



**DRAFT REPORT**  
of the  
**FISHERIES PROJECT PREPARATION**  
**MISSION TO CEYLON**

**FAO/IBRD**  
**Cooperative Program**

**FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS, ROME**

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### Currency Equivalents

US\$ 1.00	=	Rs. 4.76 (Ceylon Rupees)
US\$ 210,000	=	Rs. 1 million (Ceylon Rupees)



## PREFACE

An FAO Mission under the FAO/IBRD Cooperative Programme visited Ceylon from 12 to 26 October 1965 to identify projects in the field of fishery development. The Mission consisted of :

- C. Beever, Fishery Economist (Mission Leader)
- A. Tubb, Fishery Biologist
- G. de Moras, Fisheries Commercial Consultant

The terms of reference of the Mission were as follows :

- (i) To evaluate available data on resources of fishing grounds accessible to fleets based on Ceylon ;
- (ii) to estimate requirements for and costs of facilities, equipment and personnel for exploiting these grounds ;
- (iii) to recommend appropriate forms of commercial organization for fish production and marketing ;
- (iv) to study the economic and social aspects of increased fish production ;
- (v) to review the Government's fishery development plans in the light of the above points ;
- (vi) to assist the Government in the definition and preparation of a fishery development project (or projects) considered suitable for financing."

The Mission held discussions with Ceylon authorities, particularly with the Department of National Planning and the Ceylon Fisheries Corporation.

The Mission wishes to record its grateful appreciation of the information, hospitality and assistance it received during its stay in Ceylon.



## SUMMARY

(i) The project identified concerns the expansion of fish production and is envisaged to form an integral and the major part of the operations of the Ceylon Fisheries Corporation, an autonomous public enterprise. The project is proposed in two stages : the first stage involves the acquisition of fishing vessels and is considered to be ready for appraisal ; the second stage involves the establishment of shore facilities for larger and more diversified fishing operations and requires further project preparation during 1966-67.

(ii) Fish is the principal source of animal protein in Ceylon and developments in fish production and consumption will have a great impact on the food economy. The previous Government's draft Ten-year Fisheries Development Plan appears rather ambitious and is under revision at present, particularly in respect of its phasing and the role of private enterprise. However, the new Government attaches high priority to fishery development and the present project will provide a basis for a more crystallized policy and for the more realistic fishery development plan which is being formulated.

(iii) The first stage of the project consists of the acquisition or construction of 5 stern trawlers of 100-110 ft.; 100 coastal fishing vessels of about 36 ft ; multi-purpose vessels of 55-60 ft. and 2 tuna longlining vessels of 250-300 tons. It includes also the acquisition of 1000 outboard motors for mechanizing traditional craft. The second stage of the project provides for the construction of berthing and storage facilities at Trincomalee, Thondamanar and Kalpitiya. The first stage can be carried out independently of the second provided the Ceylon Fisheries Corporation goes ahead in the next two to three years with part of its plans to increase facilities for ice production, cold storage and transport. The increased fish output will probably cause a strain on present facilities but it is considered that it can be handled.

(iv) The first stage covering the acquisition of fishing vessels would be implemented during the three-year period 1966-68. The second stage, covering the construction of additional port terminal facilities, would be subject to further project preparation during 1966-1967 and would be implemented by 1970. While each of the two stages is to be justified on its own merits, and every category of vessels within the first stage could be justified on its own, it is considered that only through integration in a larger project could there be a sufficient impact to make a break-through in fishery development and open a scope for domestic private enterprise to enter this field and for other sources of external financing to become available.

(v) The first stage of the project would cost approximately Rs. 28 million (US \$ 6 million) of which Rs. 24 million (US \$ 5 million) would be in foreign exchange. This includes the cost of the 40 vessels already ordered which may not be eligible for Bank financing. It also includes technical assistance and the cost of studies for the second stage. The second stage itself will cost some Rs. 30 million (US \$ 6.3 million) of which about half would be in foreign exchange. The total cost of the project would therefore amount to approximately Rs. 58 million (US \$ 12.2 million) of which Rs. 39 million (US \$ 8.3 million) would be in foreign exchange.

(vi) The first stage of the project would result in increased supplies of about 25,000 tons of fish annually, valued at about Rs. 30 million (US \$ 6.3 million). As Ceylon is at present importing about 120,000 tons of fish, there should be no difficulty in disposing of the increased output on the domestic market. Incomes of fishermen in the new types of fishing vessels will average about Rs. 4,000 (US \$ 800) which compares favourably with the average per caput income in the country of some Rs. 650 (US \$ 135). Even in the mechanized traditional craft, fishermen are expected to earn Rs. 1,500 to 2,000 annually which compares very favourably with the incomes of fishermen in the non-mechanized traditional craft.

(vii) The internal rate of return for the first stage of the project would amount to more than 50 per cent. Calculated individually for each category of vessels it is always favourable. It is not possible to calculate the rate of return for the project as a whole, including the second stage, as the returns from the second stage cannot be adequately estimated at present. The expected savings in foreign exchange through import substitution are about US \$ 2 million and export earnings from tuna are estimated at US \$ 400,000 supplemented possibly by exports of shrimps.

## 1. INTRODUCTION

1. The project discussed by the Mission with the Ceylon authorities concerns the acquisition of fishing vessels and the construction of shore facilities for diversified operations which are estimated to increase fish production by about one-fourth over the next three years. Current imports of fish products are higher than present domestic production and the envisaged increase in output will avoid an increase in imports, partly substitute them and contribute to alleviate the pressing problem of foreign exchange shortage in Ceylon.

2. The project identified is envisaged to consist of two stages ; the first stage, acquisition of fishing vessels, is considered to be ready for appraisal while the second stage, the construction of shore facilities, will need further preparation during 1967 and 1968. The required studies for the second stage may be included in the first stage of the project, if the latter is approved.

## II. THE FISHERIES SECTOR

### (1) Importance of the Sector

3. In 1964 fish production in Ceylon amounted to some 95,000 tons of fish products, valued at nearly Rs. 140 million (US \$ 29.4 million) at producer prices and Rs. 180 million (US \$ 37.8 million) at market prices. Fish production has doubled since 1958 mainly through the introduction of small mechanized inshore fishing craft. Nevertheless, the fishing industry is still artisanal and involves some 65,000 fishermen in 13 to 14,000 fishing craft or beach seine crews and about 25,000 workers employed in ancillary activities.

4. In spite of the great increase in production, in 1964 Ceylon still imported the equivalent of 120,000 tons (live weight) of fish products at a cost of some Rs. 75 million at c.i.f. import prices (US \$ 15.8 million). Total fish consumption amounted therefore to about 215,000 tons representing a per caput consumption of some 44 lbs. Fish is the main and preferred source of animal protein in Ceylon and the level of retail fish prices has been consistently high, at an average of Rs. 1-1.25 per lb. Fish consumption accounts for 5 percent of total private consumption and for a substantial share of expenditure on food.

5. The tropical waters around Ceylon carry a typically varied marine fauna. There are over 500 varieties of edible fish including many herringlike species, "pony" fish, sardines, pomfrets, flying fish, horse-mackerel, Spanish mackerel, skipjack, garfish and shark. The total extent of these resources is not known since their exploitation has to date been virtually confined to the zone within five miles of the coast. The major exception to this is the trawl fishery of the Wadge Bank and in addition some deep-sea long-lining for tuna in more or less distant waters. However, unexploited resources are known to exist on the continental shelf, an area roughly 10-15 miles in width encircling the island, but much of which has been beyond the range of the present fishing fleet.

6. While no reliable estimate of the total extent of these stocks can be made, the results of the present very limited operations of larger trawlers on the Wadge Bank and experimental fishing with very small trawls in coastal waters indicate that these grounds would support an increase in fishery operations which should at least double current production. For the next two to three years, an increase of 20 to 30,000 tons based on a small expansion of the fleet should be easily attainable. (A more detailed review of the situation is given in Appendix I.)

### (2) Fisheries Organization and Administration

7. Until September 1964 public responsibility for the fishing industry was exercised by the Department of Fisheries located previously in the Ministry of Land, Irrigation and Power, and at present within the Ministry of Industries and Commerce. The Department has a staff of nearly 600, of whom some 50 are senior administrative, scientific and technical staff. Its organizational structure and functions are described in Appendix II. Its activities cover a wide range including general administration and regulation, credit, welfare, extension, fishermen housing, fishery roads, etc. In relation to its activities its budget has been small, about Rs. 10 million (US \$ 2.1 million) annually.

8. In September 1964 the Government established the Ceylon Fisheries Corporation (Whose constitutional terms of reference and organizational structure are shown in Appendix III) with powers to engage directly in commercial fish production and trade and with substantial financial resources amounting to Rs. 93 million (US \$ 20 million) in the year October 1965 September 1966. (See Appendix IV for Capital Budget of Corporation). At present the Chairman of the Corporation is also Director of Fisheries and responsible in both capacities to the Minister of Industries and Commerce. He is, therefore, the executive head of two organizations having different types of functions, whose administrative and management implications need to be defined more closely.

9. The Corporation will continue the assistance so far given to small-scale fishermen through the current mechanization scheme as a large proportion of fish supplies will continue to be derived from these operations. But, by far the larger part of its proposed investments for which it is seeking Government approval, will be devoted to the acquisition and construction of new and larger fishing units operating over a much wider area than traditional craft and supported by facilities and equipment adequate for bulk handling, storage, processing and distribution. The achievement of the Corporation's plans, therefore, will involve a radical modification of the present structure of the industry towards bigger fishing units and in particular a greater degree of centralization as the large units will be operated directly by the Corporation.

### (3) Fish Marketing

10. First stage marketing is mainly in the hands of local merchants ("mudilallis") who take delivery of catches at coastal fishing centres and deliver to wholesalers who in turn sell to retailers in the main urban centres. The "mudilallis" play a crucial role in the structure of the industry. They represent the sole outlet for most of the catches landed and the main source of finance for the construction of traditional craft and fishing gear and the purchase of fuel and other needs of fishermen and their families including the expenses of seasonal migration to fishing camps during the monsoon season. Such a decentralized system involving distribution from so many dispersed landing points is restrictive in the absence of adequate facilities for storage, handling, processing and transport with the result that local "gluts" may occur which cannot be immediately absorbed whatever the demand. Such surpluses are sorted and dried by the fishermen's families, but the process involves losses through spoilage and the prices are lower.

11. An exception to this system is the wholesale market at Mutwal Harbour (Colombo) where the catches of the Corporation's two trawlers are landed and where ice, freezing and storage facilities are available and a small fish-meal and shark-liver oil plant has been installed. Here the Corporation has recently taken over the activities of the former Ceylon Co-operative Fish Sales Union, a central selling agency which for the last ten years has handled the trawlers' catches as well as limited supplies from a few small cooperatives on the coast. Its turnover in 1964 was only some 1,600 tons valued at about Rs. 1.5 million (US \$ 0.3 million), but under the Corporation's management there are signs that turnover will increase substantially through arrangement being made to receive supplies directly from "mudilallis", as well as from cooperatives and from the catches of vessels under the Corporation's ownership or management.

12. Colombo is by far the most important retail outlet and the other main urban markets are also in the south-west of the island where about two-thirds of all fish supplies are consumed\*. In order to deal with the heavier catches resulting from longer voyages of larger vessels, the Corporation has provision in its plans for an additional ice plant and cold storage facilities as well as transport, which will be adequate to accommodate the increased catches over the next two or three years.

#### (4) Fishery Research

13. The Department of Fisheries has a Fisheries Research Station which is staffed by 44 professional staff conducting investigations of the sea and freshwater fishery resources. These include 8 fully qualified fishery biologists, one research chemist, one fisheries technologist and nine fishing skippers, mates and engineers. It has two 42 ft. trawlers for exploratory and experimental fishing. A large volume of information has been assembled and analysed concerning inshore operations and trawling operations on the Wadge Bank. However, the research programme has not been able to assemble and analyse comparable information concerning the deeper and more distant waters as commercial fishing has not been developed in these areas and the Station does not possess the larger research vessel which would be needed for work in these areas. A plan for the reorganization of research work has been formulated and will result in the re-allocation of staff to specific projects to be reported on in three years, or less. This should result in more efficient utilization of the highly qualified scientific staff available to the Research Station and should become particularly effective when supported by information from more intensive commercial operations.

#### (5) Training and Extension

14. A training centre organized with bilateral assistance from Japan relates to the mechanization of small inshore craft. It provides two courses : a one-year course for repair mechanics and a 6 months' course on fishing, each course having 10-15 students. The centre has two small inshore training craft and another on order. Since 1952, FAO/EPTA experts have been providing ad hoc training also in the repair and maintenance of small engines.

15. The Ceylon Royal Navy is also conducting an "apprentice navigation" course for 48 students as a step towards meeting the requirements of larger vessels. In collaboration with the Corporation, the Royal Navy has now elaborated a more comprehensive training scheme for the training of fishing masters, engineers and deck personnel, which is at present under review by FAO with a view to obtaining assistance from the UN Special Fund.

16. In addition to other duties, field staff of the Department of Fisheries have carried out extension work chiefly in connection with the mechanization of inshore craft.

#### (6) Credit

17. The existing credit facilities apply only to the purchase of inshore mechanized boats, engines for the mechanization of traditional craft and fishing gear. The scheme has been operated until now by the Department of Fisheries but is being taken over by the Corporation,

\* See attached map on Movement of Fish Supplies.

on behalf of the Department. The record of repayment has been poor in the past due to ineffective arrangements for collection and many difficulties caused by inadequate repair and maintenance and availability of spares which have disrupted fishing. A new scheme was introduced in 1962 whereby outboard motors can be acquired on a deposit of one-third of the value and 18 monthly repayments. This appears adequate for the mechanisation of traditional craft when repayments are effected by retention of part of the proceeds of sales made to the Corporation.

#### **(7) Fishermen's Cooperatives**

18. About 5,500 fishermen are organized in some 240 cooperative societies comprising fishing societies, credit and sales societies and production and sales societies. Their main function has been to channel credit to members and they have had little success in marketing activities. Lack of experienced management, inadequate finance and dependence on local merchants for sale of catches and for finance have restricted their effectiveness so far.

#### **(8) Draft Ten-year Fisheries Development Plan**

19. The new Government has under review the draft Ten-year Fisheries Development Plan (1965-1975) prepared by the Ceylon Fisheries Corporation during the term of the previous Government. This Plan envisaged an increase in domestic fish production from 95,000 tons in 1965 to over 680,000 tons in 1975 and the development of an export trade, now negligible, to about 220,000 tons, valued at Rs. 315 million (US \$ 66 million) by 1975; production of about 550,000 tons was to be obtained from the continental shelf area and 130,000 tons from the distant-water tuna fishery. To meet these targets the plan proposed the introduction of 3,000 new fishing vessels and a wide range of related shore facilities and services.

20. While the Government intends to formulate a new fishery development plan as a matter of priority and urgency, it is now considering a more flexible approach in view of the following objections to a long-term fishery programme.

- (i) There is insufficient scientific evidence or catching experience to confirm the estimates of potential yields from the continental shelf ;
- (ii) recent experience of declining catch rates of tuna in the Indian Ocean create serious doubts as to whether these stocks could support the introduction of 100 large tuna long-liners, especially since the extent of competition in this fishery cannot be forecast ;
- (iii) it cannot be safely assumed that the international market will absorb exports of the extent and at the rate and prices forecast in the plan ;
- (iv) the introduction of the proposed fleet and shore facilities would involve major structural changes in the industry, requiring managerial, professional and vocational skills which it may not prove possible to develop at a rate consistent with the projected rate of expansion ;

- (v) the plan in its present form provides for very little participation by the private sector and would have the effect of creating a virtual state monopoly of the fishing industry. The present Government is considering its policy on this question and appears inclined to favour more extensive participation by the private sector.

21. Accordingly, the Government is now formulating a five-year plan for fishery development which will involve the acquisition of a diversified but limited fleet and the establishment of related shore facilities consistent with the organizational and operational capacity of the Corporation and the fishery industry. The precise nature of later investments will be decided as the results of these first investments become available. However, there is definitely good scope for fisheries development in Ceylon and the Fisheries Corporation has been allocated a total of Rs. 93 million (US \$ 20 million) for this purpose, of which Rs. 39 million are budgeted for 1965-66.

### III. THE PROJECT

22. The project under consideration represents the first phase of a fishery development effort whose extent will be governed by the results obtained in a series of successive phases. It consists in a limited expansion of fishing operations which appear to be justified, on a commercially viable basis, during the next two or three years and which will supply the experience needed to determine the later phases of expansion.

23. The proposed project embraces the whole coastline of Ceylon as well as sea fishing areas on the continental shelf and tuna fishing grounds in the Indian Ocean. Operations would be conducted mainly from Colombo, Galle, Trincomalee, Beruwela, Kalpitya and Thondamanar, and would comprise trawling, gill-netting, seining, drift-netting, long-lining and pole-and-line fishing. The mechanized traditional craft would operate from numerous smaller fishing havens as well, varying with the incidence of monsoons. The SW and NE monsoons determine the location of small-scale fishing operations with seasonal camps as small-scale fishing cannot be conducted in the sea conditions produced by these winds.

24. The marketing area to be served would eventually embrace the whole island, although it is envisaged that during the first stage of the project marketing operations would be intensified in the present main marketing area, the south-western area served by the ports of Colombo, Galle and Trincomalee, with some extensions of the operation eventually to the north-eastern area.

25. The project involves the exploitation of fishing grounds which, as far as the new vessels are concerned, lie outside the present range of fishing operations with the exception of the areas fished by the two trawlers operating from Colombo, the tuna long-lining vessels formerly operated under Japanese management and an experimental 42-foot vessel operated by the FAO/EPTA master fisherman. The project would have the effect of adding some 12-13,000 square miles of sea fishing grounds to the productivity of traditional craft operating close inshore.

26. The project is envisaged in two stages. The first stage for which immediate external financing is required is the acquisition or construction, equipment and operation of a diversified fishing fleet comprising 112 modern fishing vessels and the mechanization of 1,000 inshore craft of traditional design. It is considered that this first stage can be carried out independently of the second stage which consists of the construction of port terminal facilities at Trincomalee, Thondamanar and Kalpitya, and of a factory for the manufacture of fishing gear. This second stage needs further preparation for its justification and will provide the infrastructure necessary for the further development of fisheries including participation by the private sector.

27. The purpose of the project is to increase fish supplies both for the domestic and export markets through the more intensive fishing of the continental shelf area of Ceylon and limited tuna long-lining operations in the Indian Ocean. Each of the operations of the different

categories of fishing vessels could be considered as an independent, viable activity but they are all regarded as complementary as their combined production will be directed to the same markets through common facilities and services by the Ceylon Fisheries Corporation.

### A. FIRST STAGE—FISHING VESSELS

28. The projected fleet would consist of 112 modern fishing vessels under the ownership and management of the Corporation and 1,000 mechanized inshore fishing craft under the ownership of working fishermen.

#### Vessels under the ownership of the Corporation would comprise

##### (i) STERN TRAWLERS

29. 5 stern trawlers of about 110 ft. would operate on the Wadge Bank (from Colombo) and on the Pedro Bank (from Trincomalee). These trawlers would supplement the operations now being carried out by the Corporation's three trawlers and the four additional stern trawlers to be acquired from Yugoslavia in 1966. The vessels will be fully equipped with navigational and fishing equipment including an initial supply of gear as well as spares. The vessels will be of steel construction and would need to be acquired from abroad. Basic characteristics of this type of vessel are shown in Appendix V(a).

##### (ii) 36.6 ft. MULTI-PURPOSE SHORT-RANGE FISHING VESSELS

30. 100 of this type of vessel are to be acquired. 40 have already been ordered and these might not be eligible for Bank financing. These vessels would employ various fishing methods already well-established in the inshore fishery, i.e. drift-nets, gill nets, baby trawls, long lines and poles and lines. They would be used mainly within a range of fifteen miles and having provision for sleeping quarters and icing of catches, could make longer voyages than those of existing craft. They would operate according to season and fishing conditions from Colombo, Beruwela, Galle, Trincomalee, Thondamanar, Kayts and Kalpitya. Construction could be undertaken in Ceylon if appropriate, but engines, equipment and steel plate would need to be imported. The specifications of this vessel are shown in Appendix V(b).

##### (iii) MULTI-PURPOSE 55-60 FT. VESSELS

31. 5 of this type of vessel would be used according to season and fishing conditions for long-lining, gill net fishing, live bait fishing, trolling and light trawling. Their main functions would be :

to extend the range of fishing with various types of gear in all weathers, except the worst of the monsoon gales, well beyond the range of traditional craft and the 26 ft. and 36 ft. vessels ;

to expand the live bait fishery for skipjack, at present exploited by small inshore craft ;

to allow the trawling for shrimp beyond range of and at greater depth than the present operations which indicate the existence of shrimp in commercial quantities in these deeper waters.

The vessels would need to be acquired from abroad. The main characteristics of this type of vessel are given in Appendix V(c).

(iv) TUNA LONG-LINING VESSELS

32. 2 Japanese-type long liners of about 250–300 tons would be based at Colombo, Trincomalee, Galle, and would operate over the entire Indian Ocean, probably concentrating on the tuna areas in the vicinity of Darwin, Tananarive and the Ghagos Archipelago. The vessels would need to be acquired from abroad. The main characteristics of this type of vessel are shown in Appendix V(d).

33. *Vessels under private ownership* will comprise 1,000 small inshore craft of traditional design mechanized by the installation of outboard motors. According to estimates made by the FAO/EPTA naval architect there still remain between one and two thousand traditional craft, mainly catamarans, which are suitable for the installation of outboard motors. The project would, therefore, provide for the installation of an additional 1,000 outboard motors together with spares in order to continue and accelerate the existing programme of small craft mechanization. These craft would be operated mainly within a range of 5 miles and will be based on small havens all round the coast. All the work involved in the installation of the motors can be undertaken locally under existing arrangements. While the Corporation would be responsible for the acquisition of the outboard motors and for their installation in these craft, the ownership of the motors would be transferred to individual working fishermen through hire purchase arrangements under which fishermen would pay a deposit of one-third of the cost of the motors and repay the balance by monthly or trip instalments over a period of 18 months. The ten new repair shops planned by the Corporation seem adequate for maintenance and repair needs and assuming that private initiative will also enter this field to an increasing extent.

## B. SECOND STAGE—SHORE INSTALLATIONS

34. The second stage of the project is subject to further preparation and economic justification and includes the provision of port terminal facilities at Trincomalee, Thomdamanar and Kalpitya, and the establishment of a factory for the manufacture of fishing gear.

(i) HARBOUR FACILITIES IN TRINCOMALEE

35. These facilities would consist in the immediate future in the provision of 1,000 ft. of quay space with water and power supplies. These facilities will be provided in one of the best natural harbours in the world and little work is involved, therefore, beyond the construction of quay space and sand dredging in the vicinity of the shore line. Much of this can be accomplished with local labour and materials. The existing plans have been prepared by the Port Commission which has recommended the provision of quay-space along the shore rather than finger-piers. At the present stage it is difficult to estimate what will be the extent of the fishing traffic handled by the port in the next few years, but it is assumed that this will include at least 5 trawlers, 30–40 36 ft. vessel, 2 or 3 55–60 ft. vessels, a varying number of 26 ft. vessels and perhaps one of the tuna longliners. Since it is assumed that fishery development will go well beyond the limits of the project studied by the Mission, it seems reasonable to provide for

accommodation which may go beyond the immediate requirements and which may be under-utilized from time to time according to season during the immediate future. The Mission considers it advisable also to examine the provision of assistance in the installation of additional facilities such as market buildings, ice plant and cold storage, but more detailed proposals are required in this respect and these have not been included in the estimates.

(ii) SMALLER HARBOURS

36. The Mission considers also worthy of investigation the provision of fishery shore facilities at Thondamanar and Kalpitya. These, together with the facilities available or planned in Colombo, Galle, Trincomalee and Beruwela, should meet the needs on all the coasts of the limited fleet which the Mission believes should be brought into operation during the next five years. Detailed proposals are required also in this respect.

(iii) FISHING NET FACTORY

37. The Mission also considers worthy of further investigation the proposal for the construction of a factory for the spinning of yarn and the braiding of fishing nets in Ceylon. Apart from the saving of foreign exchange, the successful operation of such a factory locally would greatly facilitate the regular and timely supply of fishing gear. The Corporation is in touch with a Japanese firm concerning the types, capacities and costs of the machinery which would need to be imported and a more detailed proposal will be prepared as soon as these enquiries are completed.

## C. CONSTRUCTION PERIOD

(i) FISHING VESSELS

38. It is advisable that the proposed new fishing vessels be introduced over the two-year period 1966-67 and that the mechanization of traditional craft be carried out over the three-year period 1966-1968.

39. Specifications should be prepared during 1966 in the light of experience obtained with the five stern trawlers being delivered under the agreement with Yugoslavia and orders for the five additional stern trawlers should be placed with a view to delivery in 1967.

40. Orders for 40 of the 36 ft. vessels have been placed with three ship-yards in Ceylon and these contracts should be completed by April 1966. It is recommended that orders for the remaining 60 be placed so as to secure delivery of an additional 20 in 1966 and the balance in 1967. Should the orders be placed locally the capacity of the shipyards concerned would permit this proposed rate of construction to be accelerated depending on whether sufficient crews and appropriate berthing and shore facilities become available.

41. Orders for the 55-60 ft. multi-purpose vessels should be staggered over the two years 1966 and 1967, but should be placed sooner if trained crews are available and especially if good results are obtained quickly through shrimp trawling and live bait fishing for skipjack.

42. Since two crews are already available for the tuna longliners orders could be placed at once with a view to delivery during the latter half of 1966.

43. With regard to the mechanization of traditional craft it is recommended that the Corporation with the advice of the FAO naval architect should make a selection of the craft most suitable for mechanization and that the present programme of mechanization be continued and expanded on this basis, with a view to mechanizing 400 additional craft in each of the years 1966 and 1967 and 200 in 1968.

(ii) FISHING PORT TERMINAL FACILITIES

44. The facilities which the Mission thinks justify further investigation have still to be designed and specified in detail. According to present estimates it is expected that the construction of the facilities envisaged for the immediate future at Trincomalee will be completed by the end of 1970, and that the other two small harbours proposed will be completed about the end of 1968. For the next two years therefore, it is foreseen that the operations of the new types of vessels going into commission will be based on Colombo, Beruwela, Galle and Kayts.

#### D. COST ESTIMATES

45. The present cost estimates have been based very largely on detailed estimates already prepared by the Ceylon Fisheries Corporation although wherever possible these have been compared with the capital and operating costs of similar projects in other countries as well as with those of operations already conducted in Ceylon. The costs of the fishing vessels have been estimated as follows :

	<i>Local currency</i>	<i>Foreign exchange million</i>	<i>Total</i>
5-100 ft. stern trawlers	—	Rs. 10.00 (US \$ 2.00)	Rs. 10.00 (US \$ 2.00)
100-36 ft. coastal vessels*	Rs. 3.00 (US \$ 0.60)	Rs. 6.50 (US \$ 1.40)	Rs. 9.50 (US \$ 2.00)
5-55-60 ft. multi-purpose vessels	—	Rs. 2.50 (US \$ 0.50)	Rs. 2.50 (US \$ 0.50)
2-250-300 ton tuna long-liners	—	Rs. 3.50 (US \$ 0.70)	Rs. 3.50 (US \$ 0.70)
1000 mechanized traditional craft	Rs. 0.15 (US \$ 0.03)	Rs. 1.50 (US \$ 0.30)	Rs. 1.65 (US \$ 0.33)
Total	Rs. 3.15 (US \$ 0.63)	Rs. 24.00 (US \$ 5.00)	Rs. 27.15 (US \$ 5.63)

\* As orders have been placed already for 40 of these vessels, these may not be eligible for Bank financing and total requirements would have to be reduced by Rs. 3.8 million, and foreign exchange requirements by Rs. 2.6 million.

46. The phasing of commitments will be as follows, although payments for fishing vessels are normally effected in accordance with the stages of construction, as prescribed in the contracts negotiated with individual builders.

*million Rupees*

Type of vessel	1966		1967		1968		Total	
	Total	Foreign Ex-change	Total	Foreign Ex-change	Total	Foreign Ex-change	Total	Foreign Ex-change
Stern trawlers	—	—	10.00	10.00	—	—	10.00	10.00
36 ft. vessel*	5.70	3.90	3.80	2.60	—	—	9.50	6.50
55-60 ft. vessel	1.00	1.00	1.50	1.50	—	—	2.50	2.50
250-300 ton tuna longliner	1.75	1.75	1.75	1.75	—	—	3.50	3.50
100 mechanized traditional craft	0.66	0.60	0.60	0.60	0.33	0.30	1.65	1.50
Total	9.11	7.25	17.71	16.45	0.33	0.30	27.15	24.00

47. The above estimates are based on various tenders in respect of smaller vessels inspected by the Mission or available in FAO records and in some cases there are substantial differences in the prices quoted according to the country of origin and certain differences of specification. (A more detailed breakdown of the costs cited above appears in Appendix VI).

48. With respect to fishing port terminal facilities, estimates for the facilities envisaged for the immediate future at Trincomalee terminal have been prepared by the Port Commission on behalf of the Corporation. The cost is estimated at Rs. 10 million (US \$ 2.1 million) of which about half will be required in foreign exchange. Costs in respect of the smaller harbours at Thondamanar and Kalpitya have been roughly estimated at Rs. 10 million each (US \$ 2.1 million) and probably about half of this will be required in foreign exchange for dredging and imported materials.

49. The Mission is of the opinion, therefore, that the first stage of the project, the acquisition of vessels, costing Rs. 27 million (US \$ 5.6 million) of which Rs. 24 million (US \$ 5 million) would be required in foreign exchange, could be investigated immediately with a view to appraisal. The second stage, the construction of shore facilities, costing Rs. 30 million (US \$ 6.3 million), of which about half would be in foreign exchange, would need further preparation in the coming three years and the costs of study for this second stage should be included

\* As order have been placed already for 40 of these vessels, these may not be eligible for Bank financing and total requirements would have to be reduced by Rs. 3.8 million, and foreign exchange requirements by Rs. 2.6 million.

in the first stage. The combined cost of the total project, including an additional US \$ 180,000 (based on FAO/EPTA/UNSF standard costing) for technical assistance would be as follows :

*million Rupees*

	<i>Total</i>	<i>Foreign Exchange</i>
First Stage	27.2*	24.0 †
Technical Assistance	0.9	0.3
Studies for Second Stage	0.1	0.1
Second stage	30.0	15.0
Total costs of combined project	58.2	39.4
or	US \$ 12.2	US \$ 8.3

\* This may have to be reduced by Rs. 3.8 million if not eligible for Bank financing.

† This may have to be reduced by Rs. 2.6 million if not eligible for Bank financing.

#### E. ORGANIZATION AND MANAGEMENT

50. The project as a whole would be an integral and the major part of the programme of the Ceylon Fisheries Corporation and in that form would be incorporated in the Government's fishery development plan being formulated. The Ceylon Fisheries Corporation will be the executing agency. (See paragraphs 8 and 9 and Appendix III).

51. The public administration of fisheries in Ceylon is in a transitional stage and the fields of action of the Fisheries Corporation and the Fisheries Department respectively have to be more clearly defined particularly in the field of research, training and credit. It appears to the Mission that the Corporation should concern itself primarily with matters relating directly to commercial fish production and trade, and perhaps certain research, training and credit activities which relate directly to its specific operations within the fishing industry. Obviously the activities of the Corporation and of the Department will need to be carefully coordinated but this should not be difficult when the two agencies report directly to the same Ministry.

52. As shown in Appendix III, the board of directors of the Corporation comprises an economist and experienced administrator as Chairman, an engineer, formerly of the Colombo Port Commission, as vice-Chairman and Technical Director, an economist also on the board of the Small Industries Corporation as Economic Director, an accountant as Finance Director, and the Captain of the Ceylon Royal Navy as Maritime Director. The experience represented on the board, therefore, is varied and comprehensive ; but in the view of the Mission its efficiency would be increased by the addition of a Director with experience in commercial fish production and trade.

53. The composition of the senior executive staff comprises some eighteen technical and managerial staff. The acquisition of additional facilities will undoubtedly create the need for additional staff : but with the reservations stated below concerning the need for foreign

experts the present executive and technical staff appear adequate to deal with the expanded operations recommended by the Mission, with the addition of a manager for each of the new port terminal facilities proposed, and some unskilled labour.

54. The financial resources of the Corporation are considered adequate to cover the recurrent operating expenses of the new fleet. Since it has only recently taken over the fishing activities of the Fisheries Department and the fish-marketing activities of the Ceylon Cooperative Fish Sales Union, a profit and loss statement of its commercial operations was not available. However, the Union, which has been working since 1952, had a working capital of Rs. 1 million in 1963 to which must be added additional income accruing from sales during 1964-1965. Additionally, the Corporation can borrow against assets of some Rs. 14.5 million owned by the Union and of Rs. 11 million taken over from the Department of Fisheries.

(i) TECHNICAL ASSISTANCE

55. The Mission would strongly recommend that foreign experts be engaged for the purpose of executing certain aspects of the project under the authority of the Ceylon Fisheries Corporation and that an effective scheme of fishermen's training be instituted as a matter of urgency. With respect to foreign experts, the Mission would recommend the following :

- (a) one experienced commercial fish marketing superintendent to supervise, advise and assist in the organization of all the fish marketing activities carried on by the Corporation ;
- (b) a fishing fleet manager to advise on the maintenance and servicing of the proposed new fleet ;
- (c) while the marketing manager could probably supervise the very limited processing in which the Corporation engages at present in Colombo (fish meal and shark-liver oil) it would also be desirable to engage a fish processing engineer with good commercial experience to supervise the additional processing activities which the Corporation will be engaged, especially freezing and possibly canning. This would be particularly important if, as it is hoped, it proves possible to develop an export market demanding high quality products.

56. In addition, it is assumed that the expert assistance which the Government has requested under the UN Expanded Programme of Technical Assistance will be available for at least the first two or three years of the execution of the project. This is expected to comprise the present master fishermen assisting in inshore fishing operations, the present naval architect, currently concerned with the construction of the 36 ft. vessels, and expert on stern trawling who has just been appointed, and an expert on fishing gear technology who is to be appointed shortly and would certainly be qualified to supervise the establishment of a fishing net factory.

(ii) TRAINING

57. With regard to the fishing operations to be conducted by the proposed fleet, the availability of trained crews will be a crucial factor and in this connection the Mission would strongly recommend the establishment of training facilities with assistance from the UN Special Fund as recently proposed to FAO by the Government (see paragraph 15). If these facilities are provided and combined with existing facilities, the vessels can be manned by the time they go into commission.

58. Two experienced crews who were trained on the Japanese tuna longliners are available for the proposed *tuna longliner vessels*.

59. The transition from the 26 ft. vessels now in operation to the 36 ft. *vessels* recommended should not present major technical difficulties although the masters of these vessels will need additional training in navigation and pilotage, which can be readily provided by the Ceylon Royal Navy. They will also need some training in the use of new types of fishing gear which can best be undertaken during the course of fishing operations.

60. The training of crews for the proposed stern trawlers and the multipurpose 55-60 ft. *vessels* will involve more thorough preparation and longer courses, from the standpoint of seamanship, navigation and fishing operations. For the purpose of the recommended project sufficient key personnel should be available as a result of experience gained during the operation of the present trawlers and the additional four to be obtained from Yugoslavia. However, since it is envisaged that the project would lead to further extension of the fishing fleet, experience gained from the limited fishing operations to be conducted during the next two or three years will not be sufficient to ensure efficient fishing operations without formal training.

61. For the type of training required in the preceding paragraph, the Corporation and the Ceylon Royal Navy strongly favour the establishment of specialized training of Navy personnel, particularly for the new larger fishing vessels using electronic and mechanical equipment. This personnel would already have received secondary level education and during the course of their naval training would have become familiar with the use of different types of equipment especially for navigational purposes. From the stand-point of level of education and training this might therefore provide a valuable source of skilled manpower for the fishing fleet.

62. The Ceylon Royal Navy in collaboration with technicians in the Corporation has therefore prepared detailed schemes for the training of different categories of fishing personnel, which it is intended to implement through a U.N. Special Fund project.

63. With regard to this proposed UN Special Fund project (see also Para 15), it is recommended that these schemes be urgently examined by FAO with a view to early negotiation of the request for assistance from the UNSF.

### (iii) CREDIT AND PRICES

64. The system introduced since 1962 for mechanization of traditional craft, whereby outboard motors can be acquired on a deposit of one-third of the value and 18 monthly repayments, is adequate provided repayments are effected by retention of parts of the proceeds of sales made to the Corporation. There is no scheme under existing legislation which could provide credit for the larger 36 ft. and 55-60 ft. vessels or larger trawlers. However, such facilities will not be required during the first stage of the project while these vessels are under the ownership of the Corporation.

65. The high general level of fish prices (Rs. 1 to 1.25 per lb.) provides an adequate margin to cover distribution and handling services above the average price of Rs. 0.50-60 per lb. which the Corporation proposes to continue to pay at the quayside or landing point.

## F. ECONOMIC JUSTIFICATION

66. The economic objective of the project to be achieved in the first stage is to increase fish supplies on a commercially viable basis and to reduce dependence on imported supplies. More specifically the project will help to meet the increasing demand for fish without increasing imports, and if possible, will reduce the present level of imports through substitution. In 1964 Ceylon imported the "live weight" equivalent of about 120,000 tons (as compared to a domestic production of 95,000 tons) at a cost of about Rs. 75 million (US \$ 16 million).

67. The implementation of the first stage of the project would increase domestic production by about 25,000 tons annually, valued at about Rs. 30 million (US \$ 6.3 million) at quayside prices or at about Rs. 40-50 million (US \$ 8.4-10.5 million) at retail\*. Tentative estimates indicate the savings of foreign exchange through substitution for imports would be about US \$ 2 million and foreign exchange earnings from the export of tuna and skipjack might be of the order of US \$ 400,000, supplemented possibly by exports of shrimp. The second stage of the project is intended to provide a basis for the further expansion of domestic production, at least to double its present level.

68. Pending preparation in full of the port terminal works recommended in the second stage of the project, it is possible to calculate the internal rate of return for the first stage only. This amounts to over 50 percent. Without the mechanization of traditional craft the internal rate of return amounts to 38 per cent. With respect to the fishing vessels, the capital and operating costs and earnings have been estimated by category in more detail and are shown in Appendix VI. These show :

- (a) that the annual net income of a stern trawler costing Rs. 2 million is estimated at Rs. 406,000 giving an internal rate of return over twelve years of about 15 per cent.;
- (b) that the annual net income of a 36 ft. coastal fishing vessel costing Rs. 95,000 estimated at Rs. 42,000, giving an internal rate of return over ten years of over 50 per cent ;
- (c) that the annual net income of a 55-60 ft. fishing vessel costing about Rs. 500,000 estimated at Rs. 140,000, giving an internal rate of return over twelve years of about 35 per cent ;
- (d) that the annual net income of a mechanized traditional craft costing about Rs. 4,600 is estimated at Rs. 4,700 ;
- (e) that the annual net income of a tuna longliner costing about Rs. 1.8 million is estimated at about Rs. 288,000, giving an internal rate of return over 15 years of 16 per cent.

69. Income of fishermen in the new types of fishing vessels are expected to average around Rs. 4,000 annually, which represents a relatively high rate of remuneration in comparison with a per caput income of Rs. 650 for the country as a whole and particularly in comparison with that earned by traditional inshore fishermen. Even in the mechanized traditional craft,

\* According to estimates of retail prices supplied by the Ceylon Fisheries Corporation.

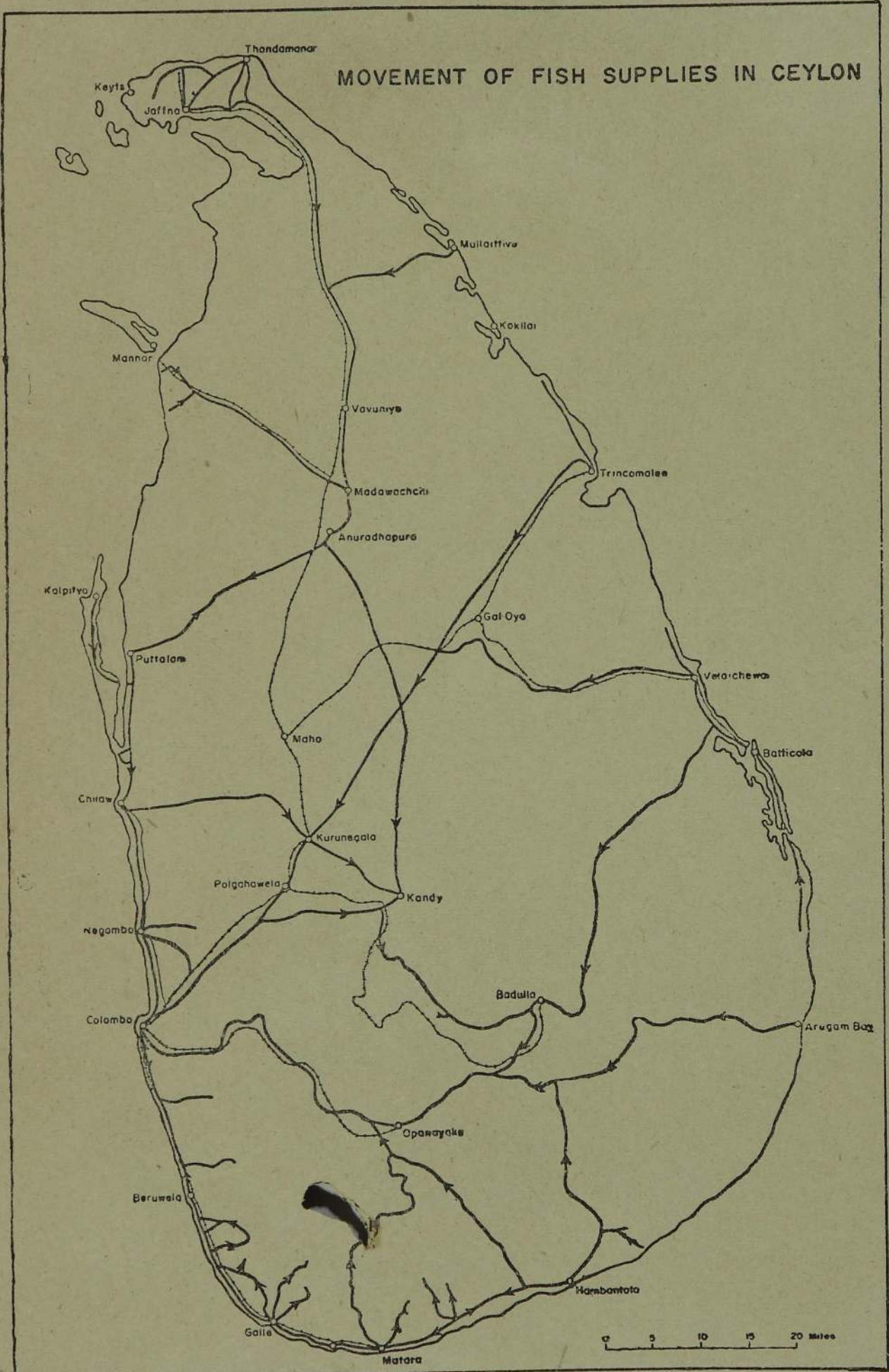
fishermen could expect to earn about Rs. 1,500 to Rs. 2,000 annually, which also compares very favourably with the incomes of fishermen in the non-mechanized traditional craft. While the project does not offer opportunities for additional employment on a large scale, it nevertheless will create opportunities, both in fishing and ancillary activities, for the employment of personnel having primary and secondary level education and unwilling to participate in traditional fishing operations.

70. While it is difficult to forecast the level of export earnings, there is certainly a good opportunity for exporting the tuna from longlining operations in the Indian Ocean, the skipjack which it is felt could be brought under more intensive exploitation and which is now absorbed entirely on the domestic market, and any shrimp which may be found in commercial quantities in the deeper waters of the continental shelf. There is also the possibility that other varieties of fish could be exported in frozen form to export markets in Europe and North America where there is considerable interest in locating additional sources of supply. In this connection some form of cooperation with foreign enterprises may provide a convenient means of developing these export markets. It is understood that the Government is giving serious consideration at the present time to its policies concerning the participation of foreign firms in Ceylon.

71. With regard to the future expansion of the fishing industry in Ceylon, both for domestic and export markets, it appeared to the Mission that once the viability of certain types of fishing operations could be demonstrated, there would be considerable interest on the part of private enterprise to invest and that there would be capital available in local currency for this purpose.



# MOVEMENT OF FISH SUPPLIES IN CEYLON





APPENDIX I

THE FISHERIES RESOURCES OF CEYLON

I. General

The coastal fisheries of the island are conducted almost invariably within five miles of the coast, i.e. normally within 20 fathoms of water. This limit is imposed by the size and seaworthiness of the vessels.

These small vessels are incapable of operation in other than relatively calm seas which even with the favourable monsoon extend only a few miles from the coast. Once out of the lee of the land, sea conditions deteriorate and the vessels are of insufficient stability to provide effective working platforms. Of the native craft, only the larger vallams (large, outrigger vessels) can operate in winds of strengths 3 and 4, and even the mechanised 26' modern fishing craft seem to suffer from similar deficiencies.

The number of fishing days per year is relatively low. For non-mechanised vessels the average over the period 1960-64 was 182 days and for mechanised craft, both native and introduced, the average was 187 days (native mechanised 184 days, introduced 194 days).

By types of craft the catch per boat per year has averaged\*.

	1960	1961	1962	1963	1964
					(tons)
Non-mechanised orus	1.55	1.55	1.70	2.20	2.35
mechanised	4.30	4.25	5.00	9.25	8.60
Teppans and catamarans					
non-mechanised	2.05	2.05	2.55	2.75	3.20
mechanised	5.65	11.55	9.60	8.95	8.75
Non-mechanised vallams	4.90	4.90	5.15	5.05	5.45
mechanised	14.45	18.25	13.45	11.80	7.15
Industrial boats	13.05	13.10	11.35	14.05	13.55

- Data provided by Ceylon Fisheries Corporation, 1965

For non-mechanised vessels the rate of catch has shown a fairly steady increase from about 2.8 tons in 1960 to 3.7 tons in 1964, while in mechanised vessels the annual catch rate has shown an initial increase from 8.1 tons in 1960 to 11.3 tons in 1961, thence declining to 8.2 tons in 1964. The catch rate of the introduced vessels has remained fairly steady over the five-year period at about 13 tons. It seems evident from qualitative data that the relatively low efficiency of the mechanised vessels, particularly the introduced boats, has stemmed from two main controlling factors. These are firstly the inadequate, in some cases non-existent, shore facilities for repair and maintenance, as well as lengthy delays in the procurement of engine spares even when this has been possible, and secondly from the difficulties and inconveniences inherent in current marketing and distribution systems.

An analysis of the total recorded landings from the coastal areas for the period October 1963—September 1964 on a basis of a 5 miles offshore fishery zone indicate an off-take at the rate of 22.3 tons per square mile; alternatively, expressed in terms of the Continental shelf, the off-take is at a rate of 8 tons per square mile. This compares favorably with the estimated off-take for 1954, when the figures show, for the 5 mile zone and zone and Continental shelf 7.0 tons respectively\*.

This tripling of the catch has been effected partly by an increase in numbers of vessels operating, partly by the introduction of synthetic fibres for nets and boats and partly by mechanization.

\* See attached table.

Concurrent with the increased catch, there has also been a general upward trend in the annual catch from vessel, suggesting that the upper limit of catch for the inshore fishermen has not yet been reached. However, some allowance may have to be made for the improvement, over the past decade, of the system for recording and collating catch statistics.

Bearing these various factors in mind, and considering the sociological aspects of the problem, it is evident that further provision for developing the inshore fisheries must be made.

## II. The Trawl Fisheries

### (1) WADGE BANK

Exploratory trawling was initiated in 1907 from Ceylon with the trawler "Violet" of 150 gross tons. During 1922/23 the Ceylon Government undertook a further survey with the "Lilla" of 250 gross tons and later the Madras Government, as part of a general survey of Southern India, employed the "Lady Goschen". Commercial fishing commenced in 1928 with the "Tongkol", 292 gross tons, and "Bulbul", 294 gross tons. These vessels produced fair catches until 1936, but for various reasons the operation was discontinued.

Later in 1945 the Ceylon Government procured the British trawler "Raglan Castle" which fished the bank until 1951. A private company operated the "Aranga" during 1947/48.

In 1950 the Government purchased the oil-fired "Braconglen" which continued operations with good catches up to 1963 when she was de-commissioned. The oil-fired trawler "Maple Leaf" commenced operations in 1953 and is still fishing.

In 1965 the Yugoslav-built stern trawler "Gundara" commenced operations.

Deficiencies in shore facilities, shortage of spare parts, crew problems and other factors held the fishing intensity at a low level, "Braconglen" and "Maple Leaf" averaging only 14 trips each per year during the period 1957/63 with an average of 121 and 145 hours' fishing per trip respectively.

Combining the results for "Braconglen" and "Maple Leaf", gives the following :

Braconglen 1957/63 (excl. 1961)	10,719½ hrs. trawling	9,182,640 lb.
Maple Leaf 1957—1965	18,432 hrs.	10,526,650 lb.

Average catch per trawl hour : 697 lb.

At a towing speed of 4 knots and with a trawl width of 80' the area covered per hour is approximately 187,000 sq. yards ; hence the standing crop may be estimated at 11,500 lb. per square mile.

Given a gross area of the bank as 4,000 sq. miles, a total standing crop takeable by the gear of up to 46 million lb. may be estimated.

The average rate of off-take per boat per year over the period 1957/65 was 1,342,600 lb., i.e. approximately 2.9 per cent. of the estimated standing crop.

The current contract with Yugoslavia provides for the supply of an additional four vessels which, if operated on Wadge Bank, might be expected, on the basis of the above figures, to result in a total off-take, including the two vessels at present in operation, of approximately 18 percent of the estimated standing crop. This does not appear to be excessive, nor too highly speculative.

Nevertheless, should evidence be obtained over the first few years of operation that this Bank is incapable of sustaining exploitation at this rate, or that there is great variation in catch rate in different areas of the Bank, there is scope for operation in the deeper coastal waters of the Island, i.e. between 20/60 fathoms, or on the north-central extension of Wadge Bank, off-shore from the coast of Kerala

### (2) PEDRO BANK

Fishery data for this area, estimated roughly at 1,500—2,000 sq. miles, are few and not susceptible to the type of examination undertaken for the Wadge Bank data. Nevertheless, there appears good reason to believe that fisheries are available in commercial quantities with a possible catch per hour rate of about 500/600 lb.

This Bank extends northward from Ceylon and should in the initial phases be capable of supporting operations of up to five trawlers, the assignment of vessels to be reviewed on a basis of actual catch data.

### (3) CEYLON COASTAL GROUNDS

The catch records of the two small trawlers "Canadian" and "North Star" operated on an exploratory fishing basis during 1964/65 and using baby trawls and prawn trawls in shallow waters (2/18 fathoms with an average of 6 fathoms) give, depending upon the area fished, fishing rates of 8/942 lb. per hour with an overall average of 295 lb. The net used had an opening of about 40', with a towing speed of 2.5 knots, the area covered per hour being approximately 59,000 sq. yards. The standing crop may then be estimated at something in excess of 15,500 lb. per square mile, since this type of gear probably harvests rather less than 60 per cent. of fish on the ground.

The operations of these two small vessels, of approximately 45' overall length, have been restricted by the size of the vessel and the power of the engine, and it has not been possible to operate in waters over 20 fathoms depth.

A preliminary study of the catches obtained indicates the continued presence of smaller or greater numbers of immature prawns in the shoal waters. This would suggest the probable presence in deeper waters of mature prawns of considerably larger size and possibly in somewhat greater quantities.

Sporadically, catches including adult prawns have been made, but the records so far show no consistency in the areas or times of occurrence of the larger forms.

There is a clear need for extended operations in deeper waters but it is probable that these could be conducted only by vessels of about 60' overall length and adequately powered.

In addition, from time to time, the small trawls have taken small amounts of top quality fish species which tend to shoal near the bottom and generally wider off shore than the trawls have been operating.

These include such forms as the larger Jacks (carangidae) and occasionally small tunas. A greatly expanded program of test fishing is clearly indicated.

### III. Beach Seine Fishing

Up to the present one of the major contributors to Ceylon's locally caught fish supply, the Beach Seine fishery appears to present evidence that it is reaching or has reached its maximum in terms of men, gear and effort. Unfortunately, and as in the case of most other sectors of the production side of the industry, detailed statistics are lacking.

Sivalingan and Medcaf (1957) have presented some information from which certain approximations can be made.

One Beach Seine haul covers an area of about 160,000 sq. yards and from a sample of 22 recorded hauls from various sites the catch ranges from 4 to 1,940 lb., with an average of 304 lb. per haul. The available standing crop vulnerable to the gear may then be calculated as about 6,000 lb. per sq. mile. It should be noted, however, that the grounds exploited by the Beach Seine extend in practice not more than 800 to 1,200 yards off shore. Nevertheless, this estimated crop is of a similar order of magnitude to that calculated for trawling operations, that is within the 0/10 ton range.

A large proportion of the net sets are "blind", that is the net is simply set in the hope of catching such fish as may be present. However "school" sets are made as and when schools of fish are sighted within range of the year. The catch rate per net year accordingly fluctuates markedly, largely depending on the movement inshore of pelagic or semi-pelagic species, such as Skipjack and cavanyids. These latter species appear to have been responsible for the sudden increase in the catch per net-year from 13.2 tons in 1963 to 17.8 tons in 1964. The two years 1961 and 1962 showed a year figure of 16.6 and 16.4 tons respectively. There does not appear to be scope for further development of this fishery.

### IV. Deep Sea Tuna Fishing

Little has been done from Ceylon to exploit the stocks of large tuna known to occur within a range of 3,000 miles of the southern coast.

The original development plan envisaged the eventual employment of a large fleet of distant water fishing vessels to encourage tuna long-lining.

While it would be premature to propose a rapid establishment and expansion of such a fleet it should be remembered that vessels with Japanese masters operating off and out of Ceylon have been obtaining up to 2.5 tons of tuna per day's operation.

Today, following the complete deterioration of the two tuna longliners which operated out of Colombo from 1959/63, Japanese based and captained vessels regularly visit Ceylon to recruit deck personnel.

Reports indicate up to 60 Japanese vessels fishing in the South Indian Ocean and it would appear reasonable to assume that Ceylon based and manned vessels should be capable of economic operation.

The development of the deep sea long lining operation will depend to a great extent on the availability of suitable bait. Verbal reports indicate the presence at appropriate seasons of large quantities of squid in certain areas and it may be found desirable to develop the fishery for these to ensure, at least in part, suitable supplies of bait for the long line vessels.

## V. THE SKIP JACK FISHERY

The fishery for Skipjack (Blood Fish) contributes significantly to the total production for the island and the fish is highly acceptable to the people.

Largely due to the limitations imposed by the size and seaworthiness of the vessels, the fishery has shown quite erratic catch figures over the period for which statistics are available. This fluctuation would appear to be due very largely to fluctuations in current movements and hence in the spatial distribution of the shoals which only a limited number of occasions have become available to the small vessels operating on them.

Qualitative material based on an examination of the size groups and seasons of occurrence of the Skipjack suggest the probability of fairly regular spawning and feeding migrations of fish from one year to three years of age and there would appear to be extremely good grounds to expect that with larger vessels of greater range and seaworthiness considerably greater quantities of Skipjack could be taken.

As in the case of deep water trawling referred to above it is probable that vessels of 55/60' overall length would be necessary. Such vessels could operate both live bait fishing and gill netting with only minor modifications of the deck layout.

In relation to the live bait operations there will of course need to be an improvement in the arrangements for supplying bait. The bait fisheries used at present are taken by small coastal fishing boats and the quantities captured appeared to be governed by the particular requirements of the present fleet. Exploratory bait fishing using lights and lampara nets is clearly indicated and this type of operation could be undertaken either by some of the existing vessels or by the larger vessels suggested.

## VI. BRACKISH WATER FISHERIES

Experiments so far undertaken by the fisheries authorities have shown on a pilot scale operation excellent results in the production of market fish in brackish water ponds. The results so far obtained compare very favourably with the results achieved in the large established culture operations conducted in the Philippines and Indonesia. Production of up to 1,000 kilos per hectare has been achieved in the initial experiments.

Moreover, test fishing in the Gulf of Mannar appears to indicate the availability of adequate supplies of milk fish fry to support the development of a considerable area of brackish water ponds.

Initial work in this field in the Negombo area is designed to bring into operation, within the next two years, upwards of 2,000 hectares of brackish water ponds. Since this development can be undertaken on a basis of local labour and equipment it should receive a high priority in the plans of the fishing industry development.

It is considered premature to recommend a greatly enhanced development of this particular operation until reliable figures on production per hectare from commercially operated ponds can be obtained.

## VII. FRESH WATER FISHERIES

Over the past fifteen years steps have been taken encouraging the development of fisheries on both native and introduced stocks in the natural waters and the exploitation of impounded waters stocked with introduced species. Some small development in pond culture of selected species of fish has been achieved.

It would not seem desirable under the present circumstances for the fisheries authorities to give high priority to further development in this field, particularly since if the present development plans for natural fisheries development are successful and appropriate marketing and distribution facilities can be provided, the demands for fish in the hinterland can almost certainly be met with comparative ease.

It may be expected, however, that there will continue to be some interest in the inland fisheries and production from them will supplement supplies from marine sources.

## VIII. CONCLUSIONS

It seems evident that the present level of production from local fish stocks is controlled primarily by the size and sea-worthiness of the vessels. Given larger vessels of greater range and greater stability in rough water, the present 5 mile limit on operations should be extended appreciably. It does not seem unreasonable to expect that vessels in the 36' and 60' classes could conveniently extend their operations to at least 15 miles offshore and, with appropriate gear, exploit the presently untouched stocks in the 20-60 fathom zone.

The present rate of catch of 22.3 tons per square mile of the shallow inshore waters may of course be affected to some extent by more distant operations, but there is a much higher probability that operations in deeper waters will tend to exploit stocks at present untapped.

A relatively conservative programme of introduction of 100 vessels of 36' foot o.a.l. five of about 60' o.a.l. and five medium trawlers (to exploit Pedro Bank and coastal grounds beyond 20 fathoms during the next few years together with a revitalisation and improvement of the existing inshore fleet should result in an increase of landings of 20,000 to 30,000 tons per annum at least. Subsequent expansion of the fleet along selected lines will depend on results achieved in the first phase.

Probably the best estimate on the information available is a potential production from the waters within the 100 fathom line of about 150,000 to 200,000 tons. This would include and may be increased by the development of the pelagic fisheries, particularly for skipjack only the fringe of which is at present exploited, and the operation of distant water tuna long lining with possibly gill netting for the smaller size groups.

The above estimate of 20,000 to 30,000 tons for the early phase of expansion is of course based on a relatively small expansion of the fleet and the need for a period of time to define the most productive lines of expansion as well as for the establishment of the essential shore facilities.

Table 1

(1) Reporting Area	(2) Area of Continental Shelf	(3) Area of Sea 5 mls. from Coast	CEYLON PRODUCTION ANALYSIS										
			Western (4) Catch Oct. 63 to Mar. 64 (Tons)	Eastern (5) Catch Apr. 64 to Sept. 64 (Tons)	4+3 (6)* Oct. 63 to Mar. 64 Catch per Sq. Mile	5+3 (7)* Apr. 64 to Sept. 64 Catch per Sq. Mile	6+7 (8)* 1963-64 Catch per Sq. Mile	(9) Year	BEST (10) Catch (Tons)	YEAR Western (11) Oct. to Mar. Catch per Sq. Mile	Eastern (12) April to Sept. Catch per Sq. Mile	11+12 (13) Catch per Sq. Mile (Tons)	(14) Catch 1954 (Tons)
19. Kalpitiya	..	160	966	531	6.0	3.3	9.3	1957	4,186	—	—	3,500	22.0
20. Mundel	..	160	2,473	1,166	15.4	7.3	22.7	1961/62	7,472	42.0	4.7	1,318	8.2
21. Chilaw	..	83	2,538	842	30.5	10.1	40.6	1963/64	3,380	30.5	10.1	3,037	24.5
3. Negombo	..	128	992	701	7.7	5.4	13.1	1962/63	1,963	7.0	8.3	949	7.4
1. Colombo/Moratuwa	..	115	430	87	3.7	.8	4.5	1960/61	1,977	7.6	9.6	296	2.6
2. Beruwela	..	128	1,538	42	12.0	.3	12.3	1962/63	2,372	16.3	2.2	447	3.5
4. Balapitiya	..	83	1,569	260	19.2	3.1	22.3	1962/63	6,157	68.0	6.2	1,167	14.0
5. Dodanduwa	..	42	159	69	3.8	1.6	5.4	1963/64	228	3.8	1.6	184	4.4
6. Galle	..	64	202	45	3.1	.7	3.8	1960	787	—	—	64	1.0
7. Matara	..	153	657	139	4.3	.9	5.2	1961/62	6,698	31.0	12.8	1,636	10.6
8. Tangalla	..	128	1,047	250	8.2	1.9	10.1	1960/61	4,038	28.8	2.7	1,067	8.3
Gap. A†	..	(460)											
18. Kalmunai	..	218	7,166	5,780	33.0	26.5	59.5	1963/64	12,946	33.0	26.5	4,111	18.8
17. Batticaloa	..	224	3,732	6,318	16.6	28.4	45.0	1962/63	13,356	18.0	41.6	2,208	10.0
16. Mutur	..	224	248	393	1.1	1.7	2.8	1962/63	1,088	1.2	3.6	426	1.9
15. Trincomalee*	..	173	1,007	1,426	6.0	8.2	14.2	1962/63	2,529	4.4	10.1	616	3.5
14. Mullaitivu	..	283	594	4,800	2.1	17.0	19.1	1961/62	6,369	5.8	18.7	668	2.3
11. Point Pedro	..	231	1,058	1,428	4.6	6.2	10.8	1959	3,696	—	—	470	2.0
10. K.K.S.	..	230	1,180	2,114	5.1	9.1	14.2	1963/64	3,294	5.1	9.1	1,190	5.1
9. Jaffna	..	597	8,892	12,766	15.0	21.4	36.4	1963/64	21,658	15.0	21.4	3,897	6.5
12. Mannar	..	346	4,041	4,458	11.6	13.0	24.6	1963/64	8,499	11.6	13.0	970	2.8
13. Arippu	..	155	1,701	928	11.0	6.0	17.0	1963/64	2,629	11.0	6.0	653	4.2
Total ..	10,422	3,925	42,277	45,502	10.8	11.6	22.3					27,889	7.0

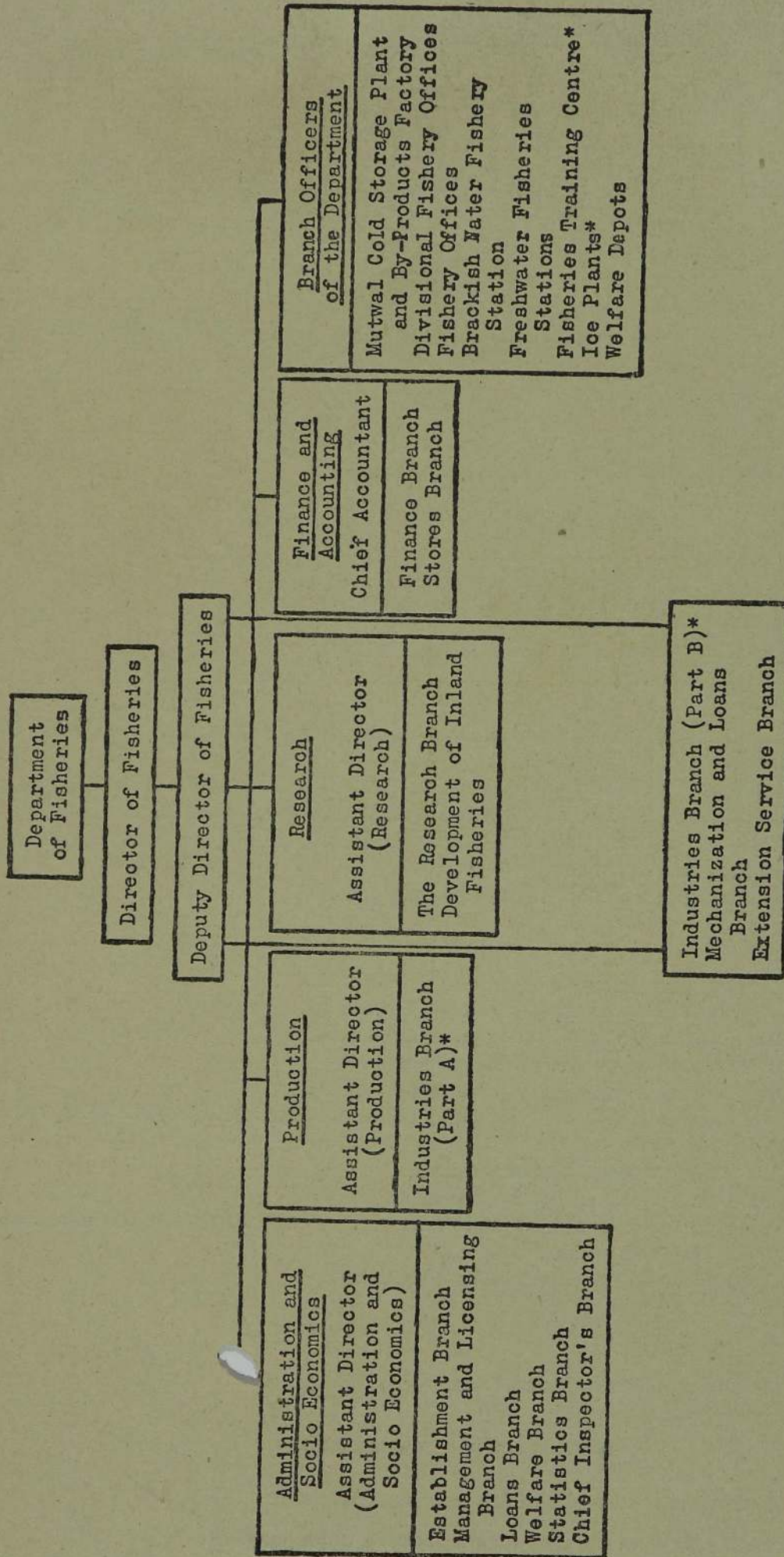
\* Based on 5 miles seaward fishing zone.

† Coast of Yala National Park Area, fishing prohibited

‡ Up to midway line between Ceylon and India.

ORGANISATIONAL STRUCTURE OF THE DEPARTMENT OF FISHERIES

Ministry of Industries  
and Fisheries



\* Now taken over by the Ceylon Fisheries Corporation

## FUNCTIONS OF THE DEPARTMENT OF FISHERIES

### Administration and Socio-Economics

#### ESTABLISHMENT BRANCH

- (a) Staff and personnel including such matters as appointments, dismissals, discipline.
- (b) Records.
- (c) Welfare and recreation of officers.
- (d) Training of officers.
- (e) Maintenance of Head Office and branch offices.
- (f) Matters such as translation, stenography, typing.

#### MANAGEMENT AND LICENSING BRANCH

- (a) Fishing disputes.
- (b) Public inquiries into fishing disputes.
- (c) Legislation and regulations for the control of fisheries.
- (d) Anti-dynamiting work.
- (e) Registration of fishing craft.

#### LOANS BRANCH

- (a) Issue and recovery of loans to fishery co-operatives for the purchase of and repairs to craft and gear and for marketing.
- (b) Issue and recovery of loans to individual fishermen for the purchase of and repairs to craft and gear
- (c) Recovery of loans granted under the Emergency Food Production Scheme 1942-1946.
- (d) Organization and development of fishery co-operatives with the assistance of the Department of Co-operative Development.
- (e) Supervision of the activities of fishery co-operatives.

#### WELFARE BRANCH

Matters relating to :—

- (a) The scheme of Relief to Fishermen in Distress.
- (b) The Fishermen's Accident Compensation Scheme.
- (c) The provision of fishery roads in remote areas.
- (d) The provision of housing for fishermen by the State.
- (e) The acquisition of land for beaching boats, construction of auction sheds, issue of bad weather warnings.
- (f) The transport fleet of the Department.
- (g) The issue of Crown timber for building boats.
- (h) The issue of salt for fish-curing and the running of welfare depots at which fishery requisites are sold to fishermen at fair prices.
- (i) The operation of the Fisheries Training Centre.
- (j) Propaganda

#### STATISTICS BRANCH

(1) Collection of data on the following :—

- (a) Production of fish.
- (b) Operation of powered and non-powered craft.
- (c) Prices of fish.
- (d) Imports and exports of fish and fish products.

(2) Statistical analysis of data for research and other purposes.

**CHIEF INSPECTORS BRANCH**

Matters relating to the activities of Fishery Inspectors and Divisional Fishery Inspectors.

**Production**

**INDUSTRIES BRANCH (PART A)\***

Matters relating to :—

- (a) The operation of the Mutwal Cold Storage and By-Products Factory.
- (b) The operation of trawlers, patrol boats and experimental fishing vessels.
- (c) The Co-operative Fish Sales Union.
- (d) International organizations.

**BRANCHES UNDER DEPUTY DIRECTOR OF FISHERIES**

(i) *Industries Branch (Part B)\**

Planning matters relating to :—

- (a) Coastal navigation aids such as beacon lights and reef gaps for entry of fishing boats.
- (b) Air Sea Rescue Service.
- (c) Tax concessions on imports of marine engines and fishing tackle.
- (d) The operation of ice plants.
- (e) The establishment of fishery harbours.

(ii) *Mechanization Loans Branch\**

Loans for the purchase of mechanized boats, inboard engines and outboard motors.

(iii) *Extension Services Branch\**

(a) Matters concerning the activities of Extension Officers, namely :—

- (1) Regular inspections of mechanized boats and engines for defects and technical advice.
- (2) Propaganda in the use of new and improved fishing techniques.
- (3) Conduct of courses on the operation and maintenance of marine engines.

(b) Fisheries Newsletter.

**Research**

**RESEARCH BRANCH**

- (a) Identification of fish and fish species.
- (b) Biology and biometry of fish species.
- (c) Research into problems on fishery technology (marine, brackish and fresh water).
- (d) Bacteriology.
- (e) Algology.
- (f) Chemical analyses.
- (g) Exploitation of pearl fishery.

**BRANCH FOR THE DEVELOPMENT OF INLAND FISHERIES**

- (a) Fresh water fish culture and propagation.
- (b) Fresh water fish farming.
- (c) Control of capture of fish in fresh water bodies.
- (d) Matters relating to the operation of the fresh water fisheries stations.
- (e) Fresh water fishery surveys.
- (f) Brackish water fish culture and propagation.
- (g) Brackish water fish farming.
- (h) Control of capture of fish in brackish water bodies.
- (i) Matters relating to the operation of the Brackish water fisheries station.
- (j) Brackish water fishery surveys.

\* Now transferred to the Ceylon Fisheries Corporation.

**Financing and Accounting**

**FINANCE BRANCH**

- (a) Budget.
- (b) All matters relating to Departmental finances including payments and control of expenditure.
- (c) Internal audit.

**STORES BRANCH**

- (a) Indenting, custody and issue of stores.
- (b) Distribution of fishery requisites through welfare depots.

**Branch Offices of the Department**

**MUTUAL COLD STORAGE PLANT AND BY-PRODUCTS FACTORY\***

- (a) Freezing and storage of fish.
- (b) Operation of trawlers and fishing vessels.
- (c) Manufacture of Shark Liver Oil, Fish Meal and other by-products.

**DIVISIONAL FISHERY OFFICES**

Supervision of the work of Fishery Officers..

**FISHERY OFFICES**

All fishery matters in their respective areas.

**BRACKISH WATER FISHERIES STATION**

Experiment and culture of brackish water fish.

**FRESH WATER FISHERIES STATIONS**

Experiment and culture of fresh water fish.

**FISHERIES TRAINING CENTRE\***

- (a) Practical and theoretical training of fishermen and repair mechanics.
- (b) Research and experiment with a view to improving fisheries techniques.

**ICE PLANTS\***

Manufacture and sale of ice for the preservation of fish.

**WELFARE DEPOTS\***

Sale of fishery requisites to fishermen at fair prices.

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\* Now Transferred to the Ceylon Fisheries Corporation.

## THE CEYLON GOVERNMENT GAZETTE

EXTRAORDINARY

No. 14,186—Thursday, October 1, 1964

(Published by Authority)

## PART I : SECTION (I)—GENERAL

*(Separate paging is given to each language of every Part in order that it may be filed separately)*

## GOVERNMENT NOTIFICATIONS

L. D.—B. 36/57

## FIRST SCHEDULE

The purpose for which the industrial undertaking is constituted shall be to undertake all or any of the following functions :—

- (i) Fishing operations, including deep-sea trawler fishing, to be undertaken directly by the Corporation or through authorised Agents;
- (ii) The processing of fish (including canning, curing and drying) and the manufacture of fish by-products, either directly by the Corporation or through authorised Agents ;
- (iii) The wholesale or retail marketing and distribution of fish, either directly by the Corporation or through authorised Agents ;
- (iv) The construction and maintenance of fisheries harbours and fisheries shore installations, including cold-rooms ;
- (v) The import and export of fish and fish products ;
- (vi) The importation and sale of gear, tackle and other requirements necessary for the fishing industry ;
- (vii) The execution of work for and on behalf of the Fisheries Department or any other Government Department, being work connected with or for the promotion of the fishing industry ;
- (viii) The construction of boats and other craft for the fishing industry ;
- (ix) The provision of repair and maintenance facilities for fishing boats ;
- (x) The manufacture and sale of fisheries requisites.

The State Industrial Corporations Act, No. 49 of 1957

## ORDER UNDER SECTION 2

BY virtue of the powers vested in me by sub-section (1) of section 2 of the State Industrial Corporations Act, No. 49 of 1957, I, Maithripala Senanayake, Minister of Industries and Rural Development, do by this Order, with the approval of the Government—

- (i) specify the industrial undertaking constituted for the purposes specified in the First Schedule hereto as the industrial undertaking to which this Order relates ;
- (ii) declare that a corporation shall be established for the purpose of setting up and carrying on the aforesaid industrial undertaking ;
- (iii) assign the corporate name "Ceylon Fisheries Corporation" to the Corporation ;
- (iv) specify that the initial capital of the Corporation shall be rupees ten ;
- (v) state that the principal place of business of the Corporation shall be at Colombo ;
- (vi) fix five as the number of members of the Board of Directors of the Corporation ;
- (vii) appoint the persons specified in the Second Schedule hereto as the first members of the Board of Directors of the Corporation ; and
- (viii) appoint Mr. S. S. H. Silva as Chairman of the Board of Directors of the Corporation.

MAITHRIPALA SENANAYEKE,  
Minister of Industries and Rural  
Development.

## SECOND SCHEDULE

The members of the Board of Directors of the Corporation shall be—

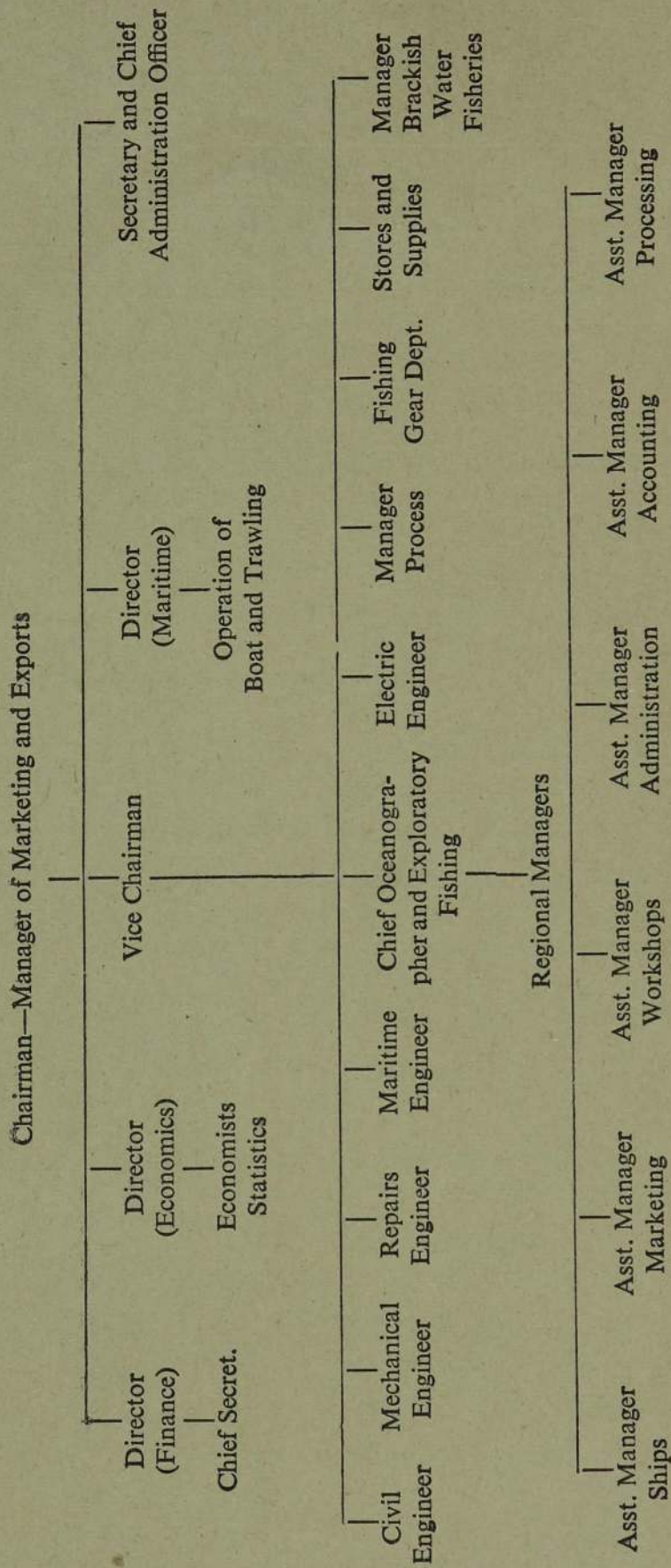
1. Mr. S. S. H. Silva
2. Mr. G. F. P. Withana
3. Mr. E. de S. Wickramaratne
4. Commodore R. Kadirgamar
5. Mr. G. V. S. de Silva

Colombo, September 30, 1964.

9—245

CEYLON FISHERIES CORPORATION

Organizational Structure



## CEYLON FISHERIES CORPORATION—CAPITAL BUDGET—1965/66

<i>Item</i>	<i>Description</i>	<i>Total Estimate</i>	<i>Expenditure 1965/66</i>
		<i>Rs.</i>	<i>Rs.</i>
1	<b>Galle</b> Acquisition of land, shore facilities such as storages, freezers, fish meal plants, etc., and the construction of a slipway and a fully equipped workshop—This work is to be carried out in two stages. Stage 1 of the project is estimated to cost approximately Rs. 23 million. Tenders for Stage 1 have already been called and close on 18th January, 1966.	23,000,000	4,000,000
2	<b>Colombo</b> Improvements to shore facilities at Mutwal, construction of a workshop and equipping same. Construction of a boat yard in the Beira—Plans for improvements to shore facilities in Mutwal and construction of workshop in hand. Tenders for the erection of the buildings at Beira Lake have been finalised.	3,900,000	1,900,000
3	<b>Trincomalee</b> Provision of interim shore facilities and repair facilities for small boats	200,000	200,000
4	<b>Temporary Workshops</b> Workshops will be set up at important fishing centres to service and maintain 3½ ton mechanised boats and out-board motors used for mechanising country craft	400,000	400,000
5	<b>Grade "B"—Fishery Harbours</b> Investigations at all sites of the proposed Fishery Harbours and initiating construction work at Hambantota and Kayts. Estimates includes the cost of equipment such as Dredgers. Firms of International Consultants have been invited to tender for the investigations and designs of civil engineering work involved in these Harbours. Representatives of several firms are now in Ceylon. Offers for this work are expected to close on 15th October 1965	11,000,000	3,500,000
6	<b>Boats</b> The following boats are to be introduced :		
		<i>Rs.</i>	
	40 Nos. 11 ton boats	3,200,000	
	5 Nos. Experimental Boats (11-20 ton range)	1,500,000	
	5 Nos. Boats 20-80 ton	2,500,000	
	6 Nos. Tuna Boats	10,500,000	
	1 No. Pole and Line	1,000,000	
	Contingencies and Equipment for Boats	1,300,000	
		<hr style="width: 100%; border: 0.5px solid black;"/>	
		20,000,000	16,500,000

Orders for the construction of 40 11-ton boats have been placed and delivery is expected to be complete by April 1966.

## APPENDIX IV—(contd.)

<i>Item</i>	<i>Description</i>	<i>Total Estimate</i>	<i>Expenditure 1965-66</i>
		<i>Rs.</i>	<i>Rs.</i>
	Design for a 45-foot boat has been completed by the F.A.O. Naval Architect attached to this Corporation. It is expected to commence building of this boat immediately		
	Offers for 5 Nos. 20-80 ton boats have been called and will close on 30th September 1965		
	Offers for 6 Tuna Boats closed on 7th September 1965 and the offers are now being scheduled		
	Preparation of specifications for both Pole and Line Boat and equipment is in hand.		
7	<b>Gear Factory</b>		
	It is proposed to negotiate in the near future with the manufacturers of raw materials and equipment manufacturers regarding the setting up of a Factory. The requirements of fishing gear for Ceylon is now being worked out in detail with a view to working out the operational specifications of the fishing gear factory	10,000,000	1,000,000
8	<b>Brackish Water Fishery</b>		
	It is proposed to complete 500 acres of Brackish Water Farm during 1965-66. Of the 500 acres, 400 acres will be in the Kalpitiya Lagoon. The balance 100 will be constructed in Mannar to be utilized as fry farms to augment the supply of fry	2,000,000	2,000,000
9	<b>Training and Research</b>		
	It is proposed to set up a Training Institute at Trincomalee	2,800,000	2,000,000
10	<b>Marketing</b>		
	Purchase of land, construction of Wholesale Markets, purchase of transport vehicles and equipment and payment to C.C.S.F.U. for assets taken over	3,000,000	3,000,000
11	<b>Navigational and Fishing Aids</b>		
	(Echo Sounders, Fish Finding Equipment and provision of Beacon Lights) Offers for Echo and Fish Finders have already been closed and are being examined	1,000,000	1,000,000
12	Office Equipment and Furniture	1,700,000	1,000,000
13	<b>Communications</b>		
	Purchase of radio equipment for 11 ton boat and commencement of work on shore facilities	1,000,000	500,000
14	<b>Contingencies</b>		
		2,000,000	2,000,000
		<u>82,000,000*</u>	<u>39,000,000</u>
	Total Estimate of work 1965-66	Rs. 82 million	
	Adding value of assets vested in the Corporation	Rs. 11 million	
	Total	<u>Rs. 93 million</u>	

\* Does not include the value of assets vested in the Corporation.

**GENERAL CHARACTERISTICS OF STERN TRAWLER OF TYPE  
SUITABLE FOR OPERATION IN CEYLON**

About 110' Loa. (Canadian West Coast type). General type as shown, but adapted for tropical fishing and with reduced hold capacity no side ramp arrangement ; centre ramp only or trawl drum. Hydraulic deck machinery. Refrigeration machinery for hold cooling (storage of fish in ice). Medium speed direct engine of about 650-700 hp, reduction gear, controllable pitch propeller. Accommodation 14-16 officers and crew. Approximate cost excluding fishing gear, built in Japan \$400,000 maximum.



## DEPARTMENT OF FISHERIES

## Specification for 36½ feet Steel Fishing Boats

## I—GENERAL

## 1. Main Dimensions

L. G. A.	36' 6"
L. W. L.	33' 5"
Beam Max	11' 0"
Beam (WL 4½.)	10' 0"
Draft (WL 4½.)	3' 9"
Depth	5' 4"
Displacement (WL 4½)	18 ton
Prismatic (Wl 4½.)	0.572

## 2. Basic Information

The vessel shall be of V Bottom Steel welded construction with a transom stern. It shall have a raised foredeck with forward engine installation, fully insulated fish hold and a 4 berth cabin for the crew, forward. The anchor chain shall be stored in the forepeak. A wheelhouse shall be fitted over the forward part of the engine room and have port side steering and engine controls, chart table with storage underneath. A sink with fresh water hand pump ; space for cooking facilities shall be provided on starboard side. The wheelhouse entrance shall be at the aft and the engine room entrance on the starboard side. Entrance outside on the main deck and access to the forward cabin shall be from a hatch at the fore end of the wheelhouse at centre. A removable wooden deck panel shall be provided in the wheelhouse floor for headroom whilst maintenance repairs are carried out and for lifting the engine out in case of a major overhaul. A trawl winch or a line hauler shall be installed immediately aft of the deckhouse and driven off the main engine front power take off. The main hatch shall be located aft of the winch leaving a clear working deck aft. The fish hold shall have a capacity of about 300 cu. ft. sufficient to carry 5 tons of fish and ice. The vessel shall be equipped for either *stern trawling, long lining or pole and line fishing*. The vessel shall be constructed in accordance with the following, Drawings\*, read together with the specifications given hereafter :

1. General arrangement (DRAWING NO. 36—01)
2. Lines Plan (DRAWING NO. 36—02)
3. Construction Plan (DRAWING No. 36—03)
4. Typical sections (DRAWING No. 36—04)
5. Off-set Table
6. Details of Rudder Assembly and Stern Bearing (DRAWING No. 36—05)
7. Details of Mast and Boom Fittings (DRAWING No. 36—06)
8. Details of hauler and winch transmission (DRAWING No. 36—07)

## 3. Materials

All materials and fittings shall be subject to approval by the Director of Fisheries or any Officer authorized by him, and

- (a) Steel—shall be stamped by Lloyds or equivalent of country of origin for ship building.
- (b) Timber—shall be well seasoned, clean grown hard-wood of an approved quality and reasonably free from knots, shakes and other defects.

\* Drawings could not be given to the Mission but they are available for inspection in Colombo.

**4. Workmanship**

The workmanship in the boat shall be according to the best boat building practices and shall be carried out and completed to the satisfaction of the Director of Fisheries or any person authorized in that behalf by the Director of Fisheries.

**5. Welding**

Welding shall be in conformity with the best practice employed in shipbuilding. The tenderers shall satisfy the Director of Fisheries that they possess adequate plant and have suitably trained personnel for the due performance and supervision of the class of welding work to be undertaken.

**6. Zinc Spraying**

Zinc spraying shall be done by the metalising process with zinc in the molten state. Spraying shall be done after thoroughly sand blasting or shot blasting the surfaces and thickness shall be not less than 0.009 ins.

**7. Galvanising**

All items to be galvanized shall be done by the hot process.

**8. Painting**

All millscale shall be removed from steel work and thoroughly wirebrushed before any paint is applied (Colours as specified or as agreed on)

- (i) Hull outside from keel to WL  $5\frac{1}{2}$ , sand or shot blasted, zinc sprayed, 1 anti-corrosive + anti-fouling.
- (ii) WL  $5\frac{1}{2}$  top bulwark, sand or shot blasted, zinc sprayed, 1 anti-corrosive + 1 marine finish colour.
- (iii) Inside bulwark and top of main deck and raised deck, zinc sprayed, 1 anti-corrosive—1 marine finish colour, on the exposed parts under wooden decks 2 red anti-corrosives.
- (iv) Outside deckhouse, sand or shot blasted, zinc sprayed 1 anti-corrosive + 1 marine finish.
- (v) The wooden roof covered by canvas shall be painted with two coats of marine finish, colour white.
- (vi) Forepeak and steering gear compartment, shall be of bituminous paint.
- (vii) Engine room, crew quarters, inside wheelhouse, 2 anti-corrosive, 1 marine finish (in engine room oil resistant enamel) colour white.

**II—DETAILED SPECIFICATIONS****Scantlings**

Scantlings shall be of sizes as indicated below :

	<i>Inches</i>
Hull (steel)	$6 \times \frac{1}{2}$
Keel, stem	$4 \times \frac{1}{2}$
Sole	$\frac{1}{2}$
Skeg	$\frac{3}{8}$
Rudder Plate	$\frac{3}{16}$
Hull Plating	$\frac{3}{16}$
Transom	$\frac{3}{16}$
Deck	$\frac{3}{16}$
Bulkheads	$4\frac{1}{2} \times \frac{1}{4}$ (bulb section)
Web Frames	
Longitudinals	$2\frac{1}{2} \times \frac{1}{4}$ (bulb section) and $2\frac{1}{2} \times 2 \times \frac{1}{4}$ Angle
Bulkheads stiffeners	$2\frac{1}{2} \times \frac{1}{4}$
Engine foundation	$\frac{3}{8}$
Extension engine foundation	$\frac{3}{16}$
Engine seating plate	$5 \times \frac{1}{2}$
Steel strips welded on deck	$1 \times \frac{1}{2}$
Floors	$\frac{3}{16}$

<b>Timber</b>	<i>Inches</i>
Decking	$\frac{3}{4}$
Beams	$2 \times 1\frac{1}{4}$
Floring-Engine room and accommodation	$\frac{3}{4}$
Fish hold floor	$\frac{3}{4}$
<b>Wheel House (steel)</b>	
Coaming	$6 \times \frac{3}{16}$
Side Plating	$\frac{1}{8}$
2 Deck beams and frames	$2\frac{1}{2} \times 2 \times \frac{1}{4}$ angles
Stiffeners	$2\frac{1}{2} \times \frac{1}{4}$
Bolts	$\frac{1}{4}$ " every 4 inches
<b>Wheel House (timber)</b>	
Top decking	$3 \times \frac{3}{4}$
Beams	$3 \times 2$
Sliding Door	$1\frac{1}{2}$

**Wheel house**

The steel deckhouse with wooden top deck of about 6' × 8' as shown in the general arrangement shall have 9 windows in wooden frames of which 5 shall be drop windows (railway carriage type) 20" × 18" clear view with  $\frac{1}{4}$ " safety glass.

A steering stand portside forward, a table with folding seat and a side board with sink 18" × 12" starboard side aft shall be provided. The sink to be provided with a No. 0 semi-rotary hand pump (brass). Storage cabinets and racks shall be provided on starboard aft for cooking and utensils and on the front side for charts, etc. All instruments and controls shall be conveniently located in the wheelhouse for operation and observation by the helmsman.

**Accommodation**

The cabin shall have accommodation for 4 persons and shall be fitted with bunks and lockers of suitable size—access to forepeak for inspection, painting, etc., shall be by means of a manhole 12" in diameter.

**Engine Room**

The floor shall be  $\frac{3}{4}$ " thick hardwood and shall be fully covered (not slats). Storage cabinets shall be provided for tools, batteries, paint, etc.

**Fishhold**

The fishhold shall be lined with synthetic insulation slabs or spray of approved type 5" thick to the inner surface of the hull and deck and 3" thick to the bulkheads and hatchcover, vapour seal shall be applied and then lined with Gauge 26 galvanized iron sheeting. The floor of the hold shall be covered with 1" thick hardwood. A tunnel shall be provided at the bottom for access to the stern gland and intermediate shaft bearing. Four pillars built up as per details in Drawing and planking 12" ×  $\frac{3}{4}$ " made to measure shall be provided for partitioning the hold. A well shall be provided for drainage, the details of which shall be subject to approval by the Director of Fisheries.

**Hatches**

Dimensions shall be as per Drawings—Locks and hinges shall be of robust design and galvanized.

**The afterpeak**

The afterpeak shall have the steering gear, fresh water tanks and storage space. Entrance to this compartment shall be through a hatch on the deck which is closed by a hatch cover flush with the wooden deck lining.

**Mooring Cleat**

Moorings bit PS and SB side shall be located forward frame No. 10 on a double plate 12" × 12" × 3/8" on which a 12" long × 4" diam. GI pipe is welded. Aft. a cleat shall be 8 welded on gallews.

**Ventilation**

A ventilation duct integral with the SB deckhouse side shall be provided for the engine room, extending from steel decklevel to a height above the forward windows in the wheel house. Size shall be 12"×6". Fixed louvres shall be provided at the mouth out of 1/18" MS sheeting.

**Ladders**

3 Nos. galvanised steel ladders 9" wide shall be fitted for access to engine room and accommodation at the respective hatches. The ladders shall be fabricated with 2"×¼" sides welded to ⅝" round iron treads.

**Rudder**

The rudder blade shall be of mild steel ⅜" thick and the rudder stock mild steel 1¼" diameter. For details of rudder assembly see Drawing No. 36—05.

**Steering Gear**

Steering wheel of 18" diameter over spokes with 2½ : 1 geared bulkhead mounting on a steering pedestal shall have a pulley arrangement as shown in Drawing No. 36—05. Flexible steel galvanised wires of suitable strength shall be used with a tensioning device.

**Fuel Tanks**

Each shall be of capacity 150 gallons welded integral to the hull and well stiffened. The filling pipes shall be 2½" diameter and shall be led to the wooden deck and fitted with a bronze flush deck fitting. The vent pipes shall be led through the deck with a gooseneck ¼" bronze drawoff cocks shall be fitted to the base of the tanks at the end of a sediment bowl and ¾" bronze shut off valves for the delivery shall be fitted 2" above base. A manhole 12" diameter shall be provided for inspection and cleaning.

**Fresh Water Tanks**

Each shall be of capacity 90 gallons welded integral to the hull and shall have a common suction. Each tank shall have a 12" manhole for cleaning. Both tanks shall be interconnected with a 1¼" GI pipe welded at bottom of tanks and shall have a single filler pipe 2½" dia. on one of the tanks led to the deck with a flush bronze deck fitting. The tanks shall be cleaned and cement washed inside.

**2 Nos. Gallows**

Gallows shall be fabricated as per Drawing No. 36—04. Gallows with fittings shall be hot dip galvanized.

**Spars**

Main mast shall be 4" OD×¼" thick MS tube 18 ft. long welded to a box section which fits in tabernacle. Details shown in Drawing No. 36—06. The boom shall be 12 ft. long×4" thick (alternative size shown in Drawing). The following rigging shall be provided :—

- (1) forestays—⅝" diam. steel wire rope or rod.
- (2) sidestays—½" diam. steel wire rope or rod.
- (3) topping lift—⅝" diam. steel wire rope with Manilla runner.
- (4) Guides to boom from gallows—⅝" diam. steel wire rope.
- (5) Lifting tackle Heavy manilla—loads up to 2 tons
- (6) Single sheave wire block—5" diam. steel sheaves fitted with swivel eyes.
- (7) Turnbuckles to be provided for all stays.

**Fittings**

All locks, hinges and similar fittings used on timber work shall be of heavy brass. Deck fittings, stem head fitting and chain pipes shall be of robust construction and galvanized. Mast and boom fittings shall be fabricated as was shown on Drawing No. 36—06 and shall be hot dipped galvanized.

**Marine Engine and Hauling Equipment**

The Director of Fisheries will supply the following :—

- (1) Marine Diesel Engine (40–60 hp) with standard equipment, inside and outside stern bearings, glands, necessary propeller, shafting, coupling and intermediate bearings.

Accessories—Bilge pump, pump for bait tanks, sea water inlet valves and strainers, electrical starting equipment, batteries, generator, remote control speed and gear.

2. Trawl Winch exclusive of transmission gear.
3. Longline hauler exclusive of transmission gear.

All other necessary fittings and materials for the installation of the above equipment shall be provided by the builder. Details of Transmission for Hauling Equipment (Drawing No. 36-07).

**Pumping Arrangements****(1) BAIT TANKS**

Pumping arrangements shall be as shown in Drawing No. 36-04. All main pipes shall be 2" diam. and branches 1½" diam. rigid plastic piping. 1" diam. perforated GI pipe shall be welded on to hull on the outside of stern and 1/3 way from stern on PS and SB as a sprinkler for pole and line fishing. Pipe shall be connected to main through a bronze valve. A separate centrifugal pump will be supplied by the Director of Fisheries for bait tanks.

**(2) BILGE**

Bilge suction pipes at suction well in fish hold and engine room shall be 1" diam. rigid plastic piping and shall be fitted with GI strum boxes so constructed that they can be easily cleaned when shoked. Pipes to be led to engine driven bilge pump.

**(3) WATER TANKS**

Piping shall be provided from tanks to galley pump.

**Electronic Equipment**

The Director of Fisheries will supply necessary equipment such as Radio, Direction Finder, Echo Sounder, etc. The builder shall provide the necessary wiring and have all such equipment installed.

**III—ELECTRICAL**

The following shall be provided by the builder :—

**Wheelhouse**

- 4×40W—12v. or 24v. lights on 2 switches port and starb.
- 1×40W instrument light
- 1 Socket point for compass
- 1 Switchboard with Fuse Box with named switches covering all the wheelhouse, navigation and deck lights.
- 1 plug point for a portable safety type hand lamp with 30 ft. of trailing lead for use in the after peak or fishhold.

**Engine Room**

- 2 Nos. 40W each lights on one switch—lights to be protected with grill
- 1 plug point for a portable safety type hand lamp with 10 ft. of trailing lead.
- 1 Switch board with 15 amp. DPBT main switch, fuses, one volt meter and one ammeter. All switches on switch board to be identified with name plates.

**Masts**

- 1 Masthead—All round light
- 1 Tricolour fishing light
- 1 White steaming forward light
- 1 White steaming astern light





**OUTLINE SPECIFICATIONS FOR A TYPICAL JAPANESE—TYPE TUNA  
LONG-LINER OF 250-300 G.R.T.**

**General Description**

These outline specifications will serve as a guide in quoting for the construction of a fishing vessel for tuna long lining.

The vessel is to conform in layout and equipment as nearly as possible to a commercial Japanese tuna long-liner of about 300 GT.

Accommodation for officers and crew will be provided in the bridge, and in the poop superstructure.

The bridge house will further accommodate the wheelhouse, chart room, officers' mess and one WC/washroom.

The galley, crew's mess, provisions and stores as well as additional WC's and washrooms to be fitted into the poop superstructure.

Fuel and fresh water tanks to be arranged in the double bottom, the wings of the engine room and in the peaks.

**Outline Dimensions**

L	43.0 m
OA	
L	37.5 m
BP	
B	7.5 m
max	
D	3.5 m
Fish Hold Capacity	400 m <sup>3</sup>
Fuel Oil capacity	200 m <sup>3</sup>
Fresh water capacity	25 m <sup>3</sup>
Main engine	800 hp
Speed, maximum	12 knots

Dimensions and capacities are approximate only for the guidance of bidders.

**Complement**

Officers and crew	25-30
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**Classifications**

The vessel is to be constructed according to the appropriate rules issued by the Japanese Government for ships of her class and to be classified with NK.

**Certificates**

The vessel is to be issued with an Inspection Certificate of the Japanese Government for export vessels. Measurement certificates according to Japanese rules for gross and net tonnage as well as certificates for engines, propeller shaft, anchors and chain, navigation and electronic equipment to be issued.

**Fishing and Fish Handling Installations**

Fishing deck machinery to be of the type commonly used on board Japanese tuna long liners of this size. Large fishing gear platform to be fitted on the aft poop and connected to the main deck by a conveyor belt. A freezing

room with a capacity of approximately 6 tons per day at  $-30^{\circ}\text{C}$ , complete with the necessary refrigeration machinery and air blast freezers, to be fitted in the forward part of the poop superstructure. The fish hold to be fully insulated and refrigerated to maintain a temperature of  $-25^{\circ}\text{C}$ .

#### **Fishing Gear**

To be specified and supplied by the owner but to be not less than 400 baskets of line. Provision to be made for carrying this gear.

#### **Anchoring Gear**

To be in accordance with Japanese rules and regulations for fishing vessels.

#### **Engine Room Arrangement**

The main engine shall be a marine diesel engine of about 800 hp. continuous output, of approved make. The engine to be either direct reversible, coupled to an optimum diameter fixed pitch propeller, or non-reversible, driving a controllable pitch propeller through a clutch. Engine and propeller details to be submitted for owner's approval. The choice of make and type of main engine to be influenced by service facilities offered in Ceylon.

An auxiliary diesel engine complete with AC generator, and sufficient capacity to provide all shipboard services, to be fitted. Emergency AC generator to be provided as well, driven by the main engine.

Compressors, pumps, fuel and lubricating oil purifiers as commonly fitted in commercial vessels of this type.

#### **Refrigeration Machinery**

Quick freezing machinery of air blast type with a capacity of about six tons per day at  $-30^{\circ}\text{C}$  to be provided for the freezer room, and Ammonia direct expansion type fish hold refrigerating machinery to maintain a consistent temperature of  $-25^{\circ}\text{C}$  to be fitted.

#### **Deck Machinery**

Windlass, capstan, cargo hoist, to be electric or hydraulic ; steering gear to be electro-hydraulic. Fishing deck machinery to be electric driven. Tools and spares and instruction manuals to be supplied for all machinery.

#### **Navigation Aids**

One gyro-compass with a minimum of five repeaters to be fitted. Gyropilot, radio direction finder, radar, loran, fish finder, echo sounder, receivers and transmitters, all of approved make and type, are to be fitted.

#### **Navigation Lights**

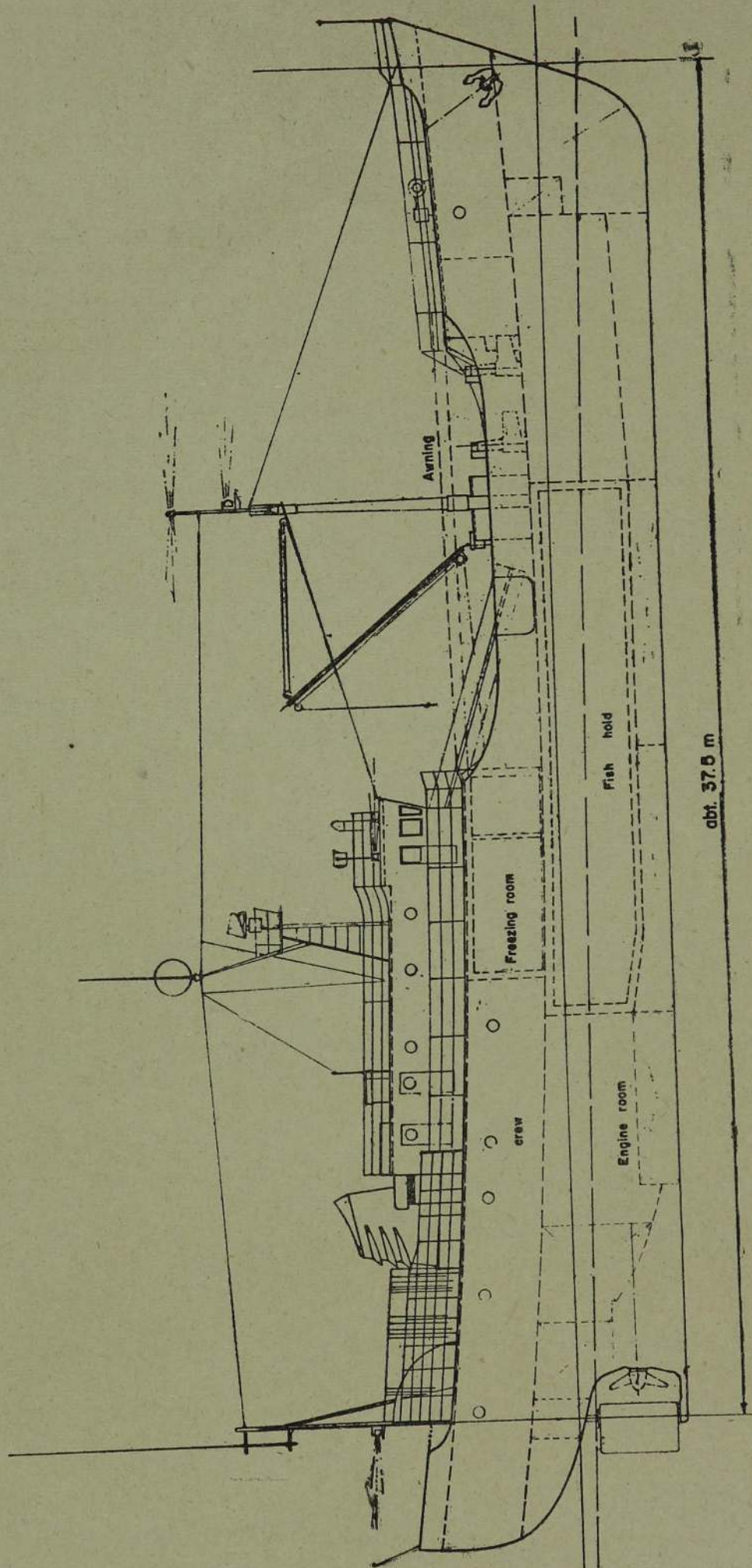
Navigation and fishing lights to be fitted in accordance with international regulations (London Convention 1960

#### **Safety Appliances**

Life saving equipment, fire fighting equipment and medical supplies to be provided in accordance with the relevant provisions of the London Convention of 1960, as far as applicable to fishing vessels.

All equipment installed to be of standard type. Joinerwork and fittings to be of normal standards for fishing boat construction. Vessel to be delivered fully equipped and ready for sea (including catering equipment for 32 persons, mattresses, linen, etc.)

TYPICAL JAPANESE—TYPE 250-300 TON TUNA LONG LINER



**ESTIMATED CAPITAL AND OPERATING COSTS OF TYPICAL 110 ft.  
STERN TRAWLER AND ITS INTERNAL RATE OF RETURN**

	<i>Foreign Exchange</i>	<i>Total</i>
	<i>(Thousand Ceylon Rupees)</i>	
<b>Capital Cost</b>		
Hull	1,188.0	1,188.0
Engine	594.0	594.0
Equipment	198.0	198.0
Initial Fishing Gear	20.0	20.0
Initial Spares	40.0	40.0
<b>Total</b>	<b>2,040.0</b>	<b>2,040.0</b>
<b>Annual Operating Costs</b>		
Fuel and Lubes		100.0
Food		20.0
Maintenance and Repairs		90.0
Consumables		20.0
Ice		25.0
Wages and Salaries		85.0
Catch Bonus		64.0
Maintenance Labour		90.0
Loading and Unloading		10.0
Insurance		50.0
Fishing Gear		80.0
<b>Total Annual Operating Costs</b>		<b>634.0</b>
Depreciation : 8 per cent. on Hull, Engine and Equipment 33 1/3 per cent. on Fishing Gear		158.0
<b>Total Annual Operating Costs including Depreciation</b>		<b>792.0</b>
Annual Proceeds of Catches—800 tons at Rs. 0.60 per lb.		960.0
Annual Net Earnings including Depreciation		168.0
Annual Net Earnings excluding Depreciation		326.0
<b>Internal Rate of Return over 12 years</b>		<b>15%</b>

**ESTIMATED CAPITAL AND OPERATING COSTS OF A 36.6 ft. COASTAL  
FISHING VESSEL AND ITS INTERNAL RATE OF RETURN**

	<i>Foreign Exchange</i>	<i>Total</i>
<i>(Thousand Ceylon Rupees)</i>		
<b>Capital Cost</b>		
Hull	} 40.0	42.0
Engine		21.0
Deck Equipment		7.0
Navigational aids	10.0	10.0
Spares	5.0	5.0
Fishing Gear	10.0	10.0
<b>Total</b>	65.0	95.0
<b>Annual Operating Costs</b>		
Fuel and Lubes		7.1
Maintenance and Repairs—Materials		4.2
Maintenance and Repairs—Labour		3.8
Ice		6.2
Loading and Unloading		1.0
Insurance		2.0
Wages and Bonus of Crew		30.0
<b>Total Annual Operating Costs</b>		54.3
Depreciation : 10 per cent. on Hull, Engine and Equipment 50 per cent. on Fishing Gear		12.0
<b>Total Annual Operating Costs including Depreciation</b>		66.3 or approx. 70
Annual Proceeds of Catches—100 tons at an average first-hand price of Rs. 0.50 per lb.		100.0
Annual Net Earnings including Depreciation		30.0
Annual Net Earnings excluding Depreciation		42.0
<b>Internal Rate of Return over 10 years</b>		over 50%

**ESTIMATED CAPITAL ANNUAL OPERATING COSTS FOR A MULTI-PURPOSE  
55-60 ft. FISHING VESSEL AND ITS INTERNAL RATE OF RETURN**

	<i>Foreign Exchange</i>	<i>Total</i>
	<i>(Thousand Ceylon Rupees)</i>	
<b>Capital Cost</b>		
Hull	250.0	250.0
Engine	126.0	126.0
Equipment	42.0	42.0
Initial Fishing Gear	80.0	80.0
Initial Spares	12.6	12.6
Total	510.6	510.6
<b>Annual Operating Costs</b>		
Fuel and Lubes		32.0
Food		10.0
Bait		12.5
Maintenance and Repairs		27.5
Consumables		6.5
Ice		15.0
Wages and Salaries		40.0
Catch Bonus		30.0
Labour for Maintenance		27.5
Loading and Unloading		6.0
Insurance		12.5
Total Annual Operating Costs		219.5
Depreciation : 8 per cent. on Hull, Engine and Equipment 50 per cent. Fishing Gear		73.5
Total Annual Operating Costs including Depreciation		293.0
Annual Proceeds of Catches —300 tons at Rs. 0.60 per lb.		360.0
Annual Net Earnings including Depreciation	approx.	70.0
Annual Net Earnings excluding Depreciation	approx.	140.0
Internal Rate of Return over 12 years		35%

**ESTIMATED CAPITAL AND ANNUAL OPERATING COSTS OF MECHANISED  
TRADITIONAL INSHORE CRAFT AND ITS INTERNAL RATE OF RETURN\***

	<i>Foreign Exchange</i>	<i>Total</i>
<i>(Thousand Ceylon Rupees)</i>		
<b>Capital Cost</b>		
Hull	—	2.80
Engine	1.50	1.65
Initial Spares	—	0.15
	<hr/>	<hr/>
<b>Total</b>	1.50	4.60
	<hr/>	<hr/>
<b>Annual Operating Costs</b>		
Fuel and Lubes		1.50
Maintenance and Repairs		0.30
Gear		0.50
Wages		3.00
		<hr/>
Total annual operating costs		5.30
Depreciation (estimated)		1.00
		<hr/>
<b>Total Annual Operating Costs including Depreciation</b>		6.30
		<hr/>
Annual Proceeds of Catch		10.00
Annual Net Earnings		3.70
Annual Net Earnings excluding Depreciation		4.70

\* While there are different estimates concerning these costs, since the financial position of the small fisheries is often obscure, other estimates based on higher costs and lower returns still show annual net savings equivalent to or greater than the investment.

**ESTIMATED CAPITAL AND OPERATING COSTS OF A 250-300 TON TUNA LONG-LINER  
AND ITS INTERNAL RATE OF RETURN**

	<i>Foreign Exchange</i>	<i>Total</i>
<i>(Thousand Ceylon Rupees)</i>		
<b>Capital Cost</b>		
Hull	960.0	960.0
Engine	480.0	480.0
Equipment	160.0	160.0
Initial Fishing Gear	150.0	150.0
Initial Spares	32.0	32.0
	<hr/>	<hr/>
Total	1,782.0	1,782.0
	<hr/>	<hr/>
<b>Annual Operating Costs</b>		
Fuel and Lubes		100.0
Food		28.0
Bait		50.0
Maintenance and Repairs—Materials		82.0
Maintenance and Repairs—Labour		62.0
Consumables		20.0
Ice		20.0
Wages and Salaries		113.0
Catch Bonus		85.0
Loading and Unloading		10.0
Insurance		43.7
		<hr/>
Total Annual Operating Costs		613.7
Depreciation : 8 per cent. on Hull, Engine and Equipment 33 1/3 per cent. on Fishing Gear		178.0
		<hr/>
Total Annual Operating Costs including Depreciation		791.7
		<hr/>
Annual Proceeds of Catches—600 tons at Rs. 1,500 per ton*		900.0
Annual Net Earnings including Depreciation		108.3
Annual Net Earnings excluding Depreciation		286.3
<b>Internal Rate of Return over 15 years</b>		<b>16.5%</b>

\* This is based on an assumed price of Rs. 0.75 per lb. which, while some what higher than the " approved Japanese Charter Price" of Rs. 0.65 per lb. is substantially lower than actual prices quoted to the Mission by a commercial enterprise, ranging from Rs. 0.90 to Rs. 1.25 per lb.

## APPENDIX VI (f)

TRINCOMALEE FISHING PORT TERMINAL—ESTIMATE FOR COD BAY  
STAGE I—1,000 FEET OF QUAY WALL, DREDGING, FILLING  
AND LAYING 10" DIAMETRE WATER PIPE LINE

<i>Item</i>	<i>Description</i>	<i>Quantity</i>	<i>Rate</i>	<i>Cost</i>
		<i>100 cu. ft.</i>	<i>Rupees</i>	<i>Rupees (million)</i>
<b>(A) Quay Wall—1,000 ft.</b>				
1	Dredging for Rubble Base	1,500	20	0.03
2	9" Hand Rubble	2,000	60	0.12
3	Placing Hand Rubble	2,000	100	0.20
4	Concrete in Quay Wall (1 : 5 : 6)	3,000	300	0.90
5	Placing Concrete	3,000	100	0.30
				<hr/> 1.55 <hr/>
<b>(B) Dredging</b>				
6	Dredging to 20' 0" below L.W.O.S.T.	80,000	20	1.60
<b>(C) Filling</b>				
7	Filling to 6' 6" above L.W.O.S.T.	60,000	20	1.20
<b>(D) Pipe Line—20 miles long</b>				
		<i>Long feet</i>		
8	10" Diametre Pipe Line	105,600	25	2.64
9	Laying Pipe Line	105,600	5	0.53
				<hr/> 3.17 <hr/>
<b>(E) Power Supply</b>				
10	Power Supply			1.00
	Sum of Items (A), (B), (C), (D) and (E)			<hr/> 8.52 <hr/>
	Contingencies			1.48
	<b>Total</b>			<hr/> 10.00 <hr/>

Source:— Ceylon Fisheries Corporation.











