



# Fiberglass Reinforced Plastic (FRP) Sheathed Canoes for North East Hill Regions

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Short Communication

## Abstract

A detailed survey of the fishing crafts in the North Eastern Hill Regions was carried out during 2005-06. All the fishing crafts in the region were being constructed in a traditional way by using different species of timber. Few popular designs were selected for construction of fishing craft using low cost less durable timber species and these were provided with Fiberglass Reinforced Plastic (FRP) sheathing for increasing their durability. Periodic physical inspection of the FRP sheathed wooden fishing craft was carried out for a period of one year and it was observed that the FRP sheathed wooden canoes were in good condition after one year and do not require any maintenance as in the case of the traditional wooden fishing craft.

**Keywords:** Fishing canoe, North Eastern Hill region, fiberglass sheathing.

## Introduction

Fishing craft is used by the fisherman to negotiate through water for operating different fishing gears like gill nets, drag nets, lines and traps. The fishing craft have evolved from the cheapest indigenous floating materials like dry wooden logs, drums, bamboo, banana stems etc. Various designs of fishing craft is seen in North Eastern Hill Regions depending on the area of operations. Different types of fishing craft used in Assam have been described by Pravin and Meenakumari

(2012). They are locally known as *Nawka*, *Bhel* and *Dingi* in Assam. Dug out and plank built canoes are the main fishing crafts seen in the region. Mostly flat bottom craft is used in the shallow water regions of ponds, beels and rivers. All these crafts are non-motorized and propulsion is by means of an oar. The LOA of the craft range from 5 to 10 m. The craft has a maximum breadth ranging from 1 to 1.5 m with depth from 0.2 to 0.6 m.

Though wood is the best known material for construction of fishing craft, the shrinking forest resources restricts its wide spread use for boat construction. Although the region is harbored with variety of trees in its wide spread forest, only a few timbers are being used for construction of boats. Wood is the primary material used for construction of boats. The scarcity of this versatile natural resource to utilize less durable species for construction of fishing craft by reinforcing through use of Fiberglass Reinforced Plastic (FRP). This material has been used in boat building for over 70 years. The first introduction of FRP in the boat building was in the late 1940s. The ever increasing scarcity and high cost of locally available timber have made fiberglass reinforced plastic (FRP) a suitable alternative for boat building. It has been accepted as an alternative boat building material in Gujarat (Mohanrajan, 1988). The many advantages of FRP

like series production capabilities, corrosion resistance, long shelf life, less maintenance cost, less resistance in water, and high strength relative to its weight makes it the most suitable material for small fishing craft. 7.60 m PAL FRP fishing crafts have been used in reservoirs (Baiju and Meenakumari, 2002) and for pole and line fishing at Lakshadweep (Nasar and Baiju, 1991). Wooden fishing crafts with FRP sheathing have already been carried out in the country (Balasubramaniam, 1967, 1971a, 1971b; Edwin and Meenakumari, 2006). The materials used and method of sheathing fishing craft with FRP are discussed in the present study.

## Material and methods

Initially a detailed survey of the various types of fishing crafts used in the rivers, beels and other water bodies in the North Eastern Hill Regions was carried out during 2005-06. Design details of the existing fishing craft in the region were collected. After compiling the data, the canoes have been

low cost wood, each having an OAL of 5.5 m were constructed and were provided with FRP sheathing and handed over to the Department of Fisheries, Arunachal Pradesh for carrying out fishing operations. Periodic inspections of the FRP sheathed fishing craft was carried out.

## Results and discussion

Wooden boats of size ranging from 5.5 m to 8.10 m LOA using locally available wood like *Dysoylum procetum* (Poma), *Mangifera indica* (Mango), *Pithecellopium spp* (Moje), *Pinus khasya* (Pine) were fabricated as per the traditional boat designs. Table 1 gives the details of various fishing craft used in the NEH regions. Locally available timber is used for the construction of fishing craft. The fishers also use combination of timbers for construction of fishing canoes mainly to reduce the cost of canoe. Generally, Sal wood is used at the bottom portion and the side bar is made of *Poma* or any other low

Table 1. Different types of fishing craft in the NEH Regions

Sl. No.	Name	Local name	Material used/ specification	Operation	Main fishing gears operated	No of persons operated
1	Banana raft	Bhur/Bhel/Pung	Banana stem and bamboo L - 2-3 m B - 0.3 0.4 m	Throughout the year (mainly during summer)	Cast nets, gill nets and hook and lines	3-4
2	Bamboo raft	Bahorbhur	Bamboo L - 0 - 15 m B - 1 - 1.5 m	Throughout the year	Hook and lines	3-4
3	Dug out canoe	Donga	Different types of wood L - 4 - 6 m. B- 0.3 - 0.5 m.	Throughout the year	Traps, gill nets, hook and lines	2-3
4	Plank built canoe	Nao/ Nawka	Different types of wood L - 7 - 10 m. B - 1 - 1.5 m	Throughout the year	Drag nets, Cast nets, Gill nets and Seine nets	2-8

categorized into three major groups namely, large size canoes (OAL 7-10 breadth 1-1.5 m depth 0.2-.06 m); medium sized canoes (OAL 6-8 m, breadth 0.7-1 m depth 0.2-.05 m); and small sized canoes (OAL 4-5 m, breadth 0.5-0.7 m depth 0.2-.03 m). Later three boats were fabricated for Assam and were provided FRP sheathing (outside 2 layers and inside 1 layer) and three boats were fabricated for Arunachal Pradesh and were provided with FRP sheathing (with outside 3 layers and inside 1 layer). These boats were operated for fishing in various beels, rivers and lakes. Periodical monitoring of the boats were carried out for a period of one year to see for any damage etc. Two holds were provided both in the aft and fore part of the fishing craft for taking ice and storing fish and their belongings. These newly constructed FRP sheathed craft were handed over to the Fishermen cooperative societies, Assam for fishing operations in the beels through the Department of Fisheries, Assam. During 2007, four fishing canoes made of

cost wood. The canoes are given a protection of coal tar to prevent the entry of water in to the wood and kept for 3-4 days in sunshine for drying and it is repeated for 2-3 times. The coal tar coating is provided to the canoe every year during maintenance. Indigenous preservative materials like lime and *Dungari* are also mixed with coal tar and used as a preservative.

The fishing craft is also used for storing personal belongings safely and also used as shelter by the fishermen for taking rest after fishing. The fishing crafts in the region are flat bottomed for propulsion in shallow waters. None of the fishing craft use OBMs or engines for fishing operations. There is scope for motorization of these crafts with few modifications in the aft portion of the canoe by making it suitable for fixing out board engines and also improving its durability by sheathing the boat with FRP. This would enable the fishermen to reach

Table 2. Cost of construction of FRP sheathed fishing canoes in NEH Region during 2006-2007

LOA (m)	5.5 m	5.5 m	5.5 m	5.85 m*	7.20 m*	8.10 m*
Wood (Common name/ Scientific name)	Poma <i>Dysoylum procetum</i>	Mango <i>Mangifera indica</i>	Moje <i>Pithecellopium spp</i>	Pine <i>Pinus khasya</i>	Poma <i>Dysoylum procetum</i>	Poma <i>Dysoylum procetum</i>
Cost of construction of canoe (Rs.)						
Quantity of wood cu.ft.	20x2	20	20	5	13	17
Cost of wood	12000.00	4140.00	4140.00	1772.00	5000.00	7148.00
Cost of Bamboo				365.00	730.00	310.00
Cost of Nails	750.00	375.00	375.00	90.00	180.00	220.00
Cost of Labour	3500.00	1750.00	1750.00	1500.00	2800.00	3600.00
Cost of Transportation	750.00	375.00	375.00	300.00	600.00	700.00
Total cost (A)	17000.00	6640.00	6640.00	4027.00	9310.00	11978.00
Cost of materials	22508.00	11254.00	11254.00	5858.00	11544.00	13098.00
Cost of Labour	8000.00	4000.00	4000.00	1800.00	3500.00	4200.00
Total cost (B)	30508.00	15254.00	15254.00	7658.00	15044.00	17298.00
Grand total (A+B)	47508.00	23754.00	23754.00	11685.00	24354.00	29276.00

\*FRP sheathing (outside 2 layers, inside 1 layer)

FRP sheathing (outside 3 layers, inside 1 layer)

the fishing area and also back to the landing site with the catch quickly. Details on cost of construction of FRP boats of varying length are given in Table 2. Periodic inspections of the FRP sheathed fishing craft was carried out and it was observed that all the FRP sheathed fishing canoes were in good condition. The canoes coated with fibreglass, are maintenance free, long lasting and also affordable.

FRP is increasingly being used as a boat building material the world over. FRP is maintenance free and has many advantages over the conventional wood material. Its smooth finish and light weight enables the fishermen to maneuver easily in the river. Wood continues to be the most favoured material for boat building by the artisanal fishermen. The growing scarcity and the spiraling cost of the conventional species of wood has made the fishermen to use less costly and non-durable wood species for boat building. Such species can be chemically treated with preservatives or sheathed with durable materials like FRP and be used for boat building (Edwin *et al.*, 2006).

Initially, when the programme to sheath the existing traditional canoes were initiated, the fisher folk were very reluctant to offer their canoes as this was totally new to them. After periodic persuasion, few fishermen were convinced and they offered two of their old canoes for the FRP sheathing. Unlike

in the past, now, there is no dearth of material as there are many companies in the country producing fiberglass roving and resins. FRP sheathing of fishing canoes in the NEH regions has proven to be successful and the fishermen in the region can take it up with the help of department of fisheries.

The FRP coated fishing canoes were periodically inspected and it was found that the coating of two layer outside and one layer inside coated boats did not show any deterioration and was physically strong and sufficient for the fishing boat and this may be recommended as it would be economical as compared to the three layer outside and one layer inside fishing canoe. The maintenance of FRP coated canoes are less compared to the wooden canoes. FRP coated canoes give a better finish outside hull and improves the speed marginally. By giving colour to the pigment in the FRP, the boats can be made colourful and attractive. While hauling the boat to the shore, the FRP protects the wooden hull.

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