

**The Flying Fish Industry of
Trinidad and Tobago: A
Continuing Case Study**

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In 1978, Mr. Hubert E Wood, Senior Fisheries Officer, Fisheries Division, Ministry of Agriculture, Lands and Food Production, in a paper entitled "Case Histories of Fisheries Development in Trinidad and Tobago" examined the developmental patterns and trends of the flying fish industry on the island of Tobago. This was an attempt to illustrate the strides that can be made in the development of an artisanal fishery once it is observed in the context of the fishery itself, the community, the people and all available resources. It also served to indicate that meaningful development of a fishery does not necessarily require the full use of sophisticated gear, equipment, machinery or highly paid consultants and expertise throughout all its stages. The timely injection of the appropriate developmental input can at times be the crucial factor influencing the expansion of a fishery. This presentation serves to re-examine and update the status of this industry.

The Resource--Flying fishes inhabit the surface layers of tropical and subtropical waters in the Atlantic, Pacific and Indian Oceans and their seas. However, it has been observed that different species show preference to a different optimum temperature even within this temperature regime. Tropical species are found where water temperatures vary between 26-29°C and for subtropical species, between 22-26°C. This means that flying fishes inhabit waters between 30-30° north and south of the Equator. Although these fishes are considered in general to be oceanic in nature, some species seem to frequent inshore and coastal waters, especially during spawning periods.

There are several species of flying fish and in the tropical and subtropical western Atlantic area bounded by the coordinates 5°S and 35°N and 40° and 100°E which includes the Caribbean Sea, Gulf of Mexico, Central American coasts and northeastern South Americas; about 14 different species have been identified. However, investigations of the flying fish fishery of Barbados, Dominica, Grenada and Tobago show that the dominant specie is the four-winged flying fish, Hirundicythys affinis. This species, similar to the others, is dark in color in the upper or dorsal section which varies between an iridescent blue or green and pale on the underneath or ventral section. The mature adult attains an average overall length of 15-20 cms.

This fish appears in its spawning state in the inshore and coastal waters of Tobago between November and July each year and a fishery has been developed around this occurrence. The peak period of both spawning and fishing activity is between February

and March. Except in limited quantities off the north and east coasts of Trinidad, the fish seem to concentrate around Tobago, thereby leading to a potential for the development of that resource around the island.

History of the Industry--Historically, the flying fish fishery of Tobago can be considered to having its beginning in the early 60's around the year 1962. A fishing entrepreneur, a national of Barbados, who was already in the flying fish business in Barbados, became aware of the resource, especially on the Caribbean Sea side of the island. He arranged to have experienced fishermen from Barbados go to Tobago to fish for the resource. Catches were either taken back to Barbados for processing or sold as bait for ocean going liners. These fishermen settled on the western part of the island - Canaan, Bon Accord, Kilgwin and Buccoo - and carried out fishing operations from beaches such as Pigeon Point, Store Bay, Kilgwin and Buccoo. The fishermen in the initial stages brought with them fishing boats, gear and equipment. Fishermen, from the beaches where fishing was done, found employment as crew members of the vessels and naturally the introduced skills and techniques were learned and passed on.

Throughout the 60's and 70's and continuing into the 80's through the utilization of government incentives to the fishing industry, the increased competence of the native fishing community, the upgrading of their equipment and training, the introduction of a combination of promotional, processing and marketing strategies, this fishery had become by 1979-1983 the preeminent mainstay of the fishery of the island through its impact on employment, increased income and other spin offs.

Fishing Methods--The season for flying fish is between November-July, which coincides with the time of spawning. During this time the fish move close inshore and group together. It is believed that spawning eggs are deposited on debris, floating wood, leaves or any object found in the coastal waters.

The method of fishing is usually referred to as drifting or lurking and is done in an open pirogue or bumboat 6-9 m long powered by outboard motors between 11-41 hp. On reaching the fishing ground, the fisherman, after determining the drift and set of the current, cuts his engine and allows the boat to drift generally in a southwesterly direction. When fish are in active spawning, they tend to congregate under the shade made by the boat or even attempt to deposit eggs on the boat. Under such conditions the fishermen can use a dip net and scoop the fish into the vessel. At other times the fishermen can construct a raft-like structure out of coconut palm leaves which is attached to and suspended in the water close to the boat. Again, the flying fish tend to group around this raft thereby making it easy to scoop them with a dip net.

When the fish are not grouped, the fishermen achieve this by chumming. In this exercise, chopped and macerated decaying flying fish or other species with high oil or fat content are suspended in a basket of bamboo or very small mesh wire or in a piece of fiber bag. By shaking and agitating this container,

pieces of fish and oils are dispersed in the water column and move with the boat in the current. The basket is left suspended over the side. It is believed that the oils and pieces of fish serve as an attraction to the flying fish and the larger species which follow and prey on the flying fish. In the meantime, a gill net of about 6-8 m long and 2-3 m deep with stretched mesh size of about 44 mm is tied to the boat and suspended in the water. The flying fish attracted to the boat become gilled in the net. In addition to the net, a raft may also be set out and these fish can be scooped up with the dip net. Flying fish can also be caught with a hook and line.

During the netting of flying fish the larger associated species are also caught by using floating lines, extending up to 150-200 m from the fishing boat, baited with live flying fish. If these larger species approach the schooling fish, they prey within the school and do not take the bait, hence it is important to capture them before they get too close to the raft or boat.

Fishing is done on a daily basis and the fisherman leaves for the fishing ground between 4:30-6:00 a.m. and returns with his catch between 2:00-6:00 p.m. Depending on the marketing arrangements, i.e., when he is assured of a market through the collector vessel, the fish plant or any other agency, he stays out as long as possible. If not he returns in midafternoon so that he can sell his own catch.

Fishing Areas.--Currently, fishing is centered along the Caribbean seacoast of the island especially between the beaches stretching from Parlatuvier to Kilgwin, to include Castara, King Peters Bay, Great Courland Bay, Black Rock Bay, Mt. Irvine, Buccoo, Pigeon Point, Store Bay and Kilgwin. Greatest activity in terms of boats, fishermen and catches is at Mt. Irvine, Buccoo and Pigeon Point (Fig. 1).

Fishermen operate between 5 km and 18 km from shore and in water depths between 20-140 m. Although flying fish are found on the Atlantic side of the island, except for the Belle Garden Beach, the fishery has not yet caught on.

Landings.--As the industry developed, catches increased, income improved and the Tobago fishermen became owners and captains of their own vessels. The incentives to do this became stronger and were influenced by substantial catches of popular marketable species: Coryhaena hippurus (dolphin), Thunnus albacares (yellow fin tuna), Thunnus alalunga (albacore), Sarda sarda (bonito), Scomberomorus cavalla (king mackerel), Xiphias gladius (swordfish), Makaira nigricans (blue marlin), Istiophorus albicans (Atlantic sailfish) and various species of sharks.

As direct result of the increased fishing efforts and developmental emphasis, landings of the flying fish have shown remarkable increase between 1974 and 1982. In 1976, the low estimate was a result of a minimal collection of landings data.

There has been continuous growth of the industry as measured by the number of fishermen, boats and earnings. The number of boats increased from 32 in 1979 to 68 in 1983.

Table 1. Estimated landings of flying fish 1974-1982

<u>Year</u>	<u>Landings kg</u>
1974	37,106
1975	35,420
1976	2,155
1977	86,965
1978	92,149
1979	221,556
1980	312,979
1981	115,454
1982	<u>163,572</u>
	1,067,356

Source: Fisheries Division, Ministry of Agriculture, Lands and Food Production, St. Clair, Port of Spain.

The industry continued at a relatively slow development pace while the fisherman improved his expertise, acquired better boats and equipment and the fish became a recognized dish. Problems of marketing, especially disposal of the catch, became a very serious bottleneck in the course of expansion of the industry.

Around 1978 the marketing problems became so acute that the Government of Trinidad and Tobago, through the Fisheries Division of the Ministry of Agriculture, Lands and Food Production and in conjunction with the Tobago Marketing Cooperative, a fisherman's organization, the Cooperative Division of the Ministry of Labour, Social Security and Cooperatives and the National Fisheries Company, introduced what is called the "Collector Vessel System" in 1979. This concept was adopted from a survey carried out in 1977 by the Caribbean Fisheries Training and Development Institute and the Government of Barbados and was called a "Mothership" operation. In this exercise, the fishermen were encouraged to spend 2-3 days and nights at sea with the days' catch being stored aboard the mothership in ice before being taken to shore.

In the collector vessel exercise, the vessel is moored at a strategic location to benefit all fishermen who sell their catch directly to the vessel. The administrative arrangements are done with the cooperation of the Tobago Marketing Cooperative, the Fisheries Division, the Cooperative Division and the National Fisheries Company. The catch is transported to the National Fisheries Company in Port of Spain where the fish, both flying fish and associated species, are processed.

Another aspect of the development of the industry was the establishment of a fish processing plant on the island in 1980 which was partially financed by the Agricultural Development Bank, the government agency which finances all aspects of agriculture and fisheries. This company is locally operated and is capable of handling and processing substantial amounts of the catch.

Marketing--In spite of the efforts by fishermen, flying fish did not form a major part of the protein diet of the Tobagonian or the Trinidadian, probably because it was a new species and a taste pattern was not developed, but most certainly the difficulties were also involved with preparation, i.e., removing the numerous bones and methods of cooking. To overcome this problem of consumer acceptance, the Division of Fisheries, Tobago, in 1972 carried out an information and education program in which it attempted to popularize this fish through demonstrating its deboning and preparation to a very wide cross section of the community. In this effort the Division incorporated the assistance of the Divisions of Community Development, Education and Home Economics and demonstrations were given to schools, home economic units, village councils, youth groups, women groups and many other organized and unorganized groups which showed an interest. Alongside these demonstrations, numerous flying fish recipes were developed. The fishing method was also taught and demonstrated to fishermen all over the island. One result of these efforts was alerting the consciousness of the population to a new source of protein which was relatively inexpensive. Also the fisherman was able to land more fish and increase his income.

In the meantime, a thriving cottage industry in the processing of flying fish was being carried out by an enterprising businessman. This involved the deboning, packaging and retailing of the flying fish fillets in groceries and supermarket outlets in Trinidad and Tobago and even Barbados. In this exercise, the businessman would distribute fish to the residences of boners or groups of boners who would debone, fillet and package the fillets which are later collected for freezing and storage. The cottage industry concept is still an important aspect of the development process of the industry.

Future of the Industry--The future of the industry as far as the resource is concerned is dependent on rational exploitation of the stock to the extent that just enough is taken out annually to ensure its regeneration and maintenance. To this end investigations are being carried out to get more information on the biology of the species, the population dynamics and other parameters that would assist to rationalize its exploitation, yet make it a worthwhile industry.

As far as the commercialization of the industry is concerned, the landings so far indicate that the industry would be better served through the establishment of a modern processing plant on the island. It, in addition to utilizing flying fish, should be capable of handling other species such as sharks, dolphin, bonito, tuna, albacore, snapper and others which seem to be quite abundant in the waters around the island.

