Sepik Fisheries—the Big Potential?

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The Place

Whether the Sepik River is mighty or not, is a matter of opinion, but the Sepik River drainage basin is, without doubt, quite impressive. A rough calculation with a map and a rule will show that something like 10,000 square miles is involved in this. There is, of course, a seasonal dry period when the water area shrinks but we shall see later that this is probably a good thing. The whole area is a shambling complexity of river, lake and swamp. For a broad, general impression, it is necessary to fly over the region and gain a bird's-eye-view. *Plate* 1 shows what is revealed on such a trip, and even that which appears grassland is shown to be actually flooded when you catch the sun's rays reflected when looking directly beneath you. Here and there are good-sized lakes such as the Chambri (*Plate* 2). These lakes and other roundwaters are relatively shallow and fertile and probably benefit from drying out annually.

The Fish

The Sepik has its own indigenous fishes such as eels, catfish and sharks. However, the focus of our attention is now upon a fish called tilapia. For once people have done the right thing and called a fish by its logical name, in this case from its scientific title of *Tilapia mossambica.* It is a native of Africa where it has many close relatives. Tilapia may also be found throughout south-east Asia and were brought to Papua New Guinea by DASF some years ago. It was released at several points in Papua New Guinea and was also put in some DASF ponds at Amanab. It is not clear whether some of these fish were transferred to

Plate I.—Aerial view of the Sepik River Basin

Plate II.—Aerial view of the Chambri Lakes taken from an altitude of 3000 ft.

the Screw River, near Ambunti, or whether there was a simultaneous stocking. Anyway, the Screw River tilapia escaped into the stream from a nearby pond, as you would guess, and found their way down into the main Sepik River and apparently from there to most points in the Sepik Basin.

Tilapia have found the new home much to their liking and from about 1958 onwards grew and thrived with the result that the Sepik system has a very impressive total stock.

In other smaller waters, the rapid breeding of tilapia has resulted in a large number of small fish which never grow any larger. In the Sepik system the fish can average 1 lb each, with some over 5 lb, so it seems that Sepik conditions do not encourage stunting.

This may be because of the annual drought. Each dry season the waters recede and many shallow swamps become dry. In the larger waters there is also a strong plankton 'bloom' (a vast increase in growth of small floating matter, both animal and plant). The physical choking of fish with perhaps a drastic reduction of oxygen also, may be one reason for the large amount of dead tilapia seen in the drainage channels leading from the larger waters. Whatever the cause, it is a fact that each dry season many of the fish die. This would of course, leave more food for the surviving fish and may be one contributory factor to the good growth of the fish.

Tilapia, so the scientists tell us, is a mouth brooder. The male makes a circular nest on the mud flats and the female lays her eggs in it. The fertilized eggs are then taken up and brooded in the mouth of the female. It is said that the very tiny young will also take refuge there when danger threatens. It is interesting to dwell upon how the female fares with a mouth full of children. Possibly she does not eat during the crucial period; but anyway a sneeze would be less drastic than a hiccup! With all that parental care it is likely that there is a good survival rate of the young. The circular nests made by the male would be about 12 to 18 in across and in the dry season one may see acres of nests in shallow water, all so close that the nests are almost touching each other.

The Sepik Basin is an enormous area. It is a reasonable guess to say that at least 2,000 square miles of water and swamp are available for tilapia and that there would be 100 lb of tilapia to the acre. With these figures we can calculate that there would be 64,000 lb to the square mile, or 128,000,000 lb in 2,000 square miles, and this is an excellent fishing potential. It is probably as good as tuna yields in Papua New Guinea waters.

Fishing Methods

The main river is not suitable for fishing owing to the depth, strong currents, drifting trees and debris; but the swamps, lakes and ox-bows are ideal. In fact when the smaller waters are drying out, Sepik women can catch the fish by hand merely by groping carefully in the grass. Sometimes this situation can be improved by placing a barrier of sticks and brushwood across a channel.

Gill netting is, of course, the established way of fishing, and choosing the right mesh size can regulate the size of fish caught. There are other more sophisticated methods which come to mind but at present things go quite well, with an occasional catastrophe when a crocodile or saw-shark blunders into the net.

Plate III.—Mr Kambaramba and Mr Mongendo holding fish ready for sale. It is pre-packed in plastic bags if it has to travel far to the market

This is one reason why comparatively heavy twine is used in the nets. Despite its inferior catching power, there are still enough fish being caught. For those who are not familiar with the term, gill nets are merely walls of light twine netting strung across suitable places and kept vertical in the water by means of floating headropes and weighted footropes. The fish blunder into the nets and are entangled by the gills after pushing their heads through a mesh. In practice many fish are tangled by various parts of their bodies rather than by the gills, for the tilapia have spiny fins and rough scales.

Processing

Originally it was intended that two processing points would be established, one at Angoram and one at Pagwi. Unfortunately owing to the transfer of the Father-in-Charge at the mission, the Pagwi venture has not materialized, but the project of Mr Jim McKinnon who has a sawmill at Angoram, has fared better. Two local government councillors, Mr Siau Kambaramba and Mr Banagu Mongendo who live close by are interested in a business partnership with Mr McKinnon.

The fish may be preserved by smoking or freezing, so the Angoram smokehouse also has a freezer. A Yanmar 14 h.p. diesel engine drives a compressor which chills the brine tank for freezing the fish. The frozen fish may be sold 'as is' or packed in plastic bags for distance travelling, as shown in *Plate* 3.

For smoking, either fresh or frozen tilapia can be used, but fresh fish seem to give the best results. Prior to smoking the fish are split from the back and cleaned (*Plate* 4) and then soaked in brine solution (normal temperature) to absorb some salt for keeping qualities. The fish are then drip-dried and later hung up in the smoke chambers. Mr McKinnon has four chambers fed from external smoke generators which can process about 2 tons per 24 hours. There is no shortage of fuel; there is always plenty of sawdust from the sawmill next door. The fish are given a short dose of fairly hot

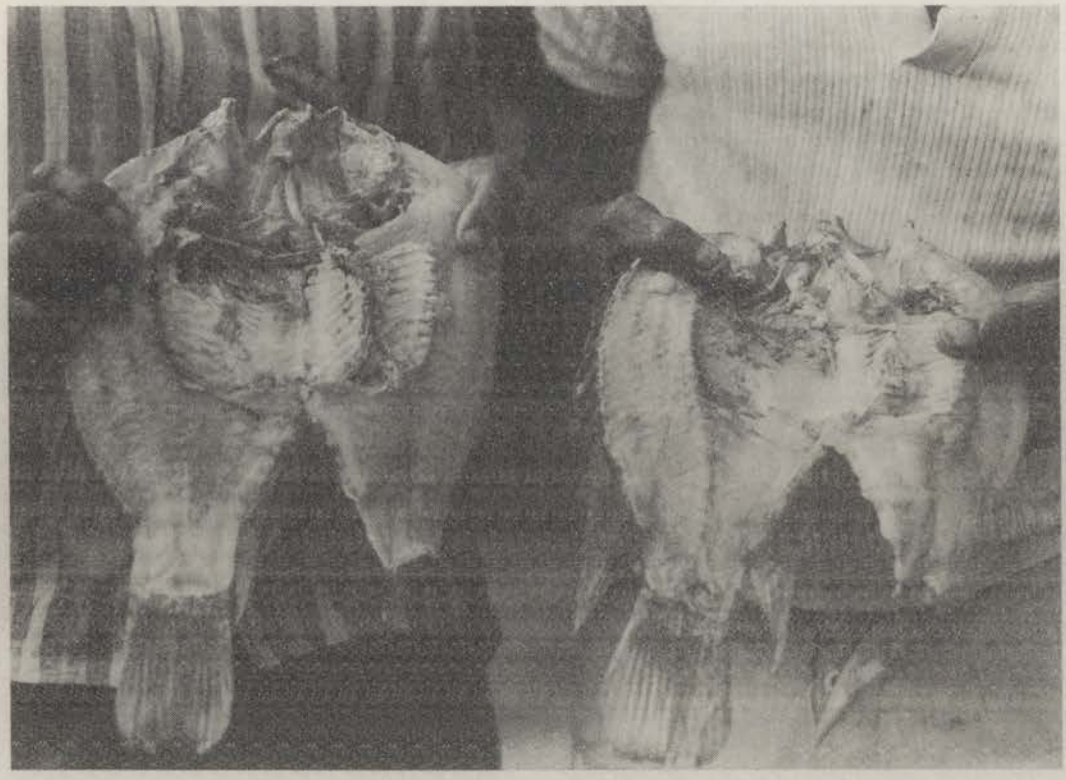

Plate IV.—Tilapia ready for smoking. The fish has been split from the back and cleaned. It will be soaked in brine before smoking

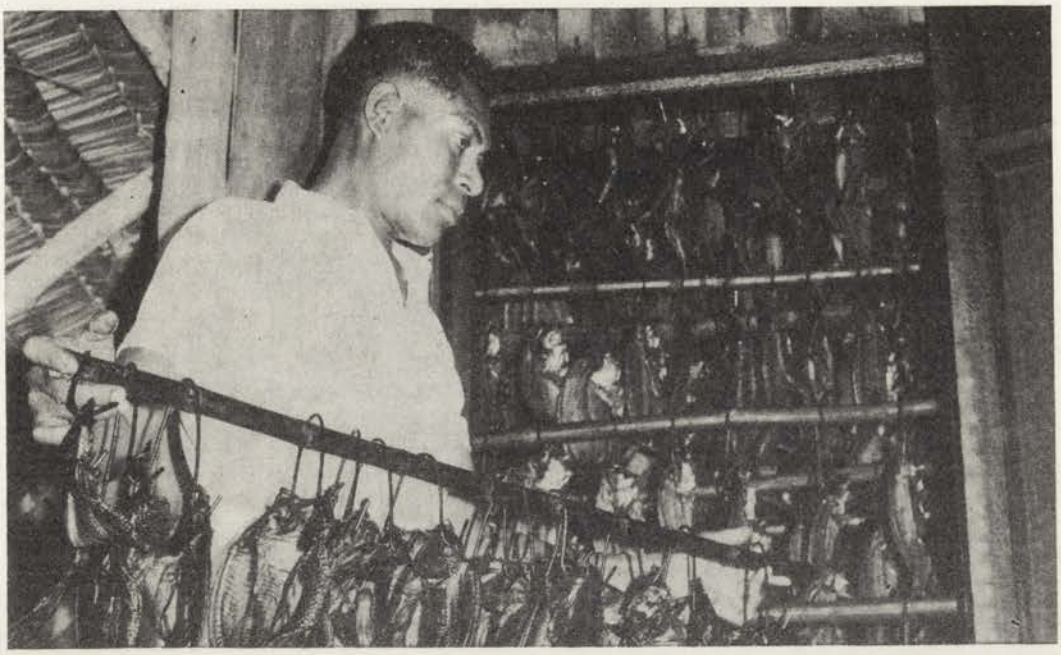

Plate V.—The fish in the smokehouse

smoke and then the fires are damped down to merely smoulder. This process is called "hot-smoking" and is the only really feasible one in the tropics owing to the humidity encounted (*Plate* 5).

Local fisherladies also smoke their fish so that it will keep long enough to reach market. In this case, however, the fish is partly cooked and slightly smoked over an ordinary fire. It serves quite well, for the fish can, say, be canoed to a point such as Pagwi and then sent by passenger truck into Wewak and still be fresh enough for market.

Distribution

As always in Papua New Guinea, a big problem is that of suitable transport. This hindrance is not unique to the fishing industry. Mr McKinnon has a DCA commercial licence to fly fish to the Highlands in his own Cessna. The distance between Angoram and the Highland main centres is not very far, thus two flights a day are quite feasible.

The problem now seems to be that of the organization of sales in the Highlands and other places where fish should be in good demand. Consumer preferences will have to be studied, of course, but it is expected that smoked tilapia will be very popular.

Prices, of course, require careful consideration, for such things as canned mackerel from Japan and Korea are established favourites at very low prices and therefore constitute a real source of competition. It is expected that the hotel and other more lucrative trades will accept tilapia fillets carefully prepared and of good quality. For the European tastes it may be necessary to skin the fillets, for the skin is somewhat dark. The flesh, however, is very acceptable and of good colour, provided that it is carefully handled from start to finish.

The Future

Fisheries research is being carried out on tilapia right now. It will also be necessary for our economists and marketing experts to find out the full extent of demand and preference in Papua New Guinea centres and possibly overseas. Lake Victoria (East Africa) tilapia fillets are exported to many places overseas and there seems to be no reason why our fish cannot also be exported. There may even be some possibility of canning tilapia or otherwise producing an acceptable product. Right now, of course, Papua New Guinea requires lots of low-priced protein and this is the line we should pursue as an immediate aim.

There could be a bright future for our Sepik fisheries. One thing is certain, there are no hungry children along the Sepik now.