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MADRAS RECORD OFFICE

Government of Madras

Public Works DEPARTMENT

G.O. No. 2099-2100 Press
B.P.—No. Mis.
311-372.73

Dated 23. 8. 1873.

Not to be folded or roughly handled

Proceedings of the Madras Government, Public Works Department, 22nd August 1873.

No. 371. Read the following Despatch from the Right Honourable the Secretary of State for India:—

Public Works.

INDIA OFFICE, LONDON,

No. 2. *3rd April* 1873.

MY LORD,—I transmit, for the information of your Excellency, an extract of a memorandum, dated the 14th February, from Lieutenant-General Sir Arthur Cotton, K.C.S.I., of the Royal (Madras) Engineers, suggesting the construction of a reservoir for the storage of the waters of the Kistna.

2. It is for your Government to consider whether it is desirable that the spot indicated should be examined by persons competent to form a judgment on the merits of the scheme.

I have, &c.,
ARGYLL.

His Excellency the Right Honourable
The Governor in Council, Fort St. George.

Extract of a Memorandum by Lieutenant-General Sir ARTHUR COTTON, K.C.S.I., *dated 14th February* 1873.

I WISH also to offer a suggestion on the very material point of a dry season supply of water for these channels, upon which the prosperity of the district is so greatly dependent, not only that the irrigation of various valuable crops, such as sugar, chillies, plantains, etc., may be provided for, but also that water transit may be secured to the whole district throughout the year. The suggestion is this:—The Kistna has a most remarkable course between this district and Kurnool, a little below that town it passes for about 80 miles through a high table-land, I believe about 1,500 feet above the sea. The level of the river at the entrance of this gorge, or rather chasm, is about 800 feet above the sea, and where it enters the open country in the Kistna District, at a distance of 150 miles, the level of the flood is about 100 feet, so that the fall of the river is about 700 feet in this distance, or 5 feet per mile on an average. It is remarkable that I have never met with any one who had ever traced the river through this part of its course, and I have never heard of any European who had seen it in its course, through the 80 miles of table-land excepting one, who in pursuit of a party in the mutinies came upon it quite suddenly, and found it, as represented in the maps, a very narrow channel, I think he said about a quarter of a mile broad, with perfectly perpendicular sides, probably 1,000 feet deep; in fact, a tremendous rent in the solid rock, similar to that of the Zambese described by Dr. Livingstone, the ground quite level up to the very edge of it on both sides. It is evident that the river being 800 feet above the sea at the entrance, if the table-land is 1,500 feet, as I believe it is, and as it appears from the hills south of it, the chasm must be 700 feet at the beginning, and it must increase to the end of the 80 miles, where it is probably more than 1,000 feet, supposing the fall of the river to be the same as the average from Kurnool the whole way to Kistna District, viz., 5 feet. This table land appears from the maps and from what I could hear of it, or rather from my being unable to obtain the least information about it, excepting that from the officer above mentioned who crossed the southern portion of it, to be entirely uninhabited, owing apparently to its feverishness chiefly.

2. Now, what occurs to me respecting this remarkable feature is, that it might be converted into a vast reservior at a very small cost, if on examination it is found to be as here supposed. The plan is this, to close the end of the chasm by heavy mines on both sides, throwing down the solid rock into the channel, and thus forming a dam, suppose 100 yards high, by a solid barrier of rock in large masses for a length of perhaps a quarter of a mile.

3. This would provide a reservoir 80 miles long by perhaps quarter of a mile broad, by 100 yards deep at the lower end, and so containing 3,000 millions cubic yards of water, or an average of 800,000 cubic yards of water per hour for 150 days from January to May, and which would be quite sufficient for all the irrigation of the delta of the Kistna in the dry season. The cost of such a work would be very small.

Supposing that a series of mines on a level with the water, and at 150 feet from the face of the rock, would be sufficient to undermine the rock and bring down the whole mass of 1,000 feet high, they would effectually close the river by a barrier which the water could not possibly cut through. Such mines would require charges of 100,000 lbs. each, costing in powder about 25,000 Rupees, at 4 Annas per lb., so that ten of them on each side would cost 5,00,000 Rupees; this would be by far the greater part of the expense; the galleries, sluice, etc., would be no great addition. The powder would be made on the spot, where saltpetre is very cheap. At the Godavery works we made the powder at exactly 1 Anna a lb., and used blasts up to 10,000 lbs. with great success. The old rule of the charge, being in lbs. $\frac{1}{3}$ of the cube of the line of least resistance in feet, we found answered exactly, and it is by that I have calculated the charges above. I have given this rough calculation merely to afford some idea of the nature and cost of the work I would propose; it is highly probable that much fewer mines than I have supposed might be sufficient. But I cannot but think, upon this view of the matter, the project is well worth investigation. Such a body of water obtained at a cost of £60,000, £20 of capital per million cubic yards per annum, or Rupees 15 per annum per million, $\frac{1}{10}$th of a rupee for 6,000 cubic yards, or per acre of crop of rice, for which the Government charge is 4 Rupees, and the increased value of crop Rupees 20, would be perhaps quite the most profitable work ever executed: the return being to the treasury, 160 acres of rice at Rupees 4, Rupees 640, for Rupees 200, or 320 per cent., and the total return in crop five times that.

This work would not interfere with any existing interests whatever, and I cannot see any possible objection to it.

No. 372. ORDER THEREON, 22nd August 1873, No. 2,099.

IRRIGATION, No. 24.

THE spot indicated by the distances mentioned in Lieutenant-General Sir A. Cotton's memorandum, as the fitting site for damming the waters of the Kistna, would appear to be above the confluence of its affluent the Dindee, in latitude 16° 20′ N. and longitude 79° 15′ E.; for 80 miles above which locality it flows from the open plains of Kurnool in a deep gorge, which is known to be accessible to beasts of burthen in all that length at only three places marked near Veerabuddra Droog, Shreeshalum Pagoda, and Allotta, in Indian Atlas Sheet No. 76. The Kistna ford near the first mentioned place is comparatively well known and accessible; those near the two latter are used only by Lumbadies trading between the Hyderabad State and Kurnool and Cuddapah, and by pilgrims to the once famous shrine of Shreeshalum. The latest information on the Government records regarding the river at these, its only accessible points, is contained in the late Captain Nelson's account of the tour made by him in 1854, expressly for the purpose of exploring the tract of country in question. He describes the descents into the gorge as difficult in the extreme, much of them consisting of paved and stepped causeways; and the general impression he gives of the character of the river banks agrees very well with that entertained by Sir Arthur Cotton.

2. Such natural facilities as may appear to favour the execution of the gigantic scheme proposed by that distinguished officer, are however, in the opinion of His Excellency the Governor in Council, in great measure negatived by the political consideration that the north bank of the river, miles of which will be submerged by such a work, is part of the territory of His Highness the Nizam, and the Government of Madras have already had such experience of the difficulty of coming to any satisfactory understanding with Native States as to the terms on which they would be disposed to value the compensation due to them for water and land appropriated, that, apart from all engineering considerations, they are not disposed to undertake the detailed investigation of the project now that the present strength of Officers of the Public Works Department is insufficient for its ordinary duties. The formation of reservoirs for storing the head waters of the Toombuddra in Mysore, and of the Perryaur in Travancore, is greatly hampered by the considerations above alluded to.

3. It would appear also to His Excellency the Governor in Council, having in view the experience gained in the attempt to plan reservoirs on the Neilgherries and in the Travancore Hills, that the construction of the mere dam, assuming that it could successfully be carried out in the manner indicated, would be by no means the chief expense and difficulty; but that the cost of providing means for regulating the discharge of the entire body of the waters of the Kistna when in flood, and when required for irrigation, would very far exceed that of the only portion of the scheme which Sir Arthur Cotton has roughly estimated. Those outlets would have to be constructed at great cost before the dam itself; and their entire destruction might be involved in its sudden precipitation on them by the agency he has proposed.

4. The Government have not the means at present of thoroughly investigating Sir A. Cotton's project, nor can it name any time within which it is likely to be able to do so, owing to the paucity of officers on its establishment, but if the Government of India consider it desirable that the project should be so investigated and can provide a qualified officer, the Governor in Council will be prepared to do all that is needed for the due prosecution of the inquiry.

(True Extract.)

(Signed) G. W. WALKER, Colonel, R.E.,
Secretary to Government.

No. 373. (DOCKET No. 2,100, dated 22nd August 1873.)

COPY of the above forwarded to the Government of India, with reference to their letter of the 26th June 1873, No. 413 I.

(True Extract.)

Colonel, R.E.,
Secretary to Government.

Erd. S. T. Austin.
Spare Copies.

Extract of a Memo: by Lieut.t General
Sir Arthur Cotton K.C.S.I. dated
February 18/3

I wish also to offer a suggestion
on the very material point of a dry
season supply of water for these
Channels, upon which the prosperity
of the District is so greatly dependent
not only that the irrigation of various
valuable Crops, such as Sugar, Chillies
Plantains &c may be provided for
but also that water transit may be
secured to the whole district throughout
the year. The suggestion is this:
The Kistna has a most remarkable
course between this district and Kurnool,
a little below that town it passes for
about 80 miles through a high table
land I believe about 1500 feet above
the sea. The level of the river at the
entrance of this gorge or Pathes chasm
is about 800 feet above the sea and
where

here it enters the open country in the
Kistna District, at a distance of 150
miles. the level of the flood is about 100
feet so that the fall of the river is
about 700 feet in this distance or 5 feet
per mile, nearly average. It is remarkable
that I have never met with anyone
who had ever traced the river through
this part of its course, and I have never
heard of any European who had seen
it in its course through the 80 miles of
table land excepting one, who in pursuit
of a party in the mutinies came upon it
quite suddenly, and found it was
represented in the maps a very narrow
channel, I think he said about ¼
mile broad, with perfectly perpendicular
sides, probably 1000 feet deep, in fact
a tremendous rent in the solid rock.
similar to that of the Zambesi described
by Dr. Livingstone, the ground quite
level up to the very edge of it on
both sides. It is evident that the river

being

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entrance, if the table land is 1500
feet, as I believe it is, and as it
appears from the hills south of it,
the chasm must be 700 feet at the
beginning, and it must increase
to the end of the 80 miles where
it is probably more than 1000 feet,
supposing the fall of the river to
be the same as the average from
Kurnool the whole way to Kistna
District viz^t 5 feet. This table land
appears from the maps around from
what I could hear of it, or rather
from my being unable to obtain
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owing apparently to its feverishness
chiefly.

Now what occurs to me respecting
this remarkable feature is that it

might

might be converted into a vast reservoir at a very small cost, if, on examination, it is found to be as here supposed. The plan is this: to close the end of the chasm by heavy mines on both sides, throwing down the solid rock into the channel and thus forming a dam, suppose 100 yards high, by a solid barrier of rock in large masses for a length of perhaps a quarter of a mile.

This would provide a Reservoir 90 miles long by perhaps ¼ mile broad, by 100 yards deep at the lower end, and so containing 3000 millions cubic yards of water, or an average of 800,000 cubic yards of water per hour for 150 days from January to May, and which would be quite sufficient for all the irrigation of the Delta of the Kistna in the dry season. The cost of such a work would be very small.

Supposing

Supposing that a series of mines on a level with the water and at 150 feet from the face of the rock, would be sufficient to undermine the rock, and bring down the whole mass of 1000 feet high, they would effectually close the river by a barrier which the water could not possibly cut through. Such mines would require charges of 100,000 lbs each, costing for powder about 25,000 Rs at 4 annas per lb, so that ten of them in each side would cost 5,00,000 Rs. The work would be by far the greater part of the expense. The galleries &c would be no great addition. The powder would be made on the spot, where salt petre is very cheap. At the Godavery works we made the powder at exactly 1 anna a lb and used blasts up to 10,000 lbs with great success. The old rule of the charge being in lbs $\frac{1}{32}$ of the cubes of the line of

of least resistance in feet, we found answered exactly, and it is by that I have calculated the charges above. I have given this rough calculation merely to afford some idea of the nature and cost of the work I would propose, it is highly probable that much fewer mines than I have supposed might be sufficient. But I cannot but think, upon this view of the matter, the project is well worth investigation. Such a body of water obtained at a cost of £ 60,000, £ 20 of capital per million cubic yards per annum or Rs. 15 per annum per million or a rupee for 6000 Cubic yards or per acre of crop if so priced, for which the Government charges 4 rupees, and the increased value of crop Rs. 20 would be perhaps quite the most profitable work ever executed, the return being to the treasury 6000 acres of Rice at Rs 4 = Rs. 640, per Rs 200, or 320 per cent, and the total return in crop 5 times that. This work would not interfere with any existing interests whatever, and I cannot see any possible objection to it.—

No 7

Extract of a Memo:

Referred to in Public Works Letter to Madras, No 2, dated 3rd April 1873.

Public Works.
No. 7.

India Office.
London 3rd April 1873.

My Lord.

1. I transmit, for the information of your Excellency, an extract of a Memorandum dated the 14th February from Lieutenant General Sir Arthur Cotton, K. C. S. I. of the Royal (Madras) Engineers, suggesting the construction of a reservoir for the storage of the waters of the Kistna.

2. It is for your Government to consider whether it is desirable that the plan indicated should be examined by persons competent to form a judgment on the merits of

His Excellency,
The Right Honorable,
The Governor in Council,
Fort St. George.

of the Revenue.

I have the honor to be,
My Lord,
Your Lordship's most obedient
humble Servant.

P.W. Letter Recd dated 22nd Augt
No 240 of 1873 –

No 6.

Pub. Wks Dept for Augt

Public Works
3rd April 1873.
19th August 1873.

The
Letter to Bor St George
No 2.
Cen: 1.

Forwarding
Extract of a Memo
by Lt Genl Sir A. T.
Cotton, K.C.S.I. suggest-
-ing the construction
of a Reservoir for
the storage of the
waters of the
Kistna –

No 2099 - 2000 - 22 Augt 73

Received at Adelaide on
the 28 April 1873.

No 371

No 2099 Irrigation Pro

Madras Government

Public Works Dept

C.H.A. No 92 dated 3 April 73.

Transcribed from the
Records of the
Legislative Department
of State for
India.

Precis of the
Despatch from the
State of

I copy
Dft
See Dispatch

The spot indica-
-ted by the distances
mentioned in Lieut
General Sir A-
Cottons memorandum
as the fitting site for
damming the waters
of the Kistna would

appear to be above
the confluence of its
affluent the Dindee,
in Lat 16° 20" N. and
Long 79° 15 E; for
80 miles above which
locality it flows from
the open plains of
Kurnool in a deep
gorge which is known
to be accessible to
beasts of burthen
in all but lengths
at only three places
marked near

Veerabhadra Droog,
Shreesthalum Pagoda,
and Allotta in the
Indian Atlas Sheet
No 76 - The Kistna
is not near the first
mentioned place is
comparatively well
known and access-
able, those near the
two latter are used
daily by Lumbanies
trading between the
Hyderabad State

and Kurnool and
Cuddapah and
by pilgrims to the
three famous shrines
of Shree Shailum -
the latest informa-
-tion on the Govern
-ment Records regard-
-ing the River at these,
its only accessible
points, is contained
in the late Captain
Nelson's account of
the tour made by him

in 1854 expressly
for the purpose of
Exploring the track
of country via ques-
-tion - He describes
the descents into
the gorge as diffi-
-cult in the extreme,
much of them con-
-sisting of paved
and stepped cause-
-ways; and the gene-
-ral impression he
gives of the character
of the river banks

native States as to the terms on which they would be disposed to waive the compensation due to them for water and land appropriated, that apart from all engineering considerations, they are not disposed to undertake the detailed investigation of the project; Especially how that the present strength of officers of the Public Works Department is sufficient for its ordinary duties. The formation of Reservoirs for storing the head waters of the Coombuddra the Kyeamba, and of the Perrygarwin Gravaire would greatly hamper by the considerations above alluded to; and it is desirable that further

School b. S. Land
Granite Ter.

projects of the Kind
to be investigated in
the Southern Presiden-
-cy should first be
looked for in diffe-
-rent localities where they
can be dealt with
unfettered by them-
selves. It would ap-
-pear also to His Ex-
-cellency the Governor
in Council, having
in view the experience
gained in the attempt
to plan Reservoirs

on the hail storms
and in the Travan-
-core Hills, that the
construction of the
bund dam, assuming
that it could succ-
-essfully be carried
out in the manner
indicated, would
be by no means the
-chief expense and
difficulty, but that
the cost of providing
means for regulating

the discharge of the
entire body of the
waters of Wastwater
when in flood, and
when required for
irrigation would
be manifold that
of the only portion of
the Scheme which
Sir Arthur Cotton
has roughly estimated.
Those outlets would
have to be constructed
at great cost before
the Dam itself, and
their entire destruc-
tion might be involv-
-ed in the sudden
precipitation on
them by the agency
he has proposed.
A risk which the
Government do
not consider it
would be advisa-
-ble to incur.

I should be inclined
to say here.
"The Govt. have not
the means at present
of thoroughly investigating
Sir A. Cotton's project-
can it name any time when they
ever will it is likely
able to do so, [illegible]
owing to the hasty
& officer on its establish-
ment - but if the Govt.
did so consider it de-

Enable the act to
prevent should be
investigators
to ~~Inquired~~ and
can provide a
good number of men,
the full cost
will be
repayment to Govt
else that is needed
for the due execution
of the Enquiry."

Docket No. 2100 of

Copy of the above for-
warded to the Govt. of India
with reference to their letter
of the 26th June 1873 No. 413-I

H.C. dated 1/9/73

P. W. Srbs Engd. d/22nd
August No. 24 of 1873.

No 371-73.

A. M. Lr to England D/ 22 Augt 24 of 1873

10-1-51 √

Govt. of {1873} Madras.

PUBLIC WORKS.

To The Chief Engr for Irrigation
& The Secretary to the Govt of Madras

Dated

Recd. Encl.

G. O. 22d August No. 2099.
2100

Nos. 371-372 & 374

Reservoir

Passing orders on despatch from the Secy of State for India forwarding &c: extract of a memo: by Lt Genl Sir A. J. Cotton, KCSI suggesting the construction of a Reservoir for the storage of the Waters of the Kistna

7

Forwarding copy of Proceedings on despatch from the Secy of State for India relative to the suggestion of Lt Genl Sir A J Cotton, KCSI for the construction of a Reservoir for the storage of the Waters of the Kistna