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MADRAS RECORD OFFICE.

Government of Madras.

Public Works DEPARTMENT.

G.O. No. <u>555</u>	Press <u>Mis.</u>
<u>519-20</u>	
Dated <u>25-2</u>	<u>18/1</u>

Not to be folded or roughly handled

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No. 519. Read the following Proceedings of the Government of India, Public Works Department, (Irrigation,) dated Fort William, 18th January 1871, No. 15-23-I —

Fish-pass for Anicuts or Weirs on Indian Rivers.

Read the following letter from F. DAY Esq, M. D., to the Secretary to the Government of India, Public Works Department, dated 10th January 1871.

AFTER I had examined some of the Madras anicuts, I suggested the construction in two of them of a new form of *fish pass* to enable the hilsa and other fish to pass those obstructions for the purpose of breeding. I have now some additional propositions to make respecting that fish-pass, and which, if carried out, will remove the necessity of constant superintendence to work it, as well as improve its efficiency.

I would first observe that having been to Europe for a few months on sick certificate, I have availed myself of the opportunity of inspecting most of the principal Salmon ladders in England and Wales, more particularly at the following places, Tewkesbury, Worcester, and three others within 9 miles of that town, Llangollen, Ervistock, and two in Northumberland on the Coquet at Acklinton and Felton.

The principle for Salmon passes is to permit the passage of migratory breeding fish over or through obstructions, but they are not intended for assisting the descent of the fry which pass over these obstructions during floods.

A *free gap*, when the height of the weir is not too great, is undoubtedly the best. This might be likened to one of the under-slucies in a Madras anicut, in which a narrow gap extends through the weir to the bed of the river, but unless the height of the weir is not very considerable, the current is too impetuous for fish to stem, and this is invariably the case in the narrow Indian under-slucies. It is different, however, where there are large openings, as in the Cuttack and Midnapoor weirs, where sufficient facilities exist for fish to pass either way, provided those sluices are left open at least one day a week, except in the very dry season, when fish do not require to ascend or descend streams.

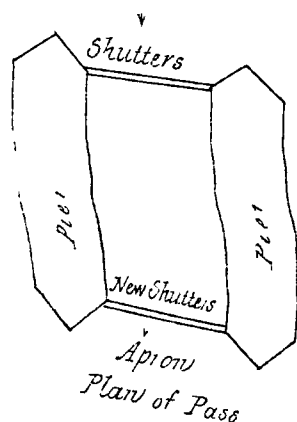
The second European plan is that of ladders, steps or a series of small pools, which, by a gradual ascent, allow fish to ascend one side of an obstruction, or up its face, and these may be straight or bent at various angles. I do not consider any of these forms suited to our Indian rivers, provided anything superior can be constructed for admitting; they allow breeding fish to ascend, they have no means by which the fry could descend as the river begins to subside.

In my reports I have already entered pretty fully upon what the majority of the fishes which frequent the Indian fresh-waters are, and have divided them into the strictly fresh-water ones that are either migratory or non-migratory; and the marine varieties which ascend large rivers to breed, or to prey upon their weaker neighbours. As a natural result, in rivers entirely blocked by anicuts, the annihilation of the migratory species must sooner or later inevitably occur, unless some remedy is applied, and which will not only allow the breeding fish to pass the anicut up-stream to deposit their ova, but allow the young fish to descend.

Fish ascend rivers when the water is discoloured and rising, being evidently aware that only at that time will the fords be covered, and then they can pass upwards

but they do not appear to attempt this during very heavy freshes. The fish-pass to be desired should permit the ascent of a sufficient number of breeding fish during moderate freshes, and the descent of the fry as the river falls, but it is not required during the very dry season of the year.

• Report to the Madras Government, dated 1st December 1868.

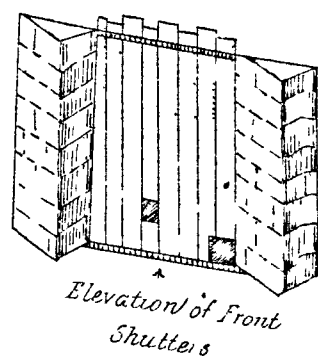


I proposed* employing the vents of the under-sluices as passes by forming them into a species of lock by instituting a second series of shutters at the lower end, as explained in the plan in the margin, or else by extending the piers down the apron, but on the same principle. I suggested "the lowest one, and a half foot of the shutter should be in the form of a movable trap-door, which can be elevated by chains from the inside;" in fact, that the lowest $1\frac{1}{2}$ feet of the shutter could be raised at pleasure, and that a shutter man should be employed to work these doors on the same principle as a lock, but regularly twice daily, keeping the upper one closed when the lower is open, and *vice versa*.

The above principle I still believe will succeed, but certain modifications will be necessary.

First, there must be a covering or ceiling over the anterior half, or two-thirds, of this under-sluice, or the water will dash over the upper-shutter into the chamber and may wash out or injure the fish, whilst the whole of the chamber forming the pass cannot be covered in for reasons to be specified.

Having thus planned the chamber with its anterior half or two-thirds covered by a ceiling, it has to be converted into a passage for fish. The plan in the margin shows the two openings I propose making in the front shutter. The lower opening I would have $1\frac{1}{2}$ feet square, and the upper one 1 foot square. These openings, of course, let water into the chamber



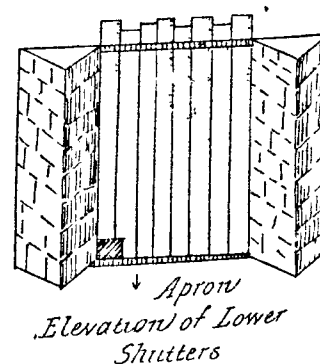
At the lower-shutters I would also propose a somewhat similar plan, only with one opening only $1\frac{1}{2}$ feet square, and at the opposite corner from the one in making in the front shutter. The lower opening I would have $1\frac{1}{2}$ feet square, and the upper one 1 foot square. These openings, of course, let water into the chamber

the front shutter. These openings, which are quite large enough for migratory breeding Indian fresh-water fishes, may have trap-doors, so that the Irrigation Officers may close them when necessary.

In this chamber more water is entering than can go through the lower opening, consequently it will be kept full, the surplus flowing over the top of the lower shutter, owing to this chamber being full, the upper openings are backed up by the water in it, decreasing the force of the rush, and leaving such a passage that fish can go through.

As fish only ascend during the moderate floods, the opening in the lower-shutter will be backed up by the water in the river, the depth of which will be several feet above the level of its upper margin. Whilst by having it close to the side of a pier, the fish can slip round to the opening

I constructed one on a scale of an inch to a foot when in England, and having had it properly fixed in a stream, I tried some gold carp, and three passed through. I do not, however, assert it is sure to succeed, for only experiments can prove such, but it obviates manual labour, it leaves a free passage through for fish ascending or descending, whilst the cost would be very inconsiderable and the result most probably successful



ORDER—Ordered, that a copy of this communication be forwarded to the Government of Madras, in continuation of Public Works Department, No. 185 I, dated 24th June 1869, to which an early reply should be submitted.

Ordered also, that a copy of the communication be forwarded to the Local Governments and Administrations marginally noted for information, and for circulation generally in the Irrigation Branch of the Public Works Department.

Ordered further, that a copy of the communication be forwarded to the Home Department for publication in the Supplement to the *Gazette of India*.
(Signed) R. B. PEMBERTON, Captain, R. E.,
Asst. Secy. to the Govt. of India.

No. 520. ORDER THEREON, 25th February 1871, No. 555.

IRRIGATION, No. 31.

ORDERED to be communicated to all Superintending Engineers and to the Chief Engineer for Irrigation.

(True Extract)
(Signed) CHARLES A. ORR, Colonel, R. E.,
Secretary to Government.

To the Chief Engineer for Irrigation
To Superintending Engineers
To the Revenue Department.

Ld S. T. Augustin.

No. 555. 25. February 71
With an order

11/2/71
Lm.

25. February 71
The Chief Engineer for Works of
the Public Works Department
Report



215 Feb 7/70 Dr. 17

BC 1/557

Govt. of 1871 Madras.

PUBLIC WORKS.

To The Chief Engineer
for Irrigation

Patent

Reed

G O. 25th Feb 1871, N 555

No. 519-520

Rich Pap. No. 1000
Transmitting copy of a letter from
Dr. Day regarding the new
form of Rich Pap for Amcult
or Weirs on Indian Rivers,
Comd. to the ~~Chief~~ Officers
concerned.