

(Paper No. 2855.)

“Cost of Dredging in the Lower Danube.”

By CHARLES HENRY LEOPOLD KÜHL, M. Inst. C.E.

IN a previous Paper¹ the Author gave some particulars of the works of improvement on the Lower Danube then being carried out by the European Commission, under the direction of Sir Charles A. Hartley, K.C.M.G., M. Inst. C.E. The methods of dredging in use were described in that Paper, and the cost of dredging was given, as based on the work done up to that time. The Table now presented gives the cost of the work which has been done in the years 1890 to 1893 inclusive. It was all effected in making a new cut between $8\frac{1}{2}$ and 18 miles from the Sulina mouth of the river.

The total quantity dredged in these four seasons amounts to 5,926,136 cubic metres, or 7,751,517 cubic yards, and the average cost has been 0·286 franc per cubic metre, or $2\frac{1}{3}d.$ per cubic yard. This includes transport by hopper-barges for such part of the stuff as was disposed of in that way, but does not include interest on capital outlay, nor any allowance for depreciation of plant or insurance.

The dredgers work night and day during the working season, in two shifts, from Monday at 6 A.M. to Sunday at 6 A.M. The stuff dredged varies from very hard clay and heavy sea-sand to light silt and fine sand. When using the mud-pump the quantity delivered per week varied from 10,000 to 40,000 cubic metres according to the nature of the stuff. When very hard clay is met with, too stiff for the mud-pump, hopper-barges are brought alongside. The heavy fine sea-sand could only be pumped with great difficulty, as it settled in the floating pipe, causing it to sink. It was found, however, that by increasing the speed of the pumps from 225 to 275 revolutions per minute, almost any material that was met could be dealt with.

The following are the vessels to whose work the Table refers:—

(1) “*Sulina*” dredger.—115 feet long, 25 feet beam, 10 feet

¹ Minutes of Proceedings Inst. C.E., vol. lxx. p. 266.

9 inches depth, with single, side-lever, low-pressure engine of 40 nominal HP. Cost, £14,700.

(2) "*Delta*" dredger.—124 feet long, 28 feet beam, 10 feet depth, with compound, surface condensing, direct-acting, inverted engine of 180 I.H.P. Cost, £16,405.

(3) "*Sir Charles Hartley*" dredger.—124 feet long, 28 feet beam, 10 feet depth, 250 I.H.P. Cost, £19,440.

(4) *Tug-boats and Hopper-barges*.—Cost, £16,495.

The "*Sulina*" works, as a rule, with hopper-barges. She was fitted in 1891 with a long shoot delivering 130 feet from the centre line of the vessel.

The "*Delta*" and "*Sir Charles Hartley*" work, as a rule, with the mud-pump on Burt's system, and only occasionally with hopper-barges.

EUROPEAN COMMISSION OF THE DANUBE. COST OF DREDGING IN THE
8½ TO 18-MILE CUTTING, 1890-1893.

Name of Vessel.	Quantity Dredged in Cubic Metres.	Working Expenses in Francs per Cubic Metre.		Repairs to Vessel and Machinery in Francs per Cubic Metre.		Total Cost.	
		Coal and Stores.	Crew and Wages.	Stores.	Labour.	Francs per Cubic Metre.	Pence per Cubic Yard.
" <i>Sulina</i> " dredger ¹	1,310,836	0·08123	0·12623	0·33500	0·05617	0·29713	2·181
" <i>Delta</i> " dredger ²	2,634,946	0·06584	0·07777	0·03337	0·03480	0·21178	1·554
" <i>Sir Charles Hartley</i> " dredger ³	1,980,354	0·05153	0·07302	0·03732	0·02433	0·18620	1·367
Tug-boats and hopper-barges ⁴	Quantity Transported. 1,004,084	0·08823	0·05730	0·00725	0·12413	0·27691	2·033

NOTE.—No allowance is made in the above figures for interest, depreciation or insurance.

¹ Dredging into hopper-barges, and also into long shoot, delivering on shore.

² Dredging with mud-pump, and occasionally into hopper-barges.

³ " " " " "

⁴ Average lead 3 nautical miles.