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Seasonal pattern and cost of fishing: A study on traditional marine fishers in Thiruvananthapuram District of Kerala, India

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ABSTRACT

The study intended to understand the seasonal livelihood pattern and socioeconomic characteristics of fishers and the cost of fishing. Small-scale fisher's livelihood pattern is largely influenced by three fishing seasons, namely pre-monsoon, monsoon, and post-monsoon. The study was conducted in the Thiruvananthapuram District of Kerala, and 150 fishers were selected using a multistage cluster sampling method. The study reveals that the livelihood challenges and concerns of traditional marine fishers are seasonal specific, and fishers were facing safety issues in monsoon and post-monsoon. The study suggested a SAFE policy framework to improve the livelihood and well-being of traditional marine fishers.

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1. Introduction

Small-scale fishing is a resource-dependent rural livelihood that has the least attention in the arena of development. The standard of living of small fishing families around the developing world is extremely low. Coastal fishing, as an employer of last resort (Panayotu, 1982), provides livelihood for 37 million people around the globe, of whom around 90% are in Asia. Though there are differences in the type of fish species, fishing vessels, fishing methods and management approaches, there is a high similarity in the resources, community impact and policy issues. A fundamental problem of most small-fishing families around the developing world is their comparatively low standard of living and frequent poverty despite decades of remarkable overall fisheries development and national economic growth (FAO, 2013). India is the second largest producer of fish in the world, with a share of 6.56% of global fish production; out of nine maritime states in India, Kerala is the third largest marine fish producing state (Fisheries Statistics, 2018), with a marine fisher population of 10.24 lakh (1.28% of State's population). Kerala, which is very well renowned for its development indicators, falls in short when it comes to marine fishers, and they are addressed as the 'outliers' of the Kerala development model. Since recently, the State has included the marine fisher community in the social security nets. Still, some basic indicators of development fell short when it comes to coastal villages in the State. Male literacy rate (42.42%) and female literacy rate (41.05%) of fisher villages in Kerala is very lower than the State's male literacy rate (96.11%) and female literacy rate (92.07%). The sex ratio (966) of fisher villages in Kerala is lower than that of State (1084) (Census Kerala, 2011; Kerala Marine Census, 2011). This indicates that the development model of the State only talks about the 'central tendency' for more than a decade and the development disputes of the State have hardly addressed the concerns of traditional marine fishers. Most fishing villages in the State have their basis in small-scale fisheries which account for a large percentage of States income. There are 222 marine fishing villages in the State and out of it, 42 villages are in the Capital district Thiruvananthapuram. Fishers in the district are traditional fishers and they practice traditional fishing devised for respective fishing seasons. Traditional fishers in villages are identified as *Fishers with traditional vessels and Stake fishers; their* definitions are discussed later in the study. Similar to agriculture, seasonality has its own emphasis in the fisheries sector. Indian fisher seasons are identified with three seasons namely, Pre-monsoon (consists 120 days from February to May), Monsoon (consists of 92 days from June to August) and Post-monsoon (consist of 153 days from September to January). These seasons will have an impact on species availability and marine geology, and thereby, it impacts the fisher practices adopted by traditional fishers. These traditional fisher practices mark their range on different points of the same scale of risk, cost, and earnings, and nowadays, the magnitude of the risk, cost and earnings are also determined by man-made causes as well.

The World's first Fisheries Community Development Project, the Indo-Norwegian Project for Fisheries Community Development-(INP), was initiated in Kerala. The project started operationalized in 1953, under the joint agreement between the United Nations, the Government of Norway, and the Government of India. The aim of this Project is to upgrade the fishery sector and improve the lives of the fishing community, but this has turned the Kerala fishery sector into a new Western-oriented Export drive (*Kurien, 1985*). The modern mechanised sector was given official encouragement and financial support in the form of subsidies to attract artisanal fishers to the modern sector and to accelerate the need to wither away traditional fisheries, but this has never happened *(Venkatraman and Sathidas, 1981*). In this project venture, the existing beach side artisanal fishery was ignored for being traditional, unscientific and resistant to change. The government policies from 1960-1980 supported the modern-mechanized trawling fishing sector which arose as an off-shot of the

INP (*Kurien, 1985*). The development model of Kerala preaches about only an average situation (central tendency) and the marine fisher villages in Kerala fall short of their development indicators very deeply when equated with the development indicators of the State. The traditional Marine fisher community of the State is thus called "outliers" of development (*Kurien et al., 1989*). In the 1970s an attempt was made to motorize log rafts by the Indo-Belgium Fisheries Project in the Kanyakumari district of Tamil Nadu, and this project failed due to the selection of costly outboard motor engines (*Sreenivas et al., 1992*). In 1973, a Pilot project to motorise *Kattamaram* was initiated with the co-operation of the Government of India, the government of Kerala and Yamaha motor company, Japan. Fishers were not convinced by the additional costs and technical swags of this and abandoned this venture, and a decade has taken to prove this wrong (*Kurien, 2005*).

The lack of details on operations and economies of artisanal fishery fleets is one of the reasons for unappreciated potential of small-scale fisheries. The costs and earnings analysis of the small-scale fishing sector with a variety of craft, gears and fishing seasons is still far and few. The practice of the system of ownership of craft and gears and system of sharing cost and earnings among traditional marine fishers in Kerala has evaluated from several points; remuneration to individual, social profitability, productivity in terms of scarce resources and it is different from those mechanized fishers with improved technology. The higher capital investment, provision for maintenance, repairs and depreciation in the mechanized sector will be higher than the traditional sector and individual earnings of the traditional sector will be higher than the mechanized sector. The social profitability and standard of living depend upon the labour and capital productivity and the extent to which the resource base can sustain higher yields in the long-term, both in traditional and mechanized sectors *(Kurien, 1982)*. Requirements of comparatively higher capital, i.e Rs. 10 to 15 lakhs, were the major bottle neck to switch to the modern sector for traditional fishers. There is a seasonal shift for the deep-sea fish workers; deep sea fisher owners have higher earnings and live in comfortable conditions, while deep sea fisher crew workers earn good income than inshore fisher crew who live almost in the same conditions as inshore fish crew workers (*Cruiz, 2004)*. Kerala was the first state in India which initiate a movement for safeguarding the means of livelihood of the artisanal fisher folk by organizing against fishing technology, which they found inappropriate to the natural resource base (*Kurien et al.,1989*). Traditional marine fishers who were once addressed as 'outliers' of the Kerala development model have somewhat netted back into the mainstream through the collective action by fish workers which led to enlightened social policies that have appropriated provision for social policies among the traditional fishers. And there is a need to enhance the flow of funds for social security, generating credible data and information and evolving new promotional and protective measures by pushing for a more democratic and decentralized delivery mechanism for addressing the existing challenges on social security (*Kurien, 2001*). Fisher Livelihood Resilience Check (FLIRES Check) is proposed to evaluate the fisher livelihood resilience and 43 attributes were designed to quantify qualitative factors that enable or constrain livelihoods in fishing communities in West Sumatra, Indonesia (Stanford et al., 2017)

The Traditional marine fishers and their livelihood have always undergone challenges and it is necessary to evaluate their socioeconomic status and the seasonal status of traditional marine fisher livelihood in order analyse the actual livelihood status of traditional fishers with respect to each fisher season. The ownership pattern and cost and income share proportion of traditional fishers are also briefed in this study. The eight attributes to understand the seasonal status of fishers are found from the qualitative aspects discussed by fishers.

This study intended to understand the seasonal pattern of traditional fisher practices in terms of these seasonal causes which are natural and man-made, with the specific objectives: (i) To examine the socioeconomic condition of the fishers in the study area; (ii) To study the seasonal pattern of traditional marine fisher livelihood and its implications on their economic condition.

2. Materials and Methods

The present research aimed at studying traditional marine fishers and seasonal livelihood patterns in Thiruvananthapuram district, Kerala. To select the sample respondents, a multistage cluster sampling method was used (Fig. 1). In Kerala there are 14 administrative districts, out of which 9 districts are coastal districts. Out of 9 districts, Thiruvananthapuram district has highest number of traditional fishers with indigenous fishing practices. Thiruvananthapuram district has six talukas (Administration at Block Level i.e., group of villages), which has 42 fishing villages. Out of 42 villages, 25 villages have fishers practicing indigenous fishing.

In 25 villages, a total of 1512 fishers were there, out of which 983 were stake fishers and 529 were fishers with traditional vessels. Out of total 1512 fishers 150 fishers were selected, which is roughly 10% of the total. To ensure equal representation from both the categories 100 stake fishers and 50 fishers with traditional vessels were selected. For selecting 150 farmers from 1512 farmers simple random sample technique (table method) was used.

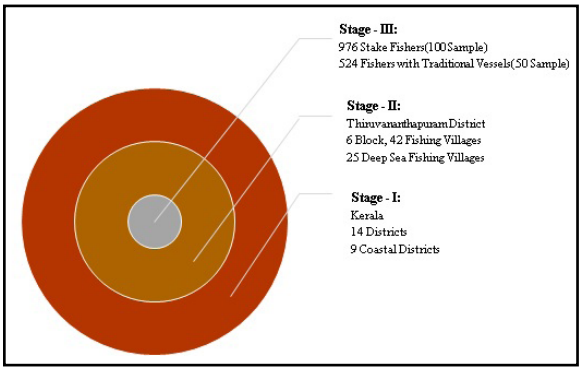

Fig. 1. Sampling Selection Process

This study was conducted over the period of three months (June-August) in the year 2018 from the fishing villages of Thiruvananthapuram district, Kerala.

Fishers with traditional vessels*:* They can be described as, "traditional fishers who own nonmechanized fishing vessels and gears and follow traditional fishing practices by employing others or by themselves. They retain a positive share for their fishing vessel on every fishing trip along with their share and share of others, which can be either positive or negative as per the fish catch."

Stake fishers: They can be described as "traditional fishers who are employed with the non-mechanized fishing vessels and gears owned by fishers with traditional vessels and follows traditional fishing practices, they are entitled to receive a share on every fishing trip, which can be either positive or negative as per fish catch."

Fishing seasons: Alike agriculture, seasonality has its own emphasis in the fisheries sector, Indian fisher seasons are identified with three seasons namely, Pre-monsoon (consists 120 days from February to May), Monsoon (consists of 92 days from June to August) and Post-monsoon (consist of 153 days from September to January).

Primary data is collected through questionnaire survey and secondary data is accessed from published official reports of the government of India, the government of Kerala, CMFRI, District fisher Co-operatives, NGOs etc. These are the two important methods *of data collection* adopted by this study. Percentage analysis and cost-return analysis have been used to interpret the data and it is presented as tabular analysis.

3. Results and Discussion

The demographic and socioeconomic conditions and the seasonal livelihood pattern of the collected sample are discussed here. The eight attributes to understand the seasonal status of fishers are taken from the qualitative aspects briefed by fishers during field work. The sample collected has been examined and discussed to analyses their living condition and livelihood patterns.

Socioeconomic Profile of the Sample Fishers:

The demographic and socioeconomic profiles considered to discuss here are age, marital status, educational status, household size and average family size, experience in fishing, landholding, nature of residence, household distance from the coast, annual income from fishing and other household income. An investigation of the demographic and socioeconomic profile of the sample will provide a comprehensive understanding and a clear background on the study sample. The distribution of the demographic and socioeconomic pattern of the sample describes the inclusiveness and the representation of the respondents. The demographic and socioeconomic profiles of the respondents are strongly associated with their livelihood patterns, behaviour, and attitude. Hence here, we attempt to discuss the background characteristics of the sample. As we have discussed in the materials and methods, one fifty samples were collected, of which a hundred are stake fishers and fifty are fishers with traditional vessels. Their demographic and socioeconomic profiles are discussed in table 1.

In Table 1, part no. 1 presents the sample distribution under two categories namely fisher with traditional vessels and stake fisher. Out of 150 sample 66.67 per cent is from stake fisher category and 33.33 per cent is from the fisher with traditional vessels category.

Part no. 1.2 explains, sample distribution of fisher by age. Out of 150 sample, 26.70 per cent are in the age group of 30-40 years, 25.00 per cent sample from the age group of 41-50 years, 18.00 per cent are in the above 60 years of age, 17.30 per cent belongs to the age group of 51-60 years and 15.00 percent from below 30 years, respectively. In fisher with traditional vessel category, 13.30 per cent are from 41-50 years age group, 6.70 per cent are in 30-40 age group, 5.30 per cent from 51-60 age group, 5.00 per cent each from below 30 years and above 60 years age group respectively. In stake fisher category, 20.00 per cent are from 30-40 age groups, 15.00 per cent of them are above 60 years age, 12.00 per cent are in the age group 51-60 years, 10.70 per cent are from 41-50 years of age and 10.00 per cent are from below 30 years respectively. The Part no. 1.3 describes sample distribution of fisher by marital status and out of 150 sample, 85.70 per cent are married fisher, 10.00 per cent are unmarried fisher, 5.70 per cent are widower fisher while only 0.70 per cent is divorced fisher. In the fisher with traditional vessels category, 30.70 per cent are married, 2.00 per cent are unmarried, 0.70 percent are divorced, and no fisher is a widower. The divorce rate in the community is very less. In the stake fisher category, 55.00 per cent are married, 8.00 per cent are unmarried, 5.70 percent are widowers, and no fisher is divorced.

The educational level of sample distribution is exhibited in part no. 1.4 as sample distribution by education. Out of the total sample distribution, 41.40 per cent are illiterate, while 39.30 per cent have primary education, 12.00 per cent have cleared SSLC, 6.00 per cent are of intermediate education, and 1.30 per cent have technical education. In the fisher with traditional vessels category, 15.00 per cent have only primary education, while 12.70 per cent have no education, 5.30 per cent have SSLC education, 1.30 per cent have intermediate education, and no one has technical education. In the stake fisher category, 28.70 per cent are illiterate, while 25.30 per cent have primary education, 6.70 per cent have SSLC education, 5.70 per cent have intermediate education, and 1.30 per cent have technical education. Part 1.5 and 1.5.1 presents the sample distribution of fisher by household size and average family size. The average family size of stake fisher is 5.88 while the average family size of the total sample is 5.85, which is much higher than the average household size of the State (5.3). Fisher with traditional vessel has an average family size as 3.4, which is less than that of State. Out of 150 samples, 60.00 per cent of the household has 3 to 6 family members, 28.70 per cent of household has 7 to 10 family members, 8.00 per cent has below 3 family members and 3.30 per cent has above 10 family members, respectively. In the fisher with traditional vessel category who is 33.33 per cent of sample 20 per cent of households with 3 to 6 family members, 10.00 per cent household with 7 to 10 family members, 2.70 per cent household with below 3 family members and 0.70 per cent has above 10 family members, respectively. In the stake

Table 1. Demographic Profile of the Sample Fishers

Part No.	Particulars	Stake Fishers	Fishers with Traditional Vessel	Grand Total
1	***Sample size by vessel ownership status***	***100 (66.67)***	***50(33.33)***	***150(100.00)***
1.2	***Sample Distribution by Age***			
	Below 30 years	15(10.00)	6(5.00)	21(15.00)
	30 – 40 years	30(20.00)	10(6.70)	40(26.70)
	41 – 50 years	16(10.70)	20(13.30)	36(25.00)
	51 – 60 years	18(12.00)	8(5.30)	26(17.30)
	Above 60 years	21(15.00)	6(5.00)	27(18.00)
1.3	***Sample Distribution by Marital Status***			
	Unmarried	12(8.00)	3(2.00)	15(10.00)
	Married	81(55.00)	46(30.70)	127(85.70)
	Divorced	0(0)	1(0.70)	1(0.70)
	Widower	7(5.70)	0(0)	7(5.70)
1.4	***Sample Distribution by Educational Status***			
	No Education/ Illiterate	43(28.70)	19(12.70)	62(41.40)
	Primary Education	38(25.30)	21(15.00)	59(39.30)
	SSLC	10(6.70)	8(5.30)	18(12.00)
	Intermediate	7(5.70)	2(1.30)	9(6.00)
	Technical Education	2(1.30)	0(0)	2(1.30)
1.5	***Sample Distribution by Household size and Average Family size***			
	Below 3 members	8(5.30)	4(2.70)	12(8.00)
	3 to 6 members	60(40.00)	30(20.00)	90(60.00)
	7 to 10 members	28(18.70)	15(10.00)	43(28.70)
	Above 10 members	4(2.70)	1(0.70)	5(3.30)
1.5.1	***Average Family size***	5.88	3.4	5.85
1.6	***Sample Distribution by the Landholdings***			
	Owned Land	52(35.70)	48(32.00)	88(58.70)
	Not owned land	36(25.00)	14(9.30)	62(41.30)
1.7	***Sample Distribution by Nature of Residence***			
	Own House	52(35.70)	35(23.30)	87(58.00)
	Family House	20(13.30)	4(2.70)	24(16.00)
	Wife House	8(5.30)	3(2.00)	11(7.30)
	Rented House	12(8.00)	3(2.00)	15(10.00)
	No House/Temporary Shelters	8(5.30)	5(3.30)	13(8.70)
1.8	***Sample Distribution by the Experience in Fishing***			
	Up to 25 years	46(30.70)	19(6.00)	65(36.70)
	26 to 35 years	12(8.00)	16(10.70)	28(18.70)
	36 to 45 years	22(15.70)	9(6.00)	31(20.70)
	46 to 55 years	15(10.00)	5(3.30)	20(13.30)
	Above 55 years	5(3.30)	1(0.70)	6(5.00)
1.9	***Sample Distribution by the Household Distance from Coast***			
	Up to 100 meters	65(43.33)	27(18.00)	92(61.30)
	101 – 300 meters	6(5.00)	7(5.67)	13(8.70)
	301 – 500 meters	17(11.33)	10(6.67)	27(18.00)
	Above 500 meters	12(8.00)	6(5.00)	18(12.00)
1.10	***Sample Distribution by Annual Income from Fishing***			
	₹ 1,00,001 to ₹ 5,00,000	83(55.34)	0(0)	83(55.34)
	₹ 5,00,001 to 10,00,000	17(11.30)	30(20.00)	47(31.33)
	Above ₹ 10,00,000	0(0)	20(13.33)	20(13.33)
1.11	***Sample Distribution by Other Household Income***			
	Up to ₹ 1,00,000	32(21.30)	19(12.70)	51(35.00)
	₹ 1,00,001 to ₹ 3,00,000	17(11.30)	10(6.70)	27(18.00)
	Above ₹ 3,00,000	2(1.30)	3(2.00)	5(3.30)
	No other income	49(32.70)	18(12.00)	67(45.70)

Note: Figures in Parentheses indicate percentage to the total sample distribution

fisher category, 66.67 per cent of the sample, 40.00 per cent of the household has 3 to 6 family members, 18.70 per cent has 7 to 10 family members, 5.30 per cent has below 3 family members and 2.70 per cent has above 10 family members, respectively.

Part no. 1.6 presents a sample distribution of fishers by their landholdings. Out of the total sample distribution, 58.70 per cent of them are their own land and 41.30 per cent have no land. Out of fishers with traditional vessels sample, 25.00 per cent have land and 9.30 per cent do not having own land. Out of the stake fisher sample, 35.70 per cent have land and 32.00 per cent have no land.

Part no. 1.7 explains the sample distribution of fishers' nature of residence. Out of the total sample, 58.00 per cent are living in their own houses, 16.00 per cent are in their family houses, 10.00 per cent are in rented houses, 8.70 per cent are living in temporary shelters or having no houses and 7.30 per cent are living in their wife houses. In the fisher with traditional vessels sample, 23.30 per cent are living in their own house, 3.30 per cent are having no house or living in temporary shelters, when 2.70 per cent are living in family house, 2.00 per cent each are living in rented house and wife house, respectively. In the stake fisher sample, 35.70 per cent of them are living in their own houses, 13.30 per cent are living in their family houses, 8.00 per cent are living in rented houses and 5.30 per cent each are living in wife houses and temporary shelters or having no houses.

Part no. 1.8 explains the sample distribution of fishers by their experience in fishing livelihood. Out of the total sample fisher, 36.70 per cent have up to 25 years of fishing experience, 18.70 per cent has 26 to 35 years of experience, 20.70 per cent has 36 to 45 years of experience, 13.30 per cent has 46 to 55 years of experience and 5.00 per cent has above 55 years of experience, respectively. In the fisher with traditional vessels category, 10.70 per cent have 26 to 35 years of experience, 6.00 per cent each from up to 25 years and 36 to 45 years of experience, 3.30 per cent from 46 to 55 years of experience, 0.70 per cent from above 55 years of experience. In the stake fisher category, 30.70 per cent has up to 25 years of experience, 15.70 per cent have 36 to 45 years of experience, 10 per cent have 46 to 55 years of experience, 8.00 per cent have 26 to 35 years of experience and 3.30 per cent has above 55 years of experience.

Part no. 1.9 explains sample distribution of fishers by the household distance from the coast. Out of total sample, 61.30 per cent have only up to 100-meter distance, 18 per cent have a distance within 301 – 500 meters, 12 per cent has above 500-meter distance and 8.70 per cent has distance within 101 – 300 meters, respectively. In the fisher with traditional vessels sample, 18 per cent has distance up to 100-meter, 6.67 per cent has the distance within 301-500 meter, 5.67 per cent has a distance within 101-300 meter and 5.00 per cent has the distance above 500 meters. In the stake fisher sample, 43.33 per cent has the distance up to 100-meter, 11.33 per cent has the distance within 301-500 meter, 8.00 per cent have the distance above 500-meter and 4 per cent has a distance within 101-300 meter.

Part no. 1.10 explains the sample distribution of fishers by their annual income from fishing. Out of total sample, the annual fishing income of 55.34 per cent are in the range of ₹ 1,00,001/ to ₹ 5,00,000/-, 31.33 per cent are in the range of ₹ 5,00,001 to ₹ 10,00,000/- and 13.33 per cent are above ₹ 10,00,000/-. In the Fisher with Traditional Vessel category the annual fishing income of 20.00 per cent of total sample is in the range of ₹ 5,00,001/ to ₹ 10,00,000/-, 13.33 per cent of total sample are above ₹ 10,00,000/-. In the Stake Fisher category, the annual fishing income of 55.34 per cent are in the range of ₹ 1,00,001/ to ₹ 5,00,000/- and 11.30 per cent are in the range ₹ 5,00,001/- to ₹ 10,00,000/-. It is observed from Table 5.11, that the highest sample representation is in the income range between ₹ 1,00,001/- to ₹ 5,00,000/- and that is of Stake Fisher sample. The highest representation of Fisher with Traditional Vessel (20.00 per cent) is in the income range of ₹ 5,00,001/- to ₹ 10,00,000/-. No Stake Fisher is in the income range above ₹ 10,00,000/-.

Part no. 1.11 explains sample distribution of fisher by other household income. Out of total sample, 45.70 per cent has no other household income, 34 per cent has up to ₹ 1,00,000/- as other household income, 18 per cent has within the range ₹ 1,00,001/- to ₹ 3,00,000/- and 3.30 per cent has above ₹ 3,00,000/-. In the fisher with traditional vessels category, 12.70 per cent has an income up to ₹ 1,00,000/-, 12.00 per cent has no other income, 6.70 per cent has an income range within ₹ 1,00,001/ to ₹ 3,00,000/-, 2.00 per cent has their income above ₹ 300000/-. In the stake fisher category, 32.70 per cent has no other income, 21.30 per cent has their other income range up to ₹ 1,00,000/-, 11.30 per cent has their income range as ₹ 1,00,001/- to ₹ 3,00,000/-, 1.30 per cent has their income above ₹ 3,00,000/-.

Livelihood Pattern of the Sample:

Livelihood patterns of traditional marine fishers are discussed in terms of seasonal patterns followed by fishers. The seasonal pattern of cost-return, seasonal status of fishers and fishing effort are attempted to brief here using tables and analysis.

Seasonal Status on Fishing Effort:

In the seasonal status on Fishing Effort, the effort put-forth by traditional marine fishers (stake fishers and fishers with the traditional vessel) during each season to procure catch is briefly discussed using table and analysis. The fishing effort has attempted to quantify the effort made by traditional marine fishers.

Table 2 discuss number of fishing trips, manpower and seasonal gears use, average duration of fishing trip and average distance covered for fishing. The Pre-Monsoon season consists of 120 days from February to May and the stake fisher and fisher with traditional vessels has 86.55 per cent of fishing trips in this season. In Pre-Monsoon season for fishing, the seasonal gears are used more than manpower, the manpower seasonal gears ratio is 40:60, the average duration for each trip is 5 hours for both category fisherman and the average distance they cover in the sea for fishing is 40 kms.

The monsoon season start from June to August, the monsoon season has 92 days and in the stake fisherman

category, the fishing trip is 76.08 per cent while fisher with traditional vessels has 69.56 per cent of fishing trips. In monsoon season, manpower is used more than seasonal gear for fishing; the ratio of manpower and seasonal gears is 80:20, the average duration for each trip is 10 hours in both category of fishermen and the average distance they cover in the sea is 60 kms.

The Post-monsoon season start from September to January and total days in post-monsoon seasons is 153 days. In both fisher categories, 78.43 per cent of days they go for fishing trips. In post-monsoon season manpower is used more than seasonal gears for fishing, the ratio of manpower and seasonal gears is 50:50, the average duration for each trip is 16 hours for both category fisherman and the average distance they travel to catch fish is 60 kms.

Seasonal Status of Fishers:

In the seasonal status of fishers, the season-wise estimation of fishing effort, fish catch, risk, resource pressure, sea accidents and their losses, help connectivity and safety precautions associated with traditional fisher livelihood is discussed using a four point scale of high, medium, low and very low.

Table 3 discusses about different aspects of fishing and the magnitude of those aspects with respect to three fishing seasons namely, pre-monsoon, monsoon, and post-monsoon. This Table presents eight important aspects of fishing and the magnitude of it in respective season on a high, medium, low, and very low scale.

In the Pre-monsoon season, the fishing effort, fish catch, and losses in sea accidents are extremely low where fishing risk, pressure on resources and connectivity to help are low and incidence of sea accidents and safety precautions are medium. In the monsoon season, the connectivity to help is extremely low while fish catch and safety precaution are medium and fishing effort, fishing risk, pressure on resources, incidence of sea accidents, losses in sea accidents are high. In the post-monsoon season, only connectivity to help is very low while the incidence of sea accidents, losses in sea accidents, and safety precautions are medium and fishing effort, fish catch, fishing risk and pressure on resources are high.

Seasonal Pattern of Cost-return:

Cost of Fishing can be categorized into two; i) Fixed Cost and Variable Cost (Operational Cost). Fixed Cost remains static and fixed irrespective of fisher seasons while variable cost (operational cost) varies according to the fisher seasons. Fixed cost of fishing is invested by the *fishers with traditional vessel* who ought to be the owners of fishing vessel. The variable cost of the fishing is initially spent by the fisher with traditional vessels and at the time of catch share, a portion of catch is appropriated towards the fisher vessel.

'Return', here, implies the profit earned or the gain of fishers from the cost consumed to catch the fish. Return from the catch is appropriated against the cost of fishing to estimate the profit of catch, i.e the Net Profit. The Net-Profit earned is shared among fishers in a particular pattern The seasonal pattern of cost-returns and the net profit sharing of fishers according to their fishing relationship are discussed briefly in here using tables and analysis.

Table 4 presents total annual seasonal costs (including fixed costs, working cost, maintenance cost, interest on fixed capital, interest on working cost and depreciation). The value of total fixed cost is spread over 10 years which is the estimated life span of the fixed asset. Therefore, annual fixed cost (or value of fixed asset in a year) is estimated accordingly (₹ 11,94,100/10 = ₹ 1,19,410/-). The annul fixed cost, risk cost, interest on working cost, interest on fixed cost and depreciation are annual costs and that are proportioned according to the seasonal fishing days.

In the pre-monsoon season, the total seasonal cost is ₹ 7,13,206/-, out of which 56.43 per cent is spent on fuel/energy, 16.04 per cent on other operational cost, 12.16 per cent on interest on working capital, 5.05 per cent is on fixed cost, 4.95 per cent is on interest on fixed cost, 3.51 per cent is on maintenance cost, 1.01 per cent on risk cost and 0.40 per cent on depreciation.

In the monsoon season, the total seasonal cost is ₹14,45,313/-, out of which 64.71 per cent is spent on other operational costs, 16.51 per cent on fuel/energy cost, 9.70 per cent on maintenance cost, 4.60 per cent on interest on working capital, 2.08 per cent on fixed cost, 1.88 per cent on interest on fixed capital, 0.38 per cent on risk cost and 0.14 per cent on depreciation.

In the post-monsoon season, the total cost is ₹ 18,81,042, out of which 56.77 per cent is operational cost, 27.67 per cent is fuel/energy cost, 5.89 per cent is on interest on working capital, 3.93 per cent is on maintenance cost, 2.66 per cent is on fixed cost, 2.40 per cent is on interest on fixed capital and 0.50 per cent on risk cost.

The total annual cost is ₹ 40,39,561/-, out of which, 52.42 per cent is spent on operational cost, 28.77 per cent on fuel/energy, 6.53 per cent on interest on working capital, 5.91 per cent on maintenance cost, 2.96 per cent on fixed cost, 2.66 per cent on interest on fixed cost, 0.54 per cent on risk cost and 0.21 per cent on depreciation.

Table 5 shows annual season wise Net Profit, the annual catch value is ₹ 60,09,000/-, out of which 60.66 per cent is a return from the post-monsoon season, 24.27 per cent is a return from the monsoon season and 15.07 per cent as a return from pre-monsoon season. The annual total cost is ₹ 40,39,561/-, out of which 46.56 per cent is incurred on the post-monsoon season, 35.77 per cent is incurred during monsoon season and 17.65 per cent is incurred on pre-monsoon season.

The Annual Net Profit is ₹ 19,69,439/-, out of which 89.56 per cent is from the post-monsoon, 9.79 per cent is from the pre-monsoon and 0.64 per cent is from the monsoon season.

Table 6 shows seasonal profit sharing of fisher by category wise, the net profit sharing is 2:1 between Fisher with Traditional Vessel and Stake Fisher. The fisher with a traditional vessel earns an annual profit, ₹ 19,69,439/- if they are not hiring any stake fisher while the fisher with a traditional vessel earns an annual profit, ₹ 13,12,959/- if they hire stake fisher and the annual profit of stake fisher

Table 2. Fishing Effort of Sea Fisher in Different Season

Seasons		Pre-Monsoon (February to May 120 days)		Monsoon (June to August 92 days)		Post-Monsoon (September to January 153 days)	
Nature of Fisher		Stake Fisher	Fisher with Traditional Vessels	Stake Fisher	Fisher with Traditional Vessels	Stake Fisher	Fisher with Traditional Vessels
No. of Fishing Trips (In Percentage)		104 ***(86.66)***	104 ***(86.66)***	60 ***(76.08)***	54 ***(69.56)***	120 ***(78.43)***	120 ***(78.43)***
Man Power and Seasonal Gears (Out of 100 per cent Fishing Effort)	Man Power	***40.00***	***40.00***	***80.00***	***80.00***	***50.00***	***50.00***
	Seasonal Gears	***60.00***	***60.00***	***20.00***	***20.00***	***50.00***	***50.00***
Average Duration of One Trip (In Hours)		5	5	10	10	16	16
Average Distance Covered in the Sea (In Kms.)		40	40	60	60	60	60

Source: Primary Data
Note: No. of fishing trips calculated to no. of days in Pre-Monsoon, Monsoon and Post-Monsoon season.
Man power and seasonal gears (fishing instruments) calculated to 100 per cent

Table 4. Profit of Fisher in Different Season

S.No	Seasons	Total Catch Value of Seasons	Total Cost of Seasons	Net Profit
1.	Pre-Monsoon	9,06,000 (15.07)	7,13,206 (17.65)	1,92,794 (9.79)
2.	Monsoon	14,58,000 (24.27)	14,45,313 (35.77)	12,687 (0.64)
3.	Post-Monsoon	36,45,000 (60.66)	18,81,042 (46.56)	17,63,958 (89.56)
4.	Annual	60,09,000 (100.00)	40,39,561 (100.00)	19,69,439 (100.00)

Source: Primary Data
Note: Figures in parenthesis indicate percentage
Net Profit=Total Catch Value of Seasons-Total Cost of Seasons

Table 3. Fishing Process and Difficulty Level of Fisher in Different Season

S. No	Components	Pre-Monsoon	Monsoon	Post-Monsoon
1.	Fishing Effort	Very Low	High	High
2.	Fish Catch	Very Low	Medium	High
3.	Fishing Risk	Low	High	High
4.	Pressure on Resource	Low	High	High
5.	Incidence of Sea Accidents	Medium	High	Medium
6.	Losses in Sea Accidents	Very Low	High	Medium
7.	Connectivity to Help	Low	Very Low	Very Low
8.	Safety Precautions	Medium	Medium	Medium

Source: Primary Data

Table 5. Profit Sharing of Fishers in Different Season

S.No	Components	Pre-Monsoon	Monsoon	Post-Monsoon	Annual
1.	Fisher with Traditional Vessels (Not Hiring Stake Fisher)	1,92,794 (9.80)	12,687 (0.64)	17,63,958 (89.56)	19,69,439 (100.00)
2.	Fisher with Traditional Vessel (Hiring Stake Fisher)	1,28,529 (9.80)	8,458 (0.64)	11,75,972 (89.56)	13,12,959 (100.00)
3.	Stake Fisher	64,265 (9.80)	4,229 (0.64)	5,87,986 (89.56)	6,56,480 (100.00)

Source: Calculated from Primary Data
Note: Figures in parenthesis indicate percentage

Table 6. Cost of Finishing of in Different Season

Season	Fixed Cost (in ₹)	Risk Cost (in ₹)	Working Cost		Maintenance Cost (in ₹)	Interest on Working Capital	Interest on Fixed Capital	Depreciation	Total Season Cost
			Fuel/Energy Cost (in ₹)	Other Operational Cost (in ₹)					
Pre-Monsoon	39,258 (5.50)	7,232 (1.01)	4,02,480 (56.43)	1,14,400 (16.04)	25,000 (3.51)	86,755 (12.16)	35,333 (4.95)	2,748 (0.40)	7,13,206 (100.00)
Monsoon	30,098 (2.08)	5,546 (0.38)	2,38,680 (16.51)	9,35,280 (64.71)	1,40,000 (9.70)	66,514 (4.60)	27,088 (1.88)	2,107 (0.14)	14,45,313 (100.00)
Post-Monsoon	50,054 (2.66)	9,222 (0.50)	5,20,600 (27.67)	10,68,000 (56.77)	74,000 (3.93)	1,10,614 (5.89)	45,048 (2.40)	3504 (0.18)	18,81,042 (100.00)
Annual	1,19,410 (2.96)	22,000 (0.54)	11,61,760 (28.77)	21,17,680 (52.42)	2,39,000 (5.91)	2,63,883 (6.53)	1,07,469 (2.66)	8359 (0.21)	40,39,561 (100.00)

Source:
Note: Cost in Indian Rupees (₹), Figures in parenthesis indicate percentage
Annual fixed cost is estimated by considering the average life span of vessels and gears for 10 years (11,94,100/10=₹ 1,19,410). Depreciation @ 7% (₹ 8358.70) Interest on working capital @ 9% (₹ 263883), interest on fixed capital @ 9% (₹107469).

is ₹ 6,56,480/-. Out of the annual profit earned by fisher, 89.56 per cent is earned during the post-monsoon, 9.80 per cent is earned during the pre-monsoon and 0.64 per cent is earned during the monsoon season.

It is observed that post-monsoon has highest number of fishing days, then pre-monsoon and the lowest is in monsoon. In the post-monsoon season those seasonal gears that uses manpower and gear power equally are employed, in the monsoon season those seasonal gears that uses manpower more than gear power are employed and in the pre-monsoon season those seasonal gears that uses more gear power than man power is employed. This indicates season wise differences in fishing habits and techniques. The average duration of fishing trip is highest in the post-monsoon season, then the monsoon season and the least duration is in the pre-monsoon season. The post-monsoon and the monsoon season have highest average distance travelled in sea for fishing while the pre-monsoon season has the lowest average distance travelled for fishing. The nature of sea and the availability of fish during each season can be a reason for this difference.

4. Findings and Suggestions

Socio-Economic Status:

Fishers tend to enter in their traditional livelihood at the age of thirty years and they exit from this livelihood after the age of sixty years. There is a decreasing trend in the fishing livelihood experience of total sample, i.e from the lowest experience to the highest experience, the sample representation is decreasing. Primary education is highest among fishers with traditional vessels while stake fishers fall in short with that. Fishers who have land has their own house and most of the households are perennial to vulnerability. Fishers with traditional vessels have the highest income range when compared to stake fishers and most of the fisher households have no income other than fishing.

Seasonal Pattern of Livelihood:

Out of the three fishing seasons, the post-monsoon season has the highest number of fishing days (120 days) and the monsoon season has the lowest number of fishing days (60 days for Stake Fishers and 54 days for Fisher with Traditional Vessels).

Fishing Effort:

With regard to the nature of sea and availability of species during each season, there are different types of fishing habits where manpower and gear power are equally employed (Post-monsoon season-50:50), man power outreach gear power (Monsoon season-80:20) and gear power outreach man power (Pre-Monsoon-40:60). Post-monsoon season has the highest average duration of fishing trip and Pre-monsoon season has the lowest average duration of fishing trip about nature of fishing habits practiced in each season. The post-monsoon season and monsoon season has the highest average distance travelled in the sea while pre-monsoon has the lowest average distance travelled with regard to the availability of fishing resource.

Seasonal Status of Fishers:

In the pre-monsoon season about fishing risk, pressure on resources, losses in sea accidents and safety precautions, the fisher has good resilience while fishing effort, fish catch, incidence of sea accidents and connectivity to help their resilience is low. In the monsoon season, with fishing effort, fish catch and safety precautions, their resilience is good, while fishing risk, pressure on resources, the incidence of sea accidents, losses in sea accidents and connectivity to help their resilience is low. In the post-monsoon season, the resilience of fishing efforts, fish catch and safety precautions are good while fishing risk, pressure on resources, incidence of sea accidents, losses in sea accidents and connectivity to help their resilience is low.

Cost-Return analysis

Out of the total fixed cost, the highest proportion is incurred on fishing gear that is tailored according to the respective fishing seasons. In post-monsoon season the fuel and operational cost is highest and may be the highest average duration of a fishing trip in this season can be a reason for this along with the fishing practice. Out of all the cost incurred by fisher in a year, the operational cost is highest which indicate the highest need for working capital in their daily life. The Net Profit earned during the post-monsoon season is the highest and it is extremely low during the monsoon season, which indicates that the earning resilience of fishers is seasonal.

Suggestions:

The official encouragement and support provided for modern fishery sector to attract artisanal fishers *(Venkatraman and Sathidas, 1981)* must be given to artisanal fishers to retain indigenous fishing practices by supporting them especially during Monsoon season when their net profit is very less due to high working cost. The standard of living of traditional fishers can be improved in this way. The need to enhance the fund flow to the social security for the traditional fishers (*Kurien, 2001*) must be given during their exit age from the fisher livelihood (> 60 years) and to ensure safety for fisher households from monsoon sea. Support for artisanal fishers on their working cost can be given after providing a seasonal framework and baseline for each fishing season. The policies for traditional fishers should be fishing season-specific.

SAFE Framework:

SAFE policy framework can be incorporated to improve the wellbeing of traditional marine fishers during those seasons when they face risk appropriated to their livelihood. Safety through Appropriate communication and Family support during Emergency seasons can be established through SAFE policy framework.

The monsoon season and post-monsoon season are emergency seasons for traditional marine fishers. In monsoon season the most demanded support to facilitate livelihood is ensuring safety through appropriate communication and family support. Support can be provided to subsidize the operating cost of livelihood activities during this season. In post-monsoon season safety through appropriate communication is expected to improve resilience.

A SAFE policy framework to improve the resilience appropriated to each fishing season might enable a better livelihood scenario for traditional marine fishers. The challenges they encounter in the practice of their livelihood are season specific and they must be addressed in par with seasons.

5. Conclusion

This study has developed a seasonal calendar on traditional fishers about their livelihood activities, and that has acknowledged the pros and cons of traditional fishers during each fishing season and a balance can be acquired by providing seasonal specific policies to support traditional fishers. The discussions on fisher livelihood and fisher vulnerability must accommodate the magnitude of resilience traditional fishers possess during each fishing season, rather than side-lining fisher livelihood as the most vulnerable livelihood. SAFE policy framework to improve the livelihood scenario appropriated to each fishing season is can improve the resilience of traditional marine fishers. The seasonal specific challenges encountered by traditional fishes must be addressed on each season as it specified. Any umbrella policies on traditional marine fishers may not cater for their seasonal needs.

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