DESIGN AND CONSTRUCTION OF 1.5M CORACLE FOR POND ACTIVITIES

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ABSTRACT

A coracle 1.5m (LOA) was designed and constructed using hardwood for the frame work and plywood for the base and side covering. It is oval in shape and after construction its light displacement was 24kg and with a dead weight (capacity) of 140kg (2 persons) with a cost estimate of N11, 500. When placed on water It floated at a draft of 4.2cm and easily maneuvered by propelling with a paddle. The craft is characterized by light weight, portability, and ability to float at shallow draft, hence could be used on shallow water body like ponds for aquaculture thereby increasing fish production.

INTRODUCTION

A fishing boat/canoe can be described as a floating plat-form used to transport the crew and equipment during fishing operation (NRC 1988). Although well designed fishing boats with adequate in-built fish boxes are in use in developed countries, they are generally not available in developing countries like Nigeria, where fish when caught are thrown into canoe which range from primitive to row-boat or canoes made of floating wood to dugout canoes, which in most case are not mechanized. The importance of water-borne craft in fishing activities cannot be over emphasized. Without a boat/canoe the fisherman is restricted to fishing along the shore hence reduced effective fishing (NRC 1988). One effective craft for shallow water bodies is the coracle. A coracle is a boat made of skin-covered wicker work. It is a water-borne craft made in a basket form covered with hide or cloth. A coracle typically seems to be 0.9-1.2m wide, 1.2-1.8m long. Viewed from above, the shape of the coracle varies: some are round, some oval, some quite square with almost a flat transom, some with sharp bows (Stanley 2003).

In Britain coracle was derived from the bitumen-coated guffa of Iraq and the skin-covered coracles of India and Tibet. The coracle is an extremely shallow draft craft which floats on the water like a cork. As a result; it is particularly well suited for catching Salmon in the shallow, rock-strewn rivers of Ireland and the border country between Wales and England (Richard, 2008). Coracles are efficient for shallow water bodies and water bodies that are not turbulent and they are also paddled or more correctly sculled not to the stem but rather forward the bow using a figure eight stroke paddling to one side as one does a canoe (Stanley, 2003). In removing some aquatic weeds in large ponds and reservoirs it is more convenient using a craft rather than going into the water directly, especially those who can not swim can carry their activities on the water body effectively with the aid of a fishing craft.

The coracle is portable and easy to handle by a single fisherman or farmer and over the years it has been modified in such that it could carry three persons and as long as 1.7m. Made of plywood and other synthetic materials used for construction of boats that are more durable, more sophisticated, beautiful and portable that can be carried about easily (Stanley, 1991). The objectives of this study are to

1. Produce a cheap craft that could be used effectively on a shallow water body.
2. Enhance pond activities, thereby ensuring increasing fish production through aquaculture.
3. Boost the utilization of ponds for recreational activities.

MATERIALS AND METHODS

The materials used for the design includes: drawing board, drawing paper, cello tape, eraser, meter rule, and an HB pencil. The following materials were used for the construction: Hard wood, plywood, fastening glue, wire nail, sanding disc and paints while power tools, machines and basic carpentry tools such as planning machine, jig saw, harmer, saw and cramp were used for the construction work. A free hand sketch of the coracle was drawn on a sheet of paper. After which drawing instruments were used to draw the coracle to scale (1:7.5). A sheet of paper was fastened to a drawing board using cello tape, on the paper the margin lines were drawn and the water line and centre-lines were established using HB pencil. The 1m hardwood formed the thwart (seat) of the coracle and it served as its width. This design is not in line with the design guidelines of Chapelle (1956). A 25mm x 30mm thick hardwood was cut to 1m in length and planned for smoothness. Then a 50mm x 50mm x 3.6m hardwood was cut to 1.5m in length using hand rip saw. The 1.5m hardwood being the length of

the coracle was connected temporarily to the thwart by nailing together in a cross section. The 50mm x 50mm hardwood was cut into sizes and planned to reduce the thickness and made the laths flexible for effective bending. Two hardwood laths were wrapped around the ends of the thwart and the lengthwise batten. This was the first, innermost layer of the gunwale. The laths were cut to such lengths, that the ends land on the ends of the seat.

The ends of the laths were glued and nailed into the ends of the seat. The seat and gunwale were upside down. When turned right side up the top of the seat flushed with the top of the gunwale. A second layer of lath was wrapped on the first layer, glued to previous layer; the ends of the laths were nailed to the ends of the seats again. After the glue has hardened, the gunwale keeps its shape and the lengthwise batten was removed. Two laths were used because one could not give a firm framework and if a thicker one was used it would not allow bending. So the frame was held together using G-cramps and it was left on the floor for 24 hours to cure. This is in line with plywood coracle building according to Richard (2008). The floor was marked out on the 15mm thick plywood using the formed frame work. It was then cut out using a jig saw; then, the base was properly faired using spoke shave and smooth planner. A 50mm thick hard wood was cut into small blocks, then secured round the edges of the prepared floor with glue and nailed. A 50mm hard wood was also cut into 3 pieces of 32cm each and used as the supporting frame work for the thwart, one at the middle and two at the sides in series. The frame was then fixed to the base directly on the 50mm x 50mm hard wood, 32cm in height which was secured to the base vertically. To be able to sheet the coracle round, 5mm plywood was placed against the framework then marked and cut out according to its shape. The cut out sheet was used to cover the side round securing with proper application of good quality glue for water tightness. Glue was applied to the outer surface of the plywood and the second layer of plywood was secured round. The need for a double layer was to achieve the required thickness as it was difficult to bend a single thick layer. After this the entire body of the coracle was faired by planning and sanding. The final step was the painting; first, a coat of primer paint was applied to both the inside and outside of the coracle and allowed to dry, then the craft was coated with two layers of red oxide paint and allowed to dry. The canoe was conveyed from the College boat building workshop to one of the College ponds for testing. It was gently placed on water then allowed to float empty, while being observed for leakage, stability, and draft. The capacity was then tested for by allowing one person at a time, until it carried the maximum weight it could carry.

RESULTS AND DISCUSSION

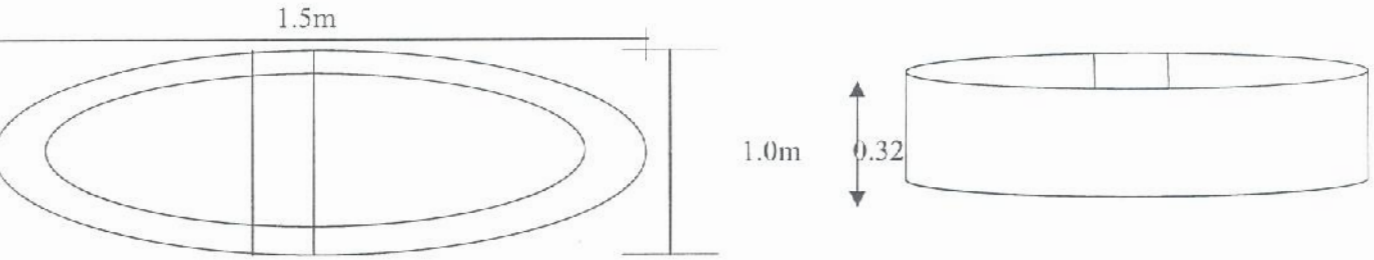
The design sketch (scale drawing) of the coracle obtained from the free-hand sketch is shown in Figure:1 Table 1 shows the specifications of the design obtained from the scale drawing. The steps followed in the construction of the coracle are presented in Plates 1 to 4. Table 2 shows the scantling materials and cost of construction which is within the cost range of local canoes based on NIFFR (2002). When the canoe empty was placed on water, it floated at a shallow draft of 4.5 cm with stable equilibrium where as the draft was 9cm and 14cm while carrying one and two persons respectively. During construction there was problem of covering the sides of the craft round with the plywood. It was not easy achieving this because bending the plywood to the round shape was difficult. The cost estimate of constructing the coracle (₦11, 500) This is an indication that the coracle will be affordable to an average fish farmer. The stability of the coracle from the result showed that the craft can carry two persons conveniently. However the craft carried three persons but the stability on water was poor. The weight of the coracle (24kg) shows that a single person can carry it conveniently hence it is portable.

Table 1: Specifications of the canoe

– Length overall (LOA)	1.5m
– Breadth overall (BOA)	1.0m
– Moulded depth	0.32m
– Draft	4.2cm
– Light displacement	24kg
– Displacement	164kg
– Deadweight (capacity)	140kg (2 persons)
– Scale	1:7.5

Table 2: Scantling sizes and cost estimate

Material	Size	Quantity	Unit	Amount (₦)
Plywood	15mm	1	sht	2,800.00
Plywood	5mm	1	sht	2,000.00
Hardwood	25x25mm	1	No	600.00
Hardwood	50x50mm	4	No	400.00
Screw	25mm	2	pkt	250.00
Wire nail	Assorted	2	lb	300.00
Glue	1kg	4	kg	1000.00
Primer paint	1gal	0.5	gal	250.00
Gloss paint	4l	1	l	900.00
Expected labour cost				3,000.00
Total cost				**N11,500.00**



Plan view

Side view

Figure 1: Design sketch of the coracle

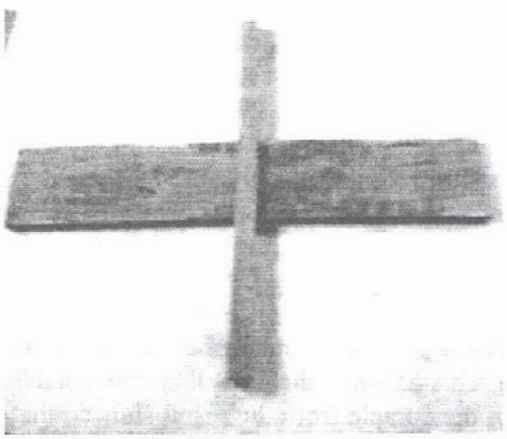


Plate 1: The thwart with a temporary framework

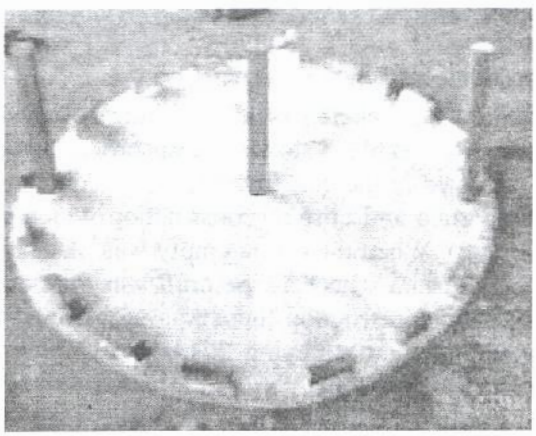


Plate 2: Floor of coracle with wooded block

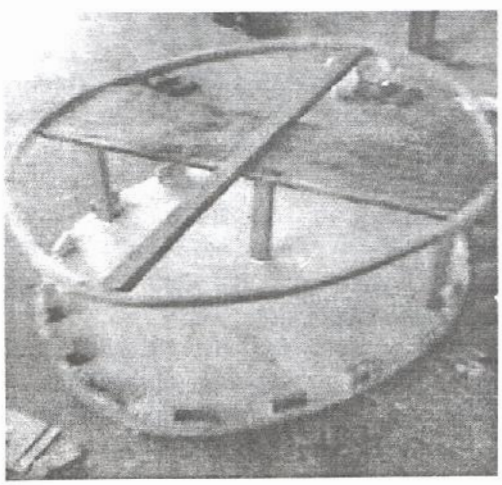


Plate 3: The Main Framework

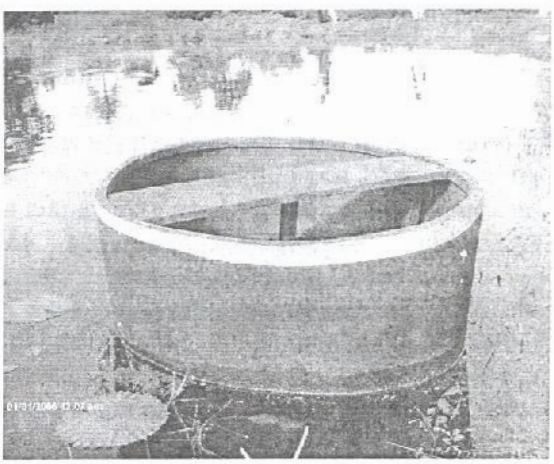


Plate 4: Completed coracle placed on water.

CONCLUSION AND RECOMMENDATIONS

From the results it could be deduced that the coracle, having light weight, shallow draft and stable equilibrium, is adequate for use on shallow water-body; hence it can be used as pleasure boat and for other activities on calm water bodies. This technology is recommended for aquaculture activities which include: removal of unwanted floating objects, aeration of oxygen depleted pond water, collection of water samples for water quality assessments, feeding of experimental fish in net hapa etc.

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