Letter Inclosure No. 2, [21-25 July 1859]

Livingstone, David, 1813-1873

Published by Livingstone Online (livingstoneonline.org)

[0001]

[0002]
Report
On the Navigation of the Zambesi.
[By Dr David Livingstone MD. FRGS etc H.M. Consul
in central Africa,
Commissioned of the Foreign Office July 26th 1859
Read November [28]1858]
In endeavouring to form
an estimate of the value of the Zambesi
for commercial purposes, [it is necessary to recollect] we were
obliged in the first instance to trust
to the opinions of naval officers
who had visited it; and the late
Captain Parker together with Lieutenant
Hoskins having declared that it was
quite capable of being used for com-
merce, though the Portuguese never
did, and do not now enter it directly
from the sea, we trusted in the testimony
of our countrymen, and though we
failed to find a passage in by
Parker's Luabo, we discovered a
~~a~~ safe entrance by the branch
Kongone; and H. M. S. Lynx,
Captain Berkely, at a subsequent
period, found a good channel

[0003]
by the main stream (Parkers Luabo) though
we had failed to observe it in a three
days search. The question of safe entrance
from the sea having thus been satisfactorily
solved, our attention was next directed
to the rest of the river - the subject of
his report.
[It is desirable also to
remember that]in an experimental Expedition
like ours, it was plainly an imperative
duty to select the most healthy period
of the year in order to avoid the fate
of the Great Niger Expedition. Had we

come any time between January and
April, a large vessel could have been
taken up as far as Tette, but [that] is the
most unhealthy time of the year, and
we then looked on the African fever
as a much more formidable disease
than we do now. We entered the river
in June, when the river was falling
fast, but even then, the official
reports of Captain Gordon R. N. and
other naval officers, were precisely
the same as those of Captain Parker
and Lieutenant Hoskins. Their

[0004]
testimony however, referred to only about
seventy miles from the sea - Mazaro - the
point at which the Portuguese use of the
river begins. We have now enjoyed a
twelvemonths experience, which is the shortest
period in which all the changes that occur
annually, can be noted, and we have
carefully examined the ~~whole, without
attempting any regular survey~~ from the
sea to Tette five times over, in a
~~shaky~~ craft[,]~~of the Niger canoe or
pot-bellied shape,~~ the top speed of which
(3 1/2 knots)[,] admitted of nothing being
done in a hurry; and may therefore
be considered in a position to give
an opinion of equal value to that of flying
visitors, better qualified in all other respects
for the task. ~~As it was expected that
my companions should collect fuller
information than I could formerly
furnish, and~~ [As] a report on the river would
be incomplete without a description
of it when at its lowest, I sent the
journal of M^{r}[T.] Baines to the ~~R. G. S.~~ [Society]
which was written at the worst part
of the river, and in a season said by all
to be one of unusual drought.

[0005]
M^{r} B.[aines] was taken up by a southern
channel which contained much less water
than that which we ascended a month
later but adopting that journal as
shewing what the river may again
become in a season of drought. I would
only add that in passing from the sea

to Tette, when the river had fallen still
lower than at the period when the journal
was penned, we were obliged to drag the
vessel over three crossings 100 or 150 feet
long of from 24 to 18 inches of water.
It is not however to be understood that
such is then the general depth. In the broad
parts of the river we have three or four
channels, and the greater part of these channels
contains water from 8 to 15 feet deep, even
when the river has reached its lowest ebb.
But we are often obliged to cross
from one channel to another,
and sometimes from one bank
to the other, and it is in these
crossings that the difficulties occur.
I am not aware that anything has
been written o~~f~~[n] the form of the bottoms
of rivers, but familiarity with that & the
signs on the surface, will enable one man
~~will enable one man~~ to fine three fathoms, while

[0006]
another will run aground on one
or two feet. From our experience
of a year in which the river was
unusually low[,] and the rise deferred
to a later than ordinary period, it is
certain that a vessel really of 18 inches
or two feet [draught] could ply at all seasons
on the first 300 miles of the Zambesi.
At my suggestion a tide pole
was planted at Tette by Major Secard
and the lowest point the river
reached in November /58 - that in
which 18 inches were found in ~~the~~ [a]
[few] crossings, adopted as the low water
mark. By careful measurement
with the theodolite the river was
found at that point to be (964)
nine hundred and sixty four yards
from bank to bank, which if
I remember rightly is more than
twice the width of the Thames at
London Bridge. At its lowest
ebb it contained between 300 &
400 yards of water of various
depths. the deep channel of

[0007]
this, in which the vessel lay, was from

twelve to fifteen feet deep. As it enables
one to form a clear idea on the subject
I may mention that we lost an anchor
there when the water rose[,] and the volume
of water being always considerable[,] we
have no hope of getting it again by
being left high and dry as a ship is
represented at her anchorage in the
Niger * At Shuramba Dembe
the river is 3490 yards wide or
1 3/4 geographical miles, nearly.
At Shigogo it is broader probably
three miles[,] but large islands
divide it into five or six channels.
It is evident that with such an
amount of spread, if the current
of the Zambesi were very rapid,
a rise of several feet at Tette would
be of comparatively small value
at Shigago. We therefore took the
precaution of marking a perpendicular
rock at the East end of Lupata, adopting
as at Tette the top of 18 inches at the

* Laird & Oldfield's book (?)

[0008]

crossings as low water mark and carefully
measured the velocity of the stream at the
most rapid parts we knew. the result
obtained both by patent and common logs
was that no part of the river below Kebrabasa
has a current of four knots. We were
particularly suspicious as to the correctness
of this result as some of our naval
friends[,] judging from sight only[,] spoke
of six and even eight knots. but
remeasureing the common log and
observing the Patent log hour after
hour[,] in parts that this vessel could
barely stem[,] shewed no more than
3 1/4 knots. The general current
is 2 1/4 knots and under. The
heights of the river observed by
Major Secard in the accompanying
table and by ourselves at Lupata
and elsewhere[,] may therefore be
considered as applicable to the
whole stream. The amount of fall
noticed also in the table, being
only once down to 7 1/2 feet
shews that the character of

[0009]
mountain torrent cannot be applied
to the noble Zambesi any more
than it can be to the Nile
From November to January
the river rose gradually to 8 feet
above low water mark. From
the 15$\underline{\text{th}}$ January to the 15$\underline{\text{th}}$ May
it had depth enough for a large
vessel. Though Major Secard
remarks that this year it attained
only a minimum height and
the accuracy of this is confirmed
by the fact that only a small
quantity of wheat is sown
the parts flooded by the river
being the parts employed for
the crop. The data now submitted
appear to prove that a vessel of
two feet draught, such as are
necessary for the Mississippi could
run the whole of ordinary years.
We knew of no other observations
on which the navigability or non navigability
of the river can be pronounced upon but leave
them for the consideration of

[0010]
of those better qualified to give an
opinion.
We have in the course of one year
cut up into small pieces upwards
of one hundred and fifty tons
of lignum vitae alone, which
according to the average prices
in London during 1858 was
worth about £900. This wood
when dry was, in the absence
of coal, the only fuel with which
we could get up steam[,] owing
to the boiler tubes being singularly
placed all on one side and
chiefly below the level of the
fire[,] from which novel arrange-
ment one side remains long cold
while the other is hot like a patient
in the palsy; and four & a half
or five mortal hours of fuel
burning are required to get up
steam - yet by incessant labour

and a dogged determination to

[0011]
extract all the good [possible] out of an engine
probably intended to grind coffee in
a shop window, we have traversed
2350 miles of river. Now had
we been permitted to shew what
could be effected in this one
branch of commerce, it is not
unreasonable to say that every
time the saw went through
lignum vitae it might have been
to secure or dress a log. Without
any great labour we might have cut
a thousand instead of one hundred
and fifty tons of that valuable
wood, and given a practical
exposition of what may and
very probably soon will be
effected by the Germans
in Zambesi commerce.
The only paper that reached
us up to the middle of June
last[,] contained a short notice
of ~~a~~[the] meeting of the Royal Geographical
Society in which some interesting
assertions were made in connection

[0012]
with a pretty theory, and an engineering
flaw, that the Zambesi which under
the very serious disadvantages of that
flaw, we have actually been navigating,
was not navigable at all. If our
fellow members will only believe
that we have a merry smile on our
faces we would venture to move,
for the support of the theory, in
Parliamentary fashion, that the word
ought to be inserted thus. "Wheat ought
not to grow at the level of the sea".
"Indigo ought not to grow more
than a foot high" and "it ought not
to contain indigo at all" "The seeds
of cucumbers and water melons
ought not to contain a fine bland
oil[,] fit for purposes of the table"
because that would be like "extracting
sun beams from cucumbers". "The
Zambesiought not to be navigable

for commercial purposes" and
the Steam Launch "Asthmatic"
"ought to have been intended to draw"
something more than merely "grist to the mill."

[0013]
~~It is a pity that M^{r} Laird~~
~~volunteered a public assertion in~~
~~direct opposition to his own official~~
~~statement which we now have here~~
~~in his own handwriting, for~~
~~we go on the principle of breasting~~
~~whatever difficulties we meet, and never blaming others if we should fail,~~
~~and would have left un-noticed,~~
~~the saving effected by putting a~~
~~low pressure cylinder, to a high~~
~~pressure engine, had he not~~
~~publicly called for a public~~
~~refutation on a matter of public~~
~~interest. Instead of "intending the~~
~~Launch to draw [tow] only." His words~~
~~were "D^{r} Livingstone may calculate~~
~~upon one ton for every inch~~
~~of Displacement in the Launch,~~
~~and as in the River he may safely~~
~~lead her to two feet, from ten~~
~~to twelve Tons will be available~~
~~for stores and crew." Twelve kroomen~~
~~bring her down to 2 feet 2 inches without~~
~~any fuel, stores, or cargo; and instead~~
~~of ten knots confidently promised~~

[0014]
~~in the same statement; a head~~
~~wind holds her paddles so that~~
~~even with sixty pounds of steam~~
~~she is stopped even going down~~
~~stream. Without coals, and it~~
~~was only when left without this~~
~~fuel, that we began to examine the~~
~~matter ourselves, we can barely~~
~~keep up with the heavy canoes~~
~~of the Zambesi, and their [speed] equals~~
~~the saunter of the lazy ploughboy.~~

If there ~~is~~[be] wind enough to
cause a slight purl on the water,
any one ascending a river may
observe dark blue lines stretching
across the stream. These by
native pilots are call "kwéttés", and
betoken the edge of the banks under

water. It may be observed
also that one bank or other of
the river is worn so as to be
perpendicular; and that these
perpendicular parts alternate from
one side to the other at greater

[0015]
or less distances according to the
rapidity of the current. the submerged
banks are generally of a semilunar form
at the lower edge or part farthest
down the stream and this is invariably
the shortest portion in the whole bank.
They lie diagonally to the direction of the
river, the angle of direction being less
or greater according as the river
is high or low. The Kwette is the part
immediately below the shoal edge of
the bank[,] and the importance of
knowing them[,] by the blue line and
other signs[,] may be judged of by the
fact that while in the kwette you may
have from two to three fathoms
up to the very edge of the convex mass,
onit you may not have one foot.
The formation of these banks it is
difficult to explain without drawings
the water actually rolls over and over
sideways towards the part of the bank
situated upstream, and there lies the
deep channel. The proper course is
to curve round [in] the kwette till the
upper third of the submerged bank is

[0016]
reached, then enter on the bank where
you have deep water along [towards and in] the side
~~by being~~ [which is] cut perpendicularly. This
which often is miles in length
is called by the pilots "kokole". Sometimes
the semilunar banks are placed
in pairs, and the water between
them is very deep; but the furrow
of three or four fathoms ends
in a triangular shoal. The upper
third of one of the banks, on which
in our bright sunshine, a distinct
bulge shews the most water,
is to be chosen for getting out of
the deep channel before reaching

the shoal. My ignorance whether
anything has been written on the
subject, and desire to wipe out,
possibly an unmerited reproach
by an American author, the Revd
Mr Bowen, that our officers were
ignorant of the laws which determine
the channel of deep water in the
Niger, are offered as excuses for
venturing these few remarks. If

[0017]
I succeed in inducing the better
qualified among your members
either to point out what has already
been done in describing the bottom
of rivers, or [in] working out the subject
which I have but touched on, I shall
not have incurred the charge of
presumption in vain. In July
last year we ran aground
perpetually by going ahead
straight. While in September
when the river was much
lower, Mr Medlycott of H.M.S.
Lynx seemed to know the kwettes &
banks intuitively, and never
touched at all.

These submerged sandbanks,
as on the Nile, are the greatest
difficulty in Zambesi navigation.
Each river has its own disadvantages.
The Mississippi has its snags, & it is said
and requires vessels of a peculiar
build and only two feet draught.
The Hoogley has its own very peculiar
difficulties of entrance & so has the
landing place at Madras; But

[0018]
difficulties are not impossibilities.
A great difficulty - the African
fever, is, we hope, rendered
less formidable, and in spite
of the theory that Europeans
cannot live and labour in
the tropics, we find that hard
work, with the good food most
conscientiously supplied by
Mr Wilson of Glasgow, and
a merry heart, have secured

as fair a share of health as we
should have had in London.
From October 1858 to June
1859, 5782 Elephants tusks
have gone down the Zambesi
from Tette alone, of these
two thirds were large or upwards
of 50 lbs each, the weight of the
whole were in round numbers
100 000 lbs. All merchandise
is carried in large unwieldy canoes

[0019]
which cost between £60 & £70 each
When loaded they draw about two
feet and carry two tons at an
expense of £10 sterling from
Quilimaine to Tette[,] when the
river is full. When the small
channel between the Zambesi
and the Quilimaine river is
dry[,] which is the case at least
nine months in the year[,] the
expense is much increased by
the land carriage to Mazaro.
English manufactured goods
come in a round about way
by Banian or Gentoo traders
from Bombay - and they are
~~able~~ [obliged] to give ~~a~~ larger prices for
ivory than the Americans[,]
who are absorbing all the trade
of Eastern Africa. Several Tette
merchants have been waiting at
Quilimaine for months in
expectation of American ships

[0020]
with cottons. For the information of
mercantile men it may be added
that the American calicoes are
coarse, unbleached, yard wide cottons,
costing at Quilimaine between 5^{d} & 6^{d}
per yard - and muskets, inferior
to English trade arms, from
26/ to 36/ each. With calicoes,
guns and gunpowder, they
easily secure all the trade on
the East coast below Zanzibar
No attempt is made to encourage
the native taste for better

articles[,] which exists quite as strongly here as on the West coast. Red and blue colours are often unravelled, respun and rewoven into country cloths, and towards Lake Shirwa the only scraps of these colours that come into the country are exclusively claimed by the chiefs

David Livingstone