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Ronald D. Lewis and Bruce C. Panuska

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Front Cover: Close-up view of a patch-reef coral head in Grahams Harbor, north of Dump Reef. As shown here, Caribbean shallow-water reefs have declined since the mid-1980s and are now largely overgrown by fleshy green macroalgae and a variety of encrusting organisms. See Curran et al., "Shallow-water reefs in transition," this volume, p. 13. Photograph by Ron Lewis.

Back Cover: Dr. A. Conrad Neumann, University of North Carolina, Chapel Hill, NC, Keynote Speaker for the 11th Symposium and author of "Cement loading: A carbonate retrospective," this volume, p. xii. Photograph by Mark Boardman.

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AN EFFICIENT, STURDY, AND LIGHTWEIGHT FLOATING PLATFORM FOR CORING SHALLOW LAKES AND PONDS

Bruce F. Rueger
Department of Geology
Colby College
Waterville, ME 04901-8858
bfrueger@colby.edu

Brian Lightbourn, Roger Hollis, and Frank Williams
Bermuda Aquarium, Museum and Zoo
P.O. Box 145,
Flatts, FL BX, Bermuda

ABSTRACT

A sturdy, lightweight, and inexpensive floating platform for coring shallow lakes and ponds that can be utilized in a variety of geographic settings is easily constructed from readily obtainable materials. The lightweight nature of the platform allows transport, assembly and disassembly by two individuals. Insertion of round water or chemical storage containers within a pair of fiberglass concrete forms provides extremely buoyant pontoons upon which a platform of marine or pressure-treated plywood is attached. An opening is cut into the platform to allow passage of coring equipment. A variety of techniques including Livingstone piston corers and vibracoring devices has been successful.

INTRODUCTION

The complications related to fieldwork in logistically difficult regions often are overcome by making use of available materials and working closely with the local community. Transportation, site accessibility, logistics, and shallow water precluded the use of vessels described by Hoyt and Demarest (1981), Smith (1987), and Stone and Morgan (1992) and Smith (1996). This is particularly true when attempting to recover sediment samples from isolated and/or remote island settings. For example, the shallow lakes and ponds of Bermuda offer a unique Holocene record of sedimentation and vegetational change that can be used to test General Circulation Models of the North Atlantic Ocean. Hence, because coring shallow lakes and ponds has been the goal of a long-term research project, a simple floating platform that was readily movable was essential (Rueger, 2002).

Collaboration with local scientists and craftsmen led to the development of a very simple and inexpensive, lightweight and extremely buoyant floating platform for coring that was easy to break-down, transport, and assemble. Due to its ease of construction and widespread access to its components, the floating platform described here can be utilized in almost any shallow water coring setting. The platform could also be used in deeper water if made at a suitable size, with anchoring or attachment to shore.

CONSTRUCTION

The pontoons of this floating platform were constructed by using two 12-ft, cylindrical fiberglass concrete forms (Figure 1A). Floatation was accomplished by inserting round, 5-gallon water or chemical storage containers into the concrete forms and securing them by using galvanized or stainless steel bolts along the seam of the forms (Figure 1B). (Many other suitable flotation mechanisms can be utilized, limited only by the imagination).

Atop the pontoons, three 20” sections of 2” x 6” spruce were bolted to the seams (Figure 1A and B) with galvanized or stainless steel bolts to provide the base for the platform. Each section of 2” x 6” was drilled to allow the passage of a 3/8” bolt through it vertically (Figure 1A). These

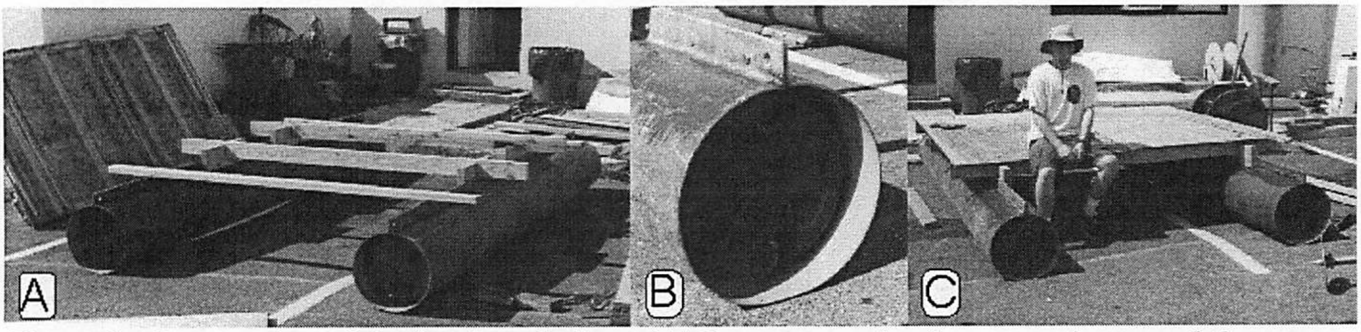

Figure 1. Construction of the floating platform. (A) Pontoons made of concrete forms and the support structure of the platform. (B) End view of one of the pontoons showing use of plastic containers for floatation. (C) Completed floating platform illustrating attachment of the platform surface to the pontoons.

Item	Quantity	Cost
Fiberglass concrete forms (12' long x 16" diameter)	2 @ ~$500	$1000.00
Marine or pressure-treated plywood for platform deck (4' x 8' x ¾" sheets)	2 @ $33.00	$ 66.00
Cross-braces (2" x 4" x 8' pressure treated studs)	3 @ $4.00	$ 12.00
Sill on deck (2" x 4" x 8' pressure treated studs)	4 @ $4.00	$ 16.00
Pontoon supports (20" long, cut from 1 2" x 6" x 10' pressure treated)	1 @ $8.00	$ 8.00
1½ " x ½ " stainless steel bolts (or galvanized steel) with ½" washers	20 @ $1.25	$ 25.00
8" x 3/8 " stainless steel bolts (or galvanized steel) with 3/8" washers	4 @ $1.75	$ 7.00
½ " stainless steel (or galvanized steel) hex nuts	20 @ $0.10	$ 2.00
3/8" stainless steel (or galvanized steel) wing nuts	4 @ $0.55	$ 2.10
Plastic 5 gallon round, chemical or water containers	16 @ $0-9	$ 144.00
Total cost		$1282.10

Table 1. Components and Approximate Costs for Platform Construction

bolts were used to secure the coring platform to the pontoons. The 2" x 6" wood pieces also were notched to accommodate the interlocking attachment of three 8-foot long 2" x 4" cross braces. These cross braces also were drilled to allow the passage of the 3/8" bolts. Once the cross braces were in place, two sheets of 4' x 8' marine or pressure-treated plywood were attached to the platform by use of wingnuts on the 3/8" bolts (Figure 1C). The platform surface was further stabilized by use of drywall screws to hold the plywood to the cross braces.

To prevent items from rolling or falling off the platform, a sill can be easily constructed around the perimeter of the work area. This can be accomplished by utilizing 2" x 4" studs, set on edge, screwed or bolted to the platform from the underside. Approximate costs of the materials used in the construction of this floating platform are given in Table 1.

OPERATION OF THE PLATFORM

With the platform completed, a hole was cut into the center of the platform to facilitate coring (Figure 2). Coring was undertaken successfully using both a Livingstone piston corer (Livingstone, 1955) and a tripod-mounted vibracoring device (Figure 2). The vibracoring device is similar to that described by Smith (1987), but was supported by an aluminum tripod used for suspension of the vibracoring device and extraction of the core tubes. The tripod used on the platform is similar to that described by Thompson, *et al.* (1991). The vibracoring tripod was stabilized by cutting three 3" holes in the platform to allow spikes below the tripod feet to penetrate the platform. The holes for supporting the vibracoring tripod should be located in close proximity to the cross-braces and pontoons for maximum support when extracting core tubes.

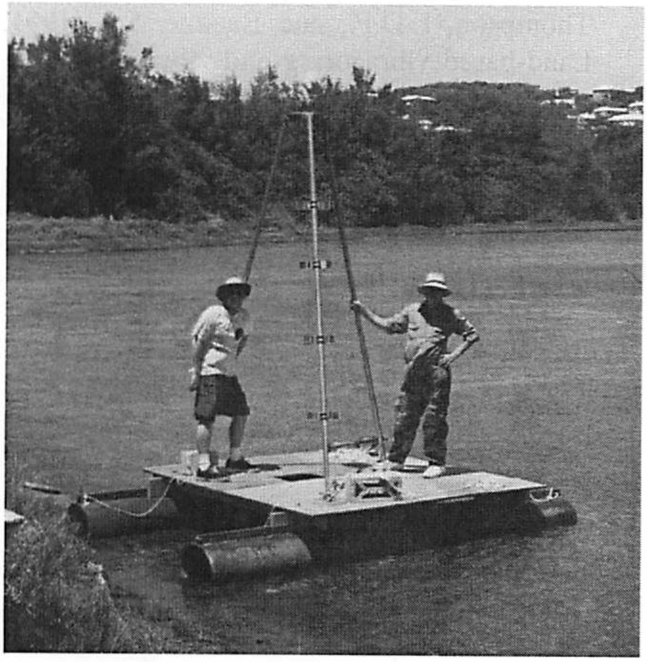

Figure 2. Floating platform prior to use illustrating the opening for coring and addition of a tripod for vibracoring.

A rail could be added to increase the safety of this watercraft. This would not impede the craft's utility when the platform is used for core retrieval employing a Livingstone piston-corer, or similar coring device using extension rods that can be removed in small sections. However, a structure of any significant height would severely limit the manipulation of the 10-20 foot irrigation pipes used in vibracoring. Use of personal floatation devices (PFD) is recommended and encouraged while the platform is in use on open water.

The raft could be held in position by the use of four anchors, each attached to a bolt hole in the ends of each pontoon. Position also could be maintained by attaching lines from the raft to the shore if the size of the pond allowed this configuration.

The floating platform was extremely stable due to the length of the pontoons and ample floatation. It stayed afloat with little difficulty during the extraction of vibracores up to 4 m in length using a winch fastened to the top of the tripod.

The displacement of the raft involves a relatively simple calculation. The volume of each pontoon can be determined by use of the formula:

$$\text{Volume} = (\pi r^2)h$$

where $\pi = 3.14$
r = radius of the concrete form
h = length of the concrete form

In this platform configuration the volume of both pontoons was approximately 36 ft^3 or 1 m^3, in which the displacement was approximately 1 metric tonne. Using this calculation, volume can be increased by using longer or wider pontoons. While the plastic containers did not exactly match the length of the pontoons, they were tightly sealed within them preventing water from entering and decreasing flotation values calculated above.

SUMMARY

The lightweight, collapsible design of this platform made it extremely useful in the field. The platform could be assembled readily and transported by two people. The collapsible design also allowed it to be carried from site to site in a relatively small flatbed vehicle.

Inasmuch as many remote and/or isolated islands or regions have undergone some level of development and concrete construction is a standard building practice, the availability of fiberglass concrete forms is widespread. The same is generally true of the availability of 5-gallon plastic containers in these remote settings. Hence, with a little outside logistical support, the parts needed to construct the platform described herein are easily obtainable. Construction of the platform requires less than a day and it is possible to begin fieldwork within a few days of arrival.

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