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THE DEVELOPMENT OF ARTISANAL FISHERIES IN
PAPUA NEW GUINEA: THE POTENTIAL ROLE OF
FISH AGGREGATING DEVICES IN THE DEVELOPMENT OF A PELAGIC FISHERY

by

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INTRODUCTION

1. Papua New Guinea (PNG) differs from the small island states of the Pacific mainly by its large size dominated by extensive mountain ranges. Large rivers systems have created extensive regions of alluvial plains. These rivers provide nutrient enrichment to coastal waters, large areas of which form nurseries for many marine animals.
2. The topography of Papua New Guinea has allowed for a large range of environmental habitats, and this is reflected in its abundance of wildlife. Because of the ease in obtaining protein from the land, Papua New Guineans have primarily developed skills in hunting and gardening, with little dependence on fish as a protein source. Due to this, the initial emphasis for the development of Primary Industries was aimed towards farming and gardening.
3. Over the last decade the realisation that fish are an under-utilized renewable resource has led to development of the fishing industry. This was initially aimed at commercial operations mainly involving foreign fleets (tuna, prawn, lobster, barramundi). Recently, however, the emphasis on development has swung from commercial to artisanal fisheries. The need to promote small scale fisheries as a source of food for local consumption is demonstrated by Papua New Guinea's reliance on large quantities of imported fisheries products. In 1981 it imported 17.5 million kina worth of fish in airtight containers (Anon 1982). Other reasons include increasing the income earning opportunities of coastal people and the production of fisheries products for export.

PROBLEMS FACING DEVELOPMENT

4. Five major constraints limit the development of artisanal fisheries in Papua New Guinea.

- (1) Rising fuel prices are rapidly crippling the advantages of extended range given by the introduction of petrol and diesel motors. Zann (1980 b&c) found that fishermen in Tuvalu and Tonga were using their outboard motors less, due to the increased fuel costs. Fuel prices also affect the cost of ice and the use of refrigeration.
- (2) The limited extent of traditionally fished shallow water fringing reefs, particularly in the more densely populated regions of Port Moresby, Lae, Madang, Rabaul and Wewak.
- (3) The competition offered from imported fisheries products both in low prices and long shelf life.
- (4) Competition with agricultural products, which often require little input in the form of fuel.
- (5) Traditional fishing rights.

5. Despite these constraints there is still an urgent need to develop artisanal fisheries as they cannot meet the increased demands for fish, especially in urban centres. Zann (1980 a) found a similar situation throughout the developing countries of the Pacific.

6. The increasing demands for fish, caused mainly by rapid urbanization, has increased the fishing pressure placed upon local resources. Over the last fifteen years the urban population has increased by 5.5 per cent whereas the rural population only increased by 2.0 per cent. In most regions in an attempt to meet these demands, traditional practices have been replaced by more efficient fishing methods. This has further increased the pressure exerted upon the limited shallow water resources. In Papua New Guinea the traditional reef fishery at Viriola (a village with a direct road link to Port Moresby) is already being adversely affected by introduced fishing gear and the potential gains from fish sales. Mono-filament gillnets are used to surround shallow water reef regions and the reef is often badly damaged in the search and consequent flushing of fish from the reef. Larger fish are speared and smaller fish gilled in the nets (often 76 mm stretched mesh). Many of these small fish are juveniles (Alu and Borne pers. comm).

7. During the last four years Papua New Guinea has established small-scale fish processing plants with the aim of increasing fisheries productivity from regions thought to have abundant fish stocks. In most regions, traditional fisheries, using introduced methods and gear, are supplying these processing plants.
8. Kearney (1979) and Zann (1980 c) both outline the implications of increased exploitation of tropical reef and lagoon environments. Briefly, the problems involved in developing these fisheries to commercial levels are firstly a great species diversity together with small productivity of marketable species and, secondly, bottom topography which inhibits commercial methods such as trawling and seining.
9. To develop fisheries in Papua New Guinea it is essential to evaluate the importance, to the local people, of their traditional resource. Two cases which demonstrate this are:- In North Solomons, Milne Bay, Manus and Central Provinces, villages stopped allowing the pole and line tuna fleet to catch baitfish in their traditional waters, thus preventing the harvest of adjacent skipjack tuna schools. Although a cash return was guaranteed, the villages feared that depletion of the baitfish would adversely affect their reef fishery, which is important to the coastal dwellers for their subsistence.
10. Protests from villagers adjacent to prawn trawling grounds (Gulf of Papua and Crangerie Bay) are numerous with villagers fearing that the fish caught as a by-product of the trawling operation are juveniles of the fish they catch.
11. Johannes (1980) emphasises that fisheries development (especially for the international and domestic export markets) should not concentrate on natural resources which are vital to traditional exchange networks. Haines (1980) gives examples where attempts to develop fisheries in Papua New Guinea have failed or succeeded because they respectively had and had not cut across traditional concepts.

FUTURE DEVELOPMENT

12. In an attempt to ease the pressure and problems associated with the exploitation of traditional shallow water reef fish, the Division of Fisheries is looking at alternative fisheries, in particular the pelagic and deepwater demersal resources.
13. Okera (1982) estimates that a possible annual harvest of many thousands of tonnes of small pelagic fish is possible in tropical Australian waters. There is every indication that large numbers can also be expected in Papua New Guinea waters. Area 71 of the FAO handbook, in which Papua New Guinea is included, shows a harvest in 1979 of 513,768 tonnes of small to medium pelagic fish (Rastrelliger spp, Megalapsis spp, Caranax spp, Decapterus spp, Sphyraena spp and Selar spp) (Anon 1979).

14. The development of a pelagic fishery is expected to be commercially viable because schools of pelagic fish have low species diversity, pelagic fish normally have rapid growth rates especially the smaller species (Okera 1982) and the schooling nature of this group of fish normally means large numbers can be caught in small periods of time.

15. A major drawback in the exploitation of pelagic stocks is the low international price obtained for most species. (An exception to this is the Spanish mackerel Scomberomorus commerson). Although pelagic fish are highly prized on the domestic markets (K1.00 - K2.00 per kg), these markets can become saturated.

16. Johannes (1980) and Kearney (1979) point out the need for import replacement of fish and fisheries products in developing countries in the Pacific. Before this potential market can be developed in Papua New Guinea two major problems have to be overcome, namely a cheap price of tinned mackerel (K0.45 per 475 gm can) and an adequate shelf life which is not dependant on refrigeration must be developed.

17. The first problem can only be overcome if large numbers of fish can be caught for little expenditure. The answer to the second problem lies in alternative processing other than freezing. Salting, smoking, small-scale canning and the development of fish protein concentrate are methods which need reviewing.

THE ROLE OF FISH AGGREGATING DEVICES

18. Where traditional fishing rights occur it is expected that development of a fishery, where schools of fish migrate across traditional boundaries, will conflict with traditional concepts. The use of fish aggregating devices (FAD) in the form of anchored rafts is expected to be more acceptable to traditional concepts, as the FAD and the fish caught around it will belong to the local village or clan.

19. As pelagic fish were seldom traditionally exploited, new gear and techniques will be developed and introduced into the fishery. With this introduction, conservation and management measures in the form of gear type and selectivity can also be controlled.

20. The present deployment of FADs has mainly been orientated to aggregating tuna for commercial purse-seine and pole and line operations. These FADs are normally anchored in depths of 500-2,500 metres and between 8 to 20 miles offshore (Murdy 1980, Phillips 1981 and Matsumoto, Kazama and Aasted 1981).

21. FADs deployment of this kind is impractical for artisanal fishermen in Papua New Guinea because fishermen are not familiar with, and often fear, going great distances out to sea. For example, a tuna company in Papua New Guinea deployed three FADs, approximately three miles offshore, for use by artisanal fishermen and although the fishermen knew of their aggregating properties, they feared travelling the distance out to sea (Kakiuchi pers. comm.). It is expected that the introduction of more stable fishing vessels (cf. outrigger canoes) will overcome some of this fear. In addition, the cost of the rope required to anchor rafts in deep water is beyond the financial resources of the fishermen and unlikely to be cost effective for small-scale fishing techniques.

22. To meet the present needs of the artisanal fishermen in Papua New Guinea, Fisheries Research will be initially concentrating its efforts on evaluating the effectiveness of FADs in near shore (2 miles) shallow (50-200 m) water regions, beyond the traditionally fished shallow water reef systems, and in developing various small-scale fishing techniques to harvest the pelagic resources.

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