

A NEW CANOE DESIGN UNDER TRIAL AT DPI KANUDI

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INTRODUCTION

Gear and vessel appraisal work was started in Papua New Guinea by the Fisheries Research and Surveys Branch of the National Fisheries Division, D.P.I.. A new unit was set up in November 1983 and the functions of this unit were later transferred to the Resource Development Section in September 1985. The aim of the work is to undertake practical, development-oriented research to find ways to make village level fishing operations more cost effective. Work is being carried out to show how local fishermen may:

- increase their catch for a given amount of work
- decrease their operating costs per kilo of fish caught.

This article describes a project to carry out trials on a new canoe design to test its suitability for village fishing operations. The new design seems to have several advantages compared to local vessels.

The project is a joint venture involving the National Fisheries Division, the Lwanga Youth Development Centre in Gerehu, National Capital District and the International Human Assistance Programme (IHAP).

THE CANOE DESIGN

The canoe design which has been chosen for testing in Papua New Guinea is known as the 'K1R-4' or 'Red Snapper' design. This design was released in January 1985.

Features of the Red Snapper canoe are shown in the drawings on page 110 and in the photographs on pages 111 and 114.

The canoe is designed to be used mainly under outboard power. However, it is recommended that it is fitted with a 9 m² sail. The sail is hoisted on a mast which fits together in two parts. This type of sail and mast arrangement is known as a gunter rig. The sail can be used when conditions are favourable for sailing, and also as a safety back up.

The recommended range of outboard motor size for use on the Red Snapper canoe is between 2 and 10 hp.

WHY CHOOSE THE 'RED SNAPPER' CANOE FOR PAPUA NEW GUINEA?

There are several reasons for believing that the Red Snapper canoe design is particularly suitable as a small-scale commercial village fishing craft in Papua New Guinea. These are listed here:

- it is similar in layout to traditional dugout canoes.
- it can carry heavier loads and withstand rougher seas than most dugouts of a similar size.
- its fine lines and relatively light weight make it a fast craft when powered by outboards as small as 8 hp.
- it is easy to sail with the wind coming from either side of the vessel - i.e. the outrigger does not have to be kept to windward.

MAIN DIMENSIONS

Length overall	7.16 m (23ft 6in)
Beam overall	3.80 m
Length datum water line (DWL)	6.32 m
Draught DWL	0.25 m
Weight empty	300 kg
Displacement loaded DWL	590 kg
Maximum load	900 kg

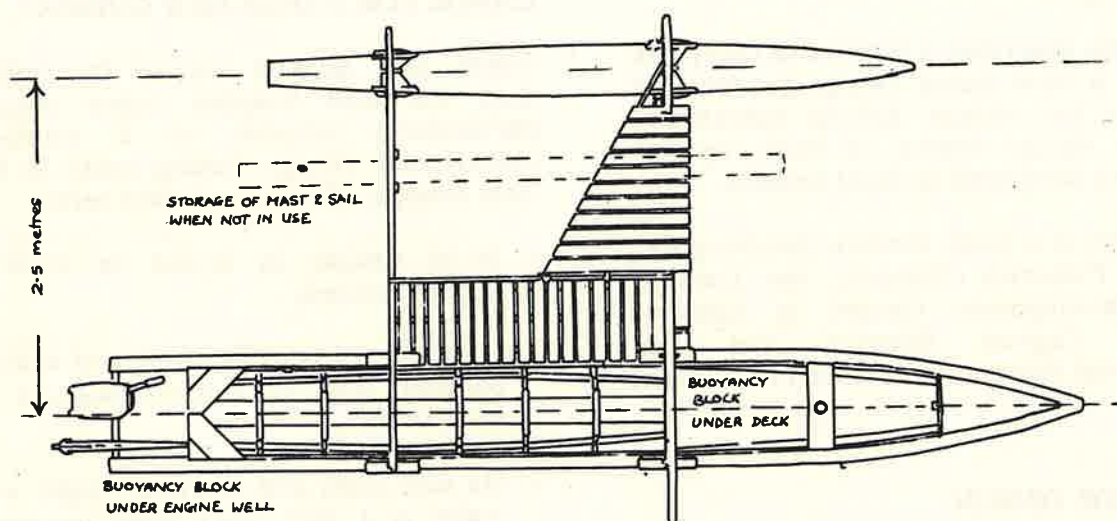
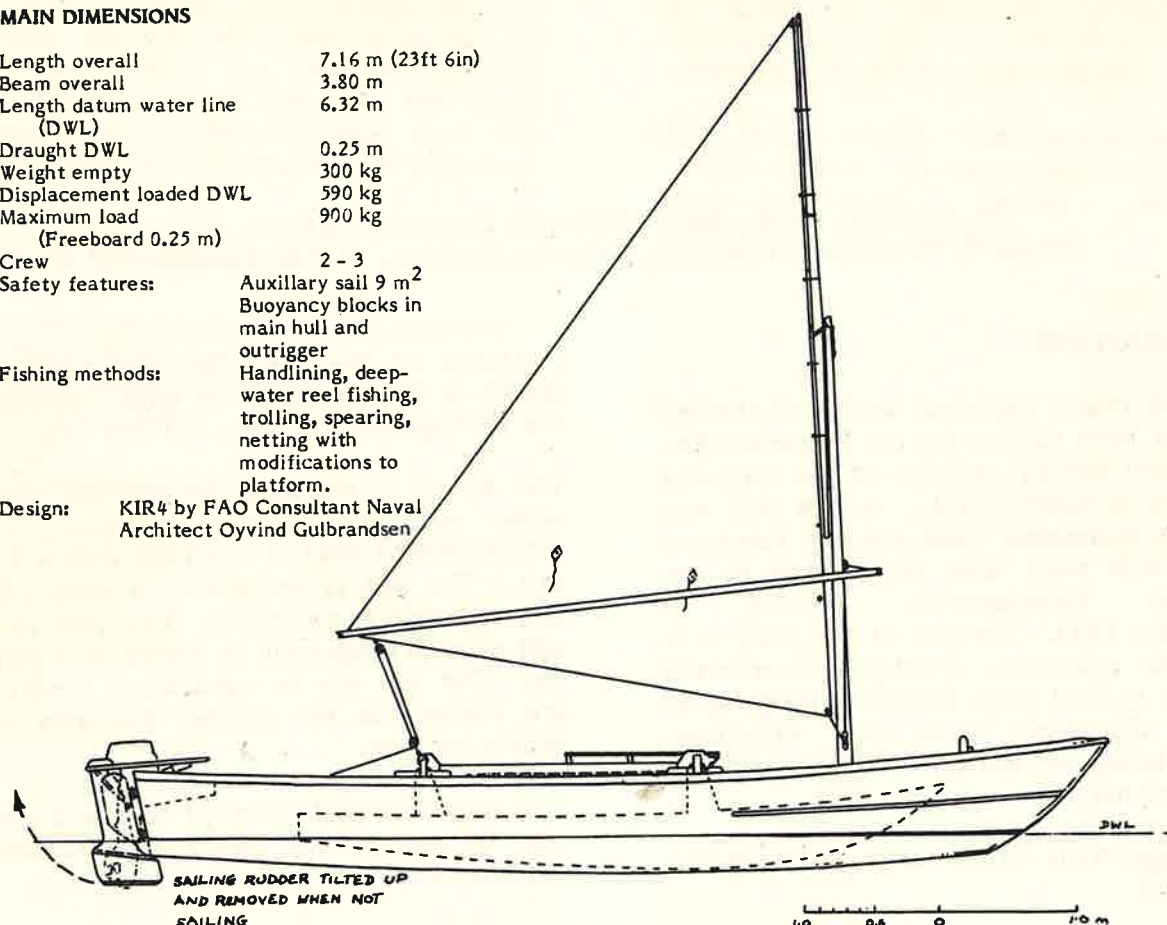
(Freeboard 0.25 m)

Crew 2 - 3

Safety features: Auxillary sail 9 m²
Buoyancy blocks in main hull and outrigger

Fishing methods: Handlining, deep-water reel fishing, trolling, spearing, netting with modifications to platform.

Design: KIR4 by FAO Consultant Naval Architect Oyvind Gulbrandsen



These diagrams show the main features of the Red Snapper canoes.



The Red Snapper canoe "Iamera" was the first of these canoes to be completed. Side (left) and front (right) views, showing the gunter rig sail.

- it is fairly light; 8 men can carry it.
- it has a double planked bottom, so that the outer layer can be replaced when spoiled by marine (sea) worms. The inner layer is protected by a sandwich layer of hydroseal.
- the hull may be built entirely from planks instead of using plywood.

Thus, this new design appears to have several advantages over both traditional dugout canoes, and imported dinghies.

The designer of the canoe, Oyvind Gulbrandson, is a well-known specialist in small-scale tropical fishing craft with extensive experience throughout the Pacific. He developed the Red Snapper canoe design during a successful and on-going 3-year project in Kiribati. The aim of his work in the Kiribati project is to provide sound, locally built and less costly fishing vessels than imported dinghies. There is a similar need in Papua New Guinea for low-cost, appropriate, improved fishing craft.

When considering how useful the canoe may be, the following points should be remembered.

1. Cost The materials to build a Red Snapper canoe cost about K1150, including the sail. Labour costs are estimated at about K1000. Therefore, this canoe may be suitable only for use by fishermen where there are opportunities to earn a cash income. It also has considerable potential as a low cost leisure craft for weekend use by the wage earner.
2. How long should the canoe last? If they are correctly built and properly looked after, plywood canoes such as the Red Snapper canoe should last as long or longer than most dinghies that are being sold in Papua New Guinea and used by village fishermen. However, plywood vessels do need more skilled care than dugout canoes and dinghies. People who intend to use the canoes must be trained to look after and maintain their vessels.

3. Sailing technique. The light weight of the outrigger means that if the canoe is sailed in fresh winds with the outrigger to windward, crew ballast (weight) is needed over the outrigger side. Otherwise the canoe could capsize. Again, people who are going to use the canoe should be trained in this, but those skilled in sailing local canoes will not find this a problem.

OPERATION RED SNAPPER

Once it had been decided that the Red Snapper canoe design was worth testing in Papua New Guinea, a project, known as 'Operation Red Snapper' was started. It had the following aims:

1. To run canoe building courses at a

suitable training centre - the Lwanga Youth Centre - while building three Red Snapper canoes.

2. To train youths and village fishermen in the practical skills needed to build and look after the canoes, working with little supervision, and to assess the level of skills required to build this type of canoe.
3. To train those taking part in the project to use the canoes for deep water snapper fishing using recently introduced wooden hand reels.
4. To assess whether the design is suitable as a small scale commercial fishing craft for village-level fishing in Papua New Guinea, and as a possible alternative to imported dinghies.



The Red Snapper canoes taking shape at the Lawanga Youth Development Centre, Gerehu.

The canoe in the top picture is "Iamera". The lower picture shows the "Parela" and "Tadiva" under construction.

THE FIRST RED SNAPPER CANOES FOR PAPUA NEW GUINEA

The first three Red Snapper canoes, were completed at the Lwanga Youth Development Centre in 1985. Money to fund two training courses was obtained from the International Human Assistance Programme (IHAP). IHAP is a USA-based organisation which has during the past 4 years provided financial help (money) for fishing groups in 12 Papuan Villages.

The Lwanga Youth Development Centre is at Gerehu, National Capital District. It is run by the Roman Catholic Sisters from the Mission of the Sacred Heart, and employs a qualified technical instructor Michael Hartong who is a German volunteer. He is responsible for running the canoe building instruction courses.

The Centre has a modestly - equipped workshop. Every year, 15 to 20 youths receive training in carpentry and other technical skills. The Centre is intended especially to help youths who left school early, and who have little or no opportunity for other formal training.

Youths from fishing groups from Roku, Kouderika and Vabukori villages took part in the construction of the three canoes and received training in the process. These three villages are all quite close to Port Moresby.

Students at the Lwanga Centre, a carpenter from a Yule Island vocational centre and a Fisheries Division carpenter also received training and assisted with the construction of the canoes.

TESTS WITH DIFFERENT SIZES OF OUTBOARD MOTORS

The Red Snapper canoes perform well when powered by small outboard motors in the 4 to 10 horse power range. Thus considerable savings in fuel costs are possible when compared to village canoes powered by 25 hp outboards. The top speeds obtained with a crew of three in a light breeze for different sizes of outboards were as follows:

4 hp gave 6.7 knots (12 km/hr)
8 hp gave 9.3 knots (17 km/hr)
10 hp gave 9.5 knots (17.5 km/hr).

At speeds of 8 knots the Red Snapper canoes travel about 4 km/l when powered by an 8 hp two-stroke outboard and about 6.5 km/l when powered by a 10 hp four-stroke Honda outboard.

Used on the canoe, the Honda four-stroke 10 hp would cover 53 nautical miles (nm) i.e. 98 km, at 9.5 knots at full throttle, and 70 nm (130 km) at 8 knots (three quarters throttle) on a full 20 l tank of fuel.

These figures depend on the canoe having a load equivalent to three persons. The greater the load the lower the speed, and the higher the fuel consumption. Note also that at slower speeds, for given conditions, engines usually travel further for a given amount of fuel: a useful point to remember if you are trying to economise on fuel or get home on an almost empty tank!

The fishermen of Roku village use an 8 hp Yamaha outboard on the "Iamera", the Red Snapper canoe they are testing. They have commented on the fuel savings they make using this combination instead of their local canoe and a 25 hp outboard. They note that the "Iamera" with the 8 hp outboard goes faster than their own canoe when powered by a 25 hp outboard. They also say that the 8 hp outboard on the "Iamera" goes about twice as far on a full tank of fuel than their usual canoe using their 25 hp. Our measurements reveal that in fact it will go over three times as far.

These figures of course depend on the load each vessel is carrying and the amount of throttle opening used. This large difference in fuel consumption is a significant advantage to the Red Snapper canoes in some types of fishing, e.g. trolling or when travelling regularly to distant fishing grounds.

PERFORMANCE IN ROUGH SEAS

During the South-east or 'Laurabada' season, fishermen regularly commented on how impressed they were with the

performance of the Red Snapper canoes in rough seas. In moderately strong afternoon winds of around 25 knots (46 km/hr) the canoes perform well. Although quite a lot of spray may fly up in strong winds, suprisingly little water comes inside the canoe.

When travelling with a rough following sea the canoe gathers speed and surfs with the waves. There is a slight tendency to broach (turn sideways) in these conditions but this can be corrected by the outboard operator.

It was once noted that the outrigger lifted out of the water in rough conditions when travelling down a wave in seas averaging about 2 metres. This was prevented by one of the crew moving onto the outrigger platform and so balancing the canoe.

Although these canoes appear to be very stable, it must be remembered that they are still experimental craft. They cannot yet be guaranteed for all types of conditions, or under inexperienced hands. Clearly, care should be taken during strong winds and in times of radio warnings to small ships.

PERFORMANCE UNDER SAIL

The "Iamera" has been sailed in winds up to about 20 knots. The full 9 metre square gunter rig was found easy to manage in winds of up to about 18 knots (estimate). Above this it was better to reduce the sail area by reefing (rolling up the bottom part

part of the sail and lashing it tight).

Unlike local canoes the Red Snappers actually sail better with the outrigger down wind, than upwind. The buoyancy of the outrigger prevents it being pushed under the water while it still "bites" into the water and helps reduce sideways drift.

Because of the buoyant outrigger the canoe has only one sharp end. Direction is changed when sailing simply by going across the wind. This is called "tacking" or "going about" when going upwind and "gybing" when travelling down wind. When attempting to tack it has been found necessary to assist the canoe round with paddles. This can be difficult at times. Gybing however can be carried out easily.

FISHING TRIALS

The canoe deck layout was originally designed for trolling and handlining in Kiribati and not for net fishing. Hence a simple netting platform has been designed and fitted to the "Iamera". The Roku fishermen consider that this improves the craft's potential as a net fishing vessel.

Ice boxes of various sizes capable of carrying up to 200 kg of fish plus ice can be fitted between the outrigger beams inside the hull. The lid of the ice box serves as part of the outrigger platform. In the photograph below the white area between the outrigger beams is the lid of the ice box on the "Parela".

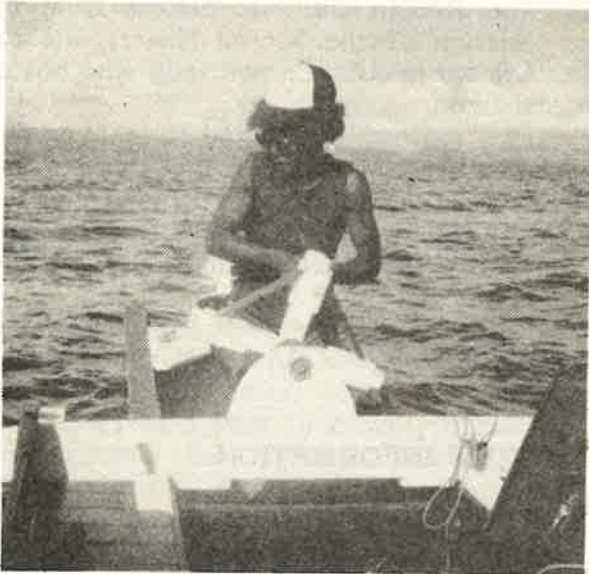
The deck layout of "Parela". The white deck area to the left of the man is the lid of the ice box.



Deep-water fishing for Red snapper and Red emperor is a new method of fishing to Papua New Guinea which the Fisheries Division is successfully introducing to a number of areas. The Red Snapper canoes display considerable potential as a relatively low-cost, locally made, small-scale commercial snapper fishing craft. Wooden handreels, modified versions of the now fairly popular Western Samoan type, can be easily fitted to these canoes.

The Fisheries Division is training groups taking part in Operation Red Snapper, in the use of handreels and how to locate the resources of Red snapper and Red emperor. Top catches made by Roku fishermen have been up to 250 kg of Red emperor per night.

Two reels are fitted per canoe as shown in the photograph:



This photograph shows how the deep water wooden fishing reels are fitted and operated.

The strength and stability of this arrangement was demonstrated on the first handreel fishing trip made by the "Tadiva". The 80 kg Giant grouper illustrated below was hooked in 180 metres on Boxing Day 1985. The Grouper was hauled on board within 10 minutes of first being hooked.

The design has also been shown to be well-



This 80 kg Giant grouper was landed on board the "Tadiva" on its first fishing trip, using handreels.

suited to trolling. The outrigger gives good stability in choppy seas. The stern of the canoe is a safe and comfortable spot from which to work the lines. The hand-reels may also be used to haul two of the four lines which are usually set. For trolling, an extra outrigger trolling pole is fitted to the side away from the outrigger to increase the space between lines and so reduce the risk of tangles.

When trolling with the Red Snapper canoes fitted with a 10 hp four-stroke outboard motor, fuel costs are about K1.20 per hour. This compares to over K3 per hour when using a local canoe powered by a 25 hp outboard motor. The low fuel costs and the new canoe's greater speed, together with the amount of Skipjack tuna to be found off Port Moresby in the right season combine to suggest that greater use will be made of these craft in the future for trolling.

THE REAL TEST

For 18 months before the project started, four groups participating in the project provided details of their daily catch and operating expenses, using their normal canoes and fishing materials. Information gathered from their fishing operations using Red Snapper canoes will show whether the new canoes can be used to undertake more cost-effective fishing than their local craft and/or imported dinghies.

The real test for the success of the project will be whether more village fishermen decide they would benefit from using canoes of this new design. If this happens it is hoped that one or more local carpenters will be trained to build the canoes in village-level workshops. If the results of the trials continue to be encouraging it is hoped that the various financial institutions such as the Agricultural Bank will consider lending money to fishermen wishing to buy this type of craft, in areas where it can be shown to be suitable.

Following the initial trials big business has already shown an interest. Steamships Slipway, run by Engineering and Marine Services Ltd of Port Moresby have accepted orders for three canoes. These are under construction at the time of writing. The price they have quoted is K1953 for the unpainted vessel, supplied without sail and spars, and K2640 supplied painted and complete with sailing gear. The engine is not included in these prices.

ALTERNATIVE NEW DESIGNS

No single design of fishing craft is ever suited to all areas and all types of fishing. For the more rural areas of PNG where trees for dugouts are still plentiful, where the price of fish is low and where there is not the demand for speed such as exists around urban areas, a cheaper alternative based on the dugout log may be preferable.

A future article in Harvest will describe a project to construct and test a new design of dugout canoe. The design, using improved and more modern, but still relatively simple construction techniques has been developed to give a robust, seaworthy canoe capable of transporting heavy loads in moderately rough seas when built around a relatively small dugout log.

ACKNOWLEDGEMENTS

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- Michael Hartong for the time, effort and skill put into the training courses, and all at Lwanga Youth Development Centre for their contributions.

FURTHER INFORMATION

For further information about the Red Snapper canoes in Papua New Guinea, you can contact:

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