Lobster (spiny)	*Panulirus fasciatus*
Mysid	*Neomysis Japonica*
Mussels	*Mytilus crassitesta*, and *Mytilus edulis*
White clam	*Meretrix meretrix*

Many other fishes are caught. Due to our lack of ichthyologists and biologists, an accurate determination of their species cannot be made for the time being.

PART II TECHNICAL PAPERS

THE PELAGIC RESOURCES

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A PLAN FOR THE DEVELOPMENT OF SEA FISHERIES IN THE PHILIPPINES[1]

by
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1. INTRODUCTION

The demand for fish in 1973 is estimated at 1,635,600 metric tons, but the fisheries industry is expected to produce only 1,610,500 metric tons or a deficiency of 25,100 metric tons.

The Philippines has had to import fish annually to make up for this deficiency. The inability of the fisheries industry to meet the demand can be attributed to a number of problems. Foremost among them are:

1. Low productivity and declining yield of areas presently exploited and under-exploitation of many areas of fishery resources.
2. Lack of adequately trained manpower.
3. Lack of capital credit facilities.
4. Poor marketing and distribution of fish and other aquatic products.
5. Lack of ports, harbors, ice plants and cold storage, etc.
6. Need for the improvement of traditional products and development of new ones for export and for import substitution.

The Government through the Bureau of Fisheries hopes to solve these problems and consequently to increase fish production by implementing one or a combination of the following measures:

1. Increase the yield per hectare of inland waters and the catch per vessel; or
2. Increase the area for fishponds and the number of fishing vessels.

To accomplish them, the Bureau of Fisheries has prepared a fish expansion program which aims not only to schieve self-sufficiency in fish by late 1974, but also to able to produce, starting in1975, enough to meet both domestic and export needs.

Thus a loan proposal to the World Bank was made for the expansion of the production capacity of the fisheries industry through improvement of productivity levels in the fishponds, deepsea and municipal fisheries sectors.

This paper proposes a credit scheme whereby funds would be secured from the World Bank through the Development Bank of the Philippines to finance the acquisition of modern fishing equipment like engines, power blocks, winches, nets, navigational aids, fish finders, etc. and to support the investment needs for the acquisition of new fishing boats and fish carriers.

2. THE SEA FISHERIES PROJECT PROPOSAL

2.1 Project description

Basically, the project is a financing scheme designed to support the sea fisheries program directed at the improvement and expansion of the existing fleet. The project includes the acquisition of catcher and boats, carrier and the improvement of existing catcher boats (*i.e.*, installation of winches, power blocks, better engines and nets, motorization of bancas, etc.).

A more detailed breakdown of the composition facilities which make up the project are as follows:

Addition to the existing fleet:	No. of Units
1) 70–90 GT Trawlers	20
2) 20 GT Trawlers	20
3) Pure-seiners	20
4) Combined Trawler Purse-seiners	10
5) Carriers	(No definite no.)
Improvement of existing fleet:	
1) Trawlers and Purse-seiners	120–150
2) Mechanization of "bancas"	6,000

1. Most of the data included in this paper were based on a project study presented to the World Bank to develop the fishery industry.

2.2 Targets

2.2.1 Target setting methodology

The shares of the sea fisheries industry of the desired incremental fish demand requirement in the next few years which need the support of banking institutions were approximated.

In the consideration of the project targets, these figures were regarded as ceilings within which the targets must be set.

After the ceilings were established, an attempt was made to assess the facility needs of the sector. Since data on this matter are most scarce, the value judgement of the FAO/UNDP and the Bureau of Fisheries people who are most familiar with the private sector was mainly relied on. Care was taken so as not to overshoot or exceed target ceilings earlier established. The number and types of faciliteis needed were determined. These figures are most proximate and tentative and were attempted only so as to arrive at a basis in the computation of project investment requirements.

2.2.2 Output targets

The project is aimed at producing some 58,300metric tons of fish in a span of 4 years or at increasing the existing fish catching capacity by about 58,300 metric tons per annum in the 4th year.

The target is further broken down into two (2), namely: targeted production from new boats set at 47,000 metric tons and targeted incremental production from the improvement of the existing fishing fleet set at 11,300 metric tons. A yearly breakdown of these 2 lines of activities under the project is presented below.

	Year			
	1	2	3	4
	(000 M.T.)			
Production of new boats	0	11.7	30.6	47.0
Incremental Production of Existing Fleet	3.8	7.6	11.3	11.3
Total	3.8	19.3	41.9	58.3

2.2.3 Types and number of facilities targeted to be included in the project

The types and number of facilities needed to effect the project's targeted output were approximated. Presented below is a more detailed breakdown of these facilities.

Table 1. Types and number of facilities to be financed under the project

Types of facilities	Year 1	2	3	Total
	Number of Units			
Trawlers (70–90 GT)	5	5	10	20
Purse Seiners	5	10	5	20
Combined Trawler Purse Seiners	2	4	4	10
Trawlers (20 GT)	10	10	–	20
Motorization of bancas	2,000	2,000	2,000	6,000

No attempt was made at specifying the type of carrier recommended for the project. Consequently no approximations of number were made. In the improvement of the existing fleet, no details were attempted as it was most difficult to approximate the scope of improvement which may be included under the project.

2.3 **Project area**

The project is envisioned to cover the fishing areas within the country's territorial water and nearby areas in the South China Sea and the Pacific Ocean. The types of fishes within these fishing grounds include different species of anchovy, big-eyed scad, chub mackerel, round scad, sardines, tuna, albacore, bonito, cavalla, crevalle, croakers, goatfish, hairtail, cutlass, nemipterid, shrimps and slipmouths.

2.3.1 Area of fishing operations

Two schemes of possible operating schedules in the presently known grounds and in new grounds still inadequately explored are envisioned under the project. If the exploration is successful, the pattern would be for most vessels to operate on known grounds initially, with an increasing shift to new grounds as these prove workable. The aggregate data in reference to areas, distances, seasons and catch rates are given as follows:

Table 2. Known ground for purse seining (middle-distance)

Area	Distance-Mile		Months	Fish	Fathoms	Quantity per day, tons		Percentages
	Shore	Base						
Cuyo and North Palawan	10–20	250	May to July	Round Scad	40	From	2.2	55
				Mackerel			0.5	12
				Sardines			0.6	
				Others			0.7	
						Total to 6	4.0	
Sibuguey Bay and Turtle Island	10–60	500	August to October	Round Scad	30–35	From	1.8	45
				Mackerel			0.6	15
				Sardines			1.0	25
				Others			0.6	15
						Total to 6	4.0	

Table 2a. New grounds for purse seining (long-distance)

Area	Distance-Mile		Months	Fish	Fathoms	Quantity per day, tons	Percentages
	Shore	Base					
South China Sea	200	600	August to November	Round Scad Mackerel Sardines Others	60–80	From 6.8 8.0	? ? ? ?

Table 3. Known grounds for trawling

Area	Distance-Mile		Months	Fish	Depth Fathoms	Quantity tons	Percentages
	Shore	Base					
Visayan Sea	10	300	December to February	Mackerel Shrimp Others	2–40	0.5 0.1 1.9	20 5 75
West Sulu Sea	15–20	400	March to April	Mackerel Shrimp Others	60–100	0.3 0.1 3.1	8 3 89

Table 3a. New grounds for trawling

Area	Distance-Mile		Months	Fish	Depth Fathoms	Quantity tons	Percentages
	Shore	Base					
South China Sea	200	1,500	December to April	Snappers Groupers Others	60–100	4.5	?

2.3.2 Weather conditions

There are four major factors in the Philippine weather conditions which affect fishing operations. Three of these are reasonably regular and predictable. The wind blows from the southeast during the period February to May, from the southwest from June to September and from the northeast from October to January. There is commonly a spell of fairly rough weather associated with each change in wind direction, but this dies down fairly quickly. The main weather hazard is that of typhoons and tropical storms. These can occur at any given time of the year. They are, however, rare south of latitude 8°N. All fishing operations come to a complete halt when a typhoon is reported to be approaching. Its effects last from 3–7 days normally. Ten to twenty (10–20) typhoons may affect the country seriously in a bad year. Better years have much fewer typhooons.

Generally speaking, weather ocnditions are consistently better the farther south one goes.

2.3.3 Estimated total sample catch for a six-month period by region

The reported catches for a six-month period from the different regions are hereunder shown:

Table 4. Estimated catch by region

Region	Places Covered	Catch in tons (6 months)
I Dagupan City	Curimao, Bobon, Nagabungan Tulnagan, La Paz, Coyodon Binabalian, Silagui, Balinasay, Ilong Malinao, Luciente, Salud, Pilar Deway and Victory	474.6
II Aparri	Cagayan, Aparri, Ballesteros Buguey, Gonzaga, Sta. Ana	490.0
III Navotas	Balayan & Nasugbu Bay Calaca, Taal, Batangas Bay, Palawan Manila Bay, Honda Bay & Sulu Sea	2,956.0
IV Naga	Ticao Pass, Sorsogon, Albay Gulf Tabaco & Tiwi, San Miguel Bay & Adjacent Ragay Gulf, Paracale, Lamon Bay, Calaguas Is., Burias Pass, Asid Gulf & Sibuyan, Cataingan Bay	45,793.68
V Iloilo City	New Washington, Kalibo, Numancia Makato, Tangalan, Pandan, Libertad Antique	687.2
VI Cebu	Calbayog, Zumarraga, Tarangan, Daran, Maqueda Bay	1,057.2
VII Zamboanga City	Batu-Batu, Bongao, Dapitan City, Dipolog City, Basilan City, Malangas, Margosatubig, Naga, Pagadian, Tukuran	1,767.0
VIII Davao City	Celebes, Sarangani Pujada Bay	989.6 (5 mos. only)

2.3.4 Estimated catch/unit of effort

The estimated catch per unit of effort in the different fishing grounds is tabulated below:

Table 5. Catch per unit effort in different fishing grounds

Fishing ground	KG./Hr.	Daily ave. catch
Tayabas Bay	35.6	302.6
Iloilo	35.6	302.6
Lucena	57.2	486.2
Zamboanga	68.0	578.0
Naga	61.64	423.9
Guimaras Strait	25.6	217.6
Visayan Sea	125.2	1,064.2
Sorsogon	20.2	171.7
Palawan	41.6	353.6
Bacolod	42.4	360.4
Samar	26.2	222.7

2.3.5 Estimates of potential of Philippine waters[1]

The Fish landings from marine waters in the Philippines have been estimated by the Bureau of Fisheries at 926,000 tons for 1971. (This does not include the figures for crustaceans and mollusks.) Of this total, commercial fishing vessels accounted for about 382,300 tons. (As this is the only sector for which any breakdown of the catches exists, estimates of the fishing potential must lean heavity on the data from this sector.)

The statistics recognize nine different types of commercial fishing gear. Of these, six are essentially aimed at pelagic fish species, the bagnet, purse seine, beach seine, round haul seine, long line and gill net, listed in the order of productivity. In 1971, the pelagic gear accounted for 43% of the commercial landings. The remaining three demersal fishing gear are the otter-trawl, muro-ami and hook-and-line, which made up the balance (57%) of the commercial landings. If the species composition is examined, it will be noted that there is a considerable overlap: the pelagic gear catch significant quantities of fish caught mainly by dermersal gear and vice-versa. For example, in 1969, demersal gear landed about 9,400 tons of big-eyed scad (*Caranx crumenophthalmus*) as against 7,600 tons for pelagic gear. In the case of chub mackerel (*Rastrelliger brackysoma*) the values are 11,500 tons for demersal and 12,400 tons for pelagic fishing gear. If we define demersal fish and pelagic fish in terms of the gear which catches a majority of each kind, we find that the pelagic catches include about 9% of demersal species and the demersal catches include about 13% of pelagic species. The point involved in making the distinction is that in the absence of detailed information, it is reasonable to associate total quantity of demersal fish with the area of shallow waters, and as it happens, the cross-over of species between the fishing gear categories more or less cancels out.

Studies from other parts of South East Asia, notably the Gulf of Thailand (Tiews, 1966) indicate a productivity of 30–40 kg./ha. If this value is applied to the Philippine waters of less than 100 fathoms deep, an area of about 200,000 square kilometers, we arrive at a total potential for demersal species of 600,000 – 800,000 tons.

The Food and Agriculture Organization of the United Nations has also made estimates of the fishery potential of Philippine waters in a paper by Shimura and Gulland (1970) included in "The Fish Resources of the Ocean". Their estimate of the total potential of the demersal resources of the Philippines is 600,000 to 1,000,000 tons, and is in good agreement with the estimates of 600,000 – 800,000 tons arrived at above.

2.3.6 Harbour facilities

At present there is not a single fishing harbour in the Philippines despite existence of a commercial fishing fleet of some 2,200 vessels aggregating to 90,550 gross tons. Provision has, however, already been made for the construction of the first fishing harbour at Navotas, Rizal with loan assistance from the Asian Development Bank. This harbour will take care of the needs of the single largest group of vessels, some 758 fishing craft based in Rizal Province and Manila with a gross tonnage of 53,129 tons.

The regions most in need of fishing harbours after Navotas, are Southern Luzon and the Visayas in Fisheries Regions No. III and No. V.

The remaining six Fisheries Regions have much smaller fleets and the urgency of constructing harbours there is much less, in the absence of a specific, regional development plan of sufficient magnitude to warrant harbours specially connected with such a plan. While it is to be expected that regional development will become a feature of future plans, the present approach is essentially on a country wide basis, and the growth of fleets is expected to take place mainly in the existing larger fishing centers.

As can be seen from the latest available Fisheries statistics, only Region III (excluding Manila and Rizal) and V have landings in excess of 10,000 tons per year. The rationale for harbour development in these two Regions is somewhat different. In Region VI there is an urgent need for harbours to cater to the immediate needs of the existing fleet and anticipated expansion. In Region III the need is more related to the economics of diverting the supply of fish required for the Greater Manila area through a harbour conveniently located for vessels fishing in waters in the center and southern part of the archipelago.

The particular sites within Region III and Region V where harbours are most urgently needed are:

1) Dalahican, Lucena, Quezon Province
2) Bacolod, Negros Occidental
3) Cadiz City, Negros Occidental
4) Iloilo City, Iloilo

Detailed studies on these sites have not been carried out yet. In its submissions for proposals of the Country Programme for UNDP assistance in 1972–1976 the Bureau of Fisheries included provision for expert assistance for a project on the location and design of seven secondary fishing harbours. Due to budgeting difficulties this request was excluded from the final NEC submission

1. Refer to "Marine Fisheries Potential in the Philippines and South East Asia" by Einar R. Kvaran. Published in the Fisheries Newsletter (July–Dec. 1971), the Bureau of Fisheries.

to UNDP. In May 1971, a fisheries review and identification mission from FAO/IBRD Cooperative Programme visited the Philippines. The mission considered that three more or less distinct categories of development in landing facilities may be considered:

1) Fishing ports proper, capable of handling vessels up to 100 tons or so;
2) Facilities for fishing boats in conjunction with commercial harbour development; and
3) Miner improvements in existing landing sites.

2.4 **Project cost estimate**

With the types and number of facilities to be included in the project determined, the project costs were calculated. The targeted yearly expenditures presented below were arrived at based on the phasing of acquisition of the project facilities.

Table 6. Cost estimates (in millions) of the sea fisheries project

	No. of units	Cost/ Unit	Total M. P	Total M. $
Marine operations				
A. New Construction				
1. Middle & distant water				
1.1 Trawlers-70-90 GRT	20	1.15	23.0	3.8
1.2 Purse Seiners	20	1.00	20.0	3.3
1.3 Combined Trawler/Purse Seiner	10	1.30	13.0	2.2
2. Near Water				
2.1 Trawlers – 20 GRT	20	0.15	3.0	0.5
B. Improvement of Existing fleet				
1. Trawlers & purse seiners	–	–	9.0	1.5
2. Mechanization of "bancas"	6,000	1.50	9.0	1.5
C. Carriers	–	–	21.0	3.5
D. Working Capital (@ 10%)	–	–	–	1.5
Total for marine fishing				17.8

Table 7. Phasing of total project costs (in millions of pesos)

	1		2		3		Total
	Units	P Mil.	Units	P Mil.	Units	P Mil.	P Mil.
Trawlers 70-90 GRT	5	5.75	5	5.75	10	11.50	23.00
Purse Seiners	5	5.50	10	10.00	5	5.00	20.00
Comb. Trawler-Purse Seiners	2	2.60	4	5.20	4	5.20	13.00
Trawlers 50 GRT	10	1.50	10	1.50	–	–	3.00
Sub-total	22	14.85	29	22.45	19	21.70	59.00
Improvement of Existing Fleet	–	3.00	–	3.00	–	3.00	9.00
Mechanization of "bancas"	–	3.00	–	3.00	–	3.00	9.00
Deep sea fishery total		20.85		28.45		27.70	77.00

2.5 **Benefit-cost analysis**

As was earlier mentioned in the economic evaluation of the fishpond models under the project, the IRR is felt to be adequate for the purposes of this project.

Assuming an output price of P1,500 per metric ton of fish, an evaluation of fisheries projects revealed the following results:

Table 8. Internal rates of return of sea fisheries projects

	IRR
Purse Seiners	49
Trawlers 70–90 GRT	36
Trawlers 20 GRT	36
Combined Purse Seiner-Trawler	44
Carriers	–
Improvement of existing commercial fleet	–
Motorization of bancas	–

Compared with the accepted standard of 20% for agricultural or non-agricultural enterprises in developing countries, the above-mentioned results appear to be fairly high and hence, feasible and acceptable.

3. CONCLUSION

Of the estimated P209 million which will be required to finance the entire loan project proposal, an estimated P107 million will be required to finance the sea fisheries sector. Of the initial working capital requirement of the enterprises to be financed, P9 million will be for this sector. The bulk of the project cost is estimated at P98 million.

The Philippine negotiating panel composed of officials from the Development Bank of the Philippines, Department of Finance and the Department of Agriculture and Natural Resources is now in Washington negotiating with the officials of the World Bank for the terms and conditions of the loan. It is hoped that at this time of writing the proposal has been approved and the loan documents already officially signed.

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