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### The Nile Reservoirs

H. D. Pearsall<sup>a b</sup>

<sup>a</sup> Assoc. M. Inst. C.E. ,

<sup>b</sup> M. Am. Inst. M.E. ,

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sponds roughly in direction with the great displacement, and lies a little to the east of it. The long sloping plateau of the eastern schists is traversed by the valleys of the Oykell, the Shin, and the Helmsdale rivers, which drain into the North Sea, and by the Naver and the Halladale, which find their way into the North Atlantic. Most of these straths are comparatively tame for the greater part of their course. Loch Shin, which runs for some 16 miles along the principal depression, is a bare and most uninteresting sheet of water lying in the bottom of what has been compared to a huge gutter, with neither tree nor crag to relieve its dull monotony. Loch Naver is a great improvement on Loch Shin, stretching as it does from the foot of Ben Clibreck to the head of "bonnie Strathnaver." The beauty of this strath in particular never impressed me very much, it must be confessed, and the person who first gave it this name must have been best acquainted with ugly places, and rather hard up for information about the rest of the county.

He who wants to find beautiful fiords and valleys should visit the Kyle of Tongue, Strath Hope, Strath Beg, at the head of Loch Eriboll, or the glens of Loch More, Loch Kylesku, and Loch Assynt; but if deep gloom and awesome desolation are preferred, commend me to the remote and weird recesses of Strath Dionard at the back of Foinaven,

"Where rocks were rudely heap'd, and rent  
As by a spirit turbulent;  
Where sights were rough, and sounds were wild,  
And everything unreconciled;  
In some complaining dim retreat,  
For fear and melancholy meet."

The most beautiful journey in Sutherland is, I think, the drive from Inchnadamff to Scourie along the charming and verdant shores of Loch Assynt. The old castle of Ardvreck and the ruined walls of Calda House, here add to the scene an element of life and human interest which is sadly lacking in much of the scenery of Sutherland. The fragrant birken slopes and grassy banks below the grand precipices of Spidean Coinich help also to relieve the overpowering sense of rockiness which, although abundantly fitted to inspire awe and admiration, also conveys a sense of fear, depression, and lifeless desolation, instead of the happiness and love that should mingle as a component element in every truly pleasing landscape.

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### THE NILE RESERVOIRS.

By H. D. PEARSALL, Assoc. M. Inst. C.E., M. Am. Inst. M.E.

THE heat of controversy over Philæ having subsided, the humours of the contest begin to be generally appreciated, and it may even be possible to obtain a hearing for other aspects of the question, about which little was heard while the *sapeurs*, to whom it is said nothing is sacred, and the

archæologists, to whom every ancient idol is more sacred than if they believed in its divinity, were tickling the public ear with epigrams. As both parties to the dispute were modern men of science, it is disheartening to perceive that the old Adam was stronger on both sides than the scientific spirit. The archæologists, not content with showing the scientific value of the ruins, backed their demands by appeals, which were truly comical, not to sacrifice the mud villages (dignified for the occasion by the name of towns and compared with the city of Oxford!) of Nubian peasants, whose condition would very clearly be immensely improved, instead of being sacrificed, by the proposed works; and even condescended to allege that the Egyptian Government proposed no compensation for disturbance, although large sums for this purpose formed part of the estimate for every scheme.

But the engineers were hardly behindhand in representing the question as merely that of "one temple more or less," and, jokingly (surely), suggesting that ignorant wonder at a feat of house-lifting would immensely add to the interest of "intellectual" tourists.

These, however, were merely the humours of the controversy into which the heat of argument led able men. The real facts were no doubt more accurately appreciated by both sides than their polemical arguments indicated, and perusal of the voluminous documents published by the Government of Egypt clearly shows that their engineers had weighed and considered with great caution all the solid arguments on both sides, and that charges of a spirit of Vandalism against them are ridiculously undeserved.

The principal temple is to be preserved as a thing of beauty by a great reduction in the level of the surface of the reservoir. Archæological interests are respected not only by thus keeping many of the ruins unsubmerged, but by the devotion of a handsome sum to an archæological survey of those ruins which will be submerged.<sup>1</sup>

The enterprise and its object itself may be described in a very few words.

Nearly the whole of Lower Egypt is under a system of perennial irrigation, by means of which two crops are raised each year, and even, on some lands, three crops. In Upper Egypt, on the contrary, only one-fourth of the land has perennial irrigation, the rest being irrigated only during flood, and raising therefore but one crop per year.

The difference between perennial and merely flood irrigation is, however, not only the difference between one crop and two, but the second or summer crop is by far the most valuable, averaging £10 per acre against £3 to £3 10s. for flood and winter crops.

The objects aimed at in the proposed reservoirs were three:—

The first was the extension of the perennial irrigation of Lower Egypt to Upper Egypt. The estimated gain in annual produce which would be obtained by this change was about 4 millions sterling.

A second object was to make the system of perennial irrigation

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<sup>1</sup> The archæological point of view is set forth by the Society for the Preservation of the Monuments of Ancient Egypt in *Reservoirs of the Valley of the Nile*.

already existing in Lower Egypt more secure, as at present, in years of low Nile, the summer supply is scanty and insufficient. The estimated value of this insurance was £250,000.

A third object was the reclamation of land in the delta which is now swamp or salted plains. The estimated value of this reclamation was £1,800,000 per annum.

A perennial system of irrigation with a sufficient supply of water at all times will also greatly increase the food supply of the country by lending itself to pisciculture.

These figures are those of Mr. Willcocks, the engineer, who was charged with the study of the reservoir question by the Government of Egypt.<sup>1</sup> It appears to be probable that they understate the increase of produce. Much more detailed estimates have also been published by the Government on the authority of Major Brown, R.E., and Mr. Foster, Inspectors-General of Irrigation, and are accepted as reliable by the Secretary of State, P.W.D. According to these figures the increased annual produce to be expected amounts to 12½ millions sterling, if the complete scheme for Upper and Lower Egypt be carried out.

The estimated cost of the reservoir and subsidiary works required to produce this return, as finally approved by the European Technical Commission, was £5,000,000. This estimate must be allowed to be among the most reliable, as the original estimate of the very capable Government engineer has been examined in detail by three independent engineers of the largest experience in such work.

It seems, therefore, on the face of these facts, to be most obviously work worth doing, and it would certainly have needed most weighty considerations to have justified the Egyptian Government in leaving it undone.

The Government therefore concluded rightly that the work ought to be done.

There appeared, however, to the Government engineers to be three or four possible ways of accomplishing the above objects, and in some of the statements and estimates published by them it even appeared that there was not very much to be said in favour of any one over the others.

The case, however, appears very differently in their final report, after re-examination of all the projects in consultation with Sir B. Baker, Signor Torricelli, and M. Boulé. Mr. Garstin, Under-Secretary of State for the Public Works Department, in his report of 17th May 1894, expressly says that, although he had thought and hoped that there were other sites for the reservoir as good as that at Assouan, he believes it to be now clearly proved that this is not the case, and that practically the Assouan is the only feasible site.

This is not a question merely of expense, as it has been represented. It is mainly a question of security. The alternative sites for dams in the Nile valley are at Silsila and Kalabcha.

The former is absolutely rejected by Sir B. Baker and Signor Torri-

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<sup>1</sup> *Report on Perennial Irrigation and Flood Protection for Egypt.* By W. Willcocks, M.I.C.E.

celli as being dangerous on account of affording no foundation except sand with layers of clay.

The Kalabcha site they reject primarily on the ground of its great cost; but this cost is not that of the estimates which are before the public. These estimates the engineers are now agreed in regarding as quite inadequate, as the methods of construction on which they were based were condemned on reconsideration as impracticable. No detailed estimates have been published of the probable expense of constructing this dam in the only way in which it could be constructed. But although this site is rejected primarily on account of its great expense, it is clear also that it is not regarded by the eminent engineers responsible for the work as entitled to the same confidence in its security as the Assouan dam. It is true that the French Commissioner, M. Boulé, maintained that it was possible to construct a dam which shall be secure in almost any locality, and this is no doubt theoretically correct if no limit whatever be put to the expense incurred. But he did not attempt any detailed sketch of a dam which he would consider absolutely safe, and still less any estimate of its cost, and it is certain that practically, with even a large expenditure, the security of either a Silsila or a Kalabcha dam will be less than that of one at Assouan, so that his opinion really leads very nearly to the same conclusion as that of the other engineers.

The public will certainly not find fault with the Government of Egypt for insisting, as a primary condition, on the greatest practicable degree of security and permanence. The collapse of large dams is unfortunately an event rather familiar, and is sufficient ground for preferring a site which has all the natural conditions of stability, however recklessly colossal we may be content to construct the artificial works on an alternative site to make up for want of these.

There is, indeed, more justification for this view than the public is aware of. In the long list of failures of dams, bad foundations are conspicuous as the chief cause, whereas there is hardly an instance of the failure of a dam of the character of that now to be built at Assouan.

In the original report of Mr. Willcocks, a fourth site for a dam was discussed just above the island of Philæ. The objection to this was of precisely the same kind, viz., rock unsuited for foundation on a part of the line of the dam. In Mr. Garstin's report, however, he speaks of making further excavations to determine this more certainly.

Whether this was done or not, there is nothing in the official report to show, but presumably, if so, the result was as anticipated, as this site is not even discussed by the members of the Technical Commission.

Besides alternative sites in the Nile valley, another project was studied by the Government of Egypt for converting into a reservoir a depression in the desert forty miles south-west of Cairo, known as the Wadi Rayan. This project obtained a great hold on the popular imagination, partly on account of the enthusiastic advocacy of Mr. Cope Whitehouse, and partly because of the idea that the Wadi Rayan, or a similar reservoir, was the ancient Lake Mœris which Herodotus and Pliny said had been artificially excavated for this very purpose.

Even in these progressive days we still believe in the wisdom of the ancients, and this old myth, transmitted to us by an author of 2300 years ago, has clearly had a good deal of weight with the British public of to-day. But a very little reflection must show that the legend was absurd, for there could have been no possible object in excavating a reservoir more than 150 feet below the level of the lowest adjoining land. The depression is therefore clearly a natural one, and this is now known to be the case by geological investigation.

But though the ancients did not dig such a reservoir, they no doubt did use a natural depression similar to the Wadi Rayan in very much the way in which Mr. Cope Whitehouse urges the Government of Egypt to use it, and the Government of Egypt has very carefully studied the question.

In the first place, it is evidently not a *substitute* for the dam proposed by Mr. Willcocks in the Nile valley—for it could only be of use to Lower Egypt, and therefore at the utmost could only secure about one-third of the advantages expected from the Assouan dam. Even of this there is grave doubt, as in case of delay in the rise of the Nile there would be danger of insufficient water to complete irrigation.

In the second place, its cost is estimated to be even more than that of adequate works for supplying both Upper and Lower Egypt.

In the third place, the percolation into adjoining lands is regarded as likely to endanger the cultivation there.

These reasons seem to be fully adequate for abandoning this project.

The figures given above for the advantages expected from the reservoir at Assouan are those of the project as formulated by Mr. Willcocks and Mr. Garstin.

Before the report of the Technical Commission, however, it had been decided to postpone the part of the project referring to Egypt south of Assiout, on account of some uncertainty as to the effect on the flood-level of the river of abandoning the use of the basins there, and as to the possibility of adequate drainage. This of course meant the abandonment of part of the increased produce mentioned above, but in the memorandum of Mr. Garstin of December 1893 he regarded this as a temporary postponement and not a permanent abandonment.

The Egyptian Government had, however, still to come to a definite decision. The answer to the technical question was clear. But what about the ruins?

They seem to have come to the conclusion that the ruins must be saved at all costs, and, by a resolution of the Ministry of 8th November last, they propose to do this by building the dam at Assouan, but so much lower than formerly proposed that the principal remains on the island of Philæ will not be submerged. Some of the smaller monuments will still be below water-level, and these it is proposed to protect by special works. Of course this reduction of the size of the dam will somewhat reduce its cost; but as the cost of the dam as originally projected was insignificant in proportion to the advantages expected from it, this is a matter of little or no importance.

But its effect on the resulting improvements is very great indeed. In

the note embodying this final decision, Mr. Garstin says that the smaller dam will only retain sufficient water for *either* Middle or Lower Egypt,—and which of these is to receive preference is not yet decided. Mr. Foster's estimate of the gain to Lower Egypt was £4,000,000 per annum, and Major Brown's estimate for Middle Egypt was £4,500,000, so that it appears that in either case some £4,000,000 sterling per annum is to be sacrificed.

With the crest of the dam at 118 metres R.L. (viz., the original project of Mr. Willcocks), the reservoir was estimated to hold 3700 million cubic metres, which was just sufficient for the whole of Egypt north of the dam. For Lower and Middle Egypt 2550 million cubic metres would suffice, and this would be retained by a dam at 114 metres R.L. The level is now to be only 106 metres, and the contents 1000 million cubic metres.

This is such an immense reduction from the original plan that it must be regarded as its practical abandonment, and, instead of a scheme providing adequate irrigation for the whole of Egypt, what is now contemplated is only a comparatively small project for the improvement of a few provinces.

It is therefore a very serious question whether the Government of Egypt have used their power rightly in coming to this decision. Is there any reasonable probability that the value to the peasants of Egypt of not submerging Philæ will be several millions sterling per annum? And surely this was the question before the Government as trustees for the people.

But even in the interest of that vague thing called civilisation, is it not more probable that the thorough search and survey of all ancient remains on the site of the reservoir, for which the Government of Egypt had set apart £50,000, and were willing to grant still more, and for which they had seven years' time, would have yielded immensely more treasures to archæological science than the mere perpetuation of the remains, subject to the incessant depredations of natives and dealers which is now going on?

No doubt, by this decision of the Government, Egypt is not deprived of the contemplated advantage for ever. At some future time other reservoirs will almost certainly be constructed higher up the river. But that is not feasible until the Egyptian frontier is moved further to the south; and no detailed surveys have yet been made, and no certain knowledge has yet been obtained as to what reservoirs are practicable there, and at what cost.

We have given an account as brief as may be of the technical sides of this question, partly for the sake of leaving some space to refer to another side of it of certainly not less importance.

In the above summary, the advantages of the proposed works are estimated in the increased produce expected. But the real object which interests the Government of Egypt and the British people is the prosperity of the people of Egypt. Is that the same thing?

Public opinion would certainly be very debased if it could devote absorbing attention to the technical question of the cheapest reservoir,



and take no interest in tracing its effect on the people of Egypt, and therefore we should expect a quite equal attention to this part of the subject.

Moreover, if Great Britain is morally responsible that works carried out there during the occupation shall be the technically best, she is morally responsible in a still stronger degree for arrangements affecting the distribution of the benefits of such works; nor could any intelligent Englishman or Scotchman be content that the result of our great work in Egypt, perhaps to be a monument of our occupation for all time, should be a factitious instead of real prosperity to the people we have taken under our protection.

With many people it would some years ago have been treated as an axiom that increased produce means increased prosperity, but that superficial view is now exploded. It does not necessarily follow, and indeed is probably not the case, that if the produce of every acre of land in England were doubled, the mass of the population would therefore be any better off. It is nearly certain that almost the whole of the increased produce would enrich only the comparatively few Englishmen who are landowners. In fact, the question, whether increased productiveness of land increases the prosperity of the inhabitants as a whole, must depend in the first place on the nature of the land tenure, and, secondly, on the way in which the finance of the improvements is managed.

As regards the system of land tenure in Egypt, the landholding class is very much larger than with us, but the inequalities are almost as great, and the class who hold no land is estimated by some competent authorities to be more than half the population.

It is not easy to see how increase of produce on the land will benefit this half of the population, unless by special arrangement to that end; and not only that, but without special arrangement the lion's share of the benefit will also be absorbed by the largest landholders.

But if we are in Egypt as trustees for the people of Egypt, it is certainly as trustees for the whole people, and we must be careful not to give away the heritage of the poor to the rich. And are not the unused waters of the Nile especially the heritage of the poor?

Whether the working population of a country has any right to the natural resources of the country may be a question in those cases where those resources have been already developed by other hands, but where *undeveloped* resources exist they surely should be regarded as *equally* the right and property of *all* the people of the country, for what more right has one man than another? Therefore when they come to be developed, it is most vital that it should be under such conditions as will secure to *all* the people, and especially to the poor, the use of their property.

If the greater part of the benefits of this immense improvement of the great natural resources of Egypt is allowed to be monopolised by the few, we shall absolutely wrong the people of Egypt. This at least should therefore be prevented, and it would certainly seem that if it be, we shall have a grand opportunity, with several millions per annum of *new* wealth, to enormously increase the prosperity

of the whole people. To these general principles probably no one will object, but much more than this is needed. It is a case where the distribution of the wealth to be created is of even more importance than its creation. The carrying out of the principle in practice should therefore surely be a condition *sine quâ non* of any scheme for further developing the resources of Egypt. It is not a mere matter of charity but of justice. It would be infinitely better, because juster and wiser, to defer further development than to develop solely for the benefit of the few, for that would be endowing them with the just heritage of the many, and taking from the latter, if not any immediate benefit, yet potential benefit of great value.

It appears that the revenue survey of Egypt is still unmade. It will almost certainly be impossible to fairly distribute the new wealth without such a survey. Therefore, if the seven years required to build the dam is not sufficient for this work also, delay in commencement of the construction is by no means to be regretted.

Most monstrous inequalities in land taxation, usually in the direction of injustice to the poor and favour to the rich, existed before the occupation. For ten years the Government of Egypt has been making strenuous efforts to approximately equalise burdens; but the inequalities still admittedly exist in innumerable cases. Let us, at least, not add to these inequalities. May not the distribution of the new wealth even be used to assist in reducing them?

We have, however, searched the Government Reports in vain for any recognition of the importance of this part of the question. The increase of revenue is discussed by Major Brown, Mr. Foster, and the Under-Secretary of State, and estimated at £850,000 for the whole of the original scheme. As regards the remaining £11,000,000 per annum, it appears to be accepted as a matter of course, as stated by Major Brown, that "the profit is to the landowners and cultivators." Is there, however, any ground for assuming that the profit is to the cultivators? Is it not rather obvious that those of them who are not landholders are unlikely to receive any share in it? Major Brown himself estimates the increase of rent as about one half of the increased produce, and assuming that the other half is represented by additional labour required by the additional crops (for it must be remembered that the increased produce is mainly due to growth of a second crop on the same land), these estimates themselves contemplate the monopoly of benefit by the rent receivers to the exclusion of the rent payers. But whether this is the basis of Major Brown's calculation or not, we know from universal experience that eventually, if not immediately, rent will always rise to almost the full equivalent of any improvement in land, so that the eventual exclusion of the mere cultivators from any benefit is certain. It appears also to be assumed as a matter of course that any tax assessed will vary only with the nature of the improvement bestowed on the land, and in this case not only will the landless receive no benefit, but the small landholders will receive only a small benefit, and the bulk of it will go to the large landholders.

It is no doubt true that any attempt to distribute this stream of

wealth with equality and justice is beset with difficulty. It is quite probable that it is impossible without a comprehensive survey of the whole land system, and that this may require considerable time. But surely delay is better than injustice. With increased wealth amounting to many millions per annum to dispose of, surely the question of how it is disposed of is of surpassing importance, and no plea of ignorance or difficulty can be accepted as sufficient for shirking it.

The general principles on which a fair distribution among the people of Egypt can be assured do not seem very far to seek, though any brief statement of them must necessarily appear crude by the necessity of brevity. At least, however, no new vested interests must be created, as it were accidentally and as a matter of course. It must not be an axiom that if the holder of 20 acres pays a new tax of £1 per acre for the improved water supply he may get from the new works, that therefore the holder of 1000 acres similarly situated and similarly benefited should also pay but £1 per acre. The contrary should indeed be an axiom, or the 1000 acre man will, of course, secure 50 times the share of benefit of the 20 acre man. Such an extension of the principle of giving to him who hath is surely in these days utterly inadmissible. There is clearly no private property in the undeveloped Nile. It is the common property of the country. Therefore, how can any one man fairly demand a fifty-fold greater share of it than another? The principle should clearly be that the benefit conferred on the 20 acre man should be the same, as nearly as may be, as that conferred on the 1000 acre man.

But even if all landholders thus receive equal treatment, the Nile reservoir would enrich only the landholders, and the landless class would have no share in the new Pactolus. As this class embraces half or more than half of the fellaheen, such a result would be a manifest injustice of the gravest kind. It is true that so far as the new source of revenue diminishes existing taxation all classes will probably gain, and the landless class among others. But the new taxes as proposed by the Government are, as we have seen, only about  $\frac{1}{4}$ th of the estimated increased produce, so that if existing taxation were reduced by the whole amount of the new tax, and the whole of the reduction were on taxes now paid by the landless class, they would still receive very much less than their reasonable share of the new wealth. But such a relief is manifestly impossible, and actually there are very few taxes a diminution in which would directly improve the condition of the landless fellaheen.

Is it impossible, then, to distribute any of this stream of wealth to those who most need it? Is it a law of nature that to those who have nothing nothing can be given, and that we must even necessarily take away even that which they have, viz., their inheritance in the future?

Most assuredly this is not so; but to devise ways in which this iniquity can be avoided will demand efforts of statesmanship perhaps greater than any of the other problems connected with this development of the resources of Egypt.

During the heated discussion about Philæ, some of the archæologists accused the Government of Egypt that their care was solely to improve the position of the bondholders by increasing the revenue and to further

enrich the already favoured large landholders of Egypt. The improvement in the position of the peasantry already effected proves that this is a libel on our representatives. The abolition of taxes on sheep and goats, and on trades and crafts, the reduction of the salt tax by 40 per cent., the abolition of the *corvée*—all show a lively and intelligent interest in the poorest of the population on the part of the Government.

But we sometimes see benevolent and just reforms of this kind carried out side by side with financial arrangements which produce the very poverty that the reforms can only alleviate. It is very much to be hoped that the Government of Egypt will not give us a glaring modern instance of this on a large scale. Amidst the clamour of vested interests by which they are surrounded it will not be easy to avoid it, but it is essential both to their honour and ours.

The English officials in Egypt are necessarily subject to the disadvantage of prolonged absence from Europe, and must be more or less out of the current of modern thought; but the condition of the common people is everywhere being recognised to-day as the really important question of government and the true gauge of the real prosperity of every country. It is admitted that poverty is the present lot of the mass of the Egyptians as of that of most other countries. With such a large stream of new wealth to be poured into the country by the hands of the leaders of civilisation, as we claim to be, shall we be content to use it so as to merely perpetuate their condition of poverty and dependence?

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### THE PEOPLE OF TIBET.<sup>1</sup>

THE word Tibet represents two Tibetan words meaning "Upper Bod," and is occasionally used by the natives to distinguish the central and western portions of the country from the eastern portion, or "Lower Bod." Of the meaning of the word Bod several explanations have been given, the most generally accepted derivation being from the verb *bodpa*, "to speak." However this may be, it is certain that Tibetans from all parts of the country call themselves Bod-pa, with some variations in pronunciation. The name Tibet first occurs in the Arab Istakhri's works (about 590 A.D.) under the form Tobbat, and is found in Plano Carpini's *Historia Mongalorum* (A.D. 1247) in the form Thabet; Marco Polo uses the form Tebet.

Tangut is simply the Mongolian appellation for Tibet, and is misleading as applied to a certain section of the country by some European writers, for the people dwelling there are pure Tibetans.

Roughly speaking, Tibet may be defined as that part of Central Asia lying between the 76th and 102nd meridians of E. long. and the parallels of 28° and 36° N. lat. With the exception of its extreme

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<sup>1</sup> Extracted from *Notes on the Ethnology of Tibet, based on the Collections in the U.S. National Museum*; by W. W. Rockhill (*Report of the U.S. National Museum*, 1893).