." He proceeded, however, to remark: "But, as a matter of fact, if you look at the map and see the parts that are coloured green, you will find that the areas which are irrigable are only of comparatively small extent, and that there still must be a much larger extent of country which is not so protected. In respect to that large country, I think that you must depend as a security against famine and other calamities upon the improved means of communication of which we have heard so much, and that being so, I think you may very well make railways, provided that you have really sure reason to believe that you may obtain from them a moderate return."¹

This is the crux of the whole situation. This is *the* point of difference :—

EXPERT.

Sir Arthur Cotton declares that there are few parts of India to which water for irrigation and navigation cannot be taken, if adequate storage be provided. Many millions of acres, he asserts, can be brought under cultivation.

NON-EXPERTS.

Sir George Campbell, and some others, including the present Governor-General (himself most favourable to irrigation), declare only a few million more of acres can be irrigated with financial profit.

¹ Q. 1868, Select Committee, 1878, p. 153.



The layman, with all the evidence before him, is inclined to trust the expert as against the non-experts. If it be a matter of doubt, in view of India's need, the decision ought to incline to the adoption of the expert's views. He, at least, spoke from knowledge.

The Select Committee reported in 1879. Probably, Sir Arthur Cotton was never more intensely annoyed and irritated in respect to any public matter than he was with that report. He had good reason for irritation and annoyance. The paragraphs in it which referred to him and to his schemes were needlessly severe, and were not in accordance with the statements he made. The one point which Sir Arthur made perfectly clear and which accounted for failure, namely, the non-connection of the navigation channels with ports or with means of getting to ports, is wholly ignored. Taking all the irrigation works together, there was no loss but considerable profit. It was recorded against Sir Arthur that he had admitted, "None of the great works pay yet," meaning certain new great works. The witness explained, in detail, why, to that point, they had not paid, and had shown that the irrigation engineers were not to blame. All of no use,—four to five per cent. of profit could not be shown on certain works in exceptional circumstances: therefore, irrigation was *anathema*. They did not then pay their way, enterprise by enterprise, though, as a whole, they yielded a large revenue to the State.

But stay: did the railways at that time fulfil the obligation which the official committeemen considered so necessary? Did they? Lump them together as the irrigation works were lumped together: what then? Sir George Campbell and his colleagues did this in their draft report though not, as is done here, for comparison (p. xxviii). With what result?

	£
Net receipts on all railways to 1877-78	44,295,589
Guaranteed interest paid	69,304,366
Loss	£25,008,777



That is, at a time when irrigation works as a whole showed considerable profit, while railways showed a loss of £25,008,777, it was recommended that, *because they did not pay*, therefore no large irrigation projects were to be considered, while railways were to be undertaken in profusion! And so successfully did this Select Committee, led whither he would by Sir George Campbell, impress the Government, that, in spite of the emphatic recommendations of the much more important Famine Commission two years later—to the 31st March, 1898, all that had been spent from capital for irrigation works, was just six millions more than the deficit on railway account twenty years earlier. Thanks, mainly, to the Committee of 1878, this is how the *first* place in provision against famine has been secured for irrigation works :—

	£
Capital Expenditure on <i>Railways</i> to 31st	
March, 1898	130,614,851
Capital Expenditure on <i>Irrigation</i> to 31st	
March, 1898	32,639,803
Difference AGAINST the works of	
first importance	£97,975,048

The draft report prepared by the Chairman (Lord George Hamilton) was especially uncomplimentary to proposals for the extension of irrigation, but, as it was not accepted, citations need not be made from it.

The report which was accepted called forth from Sir Arthur Cotton a Memorandum, which, though studiously courteous, is bright throughout with an intense fire of indignation. This Memorandum deals so fully with the report that, as an appendix to this chapter, it must be largely quoted from.

I need only here remark that Sir Arthur felt keenly the mode of examination to be unworthy of so important a body and wanting in respect to himself, as indeed it was. After quoting an instance of frivolous enquiry, to which I have not alluded in my summary of his evidence, he says :—“This mode of questioning is worthy of a lawyer trying to put down a witness, totally unworthy of men



appointed by the country honestly to ascertain the real opinions of witnesses."

For the rest I most earnestly commend the passages from Sir Arthur's temperate and most excellently reasoned comments upon the Committee's action.

Appendix I

REPORT OF THE SELECT COMMITTEE.

The following are the passages of the Report of the Select Committee, which relates to the works with which Sir Arthur Cotton was associated, and to Madras generally :—

The Madras Works, constructed with borrowed money, and in operation, chiefly consist of works in the deltas of the large rivers; the only works paying¹ being those in the Godavari, Kistna, and Cauveri Delta, to which an excess revenue of 12·94, 9·8, and 31·30 per cent. is respectively credited upon the capital expended. No account is however taken, in the case of the Cauveri works, of the native anicuts; but making all due allowance for this omission, the results of these works reflect great credit upon the officers who designed and carried them out.

The conditions under which they worked were, however, especially favourable, not only to irrigation, but to that combination of irrigation and navigation which is the chief characteristic of this system.²

The area to be irrigated consisted of flat, alluvial plains, without roads, through which passed a great and constant supply of river water, independent altogether of the real rainfall, and capable of being easily controlled and directed to any part of the surrounding delta. If, in other parts of India, similar conditions existed, your Committee would have little hesitation in recommending an expenditure for carrying out works, the receipts from which show that they are both useful to the cultivator and remunerative to the State.

The account which your Committee have, however, given of the climate, and conformation of Southern India, show that not only do not these same favourable conditions elsewhere exist, but that they are in many districts reversed. For a very large portion

¹ It will be seen, from the extracts (*Madras Administration Reports for 1897-98*), given on pp. 338-342, that, with a very few exceptions, all the Madras Works, after providing for interest, are yielding a large surplus revenue. Probably, no Report emanating from a public body has been so completely falsified by results, as has the irrigation section of this deliverance of 1879; and the railway section, too, so far as railways were to be famine preventers.

² This is not so as regards the Cauveri: see evidence on preceding pages.



of the country is unsuited to canal irrigation, and the supply of river water, with three exceptions, is precarious.

During the prolonged drought of 1876-77 the vast majority of the rain-fed tanks were either dry or their contents so reduced as to be of little utility. If, then, a drought continues for more than a year, it is clear that tanks, to be a preventive against such a continuance of dry weather, must either contain more than a year's supply of rain, or be connected with streams whose sources are independent of the local rainfall.

The point, therefore, to be solved, and the importance of which has been prominently brought before your Committee by the terrible mortality, notwithstanding the enormous State expenditure during the late Madras famine, is, taking into consideration both the present condition of Indian finance and the natural physical difficulties to be overcome, to prescribe the practical policy to be adopted the most likely to diminish the prospect of a recurrence of such a calamity in Southern India.

Your Committee are aware that a Special Commission has been appointed by the Government of India to locally investigate the causes and magnitude of this disaster, and to report upon the remedies to be adopted. Without in any way attempting those specific or detailed recommendations for the protection of this vast area from famine, such as would necessitate a preliminary inquiry into the wants and capabilities of each separate district, your Committee desire briefly to notice the proposal laid with much confidence before them by Sir Arthur Cotton. This scheme, though applicable to the whole of India, was based upon his personal experience, mainly derived from the working of the irrigation works in the deltas of Madras.

Sir Arthur Cotton proposes the summary and indefinite suspension of nearly all railway schemes and works. He would, however, devote £10,000,000 annually for the next ten or twenty years to irrigation works, mainly canals (Question 2,722), the main canals to be of such dimensions as to permit navigation. By such an expenditure he estimates that ten thousand miles of main line navigation would be constructed at a cost of £30,000,000, dealing with the most populous districts, whilst the remainder of this vast sum was to be spent on feeders or subsidiary works.

Sir Arthur Cotton estimates that such an expenditure would give a large return to Government (Question 2,751), though your Committee were unable to ascertain the data of this conclusion, especially as he does not deem it to be within his province to consider how, or at what rate of interest, the money expended would be raised. Neither has he in any way attempted to estimate or make provision for the immediate rise in the cost of material and labour which so sudden and simultaneous an expenditure throughout India must inevitably produce.

The figures already embodied in this report show how few o



the most carefully examined irrigation schemes have proved remunerative, and these returns are more than confirmed by Sir Arthur Cotton himself, who, in reply to a question asking him to indicate what works constructed by the Government of India during the last twenty years, other than those in the Madras Delta, had proved remunerative, replied, "None of the great works pay yet" (Question 2,214).

It is evident to your Committee that this scheme, though of gigantic dimensions, is of too shadowy and speculative a character to justify their noticing it, except for the purpose of emphatically rejecting it.

That the works in the Madras delta, with which Sir Arthur Cotton's name is so honourably associated, are a success, has been admitted by your Committee. On the other hand, the Orissa works, the Madras irrigation works, and the navigation works of the Upper Godavari, with which his name has more recently been connected, are financially complete failures.

Your Committee cannot, however, pass without comment the statement more than once repeated by him, that the failure of these works was due to the whole power of the Government having been exercised against their completion, on account of their dread of cheap transit (Questions 2,322, 2,264).

The Government were, in the opinion of your Committee, right when, in the exercise of their discretion, they declined to invest further sums in undertakings which, from their commencement, belied the estimates and returns upon which alone they were sanctioned.

Nor do your Committee find that the causes of the financial failure of past schemes was the want of ability or energy on the part of the officers of the Public Works Department. The main cause of that failure¹ appears to have been the placing too great reliance on the hasty generalisations of engineer promoters who, rendered over sanguine by the success of certain other undertakings, have ignored the conditions under which alone their success was achieved, and without which success was impossible.

¹ Once more it must be remarked that, taking the whole range of irrigation works, there has been no failure; rather, in the words of Sir James Lyall and his colleagues (*Fam. Com. Report*, p. 339), respecting the extensions since 1880 (and of works earlier completed): "The result has been a great advantage to the State, regarded merely from the direct financial return on the money invested, and apart from their value in increasing the wealth of the country in ordinary years, and in preventing or mitigating famine in years of drought." The Select Committee reported, in the adverse terms quoted above, in 1879; in the following year the Famine Commission said exactly the contrary: "Put irrigation in the FIRST PLACE; go on with it wherever you can," was their recommendation. But this Report was in existence, the men who wrote it in positions of influence, and—India has suffered, is suffering, and will continue to suffer; who knows how long?



Appendix II

EXTRACTS FROM MEMORANDUM BY SIR ARTHUR COTTON ON THE REPORT OF THE SELECT COMMITTEE OF THE HOUSE OF COMMONS ON PUBLIC WORKS IN INDIA, 1879.

This report seems most urgently to call for notice—first, because it does not make the slightest mention of the main point of the whole question, but is wholly occupied with minor and comparatively insignificant ones.

And secondly, because it entirely excludes one side of the question, even in respect to the minor points with which it assumes to deal. Of the constitution of the Committee we may judge from the fact that the only member of the House who was personally acquainted with the public works in India, from having been one of the Commissioners appointed to investigate the subject in Madras in 1852, was not placed on the Committee.

I may premise that, even if such a Committee were *bona fide* intended fairly to investigate a subject, there are essential defects in the system as it is now carried out.

1st. The Committee can call upon what witnesses they may please, and are consequently liable to leave out the most important ones, either from ignorance of a subject with which the members are not conversant, or from bias.

2nd. The witness, when called, may be rendered useless or worse, either from the members not knowing what questions to ask, from their want of real knowledge of the subject, or from their asking only such questions as will in effect set aside the really important information he has to give. The witness is never asked to give his view of the subject, so that he may have an opportunity of speaking upon what he knows or considers to be the really great points of the question.

3rd. But in the present case a new point was introduced which utterly stultifies the whole proceeding; and that was the examining, as a witness, one of the members¹ who, of course, as a member had to *pronounce on the value of his own evidence*. This member, in the course of his examination,² made it one main

¹ Sir George Campbell, K.C.S.I., M.P.

² His evidence was extremely long.



point to show the extreme of ignorance of one of the other witnesses, and of course it was not to be expected that either he in the report would judge fairly between himself and his adversary, or that his colleagues would so far lay aside their courtesy towards him as to support his adversary, however much they might be convinced by the arguments of the opponent. If one witness is allowed to judge in the cause, certainly another ought to be so too. Two of the witnesses were diametrically at issue, but if one has given his judgment on the matter, surely, in fairness, the other ought to be called upon to report also, otherwise the best possible means are adopted for misleading the public. In a court of law the decision of the case is never left to one of the advocates, but to a third person.

Nothing can be more evident, therefore, than that I have a perfect right to remark upon the evidence given before the Public Works Committee, now that my opposing witness has given his report to the public, and it ought to have the honour of a blue cover, just as much as the one already published. And to this I may add that my own evidence was given on a subject on which my whole attention had been concentrated and practically exercised for nearly sixty years, while my opponent's experience was confined to quite another line; that not only had he never projected a single work of irrigation or navigation, but so entirely unacquainted was he with the subject that he objected to certain lines of canal on account of the *ranges of mountains that crossed them, where there is not a vestige of a hill*.¹

And of the tone of the Committee, and the honesty with which it approached the duty laid upon it by the country, a judgment may be formed from the following questions put to Sir George Campbell by Lord George Hamilton and answered by the former, recorded in the Blue Book (p. 110):—

No. 1472. "*There are several ranges of mountains between the Godavari and Poinany, are there not?*" But this was rather too much, and the witness replied, "I should rather say a high tableland." There is not a vestige of either mountain or even high tableland. The height is exactly the same as that between the Sutlej and Jumna, where the Sirhind canal has already been cut.

No. 1474. "Do you think one might just as well say it would take twenty-five millions as two and a half millions" (to cut the canal from the Godavari to the west coast)? The distance is six

¹ The italics in this Memorandum are Sir Arthur Cotton's.



hundred miles, so that twenty-five millions would be £40,000 a mile, the most expensive canal yet cut having cost £6,000 a mile. The witness, of course, courteously replied to this, "Precisely so."

It is impossible to mistake the nature of an investigation carried on in this style. This mode of questioning is worthy of a lawyer trying to put down a witness, totally unworthy of men appointed by the country honestly to ascertain the real opinions of witnesses. As a further proof of the spirit in which this investigation was carried on, one of the members, in my presence, protested to the chairman against the statement I had given in being published in the report of evidence—that is, that the principal part of the evidence of the engineer of incomparably the greatest experience in the matter, and the only one who, according to the Commissioners' own report, had projected and executed highly remunerative public works of any kind in India, should be suppressed. But though not one of the members protested against such a monstrous course of procedure, I suppose it was considered too dangerous an experiment, and the whole of this evidence has been published in the Blue Book.

My first point is that this report entirely omits the main point of the whole question. *It says not a word on the effect of the public works upon India.* In the case of the Suez Canal, which is of most importance, the one or two millions a year it returns to the shareholders, or the connection of Eastern Asia, China, and Australia with Europe? So with the irrigation and navigation in India; which, for instance, is of the most importance, the direct returns to the Treasury, stated in this report to be a quarter of a million for the three irrigated districts of Madras, or the addition of £2 an acre on two million acres, besides other great money returns in ordinary years, and the production of a million tons of food in the late famine, supplying ten millions of people for six months, in the midst of a desperate famine that carried off several millions of people in all the surrounding districts? And, independently of the question of occasional famines, which is of most importance, the payment of a quarter of a million a year into the Treasury, according to the report before us, or the raising five millions of people to a state of plenty and prosperity far beyond those of any other districts in India? and, even merely as a question of finance, the enabling three districts to pay two millions a year in revenue—one million a year more than before the works



—while the average of the other districts is not much more than £250,000, or rather above a third of the former?

And so with respect to transit, which is of most importance—the conveyance of hundreds of millions of passengers and tons of goods cheaply, safely, and quickly, by eight thousand miles of railway, four thousand miles of steamboat canal, ten thousand miles of minor canals, and some fifty thousand miles of good road, or the payment into the Treasury of £300,000 a year, as stated in the report?

Now, I would ask, what are we to think of a report professing to be an investigation of the subject of public works in India, which utterly ignores these incomparably the most important points of the question, and which not only ignores what has been already effected, but also all that would be effected if these comparatively trifling works were extended throughout India? Not one word is said on these the essential points of the matter placed before them. It really seems incredible that such a paper should have been offered to the people of England as the result of an investigation of this subject, in which the well-being not only of the two hundred and sixty millions of the people of India is essentially involved, but that also of the whole British Empire, for all its parts are inseparably united in interest. For instance, as one point, since the improvement of Godavari the trade has increased, not fifty or a hundred per cent., but more than twentyfold. If all India were thus improved, and its trade increased twentyfold, what part of the empire would not partake in the benefit?

Now let us try to form some estimate of the results of the works that have been executed. They are:—

1st. Six million acres irrigated by new great works, besides a vast extension of irrigation under innumerable smaller works improved.

2nd. Four thousand miles of steamboat canal, besides thousands of minor canals, uniting, and so giving effect to a great extent of river navigation besides.

3rd. Eight thousand miles of railway.

4th. Some fifty thousand miles of good common road.

5th. Fifteen thousand [?]¹ miles of telegraph.

Besides innumerable minor works all over India.

¹ The query is Sir Arthur's; apparently, writing at home, he had not the necessary information.



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A very simple calculation will show, beyond all doubt, the vast extent of the benefits received by the immense population of India from these works in money only.

Estimated gain to India by Public Works.

Six million acres, irrigated, at Rs. 15 per acre, increase of produce only—besides enormous other benefits, such as security from river and rain floods, supply of drinking water, sanitary effects, and many others—£9,000,000.

Two million acres, in works not yet opened, but constructed—£3,000,000.

Four thousand miles of steamboat canals (besides smaller canals and river navigations connected with them), carrying about one hundred thousand tons per annum at 1d., against 4d. on land, or 3d. a ton on four hundred million tons—£5,000,000.

Eight thousand miles of railway, carrying, by last report, two thousand million tons at 1d., saving 3d. per ton—£25,000,000.

Fifty thousand miles of road, saving 2d. per ton on probably fifty thousand tons, or two thousand five hundred million tons the mile—£20,000,000. Total £62,000,000.

This £62,000,000 is besides a multitude of savings in money, which cannot be estimated, and besides the transport of thirty-eight million passengers by rail at one third of a penny per mile an average distance of sixty miles, or two thousand four hundred million of passengers the mile; and of many millions by water at one-eighth of a penny per mile. Thus, the mere saving in money cannot be less than £70,000,000 a year, or double the whole taxation of India; for, deducting from the revenue the items of opium, post office, telegraph, etc., which are not *taxes* on India, the remainder is only £35,000,000.

Thus :—

	£
Land	20,750,000
Excise	2,500,000
Customs	2,750,000
Salt	6,000,000
Stamps	2,750,000
Miscellaneous	250,000
	£35,000,000

But, besides direct money returns, who can estimate the effects



of this prodigious personal intercourse, and that by letter and telegraph, both in indirect money returns and in the well-being of the people? And these are only the ordinary things. What shall we say of the millions of lives saved in famines, etc., and by the sanitary effects of the regulation and supply of water, etc.? What would have been the additional loss of life in the single famine of the Peninsula had it been without the million tons of food supplied by the irrigated districts, and a large quantity carried by the railways?

And now, after sitting for many months, a Committee of the House of Commons offer to the public of England their deliberate report on the public works of India, and their conclusions as to what should be done in future, without the least attempt to estimate the results of what has been already done! Is it possible that the public can be deluded by such a make-believe document, surely the poorest that has ever been laid upon the table of the House?

And so it has been in the debates in the House. One member brought forward the whole expenditure on public works, also without a word on their effects, and—incredible as it would seem—no other member requested the first to show them the other side of the ledger before they came to a decision on the subject.

Suppose a Committee appointed to report upon the affairs of a bankrupt were to publish a statement of the liabilities without the least notice of the assets, would the creditors and the public be as grave in their reception of such a farce; and, considering it quite satisfactory, proceed to decide what was now to be done, forming their conclusions upon this wise document?

The member who brought before the House the amount of this expenditure spoke exactly as if the money had been thrown into the sea; and, therefore, the conclusion was the simplest thing in the world, viz., that all that *economy* required was to stop the expenditure, on the clear and simple principle that a penny saved is a penny gained. And that is made the climax of statesmanship! As we used to say under our former masters, "Save the rupees; never mind whether they cost a gold mohur apiece," so now the grave conclusion is, Stop the public works; never mind whether they benefit India fifty per cent. in money, or whether scores of millions perish from famine for want of them. The Committee state the whole sum expended on irrigation and navigation to be seven-



teen millions, *including five millions on works under construction and just on the point of completion, but not then at all in operation ; and three and a quarter millions for works formerly not in operation from refusal of the water, and now irrigated as far as water is supplied ; but the great mass of the land remaining unirrigated solely from want of distributaries.* And the area now actually under irrigation from these works is six million acres, giving £3 per acre as the average cost, and the mere increase of produce due to this has been thoroughly ascertained to be above Rs. 15 per acre, making the return to be about fifty per cent., besides all the other incalculable benefits. And this includes the capital on works not yet in operation. Deducting five millions for these leaves a capital of twelve millions or £2 per acre, and the return seventy-five per cent., this also including three and a quarter millions for works where the water has been till lately refused, and which, of course, under proper management, will be in full operation. Thus we cannot mistake in concluding that, with cheap transit, the saving in famine years, and other money returns, the whole of the works already in a manner finished, and including those of Orissa and the Buramputra, where the difficulty has been about the acceptance of the water, the return to India is one hundred per cent.

In Orissa, where the water was refused, 120,000 acres are now leased for water, and the only thing that limits its use is that the Government have refused to execute the distributaries, and in Midnapur the hindrance is that they have refused to store the additional water required. So also with the Godavari works : though they have been thirty-three years on hand and have from the very first returned twenty or thirty per cent. only £750,000 have been allowed for them, and they are now incomplete—300,000 acres remaining to be supplied with water, while five or six millions of money lie to their credit in the Treasury. *It is in spite of these inconceivable things that these vast results have been obtained.* Had the works been carried out with common vigour to completion, they would certainly now be watering six million more acres and yielding one hundred and fifty per cent.

The whole of the irrigation and navigation works have been thus treated. The Kistna works have been on hand twenty-five years and are not half finished, £500,000 only having been spent on them, though they have been enormously profitable.



The Godavari navigation was carried on at a cost of three-quarters of a million in twenty-five years, and was stopped entirely when it wanted some £20,000 to complete the second barrier works, which would have finished the first part of the project, opening 400 miles of navigation and bringing some ten millions of people within reach of the markets of the world. At this very time the then Secretary of State spent half a million on sixty miles of branch railways in the most out-of-the-way part of Central India, merely to carry coals and cotton, the returns on which were last year £8,500, or 1·7 per cent. So with the Orissa Canal to connect the whole populous delta and the Mahanudi valley with Calcutta. Of this, seventy miles have been cut at one end and sixty at the other, and the connecting eighty miles have been left unexecuted, though upon it depended the whole project; for it is certain that, if the market of Calcutta had been thrown open to the delta, the increased value of all produce would have been so great that the difficulties about the use of the water must have been swept away. This is the case with the whole of these works, and it is an absolute certainty that if they were all at once completed, which could be done for a sum of two or three millions, the returns to the community would be doubled.

In comparing the results of these works with the railways—according to their mode of judging them by the Treasury returns only—not a word of all this is hinted at, though it was all brought before them in evidence, and was not and could not be denied. Think of £114,000,000 being found for railways, besides fifty millions for land and accumulation of debt, the whole now returning five and a quarter millions, or 3 per cent. on cost and debt, while it was impossible to raise one million in thirty-three years for works which the Committee state return 17½ per cent., but which Mr. Thornton, of the India Office, showed returned 40 per cent., and General Strachey, some ten years ago, 28 per cent., and which are actually returning fully 100 per cent. on their cost to the country, viz.: £2 per acre on produce on £1 cost!

And all this concealed by the Committee! Not the slightest hint of it appears in a report placed before the public as the result of a full and faithful investigation of this fundamental point in the management of India. The case actually required that a truthful Committee should have added, "But, it must be clearly



understood in making the comparison, that not a single work of irrigation or navigation—even those returning from the first, according to our own statement, $17\frac{1}{2}$ per cent., and even having, sixteen years ago, on an expenditure of one-third of a million, a balance to its credit of one million, without calculating accumulation of interest (App. to report, No. 4)—that not a single work has been carried on vigorously, or even completed to this day, while every railway without exception was carried on, without a moment's delay, to completion, how ever many millions they required, and though all for twenty to twenty-five years did not pay their interest, and have now an accumulated debt of forty millions against them."

Again, one of the witnesses before the Committee quoted the following from a speech of the present Governor of Bengal, speaking of Orissa, one of the two works where the people have refused the water, but which has enjoyed all the other benefits of the irrigation and navigation works. This is the work the Committee bring forward as a proof of the failure of irrigation works. "On visiting Orissa for the first time after eighteen years (in 1878, date of visit), it is a great satisfaction to me to witness the enormous material and moral progress which this interesting province has made. Notwithstanding the fact that it has within that time been desolated by famine, I believe there is no part of India in which the prosperity of the bulk of the people has improved so much. It is four years since my predecessor visited Orissa. The trade, which had then risen to £770,000, is now £1,230,000." (The trade before the works was £30,000: it has increased in a few years forty-fold.) "I see that Orissa exported last year (1877) 115,000 tons of rice and paddy" (worth about a million). "The price represents an enormous increase of wealth to the agricultural classes."

"It is not, therefore, to me a matter of surprise that *improved facilities of intercourse with the outer world* have brought to it such a development of prosperity as has taken place. I have under my consideration to give to Balasur, and even Cuttack, direct inland water communication with Calcutta, etc. If the work be carried out, it will, *I am sure, bring this district into a condition of prosperity which will not be surpassed in any part of India.*"

These astonishing accounts of the effects of the irrigation works are entirely ignored in the report. The last refers to the



district where the only failure of the Government irrigation works has occurred, as respects the use of the water, showing, even where it is refused, that the prosperity of the district has been amazingly promoted by the other benefits of the works. Again, in an official paper, dated June 18, 1878, the following account is given of the effects of the irrigated districts in Madras:—"The Godavari and Kistna works, besides supporting the population of their own districts, and a great crowd of hungry immigrants from the surrounding country, and besides exporting over country roads an amount of food grains, which the Collector of Godavari estimates at little less than the amount exported by sea," (viz., 140,000 tons), "supplied very nearly one-fifth of the food exported from places within the Madras Presidency itself for the supply of the famine demand during the same time. Tanjore and Trichinopoly also supported their own and all the immigrant population, besides exporting by road, as well as by sea and rail, etc. It seems to me that schemes for extending and developing the Godavari and Kistna works deserve the heartiest support of the Government of India." Again: "The gross value of the rice raised by the Godavari and Kistna canals during a year of famine, when, to judge from the condition of the neighbouring districts, there would not otherwise have been an acre ripened, *may be taken at £4,950,000, or four times the whole capital outlay to the end of the year.*"

Not a word of this is inserted, or alluded to, in the report, nor in any of the debates on the famine. Think of a report on what is to be done in future in this respect not saying a word about the completion of these works, and of an official statement being made to the House of Commons on the famine, in which not a word about these amazing effects of the Madras irrigation works is mentioned! It is thus that the British public have been utterly misled, and that their ideas about irrigation are utterly contrary to the truth.

With respect to the subject of transit there is no attempt in the report to go into the essential points of the case. The questions, What does India require in this respect? What quantity ought to be carried, and at what prices, in the circumstances of India, in order to give itself and other countries the full benefit of its productions? What means can effect this? Do the railways answer the purpose or do they not—that is, can they carry



the quantities, and at the prices that are absolutely necessary for the development of the country? Can canals do this? Are they practicable generally throughout India? etc. None of these, the fundamental points of the question, are touched upon. This is probably owing to not one of the members being conversant with the subject of transit; so that whether 100,000 tons or 5,000,000 require to be carried on a certain line, and whether it will answer the purpose if goods are carried at a penny a ton, or whether they require to be carried at a tenth or a twentieth of a penny, were points which never occurred to them to inquire into. The fact is, the whole subject of transit requires to be inquired into just as if no committee had been appointed. A railway is opened at an enormous expense, and the sole question asked is, Does it pay three or four per cent. *to Government?* as if the Government were a private company, and had nothing to do with the well-being of India. As if, whether it carried the whole quantity required, and at practicable prices, or whether it was little more than a make-believe, and carried a tenth part of what was wanted, and at prohibitory prices, were matters of no moment to the rulers of the country. *The real fact is that after sinking 170 millions on railways¹ the country is utterly paralysed for want of effective transit at this moment.* For instance, in the famine, tens of thousands of tons of goods were left to rot at numbers of stations because the comparatively small traffic in grain completely choked the roads. Nothing is more urgently required at this moment than a thorough investigation of this subject, *the very first essential for India.* What India wants is to have millions of tons and millions of passengers carried on all the main lines of the country. Take two instances of this. India is deprived of the market of England for her wheat and other grains and pulse, for want of communications that can carry sufficient quantities and sufficiently cheaply; and, with unlimited supplies of coal and wood, it is burning millions of tons of manure solely for want of the means of distributing the proper fuel at practicable rates. It is utterly in vain that God has been pleased to provide the land with unbounded stores of these invaluable productions, if we do not provide the means of distributing them. This He leaves for us to do. . . .

And now with respect to the point on which the Committee

¹ Including cost of land and minus interest charges, etc.



settle the question—that is, the returns to Government. And first of the irrigation. This is given thus:—Capital fifteen and a half millions, net returns £830,000, interest 5·3 per cent., or ·8 above the Government interest. They thus show upon their own statement that *the irrigation works are an actual gain to the Government even in ordinary years*; that they cost the Government nothing. In the first place, must be added to this (even supposing the saving of millions of lives were nothing to great statesmen), the enormous saving in actual money to the Treasury in famines, and in the years following, in consequence of the additional population compared with what would have survived. Thus, in the Madras famine, rice was grown by our irrigation works sufficient to preserve the lives of ten millions of people for six months. What would have been the loss of revenue for many years if these millions had perished? There cannot possibly be any doubt about this, that in one such famine there is a loss of revenue prevented in that and the following years far exceeding the whole cost of the works. Nothing is said about this in the report. Again, in this total expenditure of fifteen and a half millions is included no less than four and a half millions, the cost of the Agra, Lower Ganges, Sone, Mootah Moolla, and Sirhind Canals, and Ekrookh Tank, all of which were under construction and not in operation, being nearly a third of the capital charged. This reduces the capital to ten and a half millions, and raises the return to 7½ per cent. instead of 5½. Thus there was in 1875-6 a clear profit to the treasury of £350,000, an ordinary year; and, further, this return is for 1875-76. In that year the irrigation was 150,000 acres in Bengal. Last official year the extent was 400,000 acres, so rapidly is it extending. Thus, with all our mistakes, mistakes which, of course, need not be repeated, the revenue has been considerably increased, even in ordinary years, by the Committee's own statement, upon a capital of only ten and a half millions; so that we have certain data for concluding that, when these works are completed, the revenue will be increased by a million a year, besides all the incalculable saving in famines and the years following them. Further, no account whatever is given of the causes of deficient returns in the works that were not remunerative in 1875-76. The cost of these works, viz., the Midnapur and Orissa Canals, was two and a quarter millions. Now, the case of these works was quite an especial



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one. The failure of returns was not any essential defect in them, but was entirely owing to two removable causes—the first is the non-completion of the works, and the other is the refusal of the water by the ryots. With respect to the latter, it is already removed. It was simply the consequence of a most wretched state of revenue management. In an official report the case is thus stated :—“From his extreme poverty and state of indebtedness, the Midnapur ryot reaps but a questionable benefit even from a bumper crop. Be it a good one or a bad one, it is said that all, beyond a bare subsistence, for a limited time, is absorbed by the landlord's rent, and the claims of his far more exacting creditor, the village money-lender, in whose toils he is hopelessly entangled, and who charges him at the rate of thirty-nine per cent. per annum.” What can an engineer do if, when he has executed such invaluable works as these, the country is so utterly neglected by the revenue authorities that the poor people are left in such a state of bondage as this? While the poor people are refusing the Government water, this is the state of demand for it in that very part of the country. General Haig says :—“There is not a single river, drainage watercourse, or channel of any kind, large or small, in the whole district that is not bunded across at frequent intervals from one end to the other for the purpose of storing the water; no pool, puddle, or waterhole that is not most jealously guarded. It is almost incredible the amount of labour and effort that is thus expended by the ryots (the zemindars, as a rule, do nothing) to secure as far as possible every drop of the precious element; and it strikingly illustrates the actual need that is felt for *more* water, for a more continuous supply, in a district where the natural supply might have been supposed to be sufficient.” If this does not show some monstrous mismanagement, what could? All this desperate anxiety to procure more water too is expended to get the *poor rain water*, while the water brought to them by the canals is *rich river water*, worth three times as much.

This was allowed to go on for many years, but at length, under a more faithful Government, this difficulty seems to be pretty well got over. A Committee that lately reported on these works (Orissa) say :—“In 1876-77 the area irrigated was 26,000 acres; in 1877-78, 95,000; and this year, 1878-79, it is estimated that 130,000 acres will have taken water.” But now, who could



imagine that the distributaries are wanting to conduct the water to the remaining area commanded? This is the way in which the whole of these irrigation works have been treated. If a railway were in hand, though it did not pay interest for twenty-five years—it did not signify how many millions it cost—there never was the slightest discussion about the money; but every water-work has been left unfinished. The one thing that has caused all the difficulty about these Orissa works was that the canal connecting them with Calcutta is not completed. The Committee before mentioned say:—"This canal forms an important link in the chain of communication between Cuttack and Calcutta, the completion of which, *first and before all things*, was urged by Colonel Haig in his exhaustive note of May 29, 1873." And the present Governor of Bengal says, as quoted by one of the witnesses to the Committee of last year:—"I trust before long to obtain sanction for the commencement of this work" (the completion of the canal), "and I hope before leaving India to see Cuttack brought within two days' journey of Calcutta. If the work be carried out, it will, I am sure, bring this province into a *condition of prosperity which will not be surpassed in any part of India*." The value of rice, as given in the Bengal report, is in Orissa Rs. 17 for the produce of an acre, 900 lb.; and in Calcutta Rs. 28. It could be carried by canal for R. 1, giving an increased value of Rs. 10 per acre to the rice alone, or seven times the water-rate. This will give some idea of what the effect of cheap transit is, and of what India is losing for want of it. The moment this canal is opened, it will give an entirely new value to everything in the district, many times the amount of the water-rate. There cannot be a question that, if this canal had been completed, the enormous increase in the value of produce would have in a moment swept away all the difficulties about the use of the water. And as with the navigation, so it is with the irrigation. Under the present weirs no less than 1,500,000 acres are commanded by the water, while only 640,000 are protected by embankments, and only 130,000 are supplied with water. In this way, of course, irrigation may be made to cost anything. If the whole project for the thorough protection, irrigation, and navigation of the whole delta were carried out, it would regulate the water for 2,000,000 acres, and in increased produce and increased value from cheap transit, the return would be fully Rs. 15



per acre, or a total of £3,000,000 a year, and the total cost of the works would certainly not exceed £4,000,000, giving 75 per cent. besides innumerable benefits in the way of sanitation, etc. There is not the smallest room for doubt that the result, as stated by the Lieut.-Governor of Bengal, would be that "the prosperity of the province would not be surpassed by any district in India." Had there been such governors in Bengal as this in previous years, it is certain that this would have been the present state of the region.

But let us now consider once more the expenditure of £500,000 on the coal railways in Nagpur in the upper basin of the Godavari. This, as I have shown, now yields $1\frac{3}{4}$ per cent., or a clear loss to the treasury of £14,000 a year. Had this sum been spent on the lower end of the Godavari in completing the delta works there, and in the Kistna district, it would have been ample for 500,000 acres, the water-rate alone on which would have been Rs. 4 per acre, forty per cent., or £200,000 a year, making the total profit on irrigation £550,000 on £11,000,000, or five per cent. above the Government interest, or half a million in all. Such would have been the return if this one sum had not been thus shamefully perverted. All this was expressly brought to the notice of the then Secretary of State personally at the time, and it was also given in evidence to the Committee. Yet not a word is said in the report about this waste of the public money. What is the object of these inquiries if it is not to point out such misapplication of the public funds, and other causes of the deficiency of the finances, and of the poverty of the people? This half million expended in watering as many acres would have afforded an increase of produce alone of a million a year to the ryots of Godavari, and this is only a small specimen of the enormous misappropriation of the public money. The fact is that the whole tendency of the report is to hush up and conceal the grievous abuses and mistakes that have been made in the public works, instead of exposing them, which was supposed to be the object of the Committee.

But, further, this return from the irrigation and navigation, as reported by the Committee, entirely leaves out of sight all the indirect return from these works. Can the wealth of the people be increased without increasing the general taxes? The Committee credits the works in Godavari with £127,000 a year; then



where does the rest of the increase of the revenue of the district come from? The revenue was before the works £220,000. It is now £570,000, an increase of no less than £350,000. Nothing is said about this difference in the report. The fact is that about £300,000 of this is due directly or indirectly to the works, and so with all the great works. On the six millions¹ of acres now watered by them, there is an increase of income to the people of at least £10,000,000 a year, and it is impossible thus to enrich the people without a considerable portion of it coming to the Treasury. Of the total income of the country about ten per cent. is paid as taxes, so that this additional income must add about one million to the finances. And, even merely in respect of the returns to the finances, if this were the sole question, the report is utterly false. The actual returns of the irrigation works alone, direct and indirect, are at this moment probably £2,000,000 a year instead of £130,000 as stated by the report. And with respect to the *prospects* of the works, even as they are, without their being carried out effectively, the gross revenue of those in Bengal, which is stated in the report as £23,000 for 1875-76, was last year £107,000, or five times as great, and there is absolute certainty that they will in a short time return above the Government interest. In that year the area irrigated was 150,000 acres; last official year it was 400,000; the Sone works are now very nearly completed to the extent to which they are now restricted, and they will water 800,000 acres. Not a word of this is stated, but the remarks in the report imply that these works were doing all they could or were ever likely to do. Only think of this sum of £23,000 a year being mentioned as the return of the Bengal works, without adding: "But the four millions of capital here given includes one and a half millions, the cost of the Sone works now approaching completion, but not in operation, which will return £250,000 a year, besides the Orissa and Midnapur works, which will water at least 500,000 acres under the main canals already cut, and yield £100,000 as soon as these difficulties about the acceptance of the water are overcome, and that they are already in fact overcome

¹ The six millions are now (1900) at least fifteen millions. If Sir Arthur's calculations still hold good, the direct contribution to the wealth of the country of the Government works alone is at least £25,000,000 a year. Probably, it is much more.



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under the present vigorous government is evident from the fact that 150,000 acres are now irrigated."

Further, in this report nothing is said about this mode of obtaining water from the *rivers*. Was this nothing, and a matter of no question whatever? Might not a laborious investigation have properly included such a fundamental essential point as this? It is continually said, it has been repeated in a late paper on India, "I prefer obtaining water from wells." Now what is right? Who could imagine that the simple answer to this is not alluded to in the report? The case is this. Well water costs, to raise it by bullocks, about R. 1 for 300 cubic yards, while rich river water, full of all the food that plants require, worth three times as much, is brought on the fields at a cost of from 1,000 to 2,000 cubic yards per rupee. The Sone works, for instance, will distribute 3,500 million cubic yards per annum, and cost, at seven per cent. on £2,700,000, £190,000, or 20,000 cubic yards per £1. One would suppose that such a plain calculation as this would set at rest this question. Neither rain nor well water will restore the soil, while the river water does this so effectually that land has been so cultivated for thousands of years without other manure. Even where there is abundance of rain, river water is just as much required. The fields should be emptied of the rain water as soon as possible and refilled from the river. It is, of course, very difficult to get people to believe the violence of the bias of the real old Indian against the use of this invaluable river water. But surely the following fact will prove this unmistakably. A gentleman¹ was lately sent out from England expressly to investigate the terrible famine question as a member of the Committee appointed in India. He went to India and passed throughout the length and breadth of the land, and, one can only suppose, under the influence of the old India atmosphere in which he was immersed, scrupulously avoided seeing what water could do for India. He not only avoided Orissa, where he might have informed himself that, in spite of great difficulties, the district had made considerable progress in rising from its abject state of poverty and despondency, as stated by the Lieut.-Governor of Bengal; but he actually touched at Cocanada, the port of Godavari, where the water works had had their almost full effect and had

¹ The late Sir James Caird, who was a member of the Famine Commission of 1879.



raised a district from below the lowest of the districts to the state of the very highest prosperity in all India, raising the revenue to £570,000 a year, two and a half times that of the districts generally, and he left the port without landing. In the same way he passed by the Kistna district, and in the south went to Trichinopoly, on the confines of Tanjore, the other thoroughly prosperous district paying a revenue of £750,000 a year, and avoided seeing that district also, so that he has returned without seeing what water can do for India. It will seem incredible, of course, that such things could be, but there is the fact. The only districts that have been fully and effectually delivered from famine, and that yield a revenue to Government, which, if it extended throughout India, would make the receipts of the Treasury one hundred millions instead of thirty-five, and that are really a credit to our rule such as no other districts afford, were carefully avoided; and if this gentleman is asked, "But, what conclusion did you come to respecting the difficulties that have been met with in Orissa and the reported complete success of the well-irrigated districts in Madras, both in respect of the famines, and of finance, and the prosperity of the people?" he must say, "I have no personal knowledge of these districts." What are we to think of these things? Were these no questions? What has made these districts the head districts of India? And how far are the means, which have here produced such astonishing effects, applicable to other parts of India?—districts which, in the midst of the most awful famine, which left every surrounding district, even in spite of a million being spent on each in railways, strewn with hundreds of thousands of dead who have perished in this awful manner, both yielded full revenue to the Treasury, sold a full crop at famine prices, kept their own population in plenty—a population of five millions—and fed ten millions of the adjoining districts.

I must advert also to one assertion of the Committee with respect to my evidence. They state that Sir Arthur Cotton's scheme for the irrigation of India was based upon his personal experience, "mainly derived from the working of the irrigation works in the deltas." My objection to this is that it is pure invention. There is not a shadow of ground for it. My words were, "I take the whole cost of irrigation up to this time wherever it has been carried out," and so on. Throughout my exami-



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nation there is not one word which showed that my calculations were based upon the cost of the works in Godavari. I stated everywhere what was the cost of irrigation in the various parts of India, and the increase of produce due to it. What are we to think of a Committee that can thus recklessly make assertions directly contrary to the fact, when they know that the person of whom they speak will have no opportunity of refuting them?



CHAPTER XI

Railways v. Irrigation and Navigation Canals

IRRIGATION "pays the Hindu everywhere, for without it millions could not live at all, and millions more would be decimated by famine every few years. Reckoning its influence upon railways, commerce, and the good government of the country, its value is simply inestimable."—HON. A. DEAKIN, M.L.A., *Victoria*.

THE real point considered in the last chapter, and, indeed, had it done its duty, the real point of the whole enquiry of the Select Committee, was as to the remedy for famine, frequently and certain-recurring famine in India, which is what has now to be faced. Though partly veiled, the actual issue was: "Do railways, or do irrigation and navigation canals, best preserve the country from famine?" Further involved in it was the additional question: "Granting railways are necessary for transport of passengers, goods, and produce, save in respect to certain trunk lines, would not properly-constructed canals serve the full purposes of such a country as India?"

To these questions Sir Arthur had but one answer. To the first he always said, unhesitatingly, and with abundant proof, that railways in India could not possibly compare, or, with fair treatment, compete, with irrigation and navigation canals as a preservative against famine. To the second, he was, all through his life, of the same mind as the late Lord Derby, one of the sanest and most far-seeing of British statesmen, that a multiplicity of railways was not needed in India, while upon irrigation and navigation canals the very existence of India depended.

The official answer ought to have been the same in each



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instance as was Sir Arthur Cotton's. What is the record of the authorities in this respect? Their record is, that their own Famine Commission of 1879-80, which made enquiries in India in 1878 and in England in 1879, plainly laid down what was the FIRST DUTY of the Indian Government. At page 150 of part ii. of the Commission's Report, this most significant statement, and this remarkable recommendation (remarkable in view of the balancing and moderate terms in which a Commission usually makes a suggestion) was submitted :—

"Among the means that may be adopted for giving India *direct protection from famine arising from drought, the FIRST PLACE must unquestionably be assigned to works of irrigation.*¹ It has been too much the custom, in discussions as to the policy of constructing such works, to measure their value by their financial success, considered only with reference to the net return to Government on the capital invested in them. The true value of irrigation works is to be judged very differently. First, must be reckoned the direct protection afforded by them in years of drought, by the saving of human life, by the avoidance of loss of revenue remitted, and of the outlay incurred in costly measures of relief. But it is not only in years of drought that they are of value. In seasons of average rainfall they are of great service and a great source of wealth, giving certainty to all agricultural operations, increasing the out-turn per acre of the crops, and enabling more valuable description of crops to be grown. From the Punjab in the north, to Tinnevely at the southern extremity of the peninsula, wherever irrigation is practised, such results are manifest ; and we may see rice, sugar-cane, or wheat taking the place of millet or barley, and broad stretches of indigo growing at a season when unwatered lands must lie absolutely unproductive."

But, on value according to financial success, that is the

¹ The italics are mine in all cases where the contrary is not stated.



payment of a reasonable dividend (and, it ought, but is not, to be the rule to provide a sinking fund also), the same Commission reported emphatically in words which leave the India Office no excuse whatsoever if they refrain even now from taking most energetic steps to carry out Sir Arthur's plans. Their neglect in the past arouses feelings of indignation which I may not express. Two pages after that mentioned above, namely on page 152 of the Commission's Report, it is stated :—

“LOOKING AT THE PRESENT POSITION OF INDIA IN RESPECT TO IRRIGATION, IT WOULD BE HARD TO FIND ANY SYSTEM OF WORKS THAT IS NOT WORTH TO THE COUNTRY THE MONEY THAT HAS BEEN SPENT ON IT; and where the reverse seems to be the case by reason of an unfavourable direct money return on the capital outlay, it will be generally found that it is due to the backwardness of the cultivators in adopting the great change in their customary system of agriculture, which necessarily follows on the introduction of irrigation, or to defects of design, or errors of management which should not have occurred, and which may be remedied more or less completely. *Only where the population is so sparse that use could not be made of irrigation if it were offered, or where the necessary cost of the works would be so exceptionally great, that it would be cheaper to accept the likelihood of expenditure on famine relief than to incur the cost of canals,*

CAN THERE BE ANY DOUBT AS TO THE ADVANTAGE OF
IRRIGATION,

or as to the expediency of extending it within the limits which the general financial position of the State imposes on its outlay on such undertakings.”

Even this does not exhaust the advice given by the Commissioners. Yet two pages further, and there is this triumphant official vindication—triumphant on the narrow official lines, more than triumphant if all the conditions are taken into account—of all Sir Arthur Cotton's contentions. “But,” say the Commissioners, “although we have thus referred to the possible *temporary* ill-success of irriga-



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tion works in some cases, *more particularly in the early stages of their development*, we must again repeat THAT THE ACTUAL EXPERIENCE OF INDIA IS ALTOGETHER OPPOSED TO THE VIEW THAT THE EXISTING WORKS OF THIS CLASS, TAKEN AS A WHOLE, ARE OTHERWISE THAN POSITIVELY REMUNERATIVE TO AN EXTENT WHICH COMPLETELY JUSTIFIES THE MEASURES WHICH THE GOVERNMENT OF INDIA HAS CARRIED OUT FOR THEIR EXTENSION DURING THE LAST TWENTY YEARS OR MORE."

" . . . The net income of the whole of the works in operation was, in the year 1879-80, £1,165,800, which amounts within a very small fraction to six per cent. on the whole capital outlay, including about £3,250,000 spent on works not yet brought into operation. If this part of the outlay be excluded, the income is found to be more than seven per cent. on the capital actually utilised."

More astounding still, in view of the comparative neglect which afterwards followed, of irrigation extension and the great extension of railways, are the following statements, statements which more than justify Sir Arthur Cotton's unanswerable position. The Commissioners report :—

To show how greatly the wealth and resources of India have been increased by her works of irrigation, the following instances may be quoted from the mass of evidence to the same effect before the Commission.

2. The outlay on completed canals in the
In Punjab up to the close of 1877-78 had been
the Punjab. £2,260,000. The total area irrigated by them was 1,324,000 acres. The weight and value of the food grains raised at the high prices which ruled during that year of drought on the two principal canals were calculated as follows :—

	Tons.	Value.
West Jumna Canal . . .	158,000	£1,147,000
Bari Doab Canal . . .	141,400	789,000
	299,400	1,936,000



The value of other crops grown on these two canals (sugar-cane, cotton, dyes, oils, vegetables, etc.) was estimated at £940,000. It may, without exaggeration, be reckoned that one-half of these crops would have perished if unwatered, or would not have been raised at all if the canals had been absent. So that altogether in that one year, the wealth of the Punjab was increased by these two canals by £1,438,000, an amount equal to about two-thirds of the cost of the works; and, but for the protection they afforded, Government would have lost heavily from the necessity of remitting revenue, and providing for famine relief. The net canal revenue for the year in the Punjab was, however, only £119,000, being about five and a half per cent. on the capital outlay on works in operation, a result which obviously supplies a wholly inadequate test of their value to the country.

3. Up to the end of 1877-78 the capital outlay on completed canals in the North-west Provinces had been £4,346,000. The area irrigated that year was 1,461,000 acres, the value of the crops raised on which was estimated at £6,020,000. Half the irrigated area was occupied by autumn crops, which, but for irrigation, must have been wholly lost; and it may be safely said that the wealth of these provinces was consequently increased by £3,000,000; so that three-fourths of the entire first cost of the works was thus repaid to the country in that single year. The net revenue to Government from irrigation in these provinces was £315,600, or about seven and a quarter per cent. on the whole capital outlay on five and three-quarter millions of which one and a quarter millions were still unproductive.

4. The results of irrigation are not so favourable in Bengal and Behar as in the North-west Provinces and Punjab; but here, too, there is abundant evidence of its value, and the receipts have at length exceeded the working expenses. Up to the end of 1878 the outlay on the Sone canals had been £1,908,000, of which probably twenty per cent. is due to

In Bengal.

In Behar.