SOME ASPECTS OF EMPLOYMENT, ORGANISATION AND PRODUCTIVITY IN THE FISHING INDUSTRY OF KERALA
- A SPATIAL ANALYSIS

Submitted in Partial Fulfilment
of the Degree of
Master of Philosophy

by
Ramakrishnan Korakandy
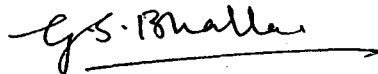
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CERTIFICATE

This dissertation entitled, "Some Aspects of
Employment, Organisation and Productivity in the Fish-
ing Industry of Kerala - A Spatial Analysis" submitted
by Shri Ramakrishnan Korakandy in fulfilment of the
six credits out of the total requirements of twenty-four
credits for the degree of Master of Philosophy (M.Phil.)
of this University is an original work. It has not been
previously submitted for any degree of this or any other
University and may be placed before the examiners for
their consideration.

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C O N T E N T S

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page no.

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ACKNOWLEDGMENTS

INTRODUCTION

The fishing industry in Kerala has a very long tradition behind it. Partial references to the fishermen, their industry and their trade are found in various writings and records of the past centuries. However, very little was known about this section of people and their economy until recently. "The fisherman of independent and picturesque type, so favourite a theme of artists and poets who with his little sailing vessel fished in the immediate vicinity of his own village..." was quite unpopular among economists to evince any interest in them. Perhaps the relative backwardness of the industry might have prompted the economists not to embark on any major enquiries about the people and their economy.

An earlier attempt to study the socio-economic conditions of the fisherfolk in Kerala was made by Mampilli Cherian in 1942. A much more detailed study of the economy of the fisherfolk was made by V.R. Pillai in 1959. This study was primarily aimed at understanding the socio-economic conditions of the fishing community in the erstwhile Travancore-Cochin State. The Department of Fisheries has also conducted a socio-economic survey of the fishermen in the districts of Malabar namely, Cannanore, Kozhikode, Palghat and Trichur, during 1963-64. A few other attempts mainly to assess the socio-economic changes initiated by

the Indo-Norwegian Fisheries Project at Neendakara (Quilon District) were also made - one by Thankappan Asari and Devidas Menon in 1963 and another by Arne Martin Klausen in 1968. The former study is essentially an evaluation of the contribution of the project to the economy of that area. The latter analyses the response of the two fishing communities - the Latin Catholics and the Arayas to the Indo-Norwegian Project. A comparative analysis of the efficiency of the fishing crafts in Kerala was made by the Agriculture Division of the State Planning Board in 1969. The impact of mechanisation of fishing crafts on the socio-economic structure of the Araya fishermen on the Vypeen Island (near Cochin) is outlined by M.S. Prakasam (1972 and 1974).

Much has been published in the newspapers and journals about the achievements, problems and prospects of the fishing industry. However, no attempt has so far been made to study the real problems in the way of development of the industry. Such an attempt is made difficult by the lack of information regarding the capital, labour and skill employed in fishing.

Of late, a vast stock of information, although not very reliable, has come out in various government publications and other sources. It is felt that these various pieces of information can be collected and put together, so that the relevant and the related among them can speak something meaningful about the development of the industry. This exercise is, however, complicated by

the heterogeneity of the spatial units for which informa-
tion was available. This problem has been felt at every
stage of analysis in this study. In fact, the study has
been plagued by this unavoidable difficulty.

The objectives of this study are: (a) to broadly
identify the problems in the way of development of the industry, and
(b) to distinguish between the regions where the industry
is comparatively developed and where it is not. Develop-
ment of fishing industry in Kerala was seriously handicapped
by the peculiar problems which it had to face in the past. How-
ever, since Independence, especially when the government
turned its attention to the problems of the industry the
prospects of development became clearer. The various pro-
blems and the ways of their tackling have been broadly
discussed in Chapter One. Chapter Two analyses some of
the demographic problems of the fishing community.

Recent developments in fishing industry have
changed the occupational pattern of the fisherfolk and the
organisational structure of the industry. Both these phe-
nomena are analysed in chapter Three, with the help of
employment statistics. The developments mentioned above
are basically the result of technological changes that
are taking place in the industry. Chapter Four examines these
t : changes in terms of the productive factor of all equip-
ments used in fishing. With improvements in the fishing
methods, the productivity of the industry is also expected
to increase. But the exact nature of this relationship

cannot be empirically tested, because the available data
dor not refer to the same area. The productivity of the
industry is, however, measured in terms of the labour input.
The problems of productivity and productivity differences
(both spatial and temporal) are discussed in Chapter Five.
Chapter Six seeks to explain statistically (by regression
analysis) how fish catch is responding to changes in fishing
effort (in terms of man-hours). Although the relationship
between technology and productivity is not determined in
Chapter Five, it has been done in Chapter Six. This is
done by fitting a regression model to a different index
of productivity. A summary of findings is given at the
end of this Chapter.

Statistical information for this study is obtained
from the General Economic Tables of Kerala, 1971 (unpublished),
Livestock Census of Kerala, 1972 (unpublished), Central
Marine Fisheries Research Institute, Ernakulam and various
other publications of the central and state governments.

Finally, it should be noted that in view of the
differences in the spatial units for which statistics were
available, the analyses have been made at three distinct
levels. In Chapters Two, Three and Four, the analysis is
made both at the village and the district levels. The unit
of study in the last two chapters is, however, a different
one, namely the various fishing zones of Kerala. The
variations in the units of our study will not materially
affect the findings, rather it would help us understand the
regional economy in its full perspective.

CHAPTER ONE

DEVELOPMENT OF FISHING INDUSTRY IN KERALA - PROBLEMS AND PROSPECTS

Fishing, like farming, is one of the oldest occupations of man and in the Kerala coast, it still continues to be the traditional occupation of the fishermen, who constitute nearly two per cent of the population. The occupation of fishing is primarily at the hunting and collecting stage of organisation in Kerala. The development of fishing industry had been very slow in the past, probably due to its peculiar problems.

The most fundamental problem the fishing industry had to face was shortage of capital and entrepreneurship. Being the traditional occupation of the fishermen who are socially and economically at the bottom, the industry suffered for want of capital and enterprise. The various social evils that are characteristic of the traditional societies and which were very common in fishing community prevented the growth of fishing industry in Kerala. The caste prejudice and the social stigma attached to fishing did not allow private capital to enter into the business of fishing. The occupation of fishing and of dealing in fish was looked upon as a business to be carried on exclusively by the lower classes. The whole industry was thus

left in the hands of people with no capital, no education, no initiative and no business capacity.[1] Another factor which was highly responsible for the slow development of the industry was the prevalence of the most backward techniques in fishing. With very little capital and knowledge, the fishermen were not able to adopt the advanced methods. The success of a fishing team generally depends on bringing better and larger catches in the shortest possible time with minimum costs. The country boats and the catamarans which are the common fishing vessels of Kerala were not able to do this because, they lacked the propelling power to go after the shoals and to bring them immediately after trapping. The consequent delay in delivering the catch adversely affected the price of fish and as a result, the earnings of the fishermen too. Price of fish is very much affected by the deterioration in the quality of fish and the cutthroat competition among the fishermen when the catches are too large.

Fishing industry in Kerala had suffered heavy loses due to lack of good facilities for storage and preservation of fish. The only method of preserving the quality fish in Kerala was to cure it with salt or by sundrying. But, this method was very ineffective and cured fish generally fetch only a low price in the market. In the absence of any other facility for preserving the

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1. K.G. Gupta, Report on Fishery Investigations in Bengal and Behar, (1906), p.35.

quality of fish, the fishermen were forced to sell their catches at rock-bottom prices.

The limited size of the market was a powerful factor in checking the development of fishing industry in Kerala. The market for fish was too small, confined to the limits of 10 or 20 miles from the fishing ports. This was mainly due to the lack of facilities for transporting fish to the interior towns and villages. Fish was generally carried in headloads and bicycles, both of which are poor means of conveying fish to the remote villages. The quantity of fish transported and marketed by these means was too small. A good part of the demand for fish in the interior villages was not met while a large quantity of fish found no market on the beach. The resulting wastage was a strain on the potential for the development of the industry.

The system of marketing fish was not conducive to the development of the industry in Kerala. Marketing of fish was done by a group of intermediaries, who by virtue of their position as financiers to the industry and as fishermen leaders, controlled the fish trade. They lend money to the needy fishermen during the slack season with the hope of realising the capital and interest in the next season. During the fishing season they take the fishermen's catch at a pre-arranged price which is often below the market price. If the market price happens to be less than the arranged price, they will bribe the leader

of the fishing team to clinch the deal at a lower price. At all events, the loss is borne by the fishing team. The prevalence of such collusion between the middlemen and the team leader is always dangerous to the development of the industry because that will adversely affect the productivity of the fishermen.

Development of fishing industry in Kerala was seriously handicapped by the lack of attention from the government. Since the administration of the state was not in the hands of a single government, there was no integrated effort for the development of fisheries in the past.[2] It was only after the states reorganisation in 1956 that a separate Department of Fisheries came into being with the primary objective of developing the fisheries.

Planned development of fisheries had, however, begun since 1953. A new scheme for the development of fisheries was initiated by the Indo-Norwegian Project which started functioning at Neendakara in Quilon district in the same year. The project was launched as a follow up of an agreement signed between the governments of Norway and India and the United Nations in 1952.

The primary objectives of the project were to increase the returns from fishing, introduce efficient handling and distribution of fish, improve the health and sanitary condition of the fisherfolk and raise the standard of living of the community in general.[3] By and large, these

2. Indicates the period before 1956.

3. P. Sandeven, Norwegian Project in Kerala, NORAD (Oslo, 1959), p.14.

objectives have been realised with the help of a series of programmes introduced by the project for mechanisation of fishing crafts, training of fishermen, better handling, preservation and distribution of fish and other social amenities.

Mechanisation of fishing crafts was considered as the chief instrument for increasing the returns from fishing. The project, therefore, evolved a variety of mechanised boats to be issued to the local fishermen at subsidised prices. Fishermen were also given training in the operation of these boats. During its operation at Neendakara, till 1963, the project had given training to nearly 167 fishermen and issued 198 mechanised boats of various sizes to groups of fishermen.[4] The project also established an ice and cold storage plant, a Fishermen Marketing Cooperative Society, a health centre and a scheme for the distribution of fresh-water in the project area.

The project extended its area of operation to Cochin in 1956, which then became its headquarters and the base for conducting deep-sea fishing and research. The project, now known as Integrated Fisheries Project, is an expert agency on fisheries technical problems in Kerala as well as in the whole of India.

The activities of the project were further extended to Cannanore in 1961. At Cannanore it established

4. Planning Commission, Evaluation of the Programme of Mechanisation of Fishing Boats, (New Delhi, 1971), p.91.

a shore-station, a boat building yard, an ice-cum-freezing
plant and a fishermen Training Centre. The steady expansion
of the project to different parts of Kerala has helped the
state to modernise its fishing industry. Apart from the
mechanisation of fishing crafts, the most remarkable con-
tribution of the project was in the field of fish handling
and distribution. Following the demonstration of the improved
methods of handling and preserving fish by the project, a
large number of processing units sprang up at Cochin and
Quilon. The traditional method of curing fish by salt lost
its importance. Quality fishes are now transported to Cochin
and Quilon from the different fishing centres to feed the
processing plants. The development of the processing industry
has helped the fishermen to earn higher incomes.

Considerable improvements were made in the earnings
of the fishermen. The annual income per fishermen household
at Neendakara increased from Rs.624 in 1954 to Rs.1,251 in
1963 at current prices.[5] The per capita income rose to
Rs.192 from Rs.118 during the same period. At Sakthikulangara
(part of the project area), the fishermen households working
with mechanised boats earned Rs.3,083 while those operating
with the canoes received only Rs.1,572 during 1963-64.[6] The
annual income of the fishermen households in the Malabar
districts of Cannanore, Kozhikode, Palghat (now they belong
to Malappuram district), and Trichur was only Rs.1,225 during
this period.[7]

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5. State Planning Board, The Impact of the Indo-Norwegian
   Project on the Growth and Development of Indian Fisheries,
   (Trivandrum, 1969), p.13.

6. Directorate of Fisheries, Master Plans for Fisheries
   Development - Kerala (Trivandrum, 1969), p.13.

7. Ibid., p.13.

The formation of fishermen cooperatives has helped many fishermen relieve themselves from the burden of indebtedness. Exploitation by the middlemen is also (by how much?) reduced. The social amenities provided by the project have improved the general welfare of the fisherfolk.

The success of the Indo-Norwegian Project prompted the government of Kerala to take various measures for the development of fisheries under the plan schemes. The first two plans made only meagre provisions for the development of fisheries. This is clear from the very low figures of expenditure, i.e. Rs.2.74 lakhs and Rs.64.36 lakhs respectively.[8] More attention was given during the Third Five Year Plan and the subsequent three Annual Plans. Expenditure on fisheries rose to Rs.327 lakhs and Rs.679 lakhs during the two periods respectively.[9] In 1969, the Department of Fisheries prepared a Master Plan for the Development of Fisheries in Kerala. The subsequent Five Year Plans made provisions for the development of fisheries in accordance with the Master Plan. A sum of Rs.1,100 lakhs was allotted for fisheries during the Fourth Plan. The Fifth Plan provision for the development of fisheries is Rs.20 crores.[10]

The chief mechanism by which the government sought to develop the fishing industry is the mechanisation of fishing crafts. Fishermen were given loans and subsidies to purchase mechanised boats. Till the end of

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8. Planning Commission, Op.cit., p.93.

9. Ibid. P. 93.

10. State Planning Board, Fifth Five Year Plan - A Draft Outline, (Trivandrum, 1973), p.174.

March 1968, the government gave subsidies upto 50 per cent of the cost of engine and 25 per cent of the cost of hull to fishermen cooperative societies in Kerala.[11] By another scheme the government issued boats on hire-purchase basis. By the end of 1969, the state had a total estimated number of 2,007 mechanised boats in existence.[12] Till the end of 1973-74, about 1,314 mechanised boats were issued by the government to the cooperatives and other public sector undertakings.[13] An equal number of boats is expected to be in the private sector.

Training fishermen in the modern methods of fishing is very important for the development of fisheries. Fishermen Training centres were established at Cannanore, Beypore, Ernakulam, Neendakara and Vizhinjam. In addition to these, there are three Regional Fisheries Technical High Schools, located at Baliapattam, Ernakulam and Vizhinjam and the Central Institute of Fisheries Operatives, Ernakulam, giving training to fishermen.

The necessity of having adequate number of boat-building yards to supply hulls of required size was recognised by the government. Boat-building yards were set up at Cannanore (by the Indo-Norwegian Project), Beypore, Azhikode, Neendakara and Vizhinjam. Apart from these, there were nearly 28 yards in the private sector in 1969.[14]

11. Planning Commission, Op.cit., p.93
12, Ibid., p.91.
13. State Planning Board, Economic Review of Kerala, 1974 (Trivandrum, 1975), p.87.
14. Directorate of Fisheries, Op.cit., p.187.

Lack of harbour facilities has been a major pro-
blem preventing the full exploitation of the fishery re-
sources of the state. The harbour works at Vizhinjam and
Mopla Bay initiated during the Third Plan period are still
incomplete. The construction works of the landing places
at Baliapattam, Beypore and Ponnani are partially comple-
ted. Development of fishing harbour is an important objec-
tive of the Fifth Five Year Plan. The Draft Plan has made
a provision of Rs.22 crores under the Central Sector for
the development of eleven major and minor fishing harbours
in the state.[15]

Repair and maintenance of fishing boats has been
a serious problem affecting the successful operation of
the boats. The repair and refitting facilities available
in the state are very inadequate. The facilities provided
by the Kerala Fisheries Corporation and the Indo-Norwegian
Project are quite insufficient. The Programme Evaluation
Organisation of the Planning Commission noted that the
repair and servicing facilities available in the state
were unsatisfactory for want of qualified mechanics in
the private workshops and lack of interest shown by the
staff in the public sector workshops.[16] In these circum-
stances, the fishing-boats are kept idle whenever there is
some trouble.

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15. State Planning Board, Fifth Five Year Plan-A Draft Outline
    (Trivandrum, 1973), p.174.
16. Planning Commission, Op.cit., p.107.

Shortage of fishing gear like nets and hooks also affect the smooth functioning of a fishing team. The state has only one net making factory with a capacity to produce 2,400 kgs. of yarn a year.[17] Since the factory is not able to supply sufficient number of nets, the fishermen fabricate their own nets by manual labour.

The facilities for marketing and processing of fish were very inadequate in Kerala. Marketing of fish was done by private traders who carry fish to the nearby towns and markets. Very little fish was processed in the state. However, with mechanisation and the development of the processing industry, a large quantity of fish is being processed for export. In 1970, there were about 150 processing units in Kerala, of which nearly 85 were exporting ones.[18] Most of these units were located at Cochin and Quilon. The State Fisheries Corporation, established in 1966, as a public sector undertaking, is primarily engaged in the business of exporting fish. However, the market for fish inside the state is still not fully developed.

Research has been given a high priority in the government's scheme for the development of fisheries. The state has at present seven Fisheries Research Stations and a Fisheries Technological Station. The research stations carry out studies on the bionomics of different fish population and the Technological Station helps the government in formulating fisheries research programmes and evaluating the work done in the field.[19] In addition to these, there are a number of Central Institutes like the Central Marine

17. State Planning Board, Draft Five Year Plan-A Draft Outline (Trivandrum, 1973), p.174
18. Indian Institute of Foreign Trade, Export Potential

Fisheries Research Institute, Central Marine Fisheries
Research Stations and the Central Institute of Fisheries
Technology. The CMFRI collect fisheries statistics for
periodic assessment of the fish stock utilisation and con-
duct studies on various aspects of marine life. The CIFT
strives to develop better fishing techniques and suitable
means of handling and preserving fish.

A new scheme for the development of fisheries
has been initiated at Puthiappa-Puthiangadi, in Kozhikode
district. Under this scheme, a fleet of fifty mechanised
boats were issued to the fishermen through their coopera-
tives.[20] Arrangements are also being made for the con-
struction of an ice-plant and a workshop for repairing the
boats. The project is jointly financed by the Agricultural
Refinance Corporation and the state government. Two similar
projects have been started at Vypeen (Ernakulam district)
and Anjengo (Trivandrum district) during 1972 and 1973
respectively.

Recently the World Bank has agreed to help the
state in developing the fisheries by constructing fishing
harbours, mechanising fishing-boats and by setting up
freezing plants for processing fish.[21]

Promotion of the welfare of fishermen is consi-
dered to be the ultimate aim of fisheries development.

Survey of Kerala, (New Delhi, 1972), p.126.

19. Planning Commission, Op.cit., p.91.

20. State Planning Board, Fifth Five Year Plan - A Draft Outline (Trivandrum, 1973), p.158.

21. Indian Express, "World Bank aid for fishery develop- ment" (New Delhi, July 8, 1975).

This objective is sought by organising fishermen cooperative societies, providing housing facilities, water supply and other amenities to the fishermen. Fishermen cooperative societies were organised in the Kerala coast as early as 1916. At the end of 1973-74, there were 189 Credit Societies, 846 producer's societies, 18 marketing societies and a Federation of Fishermen Cooperative Societies.[22] Membership of these societies stood at 37,178, 71,755, 1,088 and 10 respectively.

The importance of providing housing facilities to fishermen living in most unhygienic condition was recognised by the government. About 479 houses were constructed and allotted to the fishermen before 1968-69. Nearly 1,300 houses were constructed during the fourth Plan period. The Fifth Plan target is to provide 1,500 houses to the fishermen.[23]

A fundamental problem which seriously affects the welfare of the fisherfolk is the lack of facilities for medical attendance, drinking water, etc. The Indo-Norwegian Project had established a Health Centre and a scheme for the distribution of drinking water at Neendakara. Most of the fishing villages are lacking these facilities. The Administration Report of the Fisheries Department (1971-72) noted that "the fishing villages along the coastal areas are deprived of any medical facilities and as such the fishermen are put

22. State Planning Board, Economic Review of Kerala - 1974 (Trivandrum, 1975), p.175.

23. State Planning Board, Fifth Five Year Plan - A Draft Outline (Trivandrum, 1973), p.171.

into much difficulties."[24]   The report observed further that
"to mitigate the situation, the government have accorded sanc-
tion to locate one dispensary each" in every coastal district.[25]

Role of Fisheries in the Economy of Kerala

Economic development of Kerala is intrinsically
linked up with the sea. It may not be a mistake albiet an
exaggeration, if one says that for the future development of
Kerala "the resources from the sea are probably more important
than those from the land."[26]   In a densely populated state
like Kerala, unemployment and food shortage are chronic pro-
blems affecting the people. In the absence of any consider-
able development in the field of industries, the problem of
unemployment will be persisting in the state. The possibi-
lity of developing large scale industries in Kerala is not
yet explored. With scanty mineral resources, the state cannot
hope to achieve substantial progress in industrialisation in
the near future. With limited land for cultivation, the pro-
blem of food-shortage will continue even after all improvements
are made in the methods of cultivation.

The problem of unemployment and food shortage
can, however, be solved to a large extent by developing
the fishing industry in the state. The marine resources of the

24. Directorate of Fisheries, Administration Report for the
    Year 1971-72 (Trivandrum, 1974), p.33.

25. Ibid., p.33.

26. A.N.P. Ummerkutty, "The Sea-Kerala's New Frontier of
    Hope", in P.K.B. Nair (ed.) Development of Kerala -
    Problems and Promises (Trivandrum: Kerala University,
    1972), p. 98.

state are already reckoned to be unique. Kerala is blessed
with a long coast-line of 590 kms. having innumerable
creeks on the stretch which can be developed into fishing
ports. The continental shelf of Kerala with an average
width of 50 kms. has a fishable area of nearly 25,000 sq.kms.
Oceanographic studies have revealed that the Kerala coast
is immensely productive due to the occurence of such favour-
able natural processes in the sea as the upwelling of
waters, nutrient rich underwater currents, etc. The poten-
tial yield in the Kerala coast from the shelf region alone
is estimated at 1.3 million tonnes of fish per annum of
which the present yield is only one-third.[27]

The role of fisheries in the economy of Kerala
can be assessed briefly by looking at its contribution to
the Net Domestic Product, Consumption, Employment and
Foreign exchange earnings.

The Net Domestic Product originating from fish-
ing has been increasing steadily during the last many
years.[28] The N.D.P. from fishing Rs. 347.41 lakhs (at
1960-61 prices), which constituted 0.75 per cent of the
state income in 1961-62 rose to Rs.824.70 lakhs (at
1960-61 prices) forming 1.08 per cent of the state income
in 1972-73.. This increase was primarily the result of an
improvement in the quantity as well as the quality of the
fish caught.

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27. State Planning Board, <u>Fifth Five Year Plan - A Draft
     Outline</u> (Trivandrum, 1973), p.157.
28. See Appendix-I and Diagram-I.

Diagram-I

NET DOMESTIC PRODUCT FROM FISHING

(AT CONSTANT PRICES-1960-61)

IN
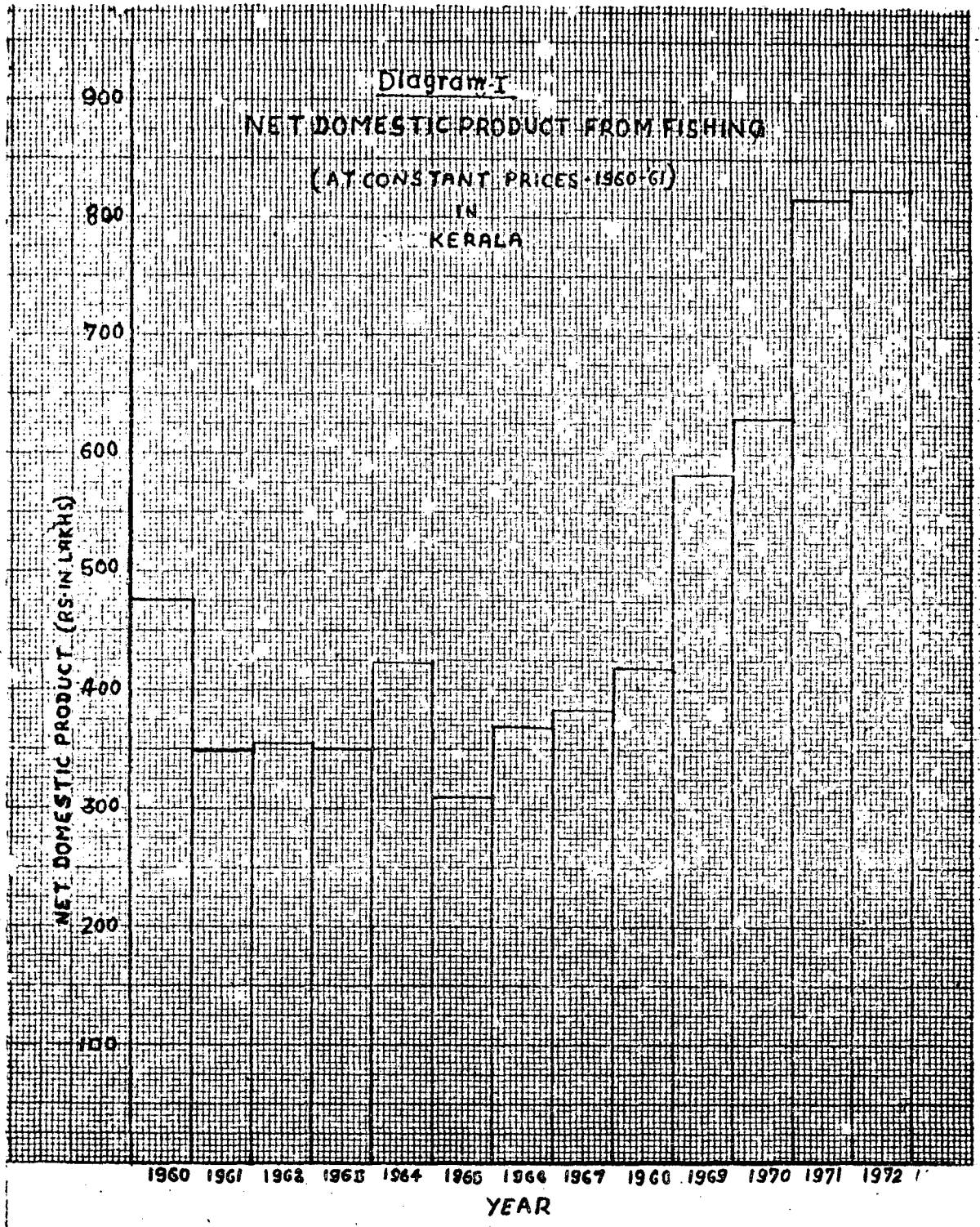
KERALA

Consumption of fish is very common in Kerala. About four-fifths of the population is accustomed to eat fish regularly. The per capita consumption of fish in the state in 1962 was estimated at 18.70 kgs. per year for the fish eating population and 14.95 kgs. per year for the whole population. The corresponding figure for the country was only 4.30 kgs. and 2.76 kgs. respectively.[29] A recent estimate of the per adult consumption of fish in Kerala has put the figure at 15 kgs. net weight a year, i.e. approximately 20 gms. of processed fish per day.[30] Assuming that nearly 60 per cent of the catch is consumed within the state, the total consumption of fish in Kerala can be estimated to have increased from 2.03 lakh tonnes in 1965 to 2.69 lakh tonnes in 1973.

The employment potential of the industry is considerably high. The Master Plan for Fisheries Development in Kerala noted that "fishing, a traditional occupation is not only the means of sustenance but also the way of life for the fishermen who constitute 2 per cent of the total population."[31] The Fifth Five Year Plan (A Draft Outline) observes that overalakh of fishermen are engaged in active fishing. The 1971 Census puts the figure at 1,22,820. According to the Livestock Census conducted in April 1972, about 2,11,126 fishermen were engaged in different fishery works, out of which 1,11,491 were in fishing (67,303 full-time and 43,188 parttime), 19,490 in marketing fish, 15,684

29. National Council for Applied Economic Research, Techno-Economic Survey of Kerala (New Delhi, 1962), p.62.

30. State Planning Board, Fifth Five Year Plan - A Draft Outline (Trivandrum, 1973) p.56.

31. Directorate of Fisheries, Master Plan for Fisheries Development - Kerala State (Trivandrum, 1969) Intrn.1
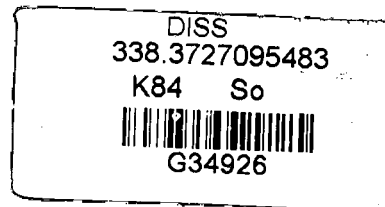
in making and repairing of nets, 11,144 in curing and pro-
cessing of fish and 54,367 in other related activities. The
difference in the number of fishermen engaged in fishing
as seen in the above sources is not very great.. The occu-
pational distribution obtained in the Livestock Census can
be taken as a good indicator of the industry's varied poten-
tial for employment. If we also include the non-fishermen
workers engaged in handling, processing and distribution of
fish, the total number of workers participating in this
industry will become much larger.

how much?

The contribution of fisheries to the state's
aggregate foreign exchange earnings is quite significant.
The foreign exchange earnings from the export of fish pro-
ducts increased from Rs.1.79 crores during 1960-61 to Rs.27.57
crores during 1970-71 and to Rs.57.75 crores during 1973-74.
The average annual growth rate in earnings marked a remarkable
increase, from 3 per cent in the early 1960's to 15 to 20 per
cent in the 1970's.[32]

Considering the vast contribution of fisheries to
employment, earnings and consumption in the state, its
importance in the future economic development of Kerala
cannot be underestimated.

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32. State Planning Board, Fifth Five Year Plan - A Draft
    Outline (Trivandrum, 1973), p.156.

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CHAPTER TWO

DEMOGRAPHY OF THE FISHERFOLK

Fishing Castes

People living all along the Kerala coast, irres-
pective of their caste or creed take to fishing as their
primary occupation. Fishing, however, has been the tra-
ditional occupation of a group of communities like
Mukkuvas, Aravas, Valans and Marakkans who are the
traditional Hindu fishing castes. In addition to these,
there are a number of Muslims and Christians engaged in
fishing in the state. They are chiefly converts from
Hindu fishing castes.

The Mukkuvas and the Mappillas (Muslims) are the
leading fishermen of the Malabar coast. While referring
to the Malabar fishermen, Buchanan wrote, "the Muccua or
in the plural Mucuar, are a tribe who live near the sea
coast of Malavala...their proper business is that of
fishermen."[1] He further observed that "in the southern
part of the province most of them have become Mussalmans,
but continue to follow their usual occupation."[2] The
Madras Census Report, 1891 noted that conversion to Islam
was common among this caste. The converts were called
Puislam or Puthia-islam (New Islam). All Puislams follow

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1. Francis Buchanan, Journey from Madras Through the
   Countries of Mysore, Canara and Malabar (Madras, 1807)
   Vol.I., p.527.
2. Ibid., p.527.

the occupation of fishing. Edgar Thurston wrote that "the Mukkuvas are the sea fishermen of the Malabar coast", who, "work side by side with Mappillas both at the fishing grounds and the curing yards."[3] Mappilla fish merchants have got good control over the fishing industry of Kerala.

The Valans and the Aravans are mainly seen in the Cochin coast. According to L.K. Ananthakrishna Iyer, "the fishing castes of Cochin, which though nominally include the four sub-castes, namely, Valan, Aravan or Katalaravan, Mukkuvan and Marakkan, really consist of the first two, the members of the last two being mostly sojourners from the sea-coasts of Malabar and Travancore, adjoining the state."[4]

The Marakkans and members of the Latin Christian community constitute the majority of the fishing population of Travancore. Muslim fishermen are also present in this part of the state.

Habitat

Fishermen live in crowded settlements near the shore. Such settlements can be seen at intervals of every two or three kilometres on the entire coast of Kerala. In 1958, the state had 264 such settlements with a total number of 42,039 households. The houses of the fishermen are mere flimsy huts made of mud or bamboo frameworks. Very few

3. Edgar Thurston, Castes and Tribes of South India, (Madras, 1907), Vol.II, p.110.

4. L.K. Ananthakrishna Iyer, Cochin Tribes and Castes, (Madras, 1909), Vol.I, p.231.

houses are built of stone and wood. A typical fishermen
settlement at Vizhinjam is described thus, "the houses are
so crowded that there is not even moving space around them.
The dense smell of fish attracts vast swams of flies which
cover the food, cooking utensils and the whole house as it were.
During the rainy season the floor of the houses will be
damp and the roof leaky. Facilities for drainage being
extremely poor, the colony presents such unhygienic surround-
ings during the monsoons that it is hardly worthy of human
habitation."[5] The majority of settlements are in identical
conditions.

Demographic Features

Having seen the broad social fabric of the fishing
community in a nut shell, an attempt is made in this section
to analyse the demographic features of the fisherfolk. But
in this attempt, we are heavily circumscribed by the paucity
of statistical information. However, with the available
data, we have tried to analyse the sex-ratio among adults,
distribution of adults and children, age composition of the
working fishermen and their literacy standards. The first
two characteristics are studied at the 'village'[6] level in
four coastal districts and at the district level in all the
eight coastal districts of Kerala. The last two aspects are
studied only at the district level. Statistics for the

5. Census of India, Village Survey Monographs of Trivan-
   drum District (Trivandrum, 1961), p.154.

6. The word 'village' is used broadly to denote the fish-
   ing villages as well as fishing towns. A few towns
   are included in the group of villages.

TAMILNADU

TRIVANDRUM

IDIKKI

QUILON

PALGHAT

KOTTAYAM

ERNAKULAM

ALLEPPEY

TRICHUR

KARNATAKA

MALAPPURAM

KOZHIKODE

ARABIAN SEA

CANNANORE

N
W E
S
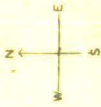
former analysis are obtained from the Livestock Census of
Kerala, 1972 and those for the latter are based on the
General Economic Tables of Kerala, 1971.

Sex-ratio Among Adults

In the present set-up sex-ratio is not a very
significant factor in economic development. From a demo-
graphic point, it has still a fundamental importance. How-
ever, in a fishing community, the sex-ratio has got very
great significance because it directly affects the economic
life of the fisherfolk. In fishing, the work at sea - partly
by tradition but mainly by physical necessity - is primarily
restricted to men. Hence, the sex-ratio will seriously
affect the participation rate in fishing.

Sex-ratio in the Villages

The sex-ratio was found to be in favour of males
in most of the fishing villages. Out of the 53 villages
included in our study, nearly 30 villages had more males
than females. Female ratio was extremely low at Kulathur
village in Trivandrum district, where there were only 36
females per 100 males. Female ratio was generally low in
most of the villages of Alleppey, Quilon and Trivandrum
districts. It was, however, very high in the villages of
Ernakulam. In one village called Nayarambalam there was
381 females per 100 males. Another village, Kumbalangy
had 362 per 100. In most of the other villages of this

district females were more than two-thirds of the adult

population. The female ratio was low only in Cochin cor-

poration where there were only 81 females per 100 males.

The distribution of females per 100 males in all the vil-

lages is given in Appendix-II.

The vast difference in the sex-ratio between

the villages of Ernakulam and those of the other three

districts suggests the operation of certain demographic

forces. It seems that the exceptionall high adult female

ratio in the villages of Ernakulam district is a reflec-

tion of the emigration of adult males from these villages.

There is every possibility of the fishermen migrating '

to the nearby urban centres like Ernakulam and Cochin in

search of industrial employment. The fact that Cochin

corporation had a high male ratio further lends ground

to such a proposition.

The phenomenon of a comparatively low female

ratio in the villages of Alleppey, Quilon and Trivandrum

districts cannot be considered as the outcome of a similar

outmigration by females. The possibility or otherwise

of an outmigration by either sex can be understood by look-

ing at the proportions of children in total population and

the participation rate in these villages. The former point

is discussed elsewhere in this Chapter.

Sex-ratio in the Districts

Sex-ratio did not change much at the district

level in the districts of Alleppey, Quilon and Trivandrum.

Map-II
KERALA
Distribution Of Females Per
100 Males In The Coastal Districts

107

88
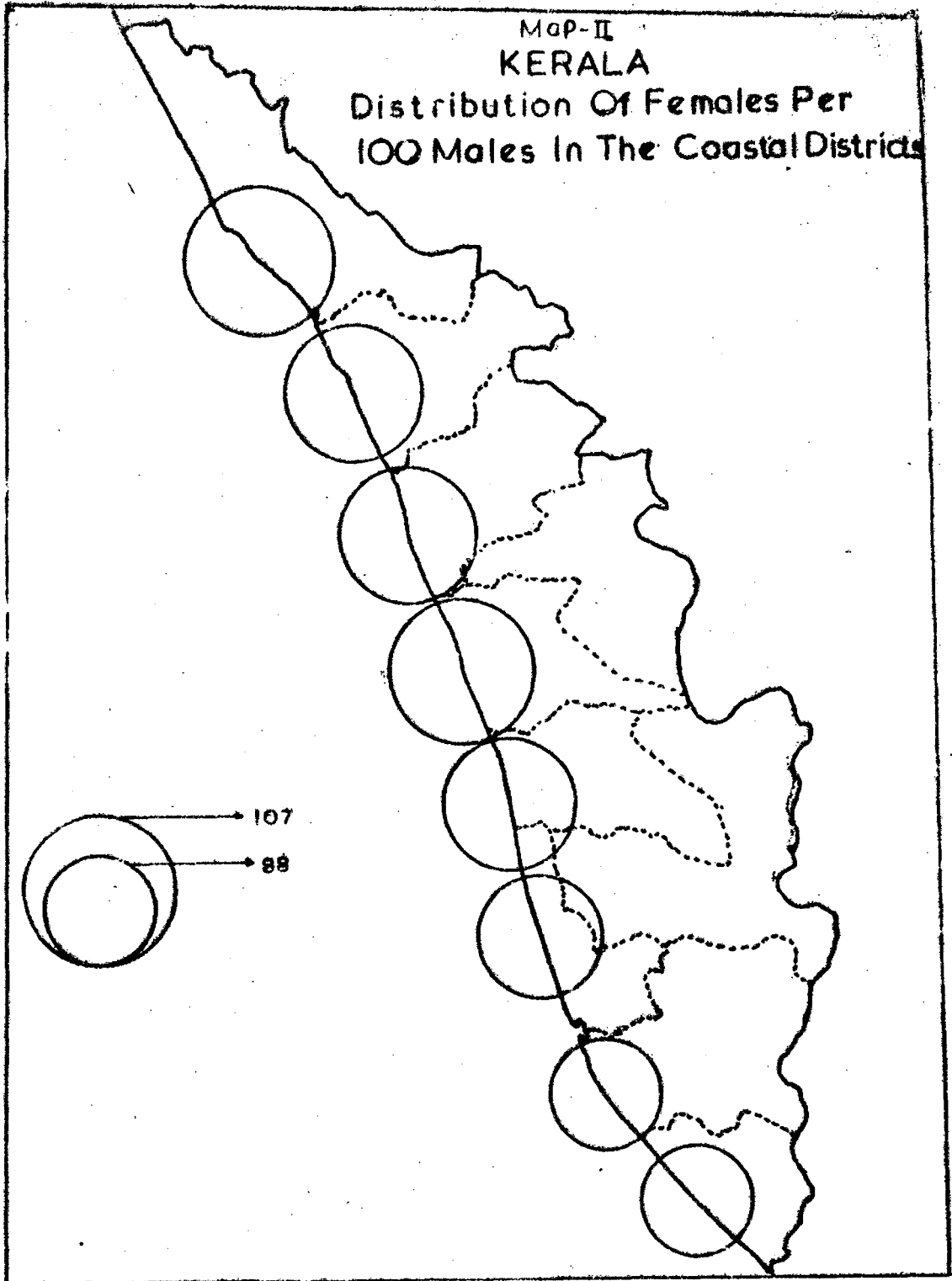
Alleppey had only 92 females per 100 males. Quilon and Trivandrum had 88 each. The picture had, however, changed in Ernakulam district. Though it had a very high female ratio at the village level, at the district level, it had only 98 females per 100 males. The sharp fall in the female ratio was due to the inclusion of Cochin corporation which had only 81 females per 100 males.

Sex-ratio appears to have a tilt in favour of the females in the districts of Malabar, namely, Cannanore, Kozhikode, Malappuram and Trichur.[7] Cannanore district had the highest female ratio, i.e. 107 females per 100 males. Kozhikode and Malappuram had 102 each. Trichur had a slightly higher ratio of 106 females per 100 males.

The phenomenon of a comparatively low female ratio in the districts of Alleppey, Quilon and Trivandrum could be the result of a high death rate among the females. Famines usually strike the fishermen households during the monsoon and females will be the first victims of this ravage. Moreover the filthy conditions around their tenements render them an easy prey to many contagious diseases. V.R. Pillai observed in 1959 that, "a fifth of the population suffered from some sort of illness...."[8] The 1961 village survey monographs also noted that "in these circumstances it is but natural that diseases find a breeding ground here. Till about a few years ago cholera used to be a regular phenomenon. It has subsided thereafter. Smallpox is still an annual feature and claims many lives a year."

7. See Map II

8. V.R. Pillai, A Study of the Economy of the Fisherfdk in Kerala, (Trivandrum, 1960), p.79.

The higher male ratio in Ernakulam district can
be attributed to the immigration of adult male fishermen
in search of better jobs in mechanised fishing boats and
other allied activities. A very low male ratio in the vil-
lages adjoining the Cochin corporation and a very high male
ratio in the corporation area suggest the possibility of an
outmigration from the former to the latter. The possibility
of a similar migration from the districts of Malabar is not
unwarranted. But in the absence of any conclusive evidence,
one cannot probe into this problem. However, the possibi-
lity of such a movement can be understood by looking at the
proportion of children to total population in relation to
the sex-ratio among adults. An attempt to this effect is
made in the following section.

Age-structure of the Fisherfolk

Age is an important variable affecting the economic
life of a community. Age structure of the population direct-
ly affects the supply of labour-force and the mass of depen-
dents in society. This section seeks to analyse the dis-
tribution of adults and children at the village and dis-
trict levels with a view to understanding the possibility
of internal migration. The problem has been posed in the
earlier sections.

Distribution of Adults and children[9] in the Villages

Out of the 53 villages included in our study, 41
villages had more than 40 per cent of the fishermen who

9. All persons below 21 years were considered as children
   in the Livestock Census, 1972.

were adults.[10] The percentage of adults was more than 50
in 25 villages. It varied between 40 and 60 in almost all
the villages of Alleppey, Quilon and Trivandrum districts.
The percentage of adults was less than 40 in seven out of
10 villages of Ernakulam district. It was very low in
villages like Kuzhupally (10.46%), Pallipuram (15.07%)
and Palluruthy (18.17%). However, it was very high in
Cochin corporation (85.12%) and Kumbalangy village (84.81%).

        The percentage of children in total population
varied between 40 and 60 in most of the villages of Alleppey,
Quilon and Trivandrum districts.[11] The percentage of
children did not vary much from that of the adults in
these villages. This, in other words, means that, children
and adults were somewhat equally distributed. This distri-
bution combined with the prevailing low female ratio in
these villages, suggests an equilibrium situation in which
there is very little urge for the fishermen to migrate to
other regions in search of better working conditions. The
size of the family and the number of dependents may not
act as compelling forces to warrant outmigration from these
villages.

        The situation was altogether different in the
villages of Ernakulam district. Children constituted 60
to 90 per cent of the total population in most of the vil-
lages.[12] In the earlier section, we have seen the preva-
lence of an exceptionally high female ratio in these vil-

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10. See Appendix-III
11. Ibid.
12. Ibid.

lages. This situation appears to be biologically and eco-
nomically unwarranted unless it also accounts for the out-
migration of male members from these villages. The size of
the family and the number of dependents might have compelled
many fishermen to seek employment outside their fishing vil-
lage, either in fishing and allied activities or in other
fields. Large scale outmigration of adult males could have
taken place in the villages of Kuzhupally, Pallipuram, Eda-
vankad, Nayarambalam, Elangunnapuzha, Palluruthy, Kumbalangy
and Chellanam. Our demographic data (sex-ratio among adults
and the percentage of children to total population) suggest
this possibility. However, in Cochin corporation and Kum-
balangy village, immigration of adults seems to be prominent.
The percentage of adults was found to be very high in these
places, i.e. about 85 per cent.

It appears from the above that there was net out-
migration from most of the villages of Ernakulam district.
There is no indication of such a tendency in the villages
of other districts. Cochin corporation presents an unique
situation in which adult male fishermen immigrate. This
is clear from the prevailing low female ratio and the
equally low percentage of children in total population.
It means that many adult males had come to stay tempora-
rily at Cochin for reasons of their employment.

Distribution of Adults and Children in the Districts

Nearly half of the population was of adults in
all the districts. The percentage of adults in total
population was uniformly distributed in almost all the

Map III
KERALA

Percentage Of Adults In Total
Fishermen In Coastal Districts

ADULTS

CHILDREN
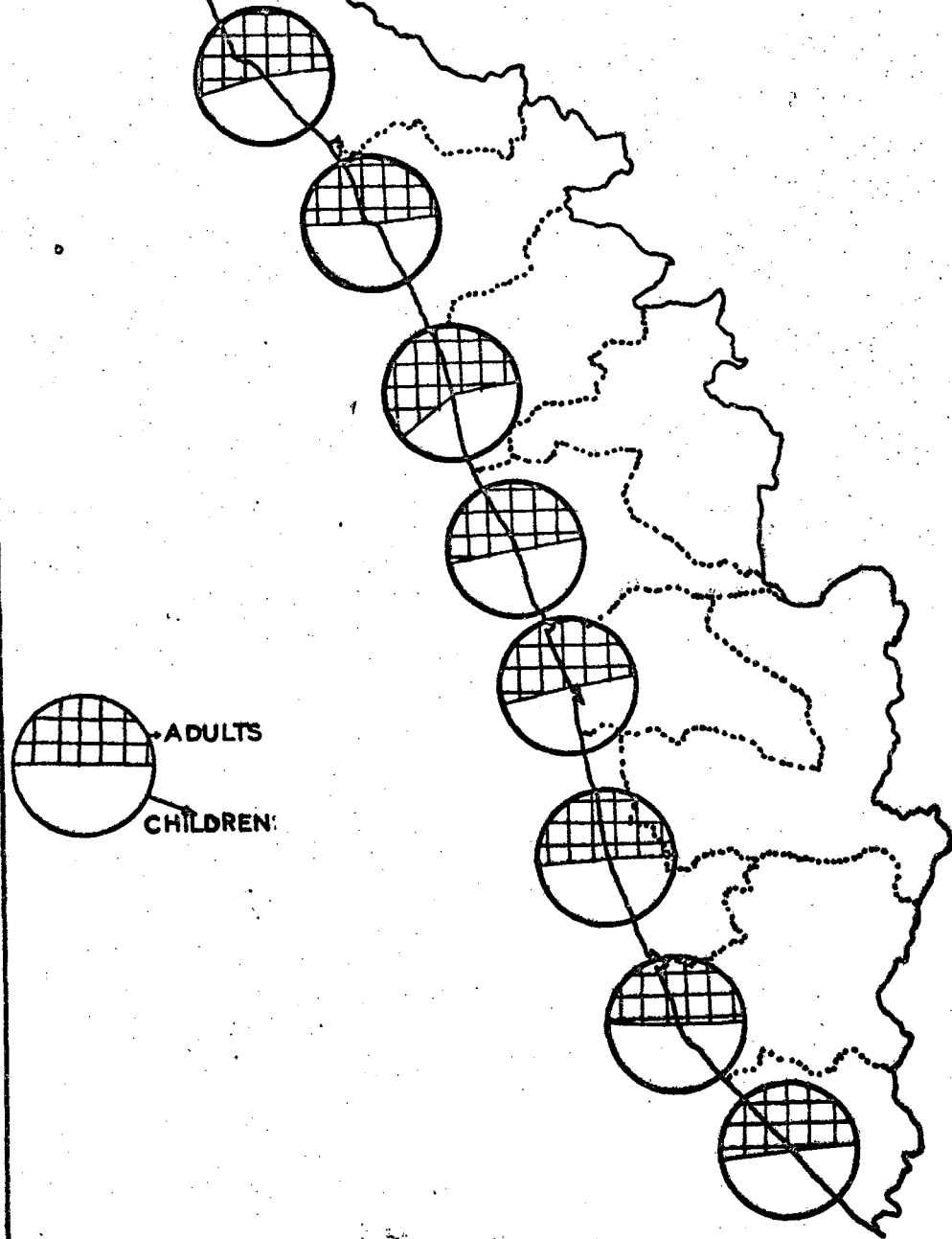
coastal districts.[13] The only exception was Malappuram, where the percentage of adults was slightly high at 57.97. The lowest percentage of 48.48 was found in the neighbouring district of Kozhikode. In all the other districts the percentage was around 50.

The percentage of children in total population was found to be the maximum in Kozhikode district - 51.52. Malappuram district had only 42.03 per cent of its fisherfolk who were below 21 years of age. The percentage of children in total population is given in Appendix-IV.

It appears from the above distribution that there was not much of a disparity between the proportion of adults and children at the district level and the village level. Recalling the fact that the sex-ratio was following a somewhat equitable distribution at the district level, the available demographic data do not speak anything about the possibility of a net outmigration of adult-males from these districts. Moreover, migration is usually for short periods, during the fishing seasons. Such migration need not be accounted for in our demographic data.

Age-composition of the Working Fishermen

We have already noted that age is an important variable affecting the economic life of a community. It reflects the capacity of the community to produce and con-

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13. See Appendix-IV and Map III.

sums. It is also an indicator of the potential for savings.
An analysis of the age-structure of the working fishermen in
the coastal districts would reveal the relative variation in
the productive power of the fishermen in these districts.

Working fishermen were classified into eight
broad age-groups. The percentage of workers in the different
age groups are given in the following table:

Table-I

Percentage of Workers in Different Age-Groups

Sl. No.	District	Age Group								
		0-14	15-19	20-24	25-29	30-39	40-49	50-59	60 +	Total
1.	Cannanore	1.43	7.43	12.45	11.51	23.56	20.90	13.06	9.67	100
2.	Kozhikode	3.05	13.52	16.48	11.50	20.25	17.18	10.73	7.50	100
3.	Malapuram	2.43	12.76	16.03	12.80	20.20	17.10	10.89	7.79	100
4.	Trichur	1.26	10.51	14.62	10.93	22.44	21.58	11.87	6.97	100
5.	Ernakulam	0.94	11.04	16.62	10.41	24.50	20.79	10.79	4.90	100
6.	Alleppey	1.26	11.73	17.80	11.89	22.62	19.76	10.36	4.58	100
7.	Quilon	1.09	11.19	16.81	11.89	22.61	20.30	10.87	5.25	100
8.	Trivandrum	2.07	10.46	14.45	13.01	24.49	18.32	9.94	7.26	100

Source: General Economic Tables of Kerala, 1971 (Manuscript
Copy) B.IV, Part A(1) and (B(1).

It appears from the above table that the proportion
of children (age group 0-14) in the working force was compara-
tively low in all the districts. Their percentage was less than
three in all the districts, except Kozhikode, where it was 3.05.
Children constituted only 0.94 per cent of the total workers in
Ernakulam district. Workers in the age group 15-19 were uni-
formly distributed in all the districts except Cannanore, where

the percentage was 7.43. In all other districts the percentage varied between 10 and 13.

The percentage of workers in the age group 20-24 varied between 12.45 and 17.80. The lower point was in Cannanore and the upper in Alleppey. In Trichur and Trivandrum the percentage was 14.45. In all the other districts the percentage stood at around 16. The percentage of workers in the age group 25-29 varied between 10.41 and 13.01. The minimum point was in Ernakulam while the maximum was in Trivandrum. Around 12 per cent of the workers were in this age-group in all other districts. The fact that the percentage of workers in the age group 25-29 is comparatively low (when compared to the age group 20-24) suggests the possibility of outmigration of members of this age-group. From this we can also say that migration is age-selective.

Twenty to twentyfive per cent of the workers were in the age group 30-39. In Ernakulam and Trivandrum nearly 24-50 per cent of the workers were in this category. The percentage of workers in this age-group was slightly low in Kozhikode and Malappuram. Nearly 23 per cent of the workers was in this age-group in all other districts.

A good percentage of workers belonged to the age-group 40-49. The actual percentages varied between 17.10 and 21.58 - the former in Malappuram and the latter in Trichur. 17.18 per cent of the workers were in this age-group in Kozhikode.

The percentage of workers in the age-group 50-59 was not very high. It varied between 10 and 13. In Trivandrum district they formed 9.94 per cent of the total workers while in Cannanore they constituted 13.06 per cent. In all other districts except Trichur, the percentage varied between 10 and 11. In Trichur, it was 11.87.

Workers aged 60 and above varied between 4 per cent and 10 per cent. They constituted nearly 10 per cent of the workers in Cannanore. Their percentage was less than 5 in Ernakulam and Alleppey. In all other districts it varied between 5 and 8.

It is clear from the above distribution that a major percentage of workers in all the districts fall in the age-group 20-24, 25-29, 30-39 and 40-49. These four groups together constitute nearly 70 per cent of the total workers. The fact that a good percentage of the workers fall in the age-group 30-39 and 40-49 indicates the family responsibilities which act as a driving force to work.

Another point which causes serious concern is the participation of workers aged 60 and above. Generally the fishing teams are keen to avoid workers of this age-group, because they may not be able to row the boats for long hours in the rough sea or to do any hard work. But very often the old fishermen cling to their old occupation as they have no other means of livelihood. That a good percentage of fishermen are compelled to stick to their job even at the old age points to the need for instituting some scheme for their security.

Apart from this disturbing feature, the overall distribution of workers in the various age-groups was following a somewhat symmetrical pattern, showing an increase in the percentage of workers as age increases and then declining as age increases further.

Literacy Standard of the Working Fishermen

Kerala has to her credit a long and remarkable history of educational development and she leads the rest of the country in the matter of literacy. Against this background it would be interesting to see the literacy standard among the fishermen in the state. But in the absence of such information, an attempt is made in this section to analyse the literacy standard of the working fishermen in the coastal districts of Kerala and to compare it with that of the cultivators and agricultural labourers. The literacy levels among fishermen, cultivators and agricultural labourers are presented in Table-II.

Table No.II shows that the majority of fishermen are literate in most of the districts.[14] Literacy ratio was, however, low in Malappuram and Trivandrum. The table also shows that among literates the majority are either just literate without any educational levels or only primary educated. Very few fishermen have got higher education. Technically trained among them are very small in number. The literacy standard of the fishermen is much lower than

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14. The word 'fishermen' here denotes only working fishermen.

that of the cultivators. However, they compare favourably

with that of the agricultural labourers.

Table II

Literacy Levels among Fishermen, Cultivators and Agricultural Labourers
(in percentage)

District/ State	Occupa- tional Catego- ry	In Total Workers		In Total Literates						
		Illi- tera- te	Lite- rate	Liter- ate with- out edu. levels	Pri- mary	Mid- dle	Mat- ricu late	Gra- du- ate and ab- ove	Tech- nical Dip- loma hol- ders	Non- tech- nical Diloma hol- ders
Cannanore	Fisher- men	47.15	52.85	30.57	60.47	8.34	0.62	-	-	-
Kozhikode		45.88	54.12	27.59	62.50	9.33	0.45	-	10.16	0.06
Malappuram	,,	73.42	26.58	44.64	52.96	2.40	-	-	-	-
Trichur	,,	48.33	51.67	30.65	59.41	8.96	1.08	-	-	-
Ernakulam	,,	22.70	77.30	35.42	56.63	6.82	1.02	0.08	0.04	-
Alleppey	,,	27.95	72.05	46.44	47.21	5.81	0.52	0.03	-	-
Quilon	,,	32.08	57.92	28.91	62.38	7.63	0.94	0.09	0.05	-
Trivandrum	,,	67.61	32.39	26.58	59.13	12.81	1.28	0.13	0.06	-
Kerala	,,	44.60	55.40	34.78	56.60	7.75	0.78	0.05	0.03	0.01
Kerala	Culti- vators	17.29	82.71	18.97	55.65	18.93	5.92	0.30	0.08	0.16
Kerala	Agri. Labour- ers	52.18	47.82	34.55	56.30	8.48	0.65	0.00	0.00	0.01

Source: General Economic Tables of Kerala, 1971 (Manuscript Copy) B-II, Part A, B-III Part B, B-IV Part A(ii) and B-VI Part B(ii).

The low literacy standard among the fisherfolk can-
not be considered as purely the result of lack of facilities
for education. Promotion of education among the fishermen was
an important objective of the Madras Fisheries Department. Spe-
cial elementary schools for fisher children and night schools
for fishermen were organised at important fishing centres in
Malabar by the Madras Government as early as 1910.

Since Independence, the Government of Kerala has been trying to improve the educational standard of the fisherfolk by establishing primary schools in fishing villages and by offering financial assistance to the fisher children. The Fishermen Training Centres and the Regional Fisheries Technical High Schools also give training and education to fisherboys in fisheries science and fishing technology.

Inspite of all these developments, the educational standard of the fisherfolk continues to be unsatisfactory. This is primerily because of the scanty attention given to education by certain sections of the fishing community. The Cannanore District Gazetteer noted that "while the Hindu fishermen and the Christian fishermen take advantage of the free educational facilities offered by the government by sending their children to nearby schools and colleges, the Muslim fishermen do not take advantage of such facilities, with the result that the percentage of literates among them is extremely low."[15]

The village survey monograph (Kottukal village) points out that "it is not lack of facilities which is responsible for this apathy...the parents take away the children from the school as soon as they are able to render any help in fishing or household duties. The boys who were able to complete S.S.L.C. are without job and refuse to go for fishing which they consider to be below their dignity. The illiterate fishermen, therefore, finds education to be not

15. A. Sreedhara Menon, District Gazetters of Kerala, Cannanore District (Trivandrum, 1972) p.308.

only a waste of time but also often inconvenient and detri-
mental to his interests...he therefore, does not want his
children to learn more than reading and writing."[16] However,
it should be noted that many of the fishing villages are
still lacking the facilities for education.

The above analysis of the demographic data, although
very incomplete, has revealed some aspects of the sex-ratio
among adults, distribution of adults and children, age-
composition of the working fishermen and their literacy
standard. Sex-ratio varied very much at the village level
even though it became somewhat even at the district level.
Variations were also observed in the proportion of adults
and children at the village level, although it turned out to
be equal at the district level. The possibility of internal
migration was perceived at the village level. Age-composition
of the working fishermen suggested the poor economic condi-
tion of the fisherfolk and the absence of any security scheme
for the old. Literacy standard of the working fishermen was
not unduly low even though they leave much to be desired.

16. Census of India, "Village Survey Monographs of Kerala,
    Trivandrum District, (Trivandrum, 1961), p.181.

CHAPTER THREE

EMPLOYMENT AND ORGANISATION IN FISHING INDUSTRY

Recent developments in fishing have changed the employment pattern and organisational structure of the fishing industry. Employment opportunities have become more diversified and organisation more strong. The objective of this chapter is to discuss the regional dimensions of the levels of development achieved by the fishing industry. An attempt is also made to study the organisational structure of the industry. Differences in the levels of development are studied with the help of employment statistics which shows the degree of diversification attained by the industry. The analysis has been made at both the village and district levels. The pattern of organisation in fishing is analysed with the help of district level statistics. The former analysis is based on the Livestock Census data and the general economic tables of the 1971 Census. The latter analysis is based primarily on the 1971 Census data.

Employment Pattern in the Fishing Industry

Fishing industry provides employment to a large section of the fishermen population in the coastal villages. However, the number of fishermen engaged in one or the other fishery activity varied considerably over the fishing villa-

ges. The purpose of this section is to ascertain the participation rate in fishing and allied activities in the different fishing villages and districts.

Out of the 53 villages covered in this study, data is available only for 48 villages. In 27 villages, more than 50 per cent of the population was reported to have been engaged in some sort of fishery activity. Participation rate was found to be exceptionally high in villages like Aratbupuzha, Karumkulam, Thrikunnapuzha, Sherthalai North, Sherthalai South, Kadakkavoor, etc.[1] In Arattupuzha, the participation rate was as high as 93 per cent. In Karumkulam, it was 88.78 per cent. Thrikunnapuzha had 88.11 per cent of the fishermen engaged in active fishery works.

Participation rate was found to be less than 50 per cent in 19 villages. Six of these villages were in Ernakulam district, óne in Alleppey, one in Quilon and eleven in Trivandrum. Participation rate was very low in four villages, namely, Kumbalangy (7.87 per cent) in Ernakulam district, Muttathura (0.39 per cent) Thiruvallam (7.22 per cent) and Kadakkampally (19.40 per cent), all in Trivandrum district. A very low participation rate in Kumbalangy village supports our argument in the last chapter about the possibility of outmigration of adult males from that village. This, combined with a very high female ratio and a very large percentage of children in total population, indicates the possibility of outmigration of adult males from that

1. See Appendix-V.

village.(see Appendix-II, III and V). However, in the case
of the other three villages, namely, Muttathura, Thiruvallam
and Kadakkampally, a lower participation rate in fishing
does not mean that there is outmigration rather, it suggests
that some of them are engaged in other activities. Our de-
mographic data :- also suggest this possibility.

A fundamental feature which becomes apparent from
this analysis is that participation rate was very high at
above 55 per cent in most of the villages of Alleppey and
Quilon, while it was not so high in many of the villages
of Trivandrum and Ernakulam. This shows that fishing and
allied activities are the only occupation for the majority
of the fishermen in the former villages, while in the latter
they also depend on non-fishing occupation for their live-
lihood.

Participation rates did not change much at the
district level in the districts of Alleppey (64.72%),
Quilon (63.14%), Trivandrum (52.13%) and Ernakulam (48.81%).
However, it was very low in the districts of Malabar, viz.,
Cannanore, Kozhikode, Malappuram and Trichur (see Map IV).
The lowest rate was found in Kozhikode district where it
was only 16.37 per cent. Only 20.01 per cent of the fisher-
men were engaged in activities related with fishing in
Cannanore. In Malappuram their percentage was slightly
higher at 37.47. However, in Trichur, it was again low
at 23.15 per cent.

The above participation rates indicate that fish-
ing and allied activities were the primary occupations for

Map-IV
KERALA
Participation Rate In Fishing
And Allied Activities In The
Coastal Districts.

WORKING FISHERMEN

NON-WORKING FISHERMEN
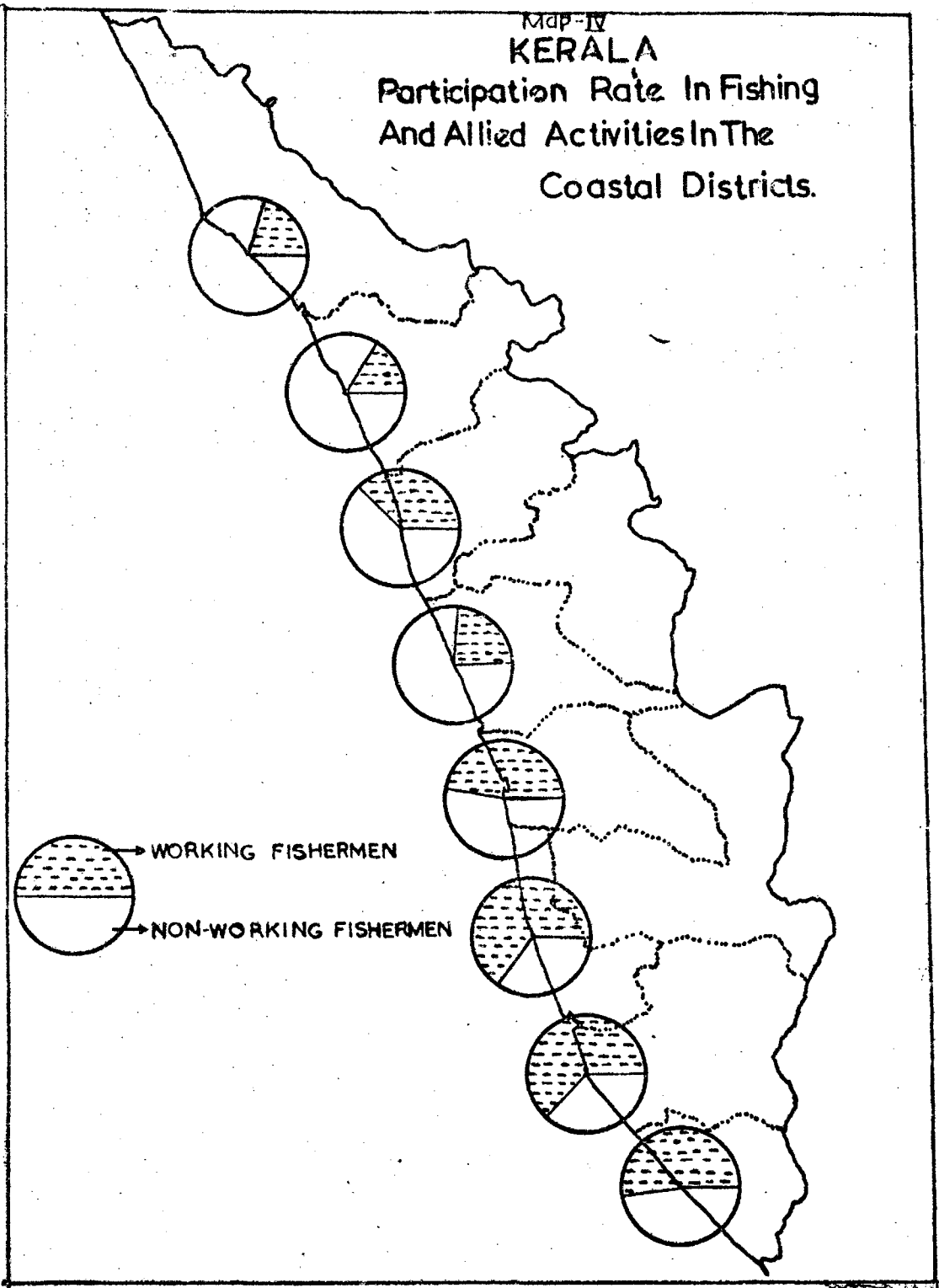
the majority of fishermen in the districts of Alleppey,
Quilon, Trivandrum and Ernakulam. The relatively low par-
ticipation rate in the other districts suggests that a
large section of the fishermen in those districts were
either unemployed or were engaged in other occupations.
This would probably mean that fishing industry is compara-
tively underdeveloped in those districts.

Differences in the levels of development can be
understood more clearly by looking at the occupational
structure of the fishing industry. This is revealed in
the proportion of fishermen engaged in different fishing
activities. Fishermen are employed not only in fishing
but also in many other activities such as the marketing,
curing and processing of fish, making and repairing nets,
etc.[2] However, the proportion of fishermen engaged in
these activities was found to vary considerably among the
villages. The following table shows the percentage of
fishermen engaged in different fishing occupations in the
coastal villages.

Table-III

The Percentage of fishermen engaged in different fishing occupations
in the coastal villages

Sl. No.	District/ Village	Fishing and Fish seed collection/Full-time	Market-ing of Fish	Making and repair-ing of nets	Curing and processing of the fish	Other activit-ies
(1)	(2)	(3)	(4)	(5)	(6)	(7)
ERNAKULAM						
1.	Kuzhupally	58.92 (96.60)	7.95	11.23	18.77	3.09
2.	Pallipuram	57.26 (78.29)	3.05	2.48	31.83	5.35
					contd.	

2. The word fishermen is used to denote only working fishermen.

(1)	(2)	(3)	(4)	(5)	(6)	(7)
3.	Edavanakad	68.80 (75.42)	3.79	3.49	11.66	12.24
4.	Nayarambalam	66.12 (75.96)	2.66	1.62	2.20	27.37
5.	Njarakkal Town	80.84 (86.49)	3.98	5.37	9.01	0.77
6.	Elangunnapuzha	63.58 (73.63)	2.97	5.69	23.94	3.79
7.	Cochin Corpn.	93.85 (29.30)	1.79	1.69	1.16	1.46
8.	Palluruthy	52.05 (85.65)	1.33	3.53	7.64	35.43
9.	Kumbalangy	45.71 (40.62)	44.28	0.00	1.42	8.57
10.	Chellanam	46.21 (74.36)	0.51	25.09	1.03	27.15
ALLEPPEY						
11.	Thuravoor South	N.A	N.A	N.A	N.A	N.A
12.	Vayalar West	N.A	N.A	N.A	N.A	N.A
13.	Sherthalai Sou.	35.15 (57.17)	4.82	5.35	4.13	50.54
14.	Sherthalai Nor.	36.65 (53.85)	6.07	9.14	5.75	42.40
15.	Mararikulam	56.47 (63.80)	4.97	11.12	6.44	21.01
16.	Aryad South	47.24 (68.48)	4.46	9.38	7.03	31.89
17.	Alleppey Town	52.89 (90.03)	11.14	11.93	4.67	19.37
18.	Punnapra	54.47 (66.06)	5.12	15.51	5.32	19.58
19.	Ambalapuzha	58.41 (64.50)	5.81	14.42	4.40	17.95
20.	Purakkad	54.69 (75.59)	3.62	7.85	6.81	27.03
21.	Thrikunnapuzha	45.22 (56.56)	4.47	10.32	2.30	37.69
22.	Arattupuzha	44.32 (54.43)	7.36	17.77	2.85	27.71
23.	Puthupally	-	-	-	-	-
QUILON						
24.	Perunad	48.67 (63.44)	4.07	13.59	3.66	30.01
25.	Kulasekharapuram	54.91 (63.93)	4.71	14.69	4.66	21.02
26.	Karunagapally	49.98 (61.10)	6.56	14.58	3.85	25.03
27.	Panmana	56.98 (69.02)	3.67	12.43	4.50	22.49
28.	Chavara	50.36 (61.86)	3.74	14.80	3.79	27.31
29.	Thekkumbhagam	53.26 (62.47)	3.67	13.38	4.31	25.38
30.	Quilon	24.72 (27.52)	17.91	0.00	11.79	45.58
31.	Quilon Town	74.08 (48.49)	7.36	1.60	2.96	13.99
32.	Eravipuram	60.47 (80.77)	11.63	2.91	0.00	25.00
33.	Mayyanadu	N.A	N.A	N.A	N.A	N.A
34.	Paravoor	-	-	-	-	-

(1)	(2)	(3)	(4)	(5)	(6)	(7)
	TRIVANDRUM					
35.	Edava	69.65 (67.66)	6.71	16.29	3.99	3.35
36.	Varkala	47.14 (45.06)	15.13	2.91	10.57	24.25
37.	Varkala Town	0.00	100.00	0.00	0.00	0.00
38.	Vettorcherunniyoor	87.46 (60.23)	6.52	2.51	2.01	1.51
39.	Kadakkavoor	44.70 (67.02)	23.25	10.79	11.85	9.41
40.	Sarkarachirayin-kil	66.43 (54.96)	14.71	6.14	6.39	6.34
41.	Azhoor	N.A	N.A	N.A	N.A	N.A
42.	Kadinamkulam	57.11 (55.37)	15.44	2.16	6.02	19.27
43.	Meenamkulam	62.49 (55.47)	17.73	1.79	0.00	17.99
44.	Attipra	68.90 (51.06)	23.13	0.58	0.00	7.39
45.	Kadakkampally	100.00 (0.00)	0.00	0.00	0.00	0.00
46.	Trivandrum Cor.	44.05 (82.43)	13.76	11.42	0.33	30.43
47.	Muttathura	62.50 (0.00)	0.00	0.00	0.00	0.00
48.	Thiruvallam	93.60 (0.00)	0.80	2.80	0.00	2.80
49.	Vizhinjam (Kovalam)	42.90 (85.38)	14.62	10.17	6.69	28.96
50.	Kottukal	29.17 (45.58)	25.20	10.12	4.76	30.75
51.	Karumkulam	35.05 (60.89)	13.49	12.37	7.25	31.83
52.	Poovar	N.A	N.A	N.A	N.A	N.A
53.	Kulathur	28.14 (69.38)	17.94	37.57	3.81	12.54

Source: Livestock Census of Kerala, 1972

It appears from the above table that a large section of the fishermen is sea-going, the majority of them being full-time fishermen. Their percentage was above 50 in nearly 28 villages. Out of these, eight villages were in Ernakulam district, five in Alleppey, six in Quilon and nine in Trivandrum. The number of villages where a very low percentage of fishermen were engaged in fishing or fish seed collection was only two. They are Kottukal and Kulathur, both in Trivandrum district. There were no fishermen engaged in fishing in Puthupally,

Paravoor and Varkala Town. In fact, the first two villages did not return any fishermen population in the Livestock Census. The percentage of fishermen engaged in fishing and fish seed collection varied between 30 and 50 in all the other villages.

The percentage of fishermen engaged in the marketing of fish was found to be very low in nearly 30 villages, where it was less than 10. In eleven villages, their percentage varied between 10 and 20. Most of these villages were in Trivandrum district. The percentage of fishermen engaged in the marketing of fish was relatively high in the following villages: Kumbalangy (44.28), Kadakkavoor (23.25), Attipra (23.13) and Kottukal (25.20). In Varkala Town, all the fishermen were engaged in marketing of fish. By and large, the percentage of fishermen dealing in fish was greater in the villages of Trivandrum district.

Making and repairing of nets is another important activity of the fishermen. However, the percentage of fishermen engaged in this activity was comparatively low in most of the villages. It was less than 10 in 25 villages (See Table-III). In 19 villages their percentage varied between 10 and 20. Most of these villages were in Alleppey, Quilon and Trivandrum. The percentage of fishermen engaged in the making and repairing of nets was very high in two villages, viz. Chellanam (25.09) and Kulathur (37.57).

The percentage of fishermen engaged in curing and processing of fish was found to be very low (less than

10 per cent) in about 39 villages (see Table-III). There
were no fishermen engaged in this activity in six villages
of Trivandrum district. In five villages their percentage
was found to vary between 10 and 20. Out of these, two were
in Ernakulam, two in Trivandrum and one in Quilon. The
percentage of fishermen engaged in the curing and processing
of fish was comparatively high in the villages of Ernakulam
district. For example, it was about 32 in Kuzhupally village
and 24 in Elangunnapuzha.

Fishermen's activities are not confined to the
above mentioned trades. A large number of them are also
engaged in 'other activities' like the collection of pearls,
conches, shells, sponges, and other sea-products. The per-
centage of fishermen engaged in these activities was compa-
ratively high in most of the villages (see Table-III). It
varied between 20 and 50 in 24 villages. In eight villages,
their percentage varied between 10 and 20. There were only
14 villages, where the percentage of fishermen engaged in
other activities was less than 10. It was generally high
in the villages of Alleppey and Quilon districts. 'Other
activities' constituted the second largest source of employ-
ment to the fishermen.

The above analysis makes it clear that the level
of diversification achieved in the occupational pattern
of the fishing industry is not very remarkable. Moreover,
considerable differences were observed in the percentage of
fishermen engaged in marketing, curing and processing of fish,

making and repairing of nets and 'other activities' in the
different fishing villages. The percentage of fishermen
engaged in different activities also suggest that certain
industries are comparatively developed in certain areas
while they are not in other areas. For instance, the curing
and processing industry was relatively well developed in
many of the villages of Ernakulam district, as the percent-
age of fishermen engaged in this occupation suggests.
Similarly, the net making industry engaged rather high per-
centage of fishermen in a large number of villages in Alle-
ppey, Quilon and Trivandrum. Marketing of fish was not a
popular job of the fishermen in most of the villages of
Ernakulam, Alleppey and Quilon districts. However, in the
villages of Trivandrum district, a large number of them
were engaged in the distribution of fish.

Keeping in mind the considerable differences in
the percentage of fishermen engaged in different fishing
occupations in the coastal villages, an attempt can be made
to see the relative position at the district level. This
would also help us understanding the regional dimensions of
development in the industry.   Table No.IV shows the
percentage of fishermen engaged in the different fishing
activities in the coastal districts.

It appears from Table No.IV that the percentage
of fishermen engaged in the actual operation of fishing and
fish seed collection was relatively high in all the districts
except Trivandrum, Quilon and Alleppey. A fundamental feature

Map-V

KERALA

Percentage Of Fishermen Engaged
In Different Fishing Occupations
In The
Coastal Districts.
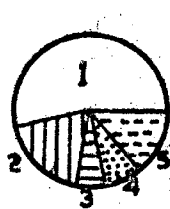
1. FISHING AND FISH
   SEED COLLECTION
2. MARKETING OF FISH
3. MAKING AND REPAIRING
   OF NETS
4. CURING AND PROCESSING
   OF FISH
5. OTHER ACTIVITIES
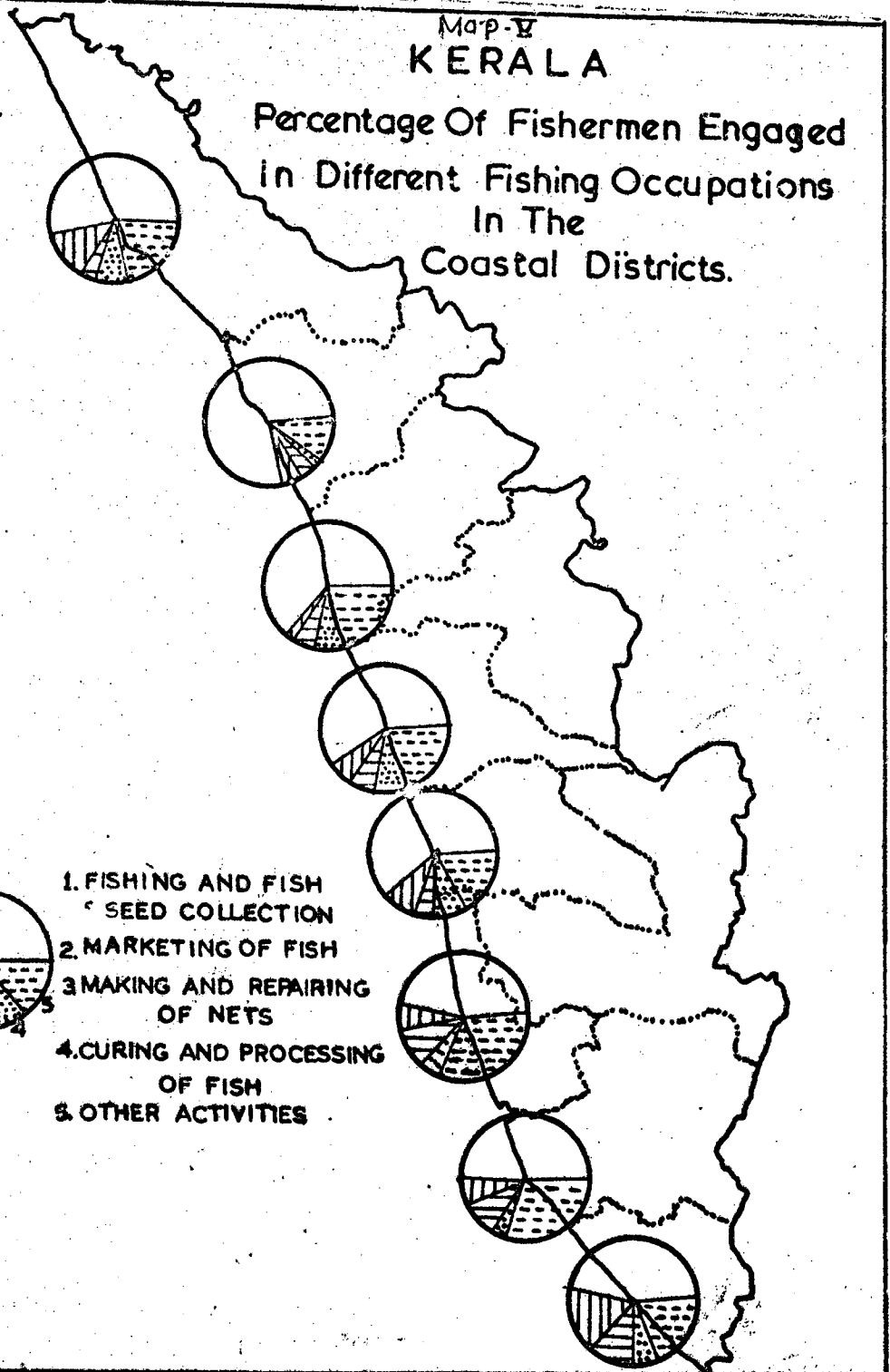
in the above distribution is that the percentage of fisher-
men engaged in fishing and fish seed collection was generally
high in the districts of Malabar (see Map V). The percen-
tage of fishermen engaged in full-time fishing was uniformly
high in all the districts (see Map VI).

Table-IV

Percentage of fishermen engaged in different Fishing Occupa-
tions in the Coastal
districts

Sl. No.	District	Fishing and Fish Seed Collection/ Full-time	Market- ing of Fish	Making and re- pairing of nets	Curing and proces- sing of fish	Other acti- vi- ties
1.	Cannanore	55.44 (60.98)	12.45	3.15	7.66	21.29
2.	Kozhikode	77.71 (58.07)	3.86	3.42	1.74	13.29
3.	Malappuram	63.21 (57.11)	2.77	5.67	7.64	20.70
4.	Trichur	58.12 (62.39)	5.99	6.05	7.87	21.97
5.	Ernakulam	59.40 (61.38)	9.01	5.55	7.91	18.13
6.	Alleppéy	44.46 (62.44)	5.90	9.46	4.44	35.73
7.	Quilon	48.84 (62.14)	6.52	8.30	3.33	33.02
8.	Trivandrum	45.32 (62.57)	15.73	10.09	5.37	23.49

Source: Livestock Census of Kerala, 1972.

Only a small percentage of fishermen was engaged
in the marketing of fish in most of the districts. Their
percentage was extremely low in Kozhikode and Malappuram
(see Map V). The percentage of fishermen engaged in the
marketing of fish is influenced by various factors. First
of all the fishermen rarely get time to sell the fish in
the market. Secondly, their economic position would not

Map-VII
KERALA
Percentage Of Fishermen Engaged
In Fulltime & Parttime Fishing

PART-TIME

FULL TIME
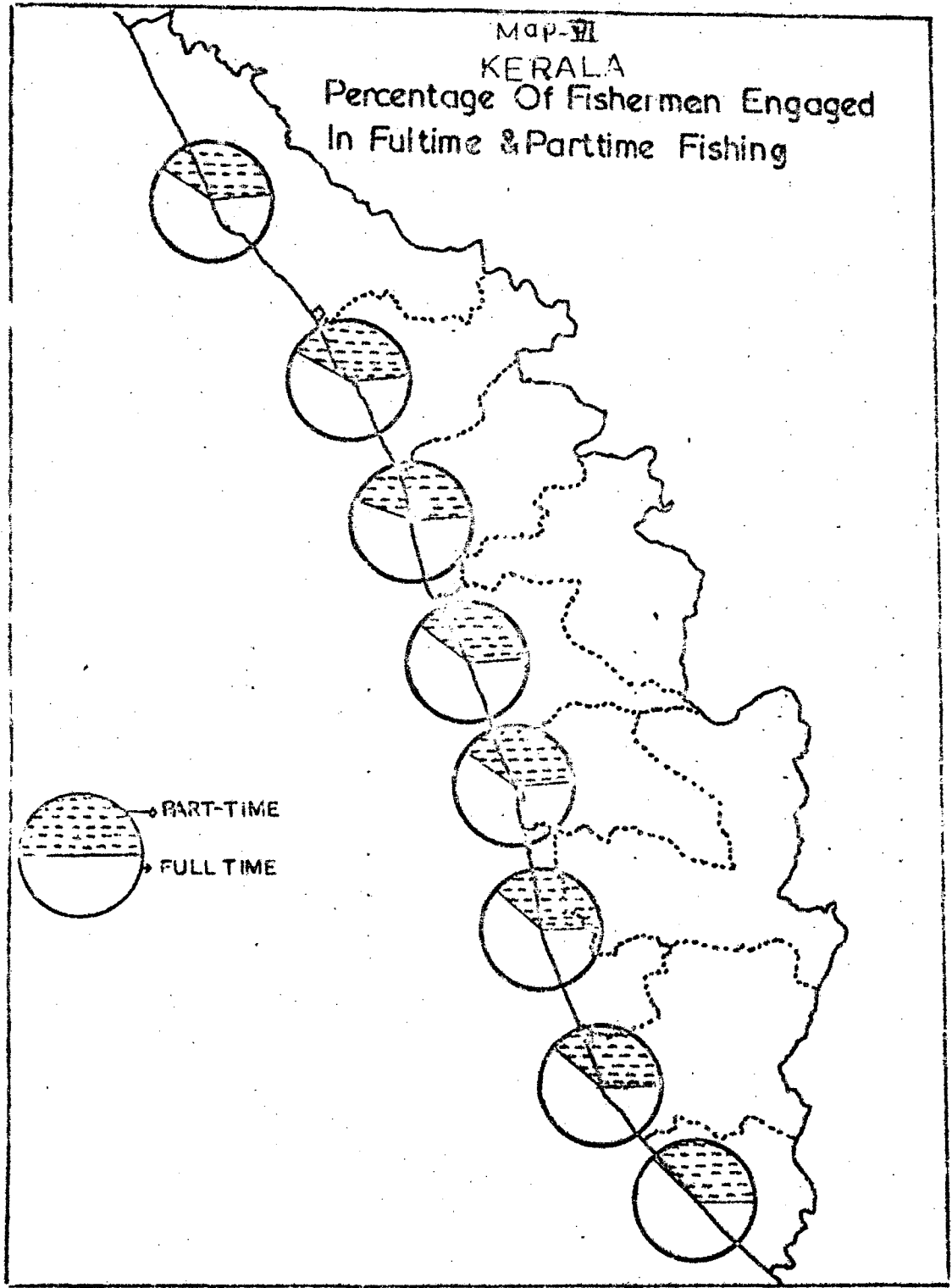
allow them to bring their catch to the market to sell it them-
selves. Being deeply in debt the fishermen are bound to sell
their catches directly to the middlemen to whom they are in-
debted. Thirdly, the risks involved in dealing a highly peri-
shable article like fish might have persuaded them not to
enter the business of dealing in fish. Finally, "this occu-
pation is considered most vulgar and a family including a
member who carries on this trade, is looked upon as very
poor."[3]

However, the percentage of fishermen engaged in the
marketing of fish was found to be comparatively high in
Cannanore and Trivandrum. It seems that the active interest
taken by females in the distribution of fish in these dis-
tricts was responsible for this increase. The Cannanore
District Gazetteer notes that the "womenfolk in Hosdurg and
Kasargod taluks also play an important role in the marketing
of fresh fish in their areas. They take their catches by
head loads and sell the same in the local markets or by
rail to Mangalore for a better deal."[4]

The percentage of fishermen engaged in the making
and repairing of nets was very low in all the districts (see
Table-IV and Map V). Net-making was an important subsidiary
occupation of the fishermen. Being a labour intensive acti-
vity, a large number of fishermen were engaged in this occu-

3. Arne Martin Klausen, Kerala Fishermen and the Indo-
   Norwegian Pilot Project (London, 1968), p.
4. A. Sreedhara Menon, District Gazetteers of Kerala,
   Cannanore District (Trivandrum, 1972), p.306.

tion. However, with the introduction of modern factory-made nets, the percentage of fishermen engaged in this occupation has come down. It is reported that most of the females who were engaged in making the nets in Vypeen area (Ernakulam district) have lost their occupation as a result of the innovation.[5]

Fish curing was an important occupation of the fishermen. Fish curing yards were set up on the Kerala coast even during the British period. A large number of fishermen were engaged in curing fish. However, with improvements in the methods of curing and processing, the percentage of fishermen engaged in this activity has come down. This is because curing and processing of fish is now, not a household activity of the fisherfolk. Curing and processing of fish has become a factory process in which many non-fishermen are employed. The percentage of fishermen engaged in curing and processing of fish was very low in all the districts (see Table-IV and Map V).

A significant feature in the development of fish processing industry in Kerala has been the tendency for the industry to concentrate in certain areas. This will be clear from the following facts. In 1968, there were 28 canning factories and 49 freezing plants in the state. But the majority of these plants were located in Ernakulam districts (18 canning units and 36 freezing units). The remaining units were located in Alleppey (six canning and five

5. M.S. Prakasam, Socio-Economic Metamorphosis of the Arayans," Journal of Social Research, (Sept. 1972), Vol. XV, No.2.

freezing), Quilon (five freezing), Trivandrum (one freezing)
and Kozhikode (three canning and four freezing). A few more
processing units were established in these and other dis-
tricts subsequently. But the process of concentration con-
tinued even during this period. It will be clear from the
following table:

Table-V

**Workers employed in Canning, Preserving and Processing
of fish, crustacea and similar foods in the coastal Dts.**[6]

Sl. No.	District	No.of Workers	Percentage to the total
1.	Cannanore	285	3.03
2.	Kozhikode	490	5.20
3.	Malappuram	495	5.26
4.	Trichur	430	4.57
5	Ernakulam	5,298	56.26
6.	Alleppey	1,539	16.34
7.	Quilon	765	8.12
8.	Trivandrum	115	1.22
		9,417	100.00

Source: General Economic Tables - 1971 (Manuscript copy)
B-IV Part-A.

The very high concentration of the workers in Erna-
kulam district (56.26 per cent) indicates that the processing
industry is highly concentrated in that area. Alleppey also
shows some concentration. The process of concentration in
Ernakulam was essentially the result of the peculiar advan-
tages which Cochin provided for the development of this in-
dustry. Being the central place and a seat of many activities,

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6. All workers need not be fishermen.

the area has all facilities for transport, finance and other
services required for the development of the industry. Cochin
port provided all facilities for the export of fish products.
Indeed, the processing industry was started with the primary
objective of exporting fish.

A large number of fishermen were also engaged in
'other activities'. The percentage of fishermen engaged in
'other activities' was generally high in all the districts.
However, in Kozhikode district, their percentage was slightly
lower (see Table IV and Map V). The percentage of fishermen
engaged in 'other activities' was the maximum in Alleppey
district. It could be the result of the inclusion of a large
number of fishermen engaged in the collection of lime shell
in this district.

It appears from the above analysis that about 70
to 90 per cent of the fishermen were engaged in the primary
activity of fishing or the related activity of collecting
pearls, shells, conches, etc. These activities together
constitute the primary sector of the fishing industry. The
percentage of fishermen engaged in the secondary and tertiary
sector of the industry was quite negligible in all the dis-
tricts.[7]

Strictly speaking, the percentage of fishermen
engaged in the secondary and tertiary sector of the industry
is not a perfect indicator of the level of development in
the industry. This is because (a) a large number of (non-
fishermen) workers engaged in the secondary and tertiary

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7. Fishermen engaged in the marketing, curing and pro-
   cessing of fish and in making and repairing of nets
   were assumed to represent the secondary and tertiary
   sector of the industry.

sectors of the industry are not included in the employment

statistics, and (b) with considerable improvements in the

fishing technology, the labour is only a minor input in

the process of production and this cannot be taken as an

indicator of the level of development of the industry.

Differentials in development can be better understood by

examining the capital investments in fishing or by their

productivity. However, this has been attempted in the fol-

lowing chapters.

Organisation of Fishing Industry

The organisation of primary fishing in Kerala was

tangled by a net-work of relationships, economic, social,

religious and the like. Even caste and kinship exerted a

strong pressure on the organisation of fishing units.

There were no regular concerns or companies engaged in fish-

ing except for the existence of a few fishermen cooperatives.

Consequently, the organisation of fishing industry is found

at a very low level of development in Kerala.

However, considering the general characteristics

of the producing units and the employment status of the

fishermen, we have identified three forms of organisation,

namely: (a) family enterprise, (b) cooperative enterprise,

and (c) capitalist enterprise.[8] These three forms of orga-

nisation represent three distinct stages of development in the

8. These three forms have been identified in my term paper
   entitled, "The Organisation and Development of Fishing
   Industry in India", submitted to Professor Moonis Raza.

relations of production. The first two are primarily pre-
capitalistic. The above three forms of organization are -c
quite common in Kerala fisheries. -

The Family Enterprise

An early form of fishing organisation is the family
enterprise, which is a kind of business organised by the head
or any other member of the household. It is a business under-
taking working with its own resources and receiving a single
family income. Some of the fundamental features of this orga-
nisation are that it does not employ hired labour; the means
of production are owned by the family itself and production is
mainly for home consumption. In this form of organisation the
family worker, or at most his kinsmen is engaged to operate
the fishing boat or the tackle. The means of production,
namely the boats, nets and tackle, are owned jointly by the
household or the family. The results of production are shared
by the members of the family by way of consumption. If anyone
from outside has contributed his labour, he is given a share
in the catch considering him as a family worker.[9] But
generally no outsider is taken in the family enterprise
as the necessity seldom arises.

In this system, production is for the most part,
for home-consumption. However, it does not mean that the
fishermen consume all the fish they catch. Whenever a sur-
plus catch is available, they will take it to the local

9. A 'family worker' is defined as "a member who works with-
out receiving wages in cash or kind, in an industry, busi-
ness or trade conducted mainly by members of the family
and ordinarily does at least one hour of work every day
during the working season. The family worker may not be
entitled to a share of the profits in the work of the

market to exchange it for money. Fisherwomen used to carry
the surplus fish to local households and exchange them for
grains or coconut. Markets are for the most part local; and
long distance trade, though not necessarily absent, plays
no determining role in the purposes or methods of production.
This system is one of 'production for use'. There is no
pressure for continual improvements in the methods of produc-
tion. Consequently, the instruments of production are simple
and unexpensive. The act of production is largely individual
and division of labour is at a very primitive level of deve-
lopment. Lone fisherman going to the sea is not an uncommon
sight in many fishing villages. The percentage of such
fishermen (family workers) was not very high in 1961. The
following table shows the total number of fishermen, family
workers and their percentage to the total.

Table VI

Total Fishermen, Family Workers and Their Percentage to the
total in the coastal districts in 1961.

Sl. No.	District	Total Fishermen	Family workers	Percentage of Family workers to total Fisher men
1.	Cannanore	10,247	731	7.13
2.	Kozhikode	16,326	1,117	6.84
3.	Palghat	3,809	93	2.44
4.	Trichur	7,626	328	4.30
5.	Ernakulam	11,883	318	2.68
6.	Alleppey	17,070	647	3.79
7.	Quilon	10,216	245	2.40
8.	Trivandrum	17,085	290	1.70

Source: General Economic Tables of Kerala, 1961, Part-II
B(1).

9. (contd.) business carried on either by the person or head
of the household or other relative." Census of India,
1961. General Economic Tables Part II-B(111).

The percentage of family workers in total fisher-
men was very low in all the districts. Because of technical
and economic reasons the family enterprise soon changes the
mode of its organisation. Working with very little capital
and equipments, the fishermen cannot go far into the sea to
catch a good quantity of fish. On the other hand, the
market demand for his commodity (fish) is pressing him to
make improvements in the method of catching fish. In the
initial stages he finds it worthwhile to spend more time
on fishing or to take his son or relative to augment the
catch. But with limited technical advance, the extra labour
turns out to be unproductive. In the last resort, many fisher-
men, prefer to work together by combining their equipments.
This takes the form of some sort of a cooperative adventure.
However, many fishermen prefer to work independently in their
family enterprise. Consequently, the family enterprise still
constitute a form of economic organisation. According to the
1971 Census, there were a few family workers in all the coas-
tal districts. The following table gives the total number of
fishermen, family workers and their percentage to the total.

Table VII

Total Fishermen, Family Workers and Their Percentage to the
total in the coastal districts in 1971.

Sl. No.	District	Total Fishermen	Family Workers	Percentage of family workers to total fishermen	Percentage of family workers to total fishermen in 1961.
1.	Cannanore	12,203	615	5.04	7.13
2.	Kozhikode	14,264	970	6.80	6.84
3.	Malappuram	11,365	979	8.61	2.44
4.	Trichur	10,469	305	2.91	4.30
5.	Ernakulam	15,466	889	5.75	2.68
6.	Alleppey	21,339	1,670	7.80	3.79
7.	Quilon	14,914	975	6.54	2.40
8.	Trivandrum	22,800	2,170	9.52	1.70

Source: General Economic Tables of Kerala. 1971 (Mss Copy) B-IV Pt.I

It is clear from the above table that the per-
centage of family workers to total fishermen was very low
in all the districts even though it showed an increase
over the 1961 level in most of the districts. The per-
centage had come down in Cannanore, Kozhikode and Tri-
chur.

Cooperative Enterprise

We have already noticed the limitations of the
family enterprise and the movement towards 'cooperation'.
Fishermen working under serious constraints of capital
sometimes decide to pool their capital and work jointly
to produce better results. Usually the organiser of this
form of enterprise is an expert fisherman who decides the
size of the crew, field of their operation, type of fish
to be caught, etc. But it should be noted that the members
of the crew are still independent workers. They work
together and share the results of their activity accord-
ing to some agreed principles. The leader or captain of
the fishing team is entitled for a larger share of the
catch. Individual share will depend upon the sort of
implements contributed by each, the type of labour per-
formed, the variety of fish caught, etc. Here all cal-
culations are strictly in value terms.

However, this form of organisation should not
be confused with the present fishermen producers coopera-

tives. It is just a temporary alliance by the fishermen
for improving their catches. This, we may even call as
a form of traditional collectivism. The alliance may
break at the end of the fishing season or even earlier
if any member leaves the group. But the element of coope-
ration still lingers on in the fishing industry. By the
very nature of the activity, fishing is a cooperative
venture in the open sea. But apart from this apparent
nature, there is a strong element of cooperation involved
in the very organisation of fishing industry. It is often
not possible for a single individual, or one family to
provide all the capital required in equipping a fishing
team. Quite often a number of fishermen join together to
operate a boat which is hired or owned by any member of
the fishing team. We have already noticed this trend.
But this does not necessarily develop into full-fledged
cooperation.

There are so many other forces which contribute
to the development of cooperation among the fishermen.
The need for cooperation among fishermen arises mainly from
the relative weakness of the family enterprise or from
the participation of the state, which provides finance
for the resources of the cooperative. The last mentioned
factor, namely, state aided cooperation was a durable force
in the development of cooperatives among fishermen in the
Kerala coast. The former factor provided a good reception.

Fishermen cooperatives were organised by the Madras Government in the Malabar Coast as early as 1916. Such societies were also organised in Travancore.

After the reorganisation of the state, the Kerala Government has been providing considerable help for the development of fishermen cooperative societies. Since then the number of such societies have increased tremendously. But, it should be noted that the organisation of these societies were very loose and therefore weak. This factor has got serious implications for the future development of the industry.

Cooperative enterprise was the chief form of organisation in fishing in 1961. The percentage of fishermen working under cooperative enterprise was very high in all the coastal districts. The following table shows the total number of fishermen, single workers[10] and their percentage to the total.

Table VIII

Total Fishermen, Single Workers and Their Percentage to the total in the coastal districts in 1961.

Sl. No.	District	Total Fishermen	Single Workers	Percentage of single workers to total fishermen
1.	Cannanore	10,247	5,699	55.62
2.	Kozhikode	16,326	8,648	52.97
3.	Palghat	3,809	1,861	48.86
4.	Trichur	7.626	3,665	48.06
5.	Ernakulam	11,883	10,213	85.95
6.	Alleppey	17,070	15,909	75.62
7.	Quilon	10,216	4,921	48.17
8.	Trivandrum	17,085	9,959	58.29

Source: General Economic Tables of Kerala, 1961, Pt.II-B(1)

10. The single workers should not be identified with 'own-account' workers. A 'Single worker' is defined as "a person who works by himself. He is not employed by

The table makes it clear that cooperative enter-
prise (both traditional and modern) was the leading form
of organisation of fishing in Kerala.

However, this form of organisation contains no
dynamic force to develop further. This system can succeed
only if it acquires the capital, skill and enterprise required
for a sound organisation. But the fishermen with limited capi-
tal, skill and education are not able to maintain the coope-
rative enterprise for long. We have already noticed that the
traditional form of cooperation breaks off immediately after
the fishing season or even before that. State aided or sub-
sidised cooperatives cannot survive the test of economy. More-
over they are not organised on any sound principles of economic
cooperation. As a consequence of all these the cooperative
enterprise is fast loosing its ground. This is revealed by
the steep fall in the percentage of single workers to total
fishermen in 1971. The following table illustrates this point.

Table IX

<u>Total Fishermen, Single Workers and their Percentage to the
total in the coastal districts in 1971</u>

Sl. No.	District	Total Fishermen	Single workers	Percentage of siggle workers to total fishermen	Percentage of single workers to total fisher- men in 1961
1.	Cannanore	12,203	2,216	18.16	55.62
2.	Kozhikode	14,264	2,510	17.60	52.97
3.	Malappuram	11,365	1,944	17.11	48.86
4.	Trichur	10,469	2,797	26.72	48.06
5.	Ernakulam	15,466	6,266	41.16	85.95
6.	Alleppey	21,339	6,210	29.10	75.62
7.	Quilon	14,914	3,444	23.09	48.17
8.	Trivandrum	22,800	5,493	24.09	58.29

Source: General Economic Tables of Kerala, 1971 (Mss. Copy)
B-IV. Part-B.

The percentage of single workers had fallen sharply
in all the districts. But the maximum fall was in Alleppey
district. The decline of the cooperative enterprise can be
further explained by looking at the sharp fall in the number
of single workers in 1971 from that of 1961. The percentage
fall in the number of single workers during the period is
given in the brackets against each district. Cannanore (61
per cent), Kozhikode (70 per cent), Malappuram (n.a.), Tri-
chur (23 per cent), Ernakulam (37 per cent), Alleppey (51 per
cent), Quilon (30 per cent), Trivandrum (44 per cent). The
steep fall in the number of single workers in Kozhikode might
be partly due to the transfer of a portion of its territory
to the newly formed district of Malappuram. The position in
Malappuram could not be assessed as the district was not a
separate unit in 1961. The number of single workers had
decreased sharply in all the other districts. It goes with-
out saying that the cooperative enterprise will be fading
soon unless reorganised on a sound durable basis.

Capitalist Enterprise

We have already noticed that the family enterprise
and the cooperative enterprise were too weak to be sustained.
There was no natural impulse in these systems to develop into
a powerful corporate organisation. But on the contrary there
are dynamic economic forces working in the fishing industry in

10. (contd.) he any one else and in his turn does not employ
any body else not even members of his household except
casually. A single worker includes a person who works in
joint partnership with one or several persons having no em-
ployee and also a member of a producers' cooperative".
Census of India, 1961, Part II-B(111). In this study the
workers engaged in cooperative enterprises are identified
with the single workers.

favour of another form of organisation, namely the capitalist enterprise. Unlike the cooperative enterprise the capitalist enterprise develops spontaneously. "In an industry such as fishing where the most productive forms of activity require continuous and heavy investment in nets and boats, there is scope for the man with capital to acquire control of the independent producer though capital advances, especially if the fishermen's problems are complicated by a season during which he receives very little if any income. Control by capitalists in different degrees has been the common fate of (Malay) fishermen."[11] Swifts' observation of the development of capitalism in Malay fishing is well applicable to the situation in Kerala.

Capitalism develops due to 'dynamic economic causes' as well as 'demographic pressures'. Dynamic economic causes will operate in many ways. Obviously the capitalist can directly invest his capital in fishing by buying boats and employing wage workers. But he rarely takes the risk of directly entering into the business of fishing by employing wage labourers. On the other hand, he secures indirect control over the business and works insidiously. This can be achieved in other ways. "Bringing into the general capitalist system need by no means involve the creation of very large capitalistically organised production units based on labour. Capital can secure this in the form of very large

11. M.G. Swift, "Capital, Saving and Credit in Malay Peasant Economy", in Raymond Firth and B.S. Yamey (eds.) Savings, Credit and Peasant Societies (London, 1966), p.155.

scale tracking under-takings, (drawing) masses of scattered producers into its sphere of influence, and economically subordinating them to its influence."[12] This can be done by developing oppressive trade and credit conditions.

The trade and credit systems work simultaneously in bringing the fishermen into the fold of capitalism. Quite often the fishermen borrow money from the merchants or the moneylenders either for financing their own consumption or for capital expenditure. Short-term loans are generally taken by the fishermen which are repayable, mostly in kind, during the fishing season. While taking these loans, the fishermen are bound to sell their catch to the middlemen by certain registered agreements, such as the Kuttaka (lease right) agreement, the champa (sale agreement of cured fish) agreements, etc. The middlemen advance money or more often goods such as rice and cloth to the fishermen during the slack season against the security of their coming catches. In return they contract with the fishermen to take their fish at an agreed price or at a price of his own setting, usually below the free market price. Fishermen often complain that their accounts are manipulated in such a way that at the end of the season they always remain in debt to the financiers. As a result of all these, the fisherman finds it hardly possible to free himself from the bondage. Quite often he looses his own boats and tackle to the moneylenders

12. A.V. Chayanov, Theory of Peasant Economy (Homewood, 1966).

to whom he is indebted. In such a situation the fisherman
prefers to work as an employee, because it is not so easy
for him to abandon his trade in which he has an accumulated
fund of knowledge and seek another employment to which he
must go as a novice.

Because of the aquisitive nature of the trade and
credit system, the ownership of the means of production
slowly passes into the hands of the merchants and the money
lending class. It has been found at Neendakara (in Quilon
district) that the percentage of non-operating entrepreneur
households had increased from zero in 1953 to 2.7 in 1963.[13]

The merchants and usurers by virtue of their po-
sition as financiers have got great control over the pro-
ducers. The boats and nets used in coastal fishing are
generally owned by the merchants. The middlemen by acquir-
ing control over the means of production engages the fisher-
men to work in their boats. But, it must be noted that even
at this stage the merchants do not want to become active
capitalist entrepreneurs striving for the promotion of their
industry. They just finance the industry and leave the
operation of the boats to the crew, generally having heads
or master fishermen, who act as their agents. A peculiarity
of this form of organisation is that although the members of
the fishing team are in essence only labour contributors,
they are not regarded as wage labourers, giving their services

13. State Planning Board, The Impact of the Indo-Norwegian
    Project on the Growth and Development of Indian Fisheries
    (Trivandrum, 1969), p.14.

irrespective of the return to the enterprise. They are
treated in a sense as cooperators, profit sharers who
partake in its good or bad fortune. Hence, it is said
that there is no employer-employee relationship in fish-
ing, in the strict sense of the term.

This is not all that capitalism means in fishing
industry. Control of the industry by trade and credit is
only a prelude to the development of capitalism in fishing.
"Merchant and usurer's capital always historically precede
the formation of industrial capital and are logically the
'necessary' premise of its formation, but in themselves,
neither merchant capital nor usurer's capital represent
sufficient premise for the rise of industrial capital (i.e.
capitalist production); they do not always disintegrate
the old mode of production and put in its place the capi-
talist mode of production; the formation of the latter
"depends entirely upon the stage of historical development
and the circumstances surrounding it."[14]

Industrial capital began to appear in the fishing
industry of Kerala only recently. It was only after the
mode of production began to change that private capitalists
began to invest money in this industry. Private capital
began to flow into fishing only after the programme for the
mechanisation of fishing boats was launched. Since then
capitalism has been gaining momentum. It was an important

14. V.I. Lenin, Development of Capitalism in Russia,
Selected Works (Moscow), Vol.I.

form of organisation of production in fishing in 1961. The
percentage of fishermen (Employers and employees) engaged
in the capitalist enterprise was relatively high in all the
districts.[15] The following table gives the number of fisher-
men, employers, employees and their percentage to the total.

Table X

Total Fishermen, Employers, Employees and their Percentage
to the total in the coastal districts in 1961.

Sl. No.	District	Total Fisher men	Emplo- yers	Percen- tage of Emplo- yers to Total	Emplo- yees	Percen- tage of Emplo- yees to Total	Percen- tage of Employers & Employer to Total
1.	Cannanore	10,247	162	1.58	3,655	35.67	37.25
2.	Kozhikode	16,326	546	3.34	6,015	36.84	40.18
3.	Palghat	3,809	107	2.81	1,748	45.89	48.70
4.	Trichur	7,626	197	2.58	3,436	45.06	47.64
5.	Ernakulam	11,883	237	1.99	1,115	9.38	11.37
6.	Alleppey	17,070	519	3.04	2,995	17.55	20.59
7.	Quilon	10,216	259	2.54	4,791	46.90	49.44
8.	Trivandrum	17,085	194	1.14	6,642	38.88	40.02

Source: General Economic Tables of Kerala 1961; Part II-B(1)

The above table shows that the percentage of fisher-
men engaged in the capitalist enterprise was the highest in
Quilon district. It was the lowest in Ernakulam. The percentage
in Alleppey also was not very high. In Palghat and Trichur, the
percentage was very high. It was low in Ernakulam and Alleppey,

15. We consider the employers and employees as representing the
    capitalist enterprise. An employer is defined as "one who
    has to employ other persons in order to perform the work.
    Employer is only that person who has necessarily to employ
    other persons in order to carry on the business from which
    he secures livelihood". "Employee is a person who usually
    works under some other person for salary or wages in cash
    or in kind." Census of India, 1961, General Economic
    Tables, Part II-B(111). An employer in fishing need not be

mainly because of the predominance of the cooperative enter-
prise. The fact that the percentage of fishermen engaged in
the capitalist enterprise was relatively high in all other
districts does not mean that capitalism was deep rooted in
the fishing industry of Kerala. It was only in the nascent
stage of development. However, the proportion of fishermen
engaged in the capitalist enterprise was increasing during
the last decade. According to the 1971 census, the percen-
tage of fishermen engaged in the capitalist enterprise had
increased tremendously from that of the 1961 level. The fol-
lowing table shows the total number of fishermen, employers,
employees and their percentage to the total.

Table XI

Total Fishermen, Employers, Employees and their Percentage to
the total in the coastal districts in 1971.

Sl. No.	District	Total Fisher men	Emplo- yers	Percen- tage of emplo- yers to the total	Emplo- yees	Percen- tage of emplo- yees to the total	Percen- tage of emplo- yers & emplo- yees to the total	Percen- tage of employers & emplo- yees to the total in 1961
1.	Cannanore	12,203	310	2.54	9,062	74.26	76.80	37.25
2.	Kozhikode	14,264	410	2.87	10,374	72.73	75.60	40.18
3.	Malappuram	11,365	200	1.76	8,242	72.52	74.28	48.70
4.	Trichur	10,469	765	7.31	6,602	63.06	70.37	47.64
5.	Ernakulam	15,466	295	1.91	7,916	51.18	53.09	11.37
6.	Alleppey	21,339	505	2.37	12,954	60.71	63.08	20.59
7.	Quilon	14,914	630	4.22	9,865	66.15	70.37	49.44
8.	Trivandrum	22,800	445	1.95	14,992	64.44	66.39	40.02

Source: General Economic Tables of Kerala 1971 (Mss. Copy)
        B-IV- Part D.

15. (contd.) a fisherman by birth or profession.

Although there was a sharp rise in the percentage
of fishermen engaged in the capitalist enterprise in all the
districts, the increase was the maximum in Alleppey and
Ernakulam. The percentage of fishermen engaged in the capi-
talist enterprise was comparatively low in these two dis-
tricts in 1961. The increase over the 1961 percentage can
be attributed to the rising tempo of mechanisation in the
industry. As a result of mechanisation, a large number of
fishermen were forced to sell their country boats and seek
employment in the mechanised fishing crafts. The country
crafts were not able to complete with the mechanised boats .
in catching the fish in the inshore waters.. Mechanisation
has also succeeded in attracting capitalists from non-fisher-
men communities of Kerala. "As it has become a thriving
business with much pecuniary gains and less risks at the
sea, all the moneyed and interested in business of different
higher castes like Nairs, Ezhavas, and communities like
Christians, Muslims, etc. have come to this trade, which was
once looked down by them."[16]

Earlier we have referred to the 'demographic pres-
sures' exercising some influence on the development of capi-
talism in fishing industry. It is to be noted that with the
growth of the population in fishing communities, the family
enterprise and the cooperative enterprise will find it increasingly
difficult to engage all the workers. The surplus manpower
will then move to the growing capitalist sector for employment.

16. M.S. Prakasam, "Socio-Economic Metamorphosis of Arayans"
    Journal of Social Research (September 1972), Vol.XV, No.2

Many internal and external conditions also favour
the growth of capitalist enterprises. The increasing demand
for fish both in the national and international markets, an
over-abundant supply of cheap labour, the knowledge of the
fishing grounds, the availability of a suitable fishing
technology, etc. will easily attract private capital into
the industry. It is interesting to note that even multi-
national companies have turned their attention to fishing in
Indian waters. The industry has already attracted institutional
finance to its sensitive spots. However, it should be noted
that the fishing industry in Kerala is even now controlled
by merchant and usurer's capital.

Development of fisheries will depend to a large
extent on the creation of 'industrial capital', which can
bring changes in the methods of production. But as long as
merchant capital controls the industry, fisheries development
will be slackened because the merchants (money-lenders) will
not take any interest in the development of the industry.
Fisheries development demands large-scale investments in
modern fishing-boats and other related undertakings. This
is what 'industrial capital' will do for the development of
the industry, and precisely the one which merchant capital
refuses to do.

Growth of merchant capital is antagonistic to the
development of the industry as well as to the interests of the
fishermen. The merchants think that it is more profitable
to lend their capital to the fishermen than to invest in

risky and expensive undertakings. The risks associated
with a fishing enterprise are much greater than the risks
involved in lending money. Moreover, having a very good
control over the marketing of fish, the moneylenders can
easily make their surplus. Thus, the moneylenders generally
prefer not to stake their capital by directly investing in
fishing enterprises. Being deeply in debt, the fishermen
also find no point in improving their industry because
whatever gains it may bring are appropriated by the money-
lenders.

Thus, merchant capital stands in the way of
development of the fishing industry by perpetuating the
traditional system of production. The solution lies in
breaking the control of merchant capital over the industry
and in liberating the fishermen from the clutches of the
merchants and the moneylenders. This can be achieved only by
a reorganisation of the finance and trade of the industry.
Institutional changes are even more important.

CHAPTER FOUR

DISTRIBUTION OF THE PRODUCTIVE FACTOR OF ALL EQUIPMENTS USED IN FISHING

The objective of this chapter is to build an index of the productive factor of all equipments used in fishing which can be taken as an indicator of the level of development in fishing in different villages and districts.

Comparison between the productive factor of all equipments used in fishing in the different regions will be extremely difficult because of the vast differences in the number and type of equipments used in fishing. Comparison can be made only after standardising the productive factor of all equipments. Standardisation is done by the following method.

In standardising the productive factor, we have taken three points into consideration. The first point is the proportionate contribution of each type of fishing craft/gear to total fish production. Proportionate contribution of each category of fishing craft/gear is derived on the assumption that 40 per cent of the catch is made by the mechanised boats and 60 per cent by the non-mechanised boats. The 40 per cent catch is distributed amongst the different type of mechanised crafts. While

doing this, the length and horse power of the boats have been taken into consideration. Boats of greater length and higher horse power were given more weightage. Altogether there were 20 different types of mechanised boats in existence. The 40 per cent catch (weightage) is distributed among the 20 different types of mechanised boats. The remaining 60 per cent is attributed to the non-mechanised boats. There were only five different types of non-mechanised boats. The 60 per cent catch is distributed among the five category of boats. For convenience in distribution, the total weightage is taken to be 1,000.

So far we have not considered the contribution of the fishing gear. Although they form part of a joint input (fishing equipments) in fishing, their contribution cannot be assessed or compared with that of the fishing boats. However, they are assigned independent weights in order to account for the variation in their number and type in every village and district. On the whole, there were 14 types of fishing gears in use. Assuming that their contribution varies from one another, they were given a total weightage of 100, distributed amongst themselves. Individual share is determined by the material of fishing gear and the type of boat with which they are generally combined. The proportionate contribution of each type of boat/gear is given in Appendix-VI. Proportionate contribution is denoted by the letter 'A'.

The second point is the actual number of each category of boat/gear in existence in the state. We call this factor 'B'. Total number of each category of boat/ gear is given in Appendix-VI against their proportionate contribution.

The third point is the standard contribution of each category of boat/gear. This is nothing but a deflated index of the proportionate contribution, which is calculated by dividing the proportionate contribution of each type of boat/gear by their respective number in the state. This in other words means $\frac{A}{B}$. This factor is denoted by the letter 'C'. Standard contribution of each category of boats/gear is given in Appendix-VI.

Productive factor of all equipments used in fishing in a village or district is equal to the sum of the standard contribution of each category of boat/gear multiplied by their respective number in that village or district. Productive factor (PF) $= \sum_{i=1}^{n}$ (C x b) where 'b' is equal to the number of a particular fishing craft/gear in the village or district.

In the following analysis we have treated the productive factor of the mechanised boats, non-mechanised boats and the fishing gears jointly as well as separately. This will help us understand the relative as well as absolute position of the villages/districts in the possession of fishing equipment. The impact of special schemes for the development of fisheries can also be understood from the productive factor of the mechanised boats.

Productive Factor of the Mechanised Boats
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Of late, Kerala has achieved remarkable progress in the field of mechanisation of fishing crafts. However, the process of mechanisation was confined to a few fishing centres. Consequently, the productive factor of the mechanised boats was highly concentrated in a few fishing villages and towns. Table XII (Col.3) shows that the productive factor of the mechanised boats was mainly concentrated in a few places like Kuzhupally, Pallipuram, Edavanakad, Njarak-kal town, Cochin corporation, Punnapra, Purakkad, Chavara, Quilon town and Karumkulam. However, it was very high in Cochin corporation (60.53) and Chavara village (45.16). It should be noted that these two areas have greatly benefitted from the mechanisation programme initiated by the Indo-Norwegian Project. Productive factor of the mechanised boats was very low in almost all other villages.

Table XII

Productive factor of all equipments used in fishing in the coastal villages of four southern districts

Sl. No.	District/ Village	Mechanised Boats	Non-mecha-nised boats	Fishing Gears	All equip-ments
(1)	(2)	(3)	(4)	(5)	(6)
	ERNAKULAM				
1.	Kuzhupally	10.90	7.81	0.68	19.40
2.	Pallipuram	9.00	4.75	0.46	14.21
3.	Edavanakad	9.16	8.61	0.46	18.24
4.	Nayarambalam	0.00	2.10	0.84	2.95
5.	Njarakkal town	7.86	7.32	1.53	16.72
6.	Elangunnapuzha	2.24	6.33	0.33	8.92
7.	Cochin corpn.	60.53	49.68	8.03	118.25
8.	Palluruthy	0.70	4.31	0.48	5.50
9.	Kumbalangy	0.00	0.90	0.47	1.37
10.	Chellanam	2.83	1.45	0.28	4.58

(1)	(2)	(3)	(4)	(5)	(6)
ALLEPPEY					
11.	Thuravoor South	1.86	1.24	0.50	3.60
12.	Vayalar West	0.68	1.32	0.45	2.45
13.	Sherthalai North	0.89	1.26	0.56	2.71
14.	Sherthalai South	0.74	1.15	0.54	2.44
15.	Mararikulam	2.15	4.16	0.73	7.05
16.	Aryad South	0.98	3.10	0.73	4.82
17.	Alleppey town	0.53	2.67	0.23	3.43
18.	Punnapra	7.25	4.86	0.52	12.64
19.	Ambalapuzha	5.92	4.24	0.56	10.73
20.	Purakkad	17.01	5.52	1.08	23.61
21.	Thrikunnapuzha	2.84	2.92	0.49	6.26
22.	Arattupuzha	5.54	3.60	0.42	9.58
23.	Puthupally	0.00	0.21	0.02	0.24
QUILON					
24.	Perunad	2.95	3.54	1.13	7.63
25.	Kulasekharapuram	0.42	4.53	1.12	6.08
26.	Karunagappally	1.89	6.79	1.25	9.94
27.	Panmana	0.51	5.60	0.94	7.05
28.	Chavara	45.16	7.07	0.86	53.09
29.	Thekkumbhagam	1.39	5.29	1.11	7.80
30.	Quilon	0.50	3.43	0.21	4.16
31.	Quilon town	7.89	18.66	4.04	30.59
32.	Eravipuram	0.62	0.98	0.20	1.80
33.	Mayyanadu	0.29	0.32	0.17	0.80
34.	Paravoor	0.99	0.00	0.14	1.14
TRIVANDRUM					
35.	Edava	0.10	2.83	0.49	3.43
36.	Varkala	0.11	1.91	0.44	2.47
37.	Varkala town	0.00	0.00	0.00	0.00
38.	Vettoor cherunniyoor	0.06	1.79	0.41	2.26
39.	Kadakkavoor	0.05	4.00	0.59	4.65
40.	Sarkara-chirayinkil	0.05	2.17	0.50	2.73
41.	Azhoor	N.A	N.A	N.A	N.A
42.	Kadinamkulam	0.60	4.88	1.05	6.54
43.	Meenamkulam	0.71	5.93	0.41	7.06

(1)	(2)	(3)	(4)	(5)	(60
44.	Attipra	0.71	3.59	0.77	5.08
45.	Kadakkampally	0.03	0.95	0.17	1.16
46.	Trivandrum Corpn.	0.51	10.81	1.51	12.84
47.	Muttathura	0.02	0.65	0.00	0.68
48.	Thiruvallam	0.06	0.77	0.20	1.04
49.	Vizhinjam (Kovalam)	0.00	3.44	0.69	4.13
50.	Kottukal	4.98	2.61	0.34	7.94
51.	Karumkulam	9.83	3.61	0.63	14.09
52.	Poovar	N.A	N.A	N.A	N.A
53.	Kulathur	1.01	2.48	0.41	3.91

Source: Livestock Census of Kerala, 1972

A fundamental point which is clear from the above table is that the productive factor of the mechanised boats was comparatively high in the villages of Ernakulam district. It seems that the impact of mechanisation is more widespread in the villages of Ernakulam than in those of other districts.

The impact of mechanisation on the productive factor of the mechanised boats in the villages of Malabar cannot be assessed for want of statistics. The regional picture can, however, be assessed from the district level data. The productive factor of the mechanised boats in all the districts are shown in the following table.

Table XIII

Productive Factor of All Equipments Used in fishing in the coastal districts

Sl. No.	District	Mechanised Boats	Non-mecha- nised boats	Fishing Gears	All Equipments
(1)	(2)	(3)	(4)	(5)	(6)
1.	Cannanore	41.60	95.32	12.48	149.40
2.	Kozhikode	38.06	81.78	17.64	137.49
3.	Malappuram	10.48	35.02	7.68	53.19

(1) (2)	(3)	(4)	(5)	(6)
4. Trichur	5.28	22.33	2.73	30.32
5. Ernakulam	143.61	135.98	24.95	304.55
6. Alleppey	55.77	74.59	14.07	144.45
7. Quilon	71.51	71.85	20.62	164.00
8. Trivandrum	20.89	54.25	8.86	84.00

Source: Livestock Census of Kerala, 1972

The above table (col.3) shows that the productive factor of the mechanised boats was not equally distributed among all the districts. It was maximum in Ernakulam district and the minimum in Trichur. Malappuram also had only a very low share of it. The position in Trivandrum was equally bad. Alleppey and Quilon enjoyed a comparatively good share of the productive factor of the mechanised boats. The position was not upto the mark in Cannanore and Kozhikode districts. The impact of special programmes for the dvelopment of fisheries is clearly reflected in the productive factor of the mechanised boats. This is precisely true in the case of Ernakulam and Quilon, where the Indo-Norwegian Project had significantly contributed to the mechanisation of fishing crafts. Alleppey also had benefitted considerably from the mechanisation programme. The benefits were not so much spread in the other districts.

Productive Factor of the Non-Mechanised Boats

Fishing is still a traditional occupation carried on with the help of country boats and catamarams. Non-

mechanised boats contribute the major productive factor in fishing in the majority of fishing villages. Compared to the productive factor of the mechanised boats, the non-mechanised boats contributed a major share of the productive factor in a large number of fishing villages (Compare cols. 3 and 4 of Table XII). Another interesting point about the productive factor of the non-mechanised boats is that it was not much concentrated in any fishing village, even though there was some concentration in Cochin corporation and Quilon town. It seems that the improved facilities for fishing have attracted a large number of non-mechanised boats to these areas.

The relative position of the districts in the possession of the productive factor of the non-mechanised boats was not much different from that seen at the village level. Table XIII (col.4) shows that compared to the mechanised boats, the non-mechanised ones contributed a larger share of the productive factor in all the districts except Ernakulam. Productive factor of the non-mechanised boats was considerably higher in all the districts except Malappuram and Trichur. An interesting feature in the above distribution is that the productive factor of the non-mechanised boats in Cannanore and Kozhikode was much higher than that of the mechanised boats in Alleppey and Quilon, where it was relatively high. (Compare cols. 3 and 4 of Table XIII). It seems that the major effort for the development of fisheries

in these districts (Cannanore and Kozhikode) was concentrated
on improving the traditional fishing crafts than on speedy
mechanisation. The relative position in districts like Mala-
ppuram, Trichur and Trivandrum was far from satisfactory.

Productive Factor of the Fishing Gears

Because of practical difficulties in integrating
the productive factor of the fishing gears with that of the
fishing boats, they have been treated separately. The pro-
ductive factor of the fishing gears was not concentrated much
in any particular fishing village. The moderate concentration
observed in Cochin corporation and Quilon town was only a
natural concomitant of the productive factor of the fishing
boats (compare cols. 3, 4 and 5 of Table XII in these areas).

That the productive factor of the fishing gears
is not matched by that of the fishing boats in many villages
should not be considered as very odd. For example, in many
villages fishing is predominantly carried on with the help
of traps, shore-seines, spawn-collecting nets, etc. which
do not require boats for their operation. The relatively
high productive factor of the fishing gears in villages
like Nayarambalam, Kumbalangy, Kulasekharapuram, Karunagapally
and Kadinamkulam suggests that backwater fishing is more
developed in these areas.

Productive factor of the fishing gear was
found to vary considerably over the districts. But the
variation was not as great as that of the fishing boats.

Productive factor of the fishing gear was the maximum in Ernakulam district. Quilon too had a good share of this factor. It is quite natural for these districts with considerable improvements in the field of mechanisation, to possess a relatively large share of the productive factor of the fishing gear. It seems that Kozhikode district also had benefitted from the availability of modern fishing gears. Productive factor of the fishing gear was very low in Malappuram, Trichur and Trivandrum (see column 5 of Table XIII).

Productive factor of all equipments used in fishing

So far we have been considering the productive factor of the mechanised boats, non-mechanised boats and the fishing gears separately. However, it would be interesting to combine the productive factor of all these equipments and then see the relative position of every village and the district. This would help us understand the level of development achieved in fishing by the different villages and districts.

It appears from Table XII (col.6) that the productive factor of all equipments used in fishing was very low in the majority of villages. It was comparatively high at Kuzhupally, Pallipuram, Edavanakad, Njarakkal town, Punnapra, Ambalapuzha, Purakkad, Quilon town, Trivandrum corporation and Karumkulam. Productive factor of all equipments used in fishing was the maximum in Cochin corporation. Chavara village also had a very high productive

Map. VII
KERALA
Index Of Productive Factor Of
All Equipments Used In Fishing
In The
Coastal Districts

304·55

30·32
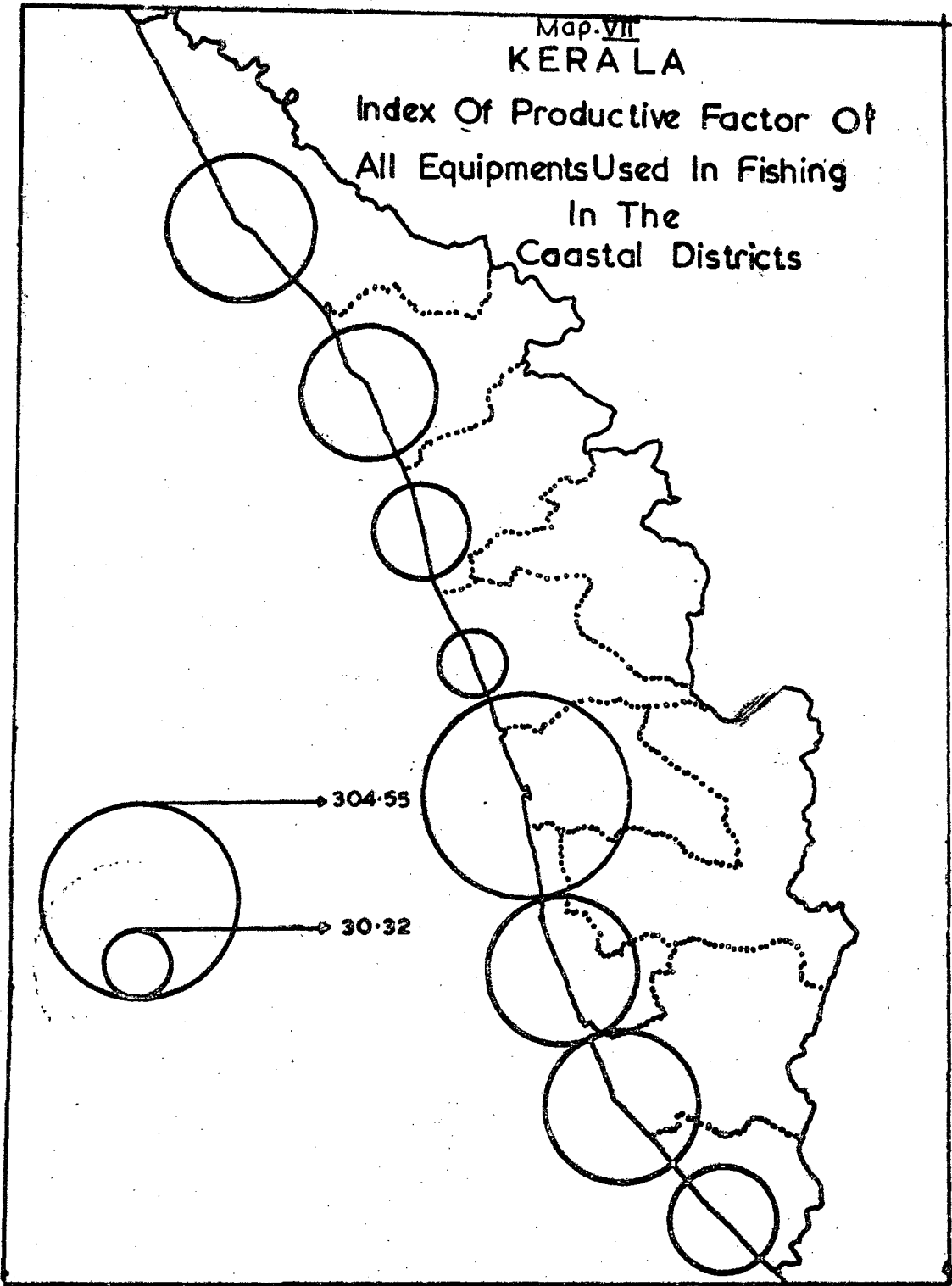
factor. We have already noted that the impact of mecha-
nisation was the maximum in these places. This factor
had helped very much in raising the productive factor of
all equipments used in fishing in these centres (compare
columns 3 and 6 of Table XII). The impact of mechanisa-
tion is also noticeable in villages like Kuzhupally, Palli-
puram, Edavanakad, Punnapra, Purakkad, Karumkulam and in
towns like Njarakkal and Quilon.

Considerable variations were observed in the
productive factor of all equipments used in fishing in
the coastal districts. Table XIII (col.6) shows that the
productive factor of all equipments used in fishing was the
maximum in Ernakulam and the minimum in Trichur. It is
quite paradoxical that fishing industry is very much back-
ward in Trichur when it is much developed in the neighbour-
ing district of Ernakulam. The position in Malappuram
and Trivandrum was far below par. Productive factor of
all equipments used in fishing was comparatively high in
all other districts (see Map VII).

Variation in the Productive Factor of all equipments used in fishing

In the earlier sections we have analysed the dis-
tribution of the productive factor of all equipments used
in fishing in the villages as well as the districts. An
attempt is made in this section to study the magnitude
of their variation over the villages and the districts.
The magnitude of variation is measured by finding out the
coefficient of variation. The following table shows the

coefficient of variation of the productive factor of all
equipments used in fishing (jointly as well as separately)
in the villages and the districts. The factors involved
in the calculation of the coefficient are also given in
the table.

Table XIV

Coefficient of Variation of the Productive factor of all
equipments used in fishing

Sl. No.	Productive Factor	Village/ District	Mean	Standard Deviation	Co-efficient of variation
1.	Mechanised Boats	Village	4.53	10.62	234.32
		District	48.40	44.50	91.94
2.	Non-mechanised Boats	Village	4.67	7.18	153.70
		District	71.39	35.62	49.90
3.	Fishing Gears	Village	0.79	1.19	151.22
		District	13.63	7.28	53.43
	All equipments used in Fishing	Village	10.00	17.89	178.94
		District	133.43	84.61	63.41

Total No. of villages: 51; Total No. of Districts: 8

The above table shows that the regional dispari-
ties were more pronounced at the village level than at the
district level. Inequality rate was the maximum at the village
level in the case of the productive factor, of the mechanised
boats. The coefficient of variation was as high as 234.32
per cent. At the district level it was only 92 per cent.
Productive factor of the non-mechanised boats was found to
vary at a rate of 153.70 per cent in the villages. The
percentage of variation was only 50 at the district level.
Even in the case of the productive factor of the fishing
gear, the villages registered a high rate of inequality of

about 151.22 per cent. At the district level it was only 53.43 per cent. Taking the productive factor of all equipments together, the villages marked 179 per cent of variation. In the case of the districts it was only 63.41 per cent.

It appears from the above analysis that the productive factor of all equipments used in fishing was mainly concentrated in a few villages (including towns) and districts. The observed concentration of the productive factor in certain areas like Quilon, Chavara and Cochin can cause serious problems for the further development of the industry. Increasing concentration of the productive factor in certain areas will adversely affect the catch and earnings of the operating units. Shortage of fishing equipments on the other hand can prevent the proper exploitation of the fish stock in other areas. It seems that both the phenomena are operating in the Kerala coast. An attempt is made in the following chapter to test how far it is true.

CHAPTER FIVE

PRODUCTIVITY IN FISHING INDUSTRY

With considerable improvements in the fishing
industry over the last many years, an analysis of the move-
ments in productivity is of paramount importance in evaluat-
ing the general performance of the fisheries in the state.
The importance of such studies was emphasised by a noted
fishery economist (Dr. B.S. Saxena), when he said, "with
the progressive increase in mechanisation and capitalisa-
tion in other forms in the fishing industry, it is essential
to find out the extent by which the catch per effort in
terms of human labour has increased in order to find out
the productivity of the capital invested."[1] Productivity
analysis of any sort has not been made so far in fishing
on a broad regional or national scale. But such an attempt
is highly restricted for want of relevant statistics regard-
ing the capital invested in the industry. Consequently, our
objective in this chapter is to find out the productivity
of labour time devoted in fishing in the different fishing
zones of Kerala.[2]

The purpose of productivity measurement is not
simply to determine a single relationship between catch and
effort, but rather to find out the variation in it-within

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1. Dr. B.S. Saxena, "An Economic Evaluation of Growth rate
   in Fish Production", <u>Indian Sea Foods</u> (Cochin, 1968),
   Vol.1, No.1.

2. The zones are merely territorial divisions made by the
   Central Marine Fisheries Research Institute, for the
   collection of Fisheries Statistics. The extent and
   boundary of these zones are given in Map VIII.

Boundary and Extent of the Fishing Zones of Kerala

Zone No.	Boundary	Extent (in kms)
I	Kollamgode to Valiaveli	44
II	Kochuthura to Chillekal	40
III	Poozhikara to Valiazhikal	49
IV	Tharayil Kadavu to Ottamasery	70
V	Vattakkal to Kathialam	65
VI	Attupuram to Ponnani	68
VII	Kootayi to Edakkadavu	72
VIII	Quilandy to Kadangod	104
IX	Taikadapuram to Kunjathur	48
	Total ...	560

Source: C.M.F.R.I., Ernakulam

Map. VIII
FISHING ZONES
of
KERALA
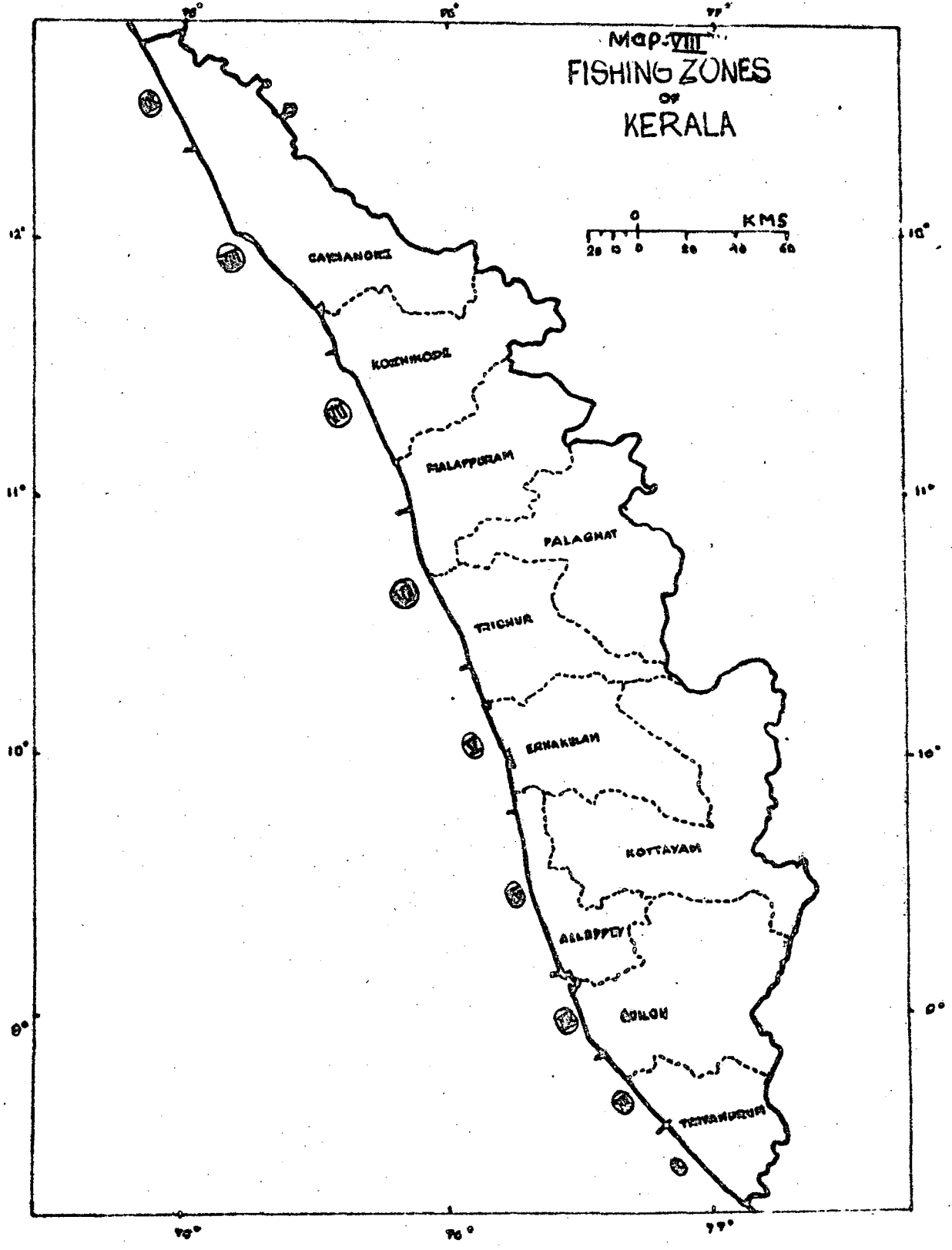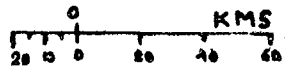
and between the different fishing zones-at various points
of time. The analysis has been made for a period of nine
years extending from 1965 to 1973.

The Concept of Productivity

"Productivity is a subject surrounded by consi-
derable confusion."[3] It is rather a narrow concept con-
cerned with only the 'physical' components, the price com-
ponent having been eliminated. This is denoted by the expres-
sion "output-input relationship" or "output per unit of
input".[4] "The term 'productivity' is generally used rather
broadly to denote the relation of output to any or all
associated inputs in real terms."[5] I.L.O. has defined
productivity as the relation between "output" of wealth
and the "input of resources used in the process of pro-
duction."[6]

Productivity studies are usually made in terms of
capital and labour inputs in production. But because of
the practical difficulties in assessing the contribution
of capital, productivity analyses are generally made in
terms of the labour inputs. The socio-economic considera-
tions also act as a strong inducement to measure producti-
vity in terms of labour. Labour productivity can be defined

3. Soloman Fabricant, The Poverty of Philosophy (Moscow,
   1948), p.

4. Organisation for Economic Cooperation and Deve-
   lopment, Concepts of Productivity Measurement in Agri-
   culture on a National Scale (Paris, 1961), p.10.

5. Kendrick John W., Productivity Trends in United States,
   (Princeton, 1961), p.6.

6. International Labour Organisation, Higher Productivity
   in Manufacturing Industries (Geneva, 1954), p.

as "the ratio of output to the corresponding input of
labour." The relationship between the input and the output
is that "for a single uniform product, the unit labour re-
quirement for any particular time of the labour consumed
per unit of output of the specified good or (which amounts
to the same thing), the ratio of the total labour required
of the production of a given volume of that good".[7] Labour
inputs are generally measured in terms of man-hours worked.

However, it should be recognised that labour pro-
ductivity ratio is not really a measure of the contribution
and effort of labour alone, but is the joint contribution
of raw-materials, capital, organisation and labour expressed
in terms of labour units. Productivity is the function of
the organisation of various factors of production, like
land, labour and capital. The computed productivity figures
in terms of man-hours do not mean isolation of the contri-
bution of labour alone in terms of the entire output which
is the combined result of all factors. The economic con-
cept of marginal productivity is only notional and assumes
ideal conditions.[8] In productivity analysis, the "physical
output in relation to labour input is the norm of measure-
ment . Though the indices thus derived are based on labour,
they do not measure merely labour efficiency. It is actual-
ly a measure of efficiency in general, reckoned in terms of

7. D. Evans and I. Siegel, "The Meaning of Productivity
   Indexes", Journal of American Statistical Association,
   (March 1942), p.

8. A.D. Singh, "Labour Productivity", Industrial Relations
   (July-August 1973), Vol.XXV, No.4, p.144.

one specific factor...any factor affecting output of labour
may have an influence on labour productivity. So what is
measured is the combined effect of the diverse; influences
at work in a productive function...."[9] It is in no way a
cause-effect relationship between production and labour.
Labour productivity indices give a comparative picture of
the worker's performance in different periods. It is,
therefore, reasonable to measure labour productivity on
the basis of the man-hours worked at a given point of time.

Productivity in Fishing

Since labour-time devoted in fishing is an impor-
tant variable affecting the catch and as labour is an active
agent in the process of production, an analysis of the pro-
ductivity of labour and its variation over space (fishing
zones) and time is quite useful. Labour Productivity in
fishing can be measured by finding out the catch-per-unit-
effort (C.P.U.E) in kilograms or tonnes during a particular
period. Unit effort can be calculated in terms of man-hours
spent on fishing. Catch-per-unit-effort can be expressed
as the catch per man-hour of fishing. This is obviously the
ratio of fish catch to the corresponding input of labour.
C.P.U.E. is, in other words, a sort of input-output coeffi-
cient in fishing. The ratio can be expressed thus: $C.P.U.E = C_i/E_i$, where 'C' and 'E' are the catch and effort respectively
during the 'i'th period. The ratio gives an index of effi-

9. R. Balakrishna, Measurement of Productivity in Indian
Industry (Madras, 1958), pp.2-3.

ciency in fishing during the period under observation.

Seasonal Variations in Productivity

Seasons play a predominant role in determining the productivity in fishing industry. Seasonal influences are very great on the catch and effort and as a result on the productivity in fishing. Considerable fluctuations were observed in the seasonal productivity indices of the different fishing zones.[10] The following table shows the seasonal variations in catch per man-hour of effort.

Table XV

Seasonal Catch Per Man-hour of Effort (Seasonal Average of 1965-73)
(in kilograms)

Fishing Zones	Fishing Seasons			
	Jan-March I	April-June II	July-Sept. III	Oct.-Dec. IV
I	1.40	2.30	5.40	2.70
II	1.90	3.20	5.40	4.60
III	3.80	4.30	9.80	5.50
IV	13.80	5.30	4.90	6.10
V	15.20	12.80	8.30	18.10
VI	13.00	7.50	5.00	7.00
VII	11.90	7.00	9.90	14.40
VIII	7.10	5.20	10.40	11.50
IX	11.00	7.80	20.70	19.70

Source: Central Marine Fisheries Research Institute, Ernakulam.

It appears from the above table that productivity figures were generally high in all the zones during the

10. See Appendix-VII

last two quarters, i.e. from July to December. However,
it was the maximum during the third quarter in Zone Nos.
I, II, III and IX, while in Zone Nos. IV, V, VII and VIII
it was the maximum during the last quarter. Zone No.VI
registered the maximum catch per unit-effort during the
first quarter .

A significant point which is clear from the above
table is that productivity figures were comparatively high
in Zone Nos. V, VI, VII, VIII and IX during all the
quarters.[11] This point has got very great connotation for
the development of fisheries. It should be noted that
these zones happen to be areas where fishing is not so
much developed on modern lines. The only exception to
this was zone No.V (which covers the whole of Ernakulam
district where fishing is highly mechanised). The fact
that productivity figures are comparatively high in these
zones suggest the possibility for further exploitation of
the fish stock in this region.

So far we have not considered the quality of the
fish caught in determining the productivity in fishing.
Quality of the fish caught is of fundamental economic
importance to the fishermen as well as the industry. A
small catch of a better quality may fetch the fishermen
more income than a large catch of a poor quality. They
are more interested in catching fishes of better quality
which can save them time and effort and earn a higher
income.

11. See Diagram II.

Diagram. II
SEASONAL AVERAGE CATCH PER MANHOUR OF EFFORT DURING 1965-73

FIRST SEASON (JAN-MAR)
SECOND SEASON (APR-JUN)
THIRD SEASON (JUL-SEP)
FOURTH SEASON (OCT-DEC)

SEASONAL CATCH PER MAN-HOUR OF EFFORT IN Kgms.

FISHING ZONES

why graph for different zones? (?)
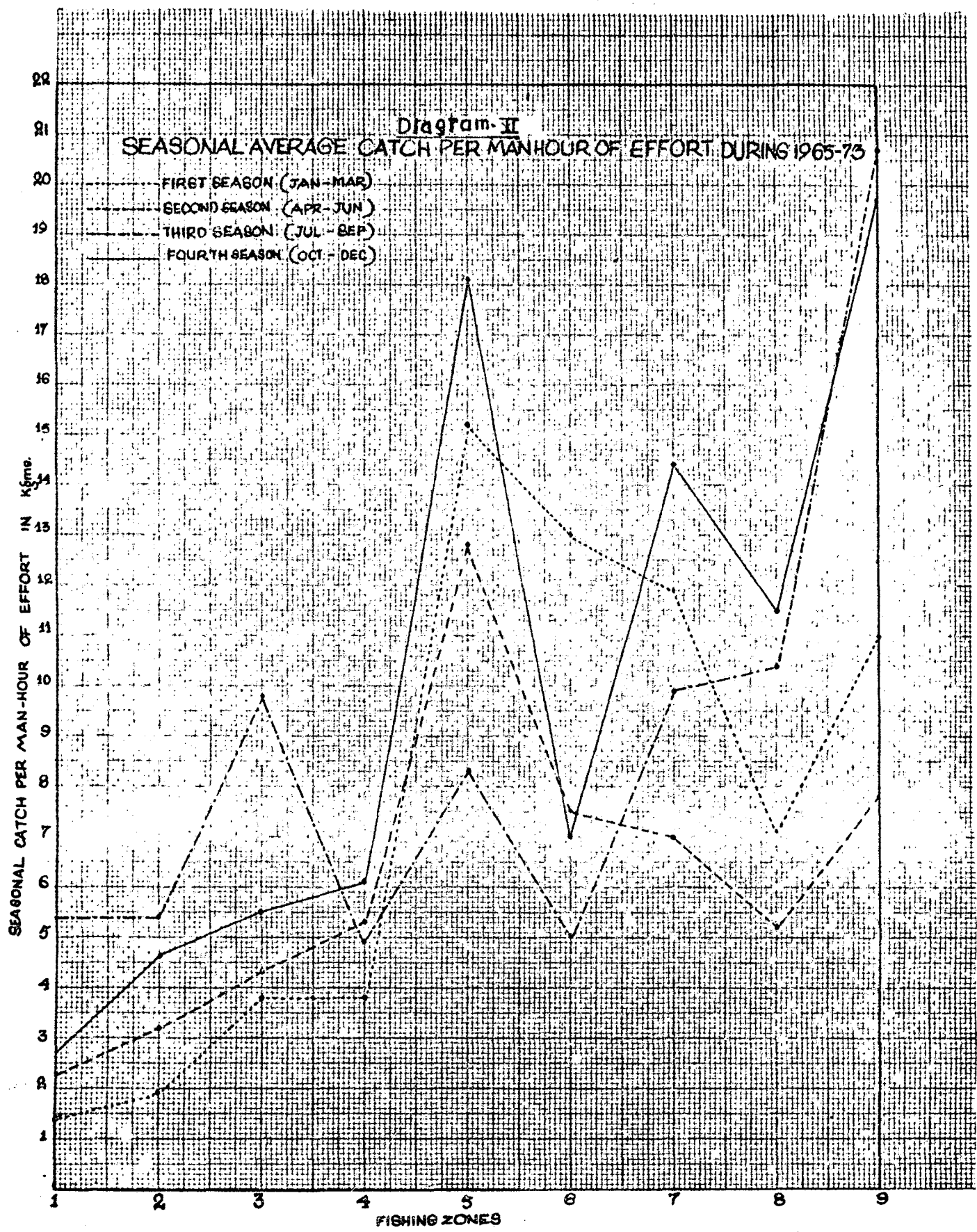
The quality of the fish has to be taken into
account especially when there is considerable variation
in the species caught during each season and in the dif-
ferent fishing zones. Quality of the fish can be incor-
porated in the productivity index by taking the money
value and the species into account. Hence, the quantity
of each species caught during the first, second, third
and fourth quarter of every year is added up and multi-
plied by the unit value of each species during the cor-
responding quarter.[12] The sum of the values of all spe-
cies caught during a particularquarter is then divided by
the sum of the fishing effort during the corresponding
quarter of the whole period. The resulting ratio will be
a better index of productivity. The following table pre-
sents the seasonal variations in gross earnings per man-
hour of effort.

Table XVI

Seasonal Gross Earnings Per Man-Hour of Effort (Seasonal Ave-
rage of 1965-73)

(in Rupees)

Fishing Zones	Fishing Seasons			
	I	II	III	IV
I	3.33	1.49	3.32	1.80
II	1.55	2.03	3.73	3.04
III	2.54	4.14	10.47	3.57
IV	2.35	4.52	5.38	3.02
V	11.06	11.76	5.70	8.40
VI	6.60	4.27	3.58	3.28
VII	6.82	4.03	6.26	6.02
VIII	4.53	3.25	5.68	4.24
IX	6.02	4.84	12.32	7.56

Source: C.M.F.R.I., Ernakulam

12. Unit value of each species is nothing but the average of
    the seasonal values of the same species during the whole
    period. Unit value of each species during the four quarters
    is calculated in terms of rupees per tonne of fish.

The above table shows that seasonal fluctuations
were not very great in the gross earnings per manhour of
effort. However, there was a general tendency for earnings
to rise during the last two quarters.[13] It was at the maxi-
mum level during the third quarter in zone Nos. II, III, IV,
VIII and IX. Zone Nos. I, VI and VII registered the highest
gross income per man-hour of effort during the first quarter.
The second quarter proved to be the most productive season
for Zone No.V.

An interesting feature in the above table is that
productivity figures were generally high in zone Nos. V, VI,
VII, VIII and IX during all the quarters.[14] We have already
noticed this trend in the catch per man-hour of effort. The
superior productivity enjoyed by these zones may be explained
in terms of the availability of a variety of species in the
inshore regions which can be exploited by the non-mechanised
boats. However, in Zone No. V, the higher productivity is
mainly the result of deep-sea fishing practised by the mecha-
nised boats.

Another feature which is quite apparent from the
above table is that productivity figures were comparatively
high in Zone Nos. V and VI during the first two quarters.
It seems that fishing is more profitable in these zones during
this period.

13. See Appendix-VIII
14. See Diagram III.

(?)

Diagram-III

SEASONAL AVERAGE GROSS EARNINGS PER MAN HOUR OF EFFORT DURING 1965-73

FIRST SEASON (JAN - MAR)
SECOND SEASON (APR - JUN)
THIRD SEASON (JUL - SEP)
FOURTH SEASON (OCT - DEC)

SEASONAL GROSS EARNINGS PER MANHOUR OF EFFORT (IN Rs)

FISHING ZONES
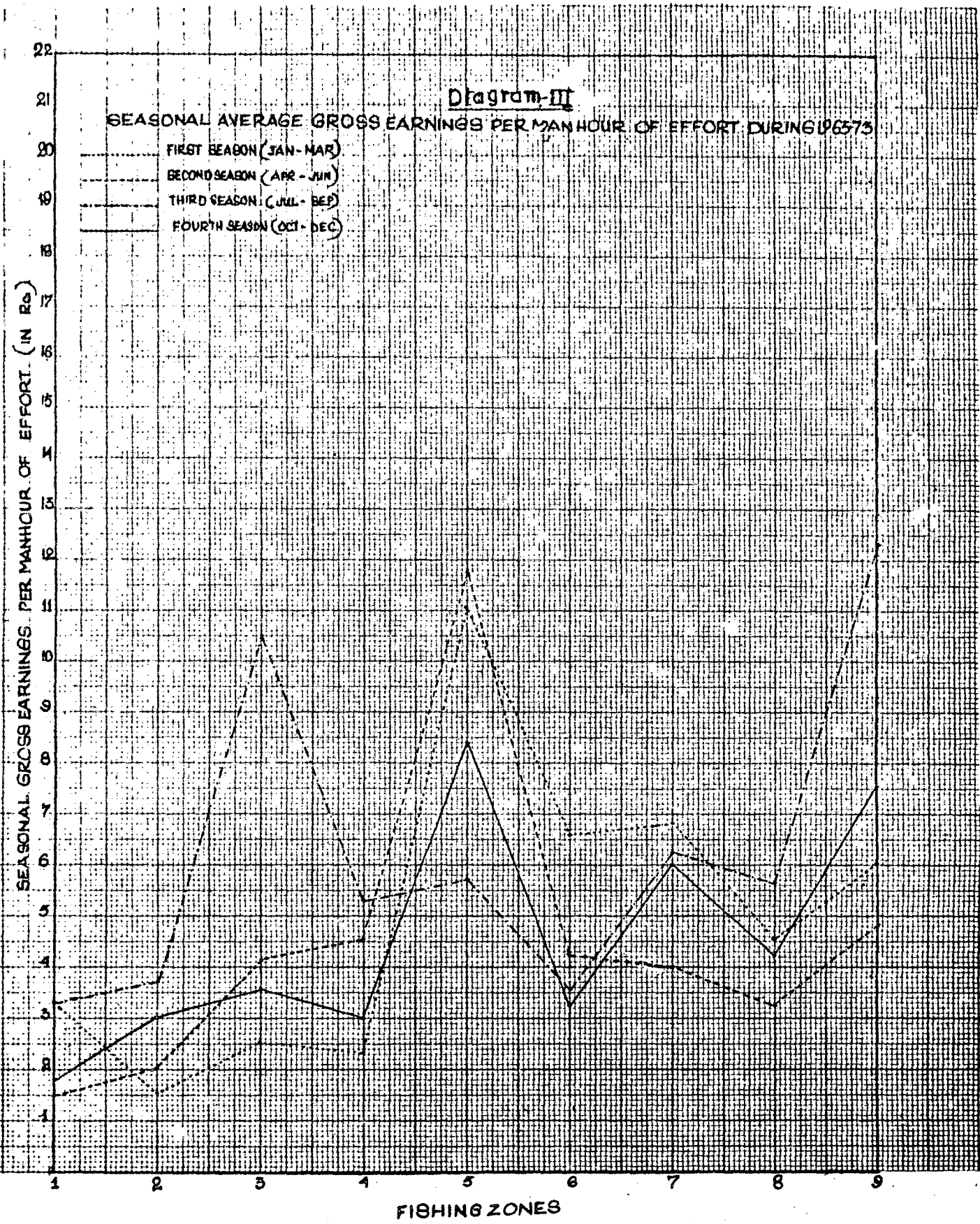
Annual Variations in Productivity

It would be interesting to see whether there is any considerable change in productivity during the different years. Catch per man-hours of effort had been highly fluctuating in all the zones during the period under observation. The following table shows how productivity figures were moving in the different zones.

Table XVII

Catch per Man-hour of effort during 1965-73 (kilograms)

| Year | Fishing Zones | | | | | | | | |
	I	II	III	IV	V	VI	VII	VIII	IX
1965	2.00	1.80	4.60	6.50	13.80	11.60	6.60	8.60	16.30
1966	3.20	4.10	4.30	4.10	16.60	10.00	7.00	9.50	16.90
1967	2.10	4.50	4.40	4.50	16.60	11.60	8.00	10.50	22.60
1968	1.80	3.20	3.00	4.90	18.80	9.40	10.20	11.00	18.80
1969	1.90	3.10	5.20	5.90	14.40	9.70	11.70	10.80	9.80
1970	0.70	7.60	5.00	5.80	11.80	9.30	17.60	11.80	13.90
1971	4.80	2.40	6.90	3.90	17.20	14.70	13.70	10.10	16.00
1972	2.70	4.40	4.70	4.40	7.40	3.30	12.20	6.10	7.20
1973	3.80	3.70	10.50	5.30	12.70	4.50	12.40	5.20	12.00
Average	2.80	3.80	5.70	5.00	14.00	8.10	11.10	9.30	15.50

Source: C.M.F.R.I., Ernakulam

It should be noted that there was no regular pattern in the movement of productivity. Catch per man-hour of effort was the maximum in Zone No. IX during 1965, 1966 and 1967. It was the maximum in Zone No. V during 1969, 1971 and 1973. Productivity was equally high in Zone Nos. V and IX during 1968. However, in 1970, it was the maximum in zone No. VIII. Catch

per man-hour of effort was comparatively high in Zone Nos.
VI, VII and VIII during the whole period, even though there
was a slight fall in Zone Nos. VI and VIII during 1972 and
1973. Productivity figures were generally low in Zone Nos.
I, II, III and IV during the whole period. However, in
1973, there was a remarkable rise in productivity in Zone
No. III.

The above table also shows that the average catch
per man-hour of effort was the maximum in Zone No. IX.
Zone Nos. V, VII, VIII, VI, III, IV, II and I stood in
descending order of productivity (see Diagram IV).

A fundamental point which is clear from the above
table is that productivity figures were comparatively high
in Zone Nos. V, VI, VII, VIII and IX. This phenomenon is
already noticed in the last section.

Now let us see whether there is any change in the
relative productivity of the zones, when the quality of the
catch is taken into account. Quality of the fish is taken
into account by multiplying the quantity of every species
caught during a particular year by the average unit value
of it during the whole period.[15] The resulting product of
the gross value of the catch is then divided by the fishing
effort in the corresponding year. This will give the gross earnings
per man-hour of effort. The following table shows the gross-
earnings per man-hour of effort in the different fishing
zones during the period 1965-73.

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15. The impact of price fluctuations are eliminated by taking
    the average unit value of every species during the whole
    period.

Diagram-IV
ZONEWISE AVERAGE CATCH PER MAN-HOUR OF EFFORT (IN KGS)
(1965-73)
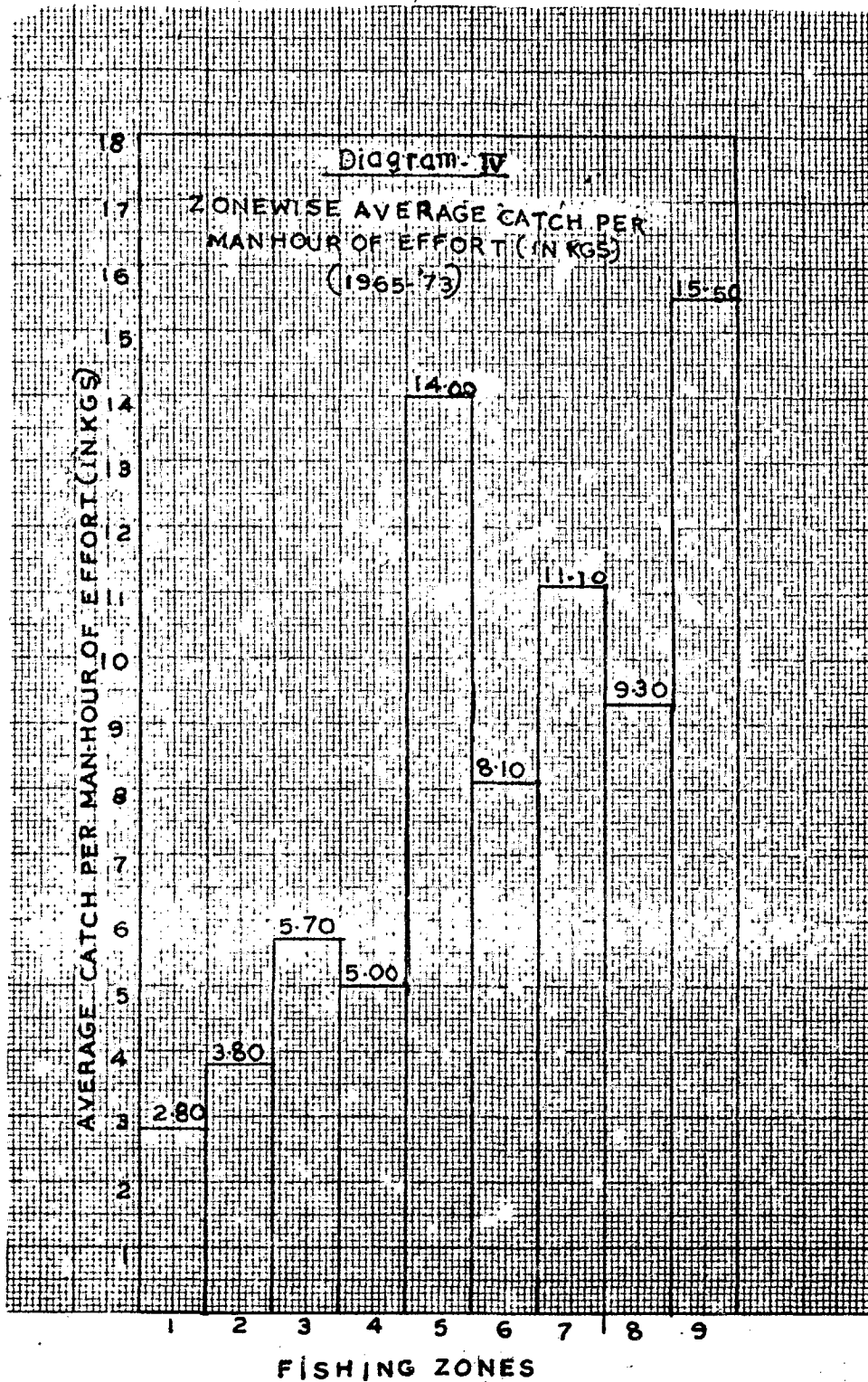
Table XVIII

Gross Earnings per Man-hour of Effort during 1965-73 9
(in Rs.)

Year	Fishing Zones								
	I	II	III	IV	V	VI	VII	VIII	IX
1965	1.36	1.41	2.64	3.31	6.99	5.02	4.17	4.32	7.60
1966	2.16	2.92	2.70	2.88	12.00	4.08	3.98	4.58	8.88
1967	1.53	3.20	3.35	3.68	8.53	4.96	3.89	5.61	9.20
1968	1.20	2.18	1.80	3.35	9.27	4.02	5.27	5.68	8.35
1969	1.30	2.13	3.76	3.65	12.06	6.27	6.52	6.20	5.08
1970	0.47	5.49	3.54	4.55	10.11	5.46	10.24	5.88	7.74
1971	3.33	1.65	5.97	2.25	10.59	7.74	8.21	5.88	9.71
1972	1.92	3.05	4.79	5.14	5.32	1.71	6.33	3.21	4.23
1973	2.47	2.60	12.01	4.19	9.80	2.68	6.07	2.55	6.90
Average	2.50	2.57	4.92	3.68	8.97	4.41	5.82	4.50	7.64

Source: C.M.F.R.I., Ernakulam

Considerable fluctuations were observed in the gross earnings per man-hour of effort during the different years under observation. Variations were also found in the productivity figures of the different fishing zones. Gross earnings per man hour was the maximum in zone No. V during 1966, 1968, 1969 and 1971. It was the highest in zone No. IX during 1965 and 1967. Zone No. VII proved to be the most productive zone during 1970 and 1972. Gross income per man hour of effort was the maximum in Zone No. III during 1973. Productivity figures were generally low in Zone Nos. I, II, III and IV. It was comparatively high in Zone Nos. V, VI, VII, VIII and IX. The relative status of the zones have changed when the quality of the catch is taken into account. Earlier it was Zone No. IX

Diagram. V

ZONEWISE AVERAGE GROSS EARNINGS
PER MAN-HOUR OF EFFORT (IN RS)
(1965-73)
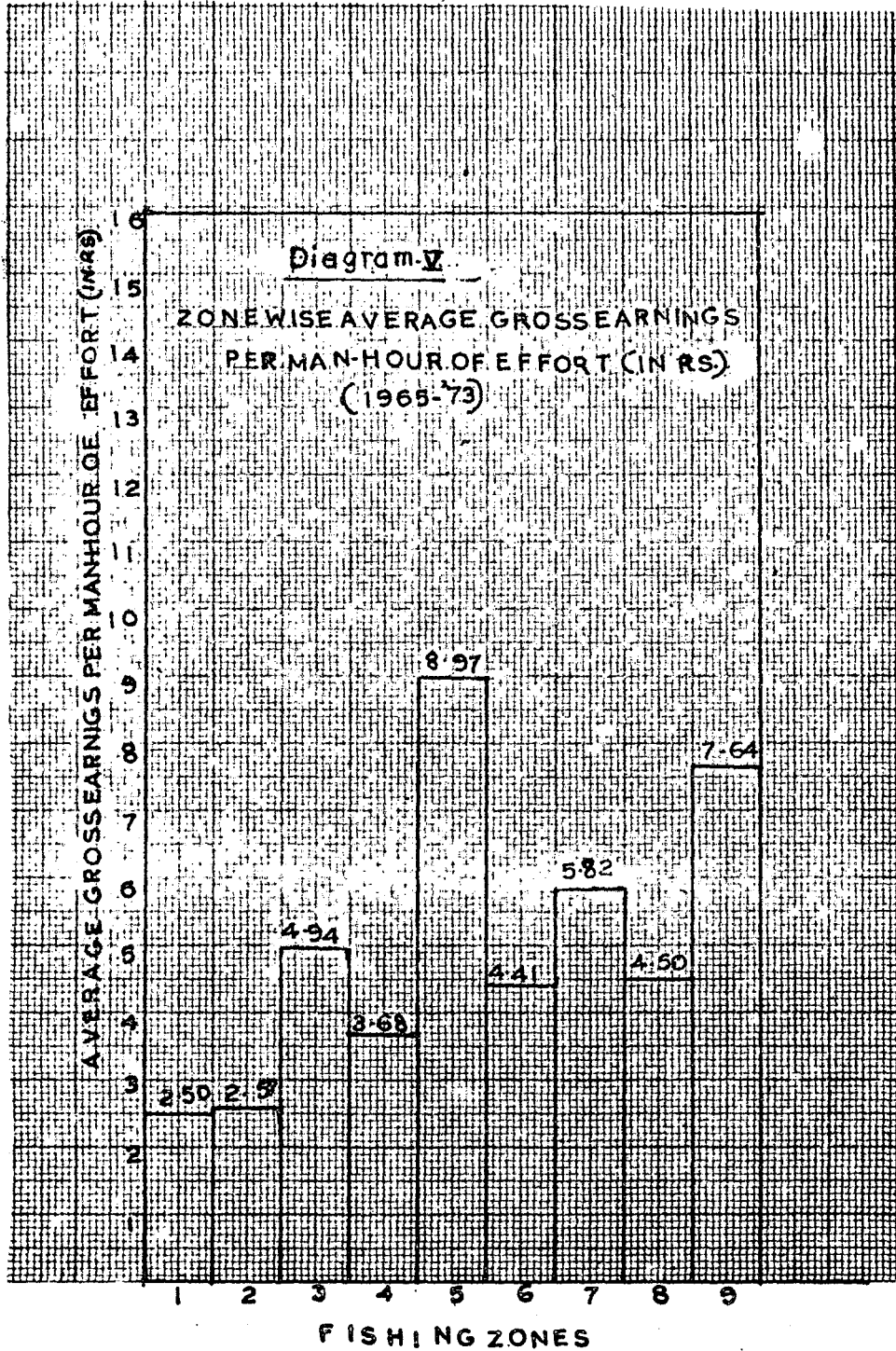
which was most productive. Now it ranks only second. The relative position of the other zones are shown in Diagram V.

A remarkable feature which is revealed in the above table is that gross-earnings per man hour of effort was the maximum in Zone No. V. It seems that the use of modern and more efficient methods in fishing have reduced the labour time required in catching a larger quantity of quality fish in this zone. This is quite possible because, as we have already noted in the last chapter, the area was in possession of a large share of the productive factor of the mechanised boats.

The above analysis makes it clear that Zone Nos. I, II, III and IV were less productive and the others more productive. Based on this fact we are inclined to think that fishing is less developed in the former zones and more developed in the latter. However, this conclusion will be very erroneous. Moreover, the inclusion of Zone No. V in the latter group is bound to distort the picture. Considering it as a separate zone, we have three groups of areas with different levels of productivity.

Productivity differences can be explained in terms of the capital employed in fishing (fishing techniques). However, in the absence of any relevant and comparable statistics of the capital employed in fishing, we can simply assume that productivity is directly related with the fishing effort. Assuming further that the productivity of the ocean is uniform throughout the Kerala coast and the fishing techniques

identical, productivity differences are primarily a function
of the intensity of fishing. The higher the intensity or the
more concentrated the fishing effort, the lower will be the
catch per man-hour of effort. It seems that fishing effort
was more concentrated in Zone Nos. I, II, III and IV. The
following table shows the intensity of fishing and the average
catch per man-hour of effort in the different fishing zones.

Table XIX

Fishing Effort per Kilometre of Coastline and the Average
Catch per Man-hour of Effort (Average of 1965-73)

Fishing Zone	Fishing Effort (in lakh man-hours)	Catch per man-hour of Effort (in kg)
I	1.70	2.80
II	0.90	3.80
III	1.30	5.70
IV	0.90	5.00
V	0.50	14.00
VI	0.70	8.10
VII	0.50	11.10
VIII	0.70	9.30
IX	0.50	15.50

Source: C.M.F.R.I., Ernakulam

It appears from the above table that catch per man-
hour of effort was negatively related to the intensity of
fishing.[16] Productivity figures were low in Zone Nos. I, II
III and IV mainly because of the excessive effort put on a
limited stock of fish. The superior productivity of the other
zones can be explained in terms of the extensive use of the

16. The intensity of fishing is simply measured by dividing
the annual average fishing effort by the length of the
coast line of every zone.

fishing grounds. However, in the case of Zone Nos. V and IX, the extremely high productivity figures were largely the contribution of the mechanised boats. Mechanised fishing is fairly developed in these zones.[17]

Based on this analysis we can easily conclude that productivity figures had reached the minimum desirable limits in Zone Nos. I, II, III and IV, beyond which, unless deep-sea fishing is attempted, productivity will register a further fall, making the operations totally uneconomical. It is also to be noted that the other zones still offer chances for intensifying the fishing effort in both the inshore and offshore regions.

17. The impact of mechanisation is already noticed in the productive factor of the mechanised boats in Ernakulam district which forms the major part of Zone No.V. It seems that the mechanised boats from Mangalore had helped to a large extent in bringing larger and better catches in Zone No. IX.

CHAPTER SIX

SPATIAL AND TEMPORAL VARIATIONS IN FISH CATCH
- A STATISTICAL ANALYSIS OF THE FACTORS RESPONSIBLE FOR IT

Purpose of this Section

We have data of fish catch for nine years with
quarter-wise break up for nine fishing zones of Kerala. There
was considerable fluctuation in the fish catch over time and
space. We thought that it would be interesting to investigate
into the causes of such fluctuations. In this section, an
attempt has been made to identify certain causal variables
to specify the nature of their relationship with fish catch
and empirically test the stipulated relationship.

Identification of Explanatory Variables

The total fish catch in a given period can be
viewed as a function of productivity of the oceans, labour/
machine time spent on fishing, and the technology used in
fishing. With marginal improvements in the technology over
the period under study, fishing remains a labour intensive
activity in which the bulk of the catch is due to human labour
involved in this process. Now, assuming that productivity of
the sea is constant, variations in the labour time spent (man-
hours worked) on fishing can cause fluctuations in the catch.
But it appears to be too simple an assumption because, "even
if there is a fairly good correlation between catch and effort,
there may be substantial fluctuations in catch results which

do not correspond to any changes in fishing effort. Additional factors may, therefore, account for these catch fluctuations."[1] Randon observation of the statistics of catch and effort suggests that a simple measure of correlation between catch and effort would be inadequate to explain the variations in catch. The need for introducing more explanatory variables is quite evident, but there would be insurmountable problems in quantifying them in the absence of the relevant statistics. However, it may be possible to incorporate their impact on catch, although not very precisely, by introducing a proxy variable - Time.

Time in our analysis is not a metaphysical concept. It is rather a "catch all variable" in the sense that in a regression model it works well as a substitute for many trend variables. It represents the changes occuring, if any, in the technical, economic and social organisation of the industry. It would also be a proxy for any continuous and regular changes in the productivity of the ocean. Technical and organisational changes in the industry will significantly affect the productivity of the fishermen and thereby their catch. Changes in the social outlook and institutional frame are yet other important variables affecting the catch and productivity in the industry. Therefore, the inclusion of these variables either directly or through a

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1.   A. Kerr, "Correlation and Regression Analysis as a Tool
     in Management Decision Making", Fisheries Reports, No.22
     Vol.3 (FAO, Rome, 1965), p.413.

proxy is very important in the present study. It is, however, not possible to relate in the beginning how effective Time would be in representing the variation of these underlying variables.

The analysis would be only partial until we are able to construct effective indices for changes in weather and oceanic conditions. But such an analysis is beyond the scope of this study. Despite these drawbacks, the analysis can throw some light on the relationship between catch effort and Time.

Scheme of Analysis

The analysis treats Catch as the dependent variable and Effort and Time as the explanatory variables. The study is based on the quarterly and yearly statistics. The following are the three analyses that were made.

(i) Multiple Linear Regression with Effort and Time

Initially it was felt that fluctuations in Catch will be directly related to changes in Time and Effort. By postulating a linear relationship between Catch, Time and Effort, an attempt was made to fit a multiple linear regression to the available data. 'F' values for the coefficient of determination and 't' values for the regression coefficients were determined to test the validity of the exercise.

(ii) Multiple Non-linear Regression with Time

As Time appeared in the analysis as a substitute of several other variables, it is possible to argue that

these group of variables may be multi-colinear. If the
effect of these variables are multiplicated among them-
selves, Time will affect the fish catch, not in a linear
fshion. In view of this, a non-linear function was also
fitted and tested.

(iii) Multiple Non-linear Regression with Effort

It is believed that Effort may not affect the
catch figures by constant multiple or in a linear fashion.
Non linearity in production function tried for many other
industrial sectors needs to be tried in the fishing industry
also. This would enable a researcher to look into the
economies and dis-economies of scale of the industry. It
would also be possible then to tell the optimum level of
production and suggest whether in fishing industry the
optimum has been reached.

Analysis of the Results

It would be worthwhile to begin the analysis by
examining the relationship between Catch and Effort and
Time during the different fishing seasons (quarters). The
following table gives the statistical results of the linear
and non-linear relationship worked out between Catch, Effort
and Time during the different quarters of the period 1965
to 1973.

Table XX

Coefficient of Multiple Determination of Catch by Effort and Time

	Linear Effort and Time		Non-Linear Effort		Linear Effort	Non-Linear Time	
	R^2	F	R^2	F	R^2	R^2	F
1	2	3	4	5	6	7	8
I	.36	9.52	.33	8.30	.33	.28	6.54
II	.44	13.49	.60	25.45	.43	.10	1.96
III	.33	8.37	.27	6.18	.26	.34	8.57
IV	.60	25.05	.60	25.71	.60	.37	10.01
V	.41	11.94	.39	10.92	.39	.06	1.16
VI	.21	4.42	.24	5.49	.16	.00	.05
VII	.29	7.04	.20	4.34	.18	.01	.25
VIII	.69	37.18	.68	35.13	.68	.08	1.51
IX	.48	15.50	.47	15.12	.47	.09	1.66

Table Value of F = 3.23 (DF = 2,33) Significant at 1% level

Multiple Linear Correlation between Catch, Effort and Time

The above table shows that Catch is significantly correlated with Effort and Time in all the zones. It is quite peculiar that the Coefficient of Determination is very high in Zone Nos. IV and VIII. These two zones cover the major part of the coastline of Alleppey, Cannanore and part of Kozhikode districts.[2] R^2 is comparatively high in Zone Nos. II, V and IX. These zones cover part of the coastline of Trivandrum, Quilon, Alleppey, whole of Ernakulam, part of Trichur and Cannanore districts. R^2 is generally low in all

2. Boundary of the Zones can be seen in Map VIII.

other zones. These zones cover the major part of Trivandrum, Quilon, Trichur, Malappuram and Kozhikode districts. However, if we look at the results derived from the annual statistics, it can be seen that R^2 has improved in all zones except zone Nos. V, VI and VIII. R^2 is seen to become lower in the last three zones.

The above analysis shows that variations in Catch are not solely due to changes in fishing effort or Time, though they explain a significant percentage in the total variation in the Catch figures in most of the zones. A disadvantage in the above analysis is that the regression coefficient would tend to become unreliable with a high degree of multi-colinearity. This can be assessed somewhat satisfactorily by taking a bivariate regression model first, and then examining whether the inclusion of this augments the explained variation. To investigate whether Time provides significant explanation for variation in Catch, the bivariate correlation coefficients were calculated. The correlation matrix clearly indicates that effort is more important than Time as its correlation with Catch is uniformly high in most of the zones. The correlation between Catch and Effort has improved further, when the analysis is repeated with yearly statistics. However, in three zones, the correlation between Catch and Effort turned out to be weak. R^2 did not improve much in majority of the zones even after incorporating Time in the regression model. However, there are a few zones where increase in R^2 by introducing Time is rather marked. Time has improved the R^2

in Zone Nos. III, IV and VII. This in other words means that
Time is an important variable affecting the Catch in these
zones. However, it is very difficult to say which particular
Time factor is influencing the catch in these zones. There is
every possibility for Catch to respond to the technological
changes that were taking place in those zones. But in the
case of Zone Nos. VI and VII, this relationship is to be
doubted because the technological changes were not very re-
markable in these zones. The impact of Time on Catch is not
very great in all other zones. Catch on the other hand
responds more to changes in Effort in these zones.

This can be further explained by applying the t-test
to the regression coefficients of Catch on Effort and Time.
The following table gives the calculated values of 't' and
their constants.

Table XXI

T-Values of the Regression Coefficients of Catch on Effort and Time

Zones	Linear Effort and Time			Non-Linear Effort			Non-Linear Time		
	Effort	Time	Constant	Effort	Effort^2	Constant	Time	Time^2	Constant
1	2	3	4	5	6	7	8	9	10
I	3.88	1.28	-2168.7	1.18	.14	- 630.6	-2.55	3.09	9375.2
II	4.55	0.90	- 277.0	-1.85	3.78	3397.1	0.19	0.29	2314.3
III	2.14	1.93	-4286.5	1.38	.72	-8827.0	-1.28	2.20	8234.5
IV	5.95	0.29	54.3	2.53	.77	-1407.8	-2.42	3.26	10318.9
V	4.88	-1.13	3840.3	1.62	.24	1602.8	1.46	-1.52	7787.4
VI	2.95	-1.39	7517.2	2.60	1.93	-2893.7	-0.10	0.17	10557.6
VII	3.69	2.31	-6788.9	1.51	0.97	-6159.7	-0;28	0.44	13380.1
VIII	8.56	-1.14	-3202.3	2.19	0.09	-5707.9	1.45	-1.64	11565.5
IX	5.20	-0.77	- 399.4	0.83	0.45	- 413.0	0.66	-1.05	9686.5

Table Value of T = 2.021 (DF = 2,33) Significant at 5% level

t-values of the regression coefficients (linear)
of Catch and Effort are significant in all the zones. The
corresponding values of t derived from the annual statistics
are also significant in four zones. t-values are found to
be positive in all the zones. t-values of the regression
coefficients of Catch on Time, on the other hand, are in-
significant or negative in all the zones. t-values calcu-
lated from the annual statistics are also either negative
or insignificant (see Appendix-XI). From this we can easily
conclude that Catch has a strong positive response to changes
in effort than to changes in Time. However, to finally
pronounce that Time has no important role to play in explain-
ing Catch variation, it would be necessary to examine if
it has any non-linear influence on Catch.

Non-linear Correlation between Catch and Time.

Though Catch was not significantly related (linearly)
with Time, it appears to have significant correlation (non-
linear) with Time in atleast three zones,[3] namely, Zone Nos.
I, III and IV. R^2 is significantly high in these zones. It
has improved further when yearly data was analysed. The
t-values are also found to be significant in these zones, both
in the quarter-wise (Zone III is an exception) and year-wise
analysis.[4] From this, we can safely conclude that Time is
quite significant a variable in explaining the fluctuations
in Catch in these zones. These zones cover part of the coast
of Trivandrum, Quilon and major part of the coast of Alleppey
district.

3. Compare cols.7 in Table XX and Appendix-IX
4. See cols.9 in Table XXI and Appendix-X

Time did not have any influence significant enough
to be reckoned with, in all other zones.

Non-linear Correlation between Catch and Effort

We have already seen that Catch is significantly
correlated (linearly) with Effort in all the zones. Now let
us see whether R^2 is changing significantly when non-linearity
is introduced in the relationship between Catch and Effort.
Table No. XX shows that there is not much of a variation in
R^2 when non-linearity is introduced in the function to ex-
plain the variations in Catch.[5] It means that the relation-
ship is basically a linear one.

However, in Zone No.II there is a definite change.
R^2 (non-linear) has improved to some extent in this zone. It
is clear from Table XX (col.3). There is a clear improvement
in Zone Nos. II, III, IV and VII, when the annual Catch
results are studied (compare cols. 3 of Table XX and col.3
of Appendix-IX). t-values are also positive in all the
zones though they are not significant in all, but zone No.II.
t-values are, however, significant in Zone Nos. III, IV and
VI when the analysis is made on the basis of yearly statistics.

One peculiar feature of the production function
obtained in this section needs special attention. It can be
seen that with no exception, the coefficients for the second
degree term in the regression models are strictly positive.
This suggests, rather the unusual feature of the production
function. Since the second derivative of Catch with respect

5. Compare Col. 3 and 5 of Table XX.

to Effort is positive, it may be argued that with, increase in effort fish catch increases at an increasing rate. The general theory of economics and various empirical studies in other branches of industry, however, indicate quite different functional relationship between labour and output. The concave and quasi-concave production functions with which the economists generally proceed in their analysis would imply a positive marginal productivity and a negative response of marginal product to increase in labour.

There could be three explanations for this strange, but interesting result. First of all, one may dismiss the result by arguing that the t-values associated with the second degree regression coefficient (i.e. effort^2) are not significant for most of the zones. There is only one zone for which t-value is significant and that may be considered as unusual. However, it should be understood that even for the zones for which t-values (associated with Effort) are not significant, the signs of regression coefficients are positive. Second, one may argue that falling rate of marginal products accepted by economists is applicable only after a certain level of output is reached. Till that point is reached increasing marginal product should not be considered very unusual. Lastly, increase in labour is generally accompanied by better fishing amenities. Because of this relationship between Effort and technology, Effort at higher level embodies a certain impact of mechanisation and modernisation as well, which leads to a larger Catch.

Technology and Productivity in Fishing

The fishing industry in Kerala was not able to
adopt the technological developments accomplished in the
field in other parts of the world, due to dearth of capital.
In spite of this fact, the state accounts for nearly 30
per cent of the country's marine fish production and enjoys
first place among the fish producing states in the country.
However, the conditions of this industry in Kerala appears
to be quite disturbing when an inter-state comparison is
made on the basis of the indices of productivity.[6] Large
quantity of fish caught in Kerala is probably the result of
intensive labour effort than a contribution of advanced
technology. However, it appears that some improvements
have taken place during the period under study.

While contradictory theories are being propagated
by various research scholars and government agencies regard-
ing productivity and its relation with technology, it would
be interesting to ascertain precisely the nature of their
relationship. Therefore, we thought of fitting a regression
model to test the nature of the relationship existing in
this industry. The precise question to which this section
is devoted is to see how far the technological inputs affect
the output per fisherman in Kerala. In the absence of time-
series data, only a cross-section analysis is attempted,
taking the district level data for the year 1972.

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6. See Appendix XI.

Two indices have to be constructed in studying the aforesaid relationship. Index of technology (productive factor), which is the independent variable in this analysis, has been constructed in Chapter IV. Index of productivity or output per fisherman which happens to be the dependent variable is calculated by dividing the total catch by the number of active fishermen in every district.

The functional form of the relationship postulated between the two variables is a linear one. The statistical results, however, indicate that the relationship between technological inputs and productivity is highly insignificant. The regression coefficient surprisingly comes to be negative, which need not be considered alarming as the R^2 value is very low. One may try to interpret this result by referring to the earlier results in this study. It may be suggested that the index of technology which has mechanised boats as a not very important component would not explain significant proportion of the total variation. This is because, as we have seen earlier, in fishing it is the effort involved in the production process and the improvements in the skill and organisation etc. that go with increase in effort that explain a very large percentage of the total fish catch. On the other hand, if a regression analysis is attempted by taking the productivity of labour in fishing with the index of mechanisation alone, the relationship might be positive and significant.

SUMMARY OF FINDINGS

The present study brings out the following points:
(1) The problems of fishing industry are many. Broadly they
include shortage of capital, inefficient method of fishing,
insufficient facilities for docking and repair of boats,
lack of facilities for storage and preservation of fish,
poor marketing arrangements, malpractices of the middlemen,
poor housing and medical facilities, etc. Many of these
problems are being tackled by the government in recent years
while many of them are still wanting solution.
(2) Fishermen are as a rule victims of poverty, disease and
illiteracy. The literacy standard of the fisherfolk is very
poor. Their standard cannot be compared on an equal footing
with that of any other occupational category except that
of the agricultural labourers. Their problems are more acute
in districts like Cannanore, Kozhikode, Malappuram, Trichur
and Trivandrum.
(3) The possibility of out-migration of adult males from
some of the villages of Ernakulam district is identified while
an opposite movement is observed in Cochin corporation. The
available statistics is insufficient to say anything about
the nature and course of migration. However, it seems that
migrants are mostly in the age-group 25 - 29.
(4) The occupational pattern of the fisherfolk has changed
very much in recent years. But the majority of the fishermen
are still employed in the primary sector of the fishing industry

- in fishing and 'other activities' such as the collection
of pearls, conches, shells, etc. The percentage of fisher-
men engaged in the secondary and tertiary sector of the
industry is very small.

(5) The most remarkable development in fishing industry in
Kerala in recent years is the growth of numerous fish-
processing units in Cochin-Quilon areas. These units are
mainly engaged in export business.

(6) Fishing industry is found organised in three distinct
forms. They are: (a) family enterprise; (b) cooperative
enterprise; and (c) capitalist enterprise. The first two
forms of organisation are too weak and undeveloped. Capita-
list enterprise is the leading form of organisation in
fishing. This form of organisation is however, controlled
by 'merchant capital'. 'Industrial capital' is yet to
grow in the industry.

(7) Fishing equipments used in Kerala are very primitive.
A major share of the productive factor (of equipments) is
contributed by the non-mechanised boats. Productive factor
of the mechanised boats is mainly concentrated in a few
fishing villages/towns and districts. At the village/town
level a major concentration is found at Cochin corporation
'and Chavara village. At the district level the concentra-
tion is the maximum in Ernakulam district. Productive factor
of the fishing equipments is either relatively or absolutely
low in all other districts.

(8) Considerable variation is observed in the productivity of the industry during the different fishing seasons. By and large the last two quarters of the year (July to December) proved to be more productive. Seasonal variations are common to all the fishing zones. Seasonal influences on productivity are, however, overcome in Zone No. V with the help of mechanisation and modernisation. Quality of the catch is an important variable affecting the relative productivity of the zones.

(9) Productivity differences are remarkable between the Southern (I, III, II and IV) and the Northern Zones (VI, VII, VIII and IX). Zone No.V is the most productive of all zones. Productivity differences are mainly a function of the variation in the intensity of fishing.

(10) Total fish catch is found to move directly with changes in fishing effort. The large quantity of fish caught in Kerala is mainly the result of the intensive fishing effort made in the state.

(11) The relationship obtained between existing technology and labour productivity is negative but very insignificant. This result need not be considered very alarming because, the index of technology in which mechanised boats do not form an important component does not materially contribute to productivity. The impact of mechanisation and modernisation is largely felt in districts like Ernakulam and Quilon. This statistical finding is probably affected by the inclusion of

the other districts, where this effect is very weak. The
exact nature of this relationship can be tested only with
the help of production statistics. This can be done by
making a firm-level analysis of productivity.

APPENDIX - I

Net Domestic Product originating from Fishing in Kerala
during 1960-'73.

At constant prices(1960-'61)(Rs.Lakhs)

Year	Fishing (N.D.P)	Total (N.D.P)	Percentage to Total
1960-61	475.47	55211.91	0.86
1961-62	347.41	46177.89	0.75
1962-63	354.47	47963.92	0.74
1963-64	349.85	49301.20	0.71
1964-65	422.88	52281.60	0.81
1965-66	309.38	53928.22	0.57
1966-67	368.48	86816.48	0.42
1967-68	383.29	62808.36	0.61
1968-69	418.75	64684.42	0.65
1969-70	582.43	68437.59	0.85
1970-71	655.09	71435.56	0.92
1971-72	816.65	73096.50	1.12
1972-73	824.70	76246.19	1.08

Source:- Notes of Shri T.R. Thankappan Asari, Assistant
Director, State Planning Board, Trivandrum,
Kera-la.

APPENDIX - II

Distribution of Females per 100 Males in the coastal villages

Sl. No.	Dist./Village	Females per 100 Males	Sl. No.	Dist./Village	Females per 100 Males
ERNAKULAM			**QUILON** (contd.)		
1.	Kuzhupally	245	30.	Quilon	60
2.	Pallipuram	209	31.	Quilon town	93
3.	Edavanakad	206	32.	Eravipuram	88
4.	Nayarambalam	381	33.	Mayyanadu	167
5.	Njarakkal town	106	34.	Paravoor	-
6.	Elangunnapuzha	225	**TRIVANDRUM**		
7.	Cochin Corpn.	81	35.	Edava	97
8.	Palluruthy	188	36.	Varkala	93
9.	Kumbalangy	362	37.	Varkala town	54
10.	Chellanam	189	38.	Vettoor-Cherunniyoor	101
ALLEPPEY			39.	Kadakkavoor	64
11.	Thuravoor South	91	40.	Sarkara Chirayinkil	74
12.	Vayalar West	79	41.	Azhoor	N.A
13.	Sherthalai North	96	42.	Kadinamkulam	94
14.	Sherthalai South	78	43.	Meenamkulam	106
15.	Mararikulam	101	44.	Attipra	96
16.	Aryad South	97	45.	Kadakkampally	102
17.	Alleppey town	93	46.	Trivandrum Corpn.	88
18.	Punnapra	91	47.	Muttathura	103
19.	Ambalapuzha	100	48.	Thiruvallam	90
20.	Purakkad	104	49.	Vizhinjam(Kovalam)	82
21.	Thrikunnapuzha	89	50.	Kottukal	106
22.	Arattupuzha	96	51.	Karumkulam	102
23.	Puthupally	-	52.	Poovar	N.A
QUILON			53.	Kulathur	39
24.	Perunad	90			
25.	Kulasekharapuram	88			
26.	Karunagapally	83			
27.	Panmana	96			
28.	Chavara	79			
29.	Thekkumbhagam	88			

SOURCE:- Live Stock Census, Kera la. 1972.

An unlikely source (!)

APPENDIX - III

Percentage of Adults in total Fishermen in the Coastal villages

Sl. No.	District/Village	Percentage of Adults	Sl. No.	District/Village	Percentage of Adults
ERNAKULAM			**QUILON** (contd.)		
1.	Kuzhupally	10.46	31.	Quilon town	52.58
2.	Pallipuram	15.07	32.	Eravipuram	39.49
3.	Edavanakad	33.03	33.	Mayyanadu	66.67
4.	Nayarambalam	38.10	34.	Paravoor	-
5.	Njarakkal town	48.12	**TRIVANDRUM**		
6.	Elangunnapuzha	24.10	35.	Edava	49.91
7.	Cochin corpn.	85.12	36.	Varkala	60.43
8.	Palluruthy	18.17	37.	Varkala town	45.45
9.	Kumbalangy	84.81	38.	Vettoor-Cherunniyoor	53.06
10.	Chellanam	32.11	39.	Kadakkavoor	59.33
ALLEPPEY			40.	Sarkara Chirayinkil	56.14
11.	Thuravoor South	63.92	41.	Azhoor	N.A
12.	Vayalar West	48.05	42.	Kadinamkulam	51.65
13.	Sherthalai North	44.31	43.	Meenamkulam	42.39
14.	Sherthalai South	46.99	44.	Attipra	50.25
15.	Mararikulam	55.02	45.	Kadakkampally	49.42
16.	Aryad South	56.56	46.	Trivandrum corpn.	49.38
17.	Alleppey town	50.13	47.	Muttathura	58.30
18.	Punnapra	52.70	48.	Thiruvallam	53.81
19.	Ambalapuzha	51.36	49.	Vizhinjam (Kovalam)	44.34
20.	Purakkad	53.13	50.	Kottukal	46.96
21.	Thrikunnapuzha	51.99	51.	Karumkulam	47.68
22.	Arattupuzha	49.75	52.	Poovar	N.A
23.	Puthupally	-	53.	Kulathur	69.63
24.	Perunad	50.88			
25.	Kulasekharapuram	50.53			
26.	Karunagapally	55.11			
27.	Panmana	41.16			
28.	Chavara	50.99			
29.	Thekkumbhagam	48.23			
30.	Quilon	42.84			

Source: Livestock Census, Kerala, 1972

APPENDIX - IV

Percentage of Children and Adults in total Fishermen in the coastal districts

Sl. No.	District	Percentage of children	Percentage of adults
1.	Trivandrum	49.20	50.80
2.	Quilon	50.52	49.48
3.	Alleppey	49.23	50.77
4.	Ernakulam	48.77	51.23
5.	Trichur	50.46	49.54
6.	Malappuram	42.03	57.97
7.	Kozhikode	51.52	48.48
8.	Cannanore	47.98	52.02

Source: Livestock Census, Kerala, 1972.

APPENDIX - V

Participation rate in fishing and allied activities in the coastal villages

Sl. No.	Distt./Village	Participation rate	Sl. No.	Distt./Village	Participation rate
ERNAKULAM			**QUILON** (Contd.)		
1.	Kuzhupally	62.99	31.	Quilon Town	64.98
2.	Pallipuram	48.97	32.	Eravipuram	29.40
3.	Edavanakkad	38.93	33.	Mayyanadu	N.A
4.	Nayarambalam	50.52	34.	Paravoor	-
5.	Njarakkal Town	26.25	**TRIVANDRUM**		
6.	Elangunnapuzha	39.17	35.	Edava	36.98
7.	Cochin Corpn.	33.67	36.	Varkala	33.66
8.	Palluruthy	73.48	37.	Varkala Town	22.73
9.	Kumbalangy	7.87	38.	Vettoor-Cherunni-yoor	23.49
10.	Chellanam	72.75	39.	Kadakkavoor	77.27
ALLEPPEY			40.	Sarkara Chirayin-kil	66.94
11.	Thuravoor South	N.A	41.	Azhoor	N.A
12.	Vayalar West	N.A	42.	Kadinamkulam	52.16
13.	Sherthalai North	79.60	43.	Meenamkulam	37.25
14.	Sherthalai South	78.98	44.	Attipra	27.49
15.	Mararikulam	55.43	45.	Kadakkampally	19.40
16.	Aryad South	69.25	46.	Trivandrum Corpn.	47.52
17.	Alleppey Town	34.67	47.	Muttathura	0.39
18.	Punnapra	52.00	48.	Thiruvallam	7.22
19.	Ambalapuzha	57.46	49.	Vizhinjam (Kovalam)	47.92
20.	Purakkad	51.96	50.	Kottukal	60.04
21.	Thrikunnapuzha	88.11	51.	Karumkulam	88.78
22.	Arattupuzha	93.01	52.	Poovar	N.A
23.	Puthupally	-	53.	Kulathur	73.19
QUILON					
24.	Perunad	63.09			
25.	Kulasekharapuram	57.58			
26.	Karunagapally	56.23			
27.	Panmana	69.98			
28.	Chavara	55.86			
29.	Thekkumbhagam	62.30			
30.	Quilon	59.04			

Source: Live Stock Census, Kerala, 1972.

APPENDIX-VI

Proportionate contribution of the Different Fishing Equipments

Mechanised Crafts

Sl. No.	Name of the Craft/gear	Length Group	Horse Power	Proportionate contribution (A)	No. of Boats (B)	Standard Contribution $\frac{A}{B} = C$
1.	Gill netters	Below 30'	HP upto 25	22	492	0.0447
2.	,,	,,	26 to 100	5	90	0.0556
3.	,,	,,	Above 100	3	12	0.2500
4.	Gill netters	30' & above	HP upto 25	7	285	0.0246
5.	,,	,,	26 to 100	3	115	0.0261
6.	Trawlers	Below 30'	Upto 25	12	40	0.3000
7.	,,	,,	26 to 100	48	19	2.5263
8.	Trawlers	30' & above	Upto 25	36	42	0.8571
9.	,,	,,	26 to 100	108	15	7.2000
10.	,,	,,	Above 100	36	7	5.1429
11.	Liners	Below 30'	Upto 25	12	468	0.0256
12.	,,	,,	26 to 100	2	38	0.0526
13.	,,	,,	Above 100	2	6	0.3333
14.	Liners	30' & above	Upto 25	15	232	0.0647
15.	,,	,,	26 to 100	9	32	0.2813
16.	Others	Below 30'	Upto 25	3	327	0.0092
17.	,,	,,	26 to 100	24	185	0.1297
18.	,,	,,	Above 100	5	6	0.8333
19.	Others	30' & above	Upto 25	12	154	0.0779
20.	,,	,,	26 to 100	36	76	0.4737

Non-mechanised Crafts

Sl. No.	Name	Length Group	Horse Power	(A)	(B)	$\frac{A}{B} = C$
1.	Beach seine	-	-	180	3020	0.0596
2.	Plank built Boats	-	-	60	1104	0.0543
3.	Dug-out Canoes	-	-	180	9865	0.0182
4.	Catamarans	-	-	120	9719	0.0123
5.	Others	-	-	60	6886	0.0087

Fishing Gears

Sl. No.	Name	Length Group	Horse Power	(A)	(B)	$\frac{A}{B} = C$
1.	Dragnets made of cotton twine	-	-	6	14007	0.0004
2.	Dragnets made of Hemp twine	-	-	2	1231	0.0016
3.	Dragnets made of Synthetic twine	-	-	2	4750	0.0004
4.	Gill nets made of Cotton twine	-	-	2	12961	0.0002

APPENDIX - VI (contd.)

Fishing Gears (contd.)

Sl. No.	Name of the Craft/gear	Length Group	Horse Power	Proportionate contribution (A)	No. of Boats (B)	Standard Contribution $\frac{A}{B} = C$
5.	Gill nets made of Hemp twine	-	-	1	2630	0.0004
6.	Gill nets made of Synthetic twine	-	-	12	20328	0.0006
7.	Trawl nets made of Cotton twine	-	-	13	4858	0.0027
8.	Trawl nets made of Synthetic Twine	-	-	37	11642	0.0032
9.	Cast nets made of Cotton twine	-	-	4	4842	0.0008
10.	Cast nets made of Synthetic twine	-	-	6	6431	0.0009
11.	Traps	-	-	2	18418	0.0001
12.	Shore-seines	-	-	10	8224	0.0012
13.	Spawn collecting nets		-	1	977	0.0010
14.	Others	-	-	2	23554	0.0001

APPENDIX - VII

Seasonal Catch per Man-hour of Effort (in kg.)

Year	Season	Catch per man-hour of Effort								
		Fishing Zones								
		I	II	III	IV	V	VI	VII	VIII	IX
1965	I	0.50	1.10	4.40	13.10	20.60	22.00	13.50	6.10	25.40
	II	3.20	1.80	5.30	3.10	22.20	10.70	8.60	4.80	8.40
	III	2.80	3.30	4.10	1.80	8.90	5.60	6.80	12.00	13.10
	IV	1.00	1.20	4.80	3.40	12.20	8.20	7.20	7.10	13.30
1966	I	0.90	1.20	2.40	1.00	18.40	16.00	8.50	1.70	4.80
	II	5.50	3.40	4.10	2.90	22.40	5.80	5.30	5.70	7.10
	III	4.80	7.00	6.80	5.90	7.50	5.40	6.70	12.10	50.30
	IV	2.50	5.50	4.40	5.30	25.90	10.80	6.90	11.90	12.30
1967	I	1.20	2.60	4.20	4.10	13.60	14.60	7.30	11.50	26.40
	II	1.20	2.50	2.90	8.60	11.40	10.90	8.30	2.20	3.60
	III	5.10	7.50	5.00	5.60	14.90	7.50	2.70	13.80	15.30
	IV	2.60	5.80	4.70	4.50	20.40	10.00	14.90	15.30	26.50
1968	I	0.90	1.50	2.80	5.10	19.50	12.90	4.90	5.50	8.50
	II	2.00	2.40	1.40	3.20	9.90	5.60	3.50	2.60	2.90
	III	2.90	6.30	2.40	2.80	8.20	5.50	19.40	14.40	35.30
	IV	2.40	3.60	4.20	11.60	31.00	10.70	19.60	14.50	25.50
1969	I	1.30	2.20	5.40	2.70	12.50	11.50	11.70	7.50	2.70
	II	2.10	4.10	8.00	5.30	10.20	7.90	3.20	4.70	5.40
	III	3.70	4.10	9.20	4.70	20.70	13.60	11.40	7.80	9.20
	IV	1.20	3.10	4.10	9.20	17.20	7.00	17.10	17.10	18.10
1970	I	0.30	3.50	3.30	1.80	11.00	6.40	12.70	7.80	11.80
	II	0.80	3.20	2.00	6.60	11.90	16.20	6.30	12.50	15.40
	III	0.80	5.40	5.70	8.00	7.30	11.00	22.50	11.80	9.80
	IV	0.80	75.80	7.60	9.70	15.60	8.70	28.50	14.80	17.60
1971	I	0.60	1.90	5.60	3.00	18.50	19.40	19.40	8.00	5.50
	II	1.30	2.00	5.20	8.10	20.50	15.80	9.70	9.50	15.60
	III	13.40	3.10	7.40	3.20	8.90	7.20	10.20	11.50	21.90
	IV	5.00	2.70	8.10	4.90	22.10	5.30	13.50	11.50	28.00
1972	I	2.70	2.30	3.20	2.20	13.80	7.70	16.60	9.60	5.50
	II	2.40	4.10	4.10	1.50	4.70	4.80	12.10	5.30	10.90
	III	2.80	6.10	8.00	8.80	3.00	1.40	7.80	1.90	6.40
	IV	2.90	5.30	3.80	2.90	12.50	1.80	12.70	3.90	6.60
1973	I	1.50	1.20	3.20	2.70	12.60	2.50	14.40	3.80	8.50
	II	11.20	3.60	7.70	8.70	20.20	3.60	6.70	2.30	5.70
	III	11.40	5.00	25.90	5.10	7.30	5.00	12.80	3.80	17.00
	IV	1.80	8.80	6.30	6.00	14.20	5.70	14.40	7.10	20.40

APPENDIX - VIII

Seasonal Gross Earnings per man-hour of Effort

| Year | Season | Gross Earnings per man-hour of Effort (in Rs) | | | | | | | | |
| | | Fishing zones | | | | | | | | |
		I	II	III	IV	V	VI	VII	VIII	IX
1965	I	0.45	0.95	2.50	6.89	11.19	9.76	6.10	2.86	10.74
	II	2.02	1.19	3.42	1.32	19.00	4.52	4.24	3.14	4.31
	III	1.83	2.64	2.10	1.83	6.92	3.72	4.23	7.16	5.41
	IV	0.70	0.79	2.59	1.24	4.46	9.86	2.56	4.52	7.43
1966	I	0.66	1.01	1.45	0.67	13.95	9.37	4.28	2.20	2.26
	II	3.43	2.21	3.11	3.64	31.16	3.59	3.03	2.06	5.69
	III	2.89	4.80	3.92	4.10	4.04	3.10	4.74	4.32	28.83
	IV	1.77	3.72	2.29	2.33	11.85	3.51	3.43	1.79	4.52
1967	I	1.01	2.11	2.82	2.67	7.72	6.50	3.76	5.61	11.28
	II	0.80	1.58	2.07	2.90	9.18	4.80	4.68	1.87	1.98
	III	4.00	5.54	4.43	8.32	8.97	5.29	1.59	10.04	9.51
	IV	1.67	3.82	3.43	2.52	7.86	3.12	5.35	5.31	8.26
1968	I	0.70	1.23	1.86	3.47	8.88	5.51	3.43	4.18	5.38
	II	1.28	1.48	1.95	3.18	7.15	2.81	2.78	2.56	1.33
	III	1.94	4.25	1.87	2.84	7.96	3.55	9.41	7.58	19.89
	IV	1.48	2.30	2.02	4.57	9.88	3.43	7.63	5.88	7.46
1969	I	1.06	1.82	2.58	1.58	14.61	4.88	6.59	4.79	2.93
	II	1.29	2.50	3.59	5.74	11.31	5.95	2.76	3.53	4.59
	III	2.41	2.55	6.08	2.82	11.95	11.94	9.47	4.51	4.63
	IV	0.83	2.08	2.54	4.10	9.60	2.97	7.12	7.12	7.52
1970	I	0.24	3.12	2.34	1.35	11.81	4.49	9.56	4.53	7.31
	II	0.55	2.13	1.84	3.78	12.90	6.03	4.08	5.73	7.59
	III	0.61	3.93	4.57	3.95	5.12	9.56	13.18	5.82	6.02
	IV	0.52	50.26	4.83	6.84	9.10	4.01	13.11	6.90	9.08
1971	I	0.54	1.57	3.60	1.77	9.01	9.88	13.37	6.29	4.53
	II	0.82	1.38	4.10	5.50	8.12	10.68	5.24	6.57	10.83
	III	8.43	2.07	8.86	2.81	4.67	5.63	7.63	8.25	15.88
	IV	3.31	1.64	5.36	1.96	11.26	2.88	5.71	4.37	9.52
1972	I	2.26	1.68	2.88	1.56	10.97	4.57	9.64	5.21	5.50
	II	1.71	2.60	4.23	3.64	3.87	2.21	6.22	3.41	6.58
	III	1.86	4.09	8.88	11.74	2.23	0.76	4.70	1.16	3.25
	IV	1.91	3.53	3.28	1.96	7.48	0.70	5.25	1.55	2.40
1973	I	12.80	0.96	2.83	1.97	10.39	1.48	6.95	2.98	4.37
	II	0.81	2.30	8.50	6.53	15.56	3.09	3.54	2.52	3.02
	III	6.65	3.35	33.98	5.82	5.07	3.17	7.52	1.76	9.85
	IV	1.21	2.56	4.22	2.46	9.99	1.97	5.89	2.60	13.71

APPENDIX - IX

Coefficient of Multiple Determination of Catch by Effort & Time

Zone	Linear Effort & Time		Non-Linear Effort		Linear Effort	Non-linear Time	
	R^2	F	R^2	F	R^2	R^2	F
I	.88	22.29	.81	13.63	.81	.76	9.79
II	.63	5.24	.77	10.07	.62	.21	.79
III	.71	7.56	.88	22.63	.70	.72	7.93
IV	.93	46.85	.98	172.99	.93	.69	6.81
V	.14	.52	.07	.25	.07	.35	1.64
VI	.03	.11	.75	9.03	.02	.04	.12
VII	.43	2.30	.21	.82	.07	.10	.33
VIII	.53	3.45	.42	2.21	.40	.53	3.40
IX	.85	17.29	.84	16.21	.83	.43	2.28

Table Value of F = 5.14   (D.F = 2,6)   Significant at 1% level

APPENDIX - X

T-Value of the Regression Coefficients of Catch on Effort & Time

Zone	Linear Effort & Time			Non-Linear Effort			Non-Linear Time		
	Effort	Time	Constant	Effort	$Effort^2$	Constant	Time	$Time^2$	Constant.
1	2	3	4	5	6	7	8	9	10
I	5.93	1.77	- 0242.3	1.09	0.11	- 2165.2	-3.27	3.85	45280.7
II	2.66	0.40	- 917.7	-1.12	1.94	14119.5	0.12	0.15	9658.7
III	1.86	0.53	-39451.8	-2.44	3.04	164947.4	-1.13	1.95	34436.6
IV	7.86	-0.48	- 160.2	-1.40	4.00	28201.0	-1.96	2.60	44981.5
V	0.98	-0.72	32286.2	-0.08	0.17	49488.3	1.65	-1.77	32195.8
VI	0.07	0.25	36346.9	4.24	4.17	-75940.4	-0.08	0.18	40572.9
VII	1.91	1.94	-20285.9	1.11	1.02	-77813.4	-0.42	-0.26	35390.5
VIII	2.11	-1.30	8731.5	-0.28	0.47	96175.5	1.69	-2.09	54055.4
IX	4.62	-0.93	-15936.8	0.07	0.70	- 999.6	0.62	-1.06	39746.6

Table Value of T = 2.447 (DF = 2,6)   Significant at 5% level

APPENDIX - XI

Catch per man-hour of Effort in the different Fishing States (1969-72)

Sl. No.	Name of State	1969	1970	1971	1972
1.	West Bengal & Orissa	1.63	1.94	2.11	0.98
2.	Andhra Pradesh	2.51	2.12	2.06	1.90
3.	Tamil Nadu	3.27	3.37	3.44	2.77
4.	Pondicherry(u·т)	2.68	2.65	3.12	3.33
5.	Kerala	8.00	9.74	9.90	5.11
6.	Mysore	8.84	13.58	9.88	9.41
7.	Maharashtra	6.50	10.32	7.60	7.93
8.	Gujarat	6.33	5.40	4.40	5.53

Source: Annual Reports of the CMERI, Ernakulam, 1970-72.

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