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Trends and Cycles in Fishery Returns from Motorised Traditional Fishing Crafts

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Based on the landing data for a period of sixty months this study estimates the pattern and the extent of swings in the annual cycles of revenues earned in fisheries. It identifies the peak and trough in terms of their relative temporal length and the margin of difference in revenue. The short period trend shows a 69% rise in revenue during the five year period. Significance of the residual variations are brought out.

Key words : Fishery returns, motorised traditional fishing crafts

It is well known that catches and consequently financial returns from fishing follow cyclical movements. Long term trends of financial returns is a basic indicator of the economic health of fishery industry. It helps plan long run investment projects and infrastructural facilities on a self sustainng basis. A clear understanding of cyclical movements will help in streamlining of fisheries credit policy, particularly for rational structuring of lending and recovery schedules. The relative slope and direction of secular trends in different fishery sub-sectors will help in identifying areas of growth and stagnation to guide investment priorities. This study is an attempt to develop such quantitative estimates of trends and cycles for the fishing sector of motorised traditional craft.

Materials and Methods

This study is based on data collected from two fishing villages of Quilon district, Kerala State. Data on primary auction proceeds of landings from 24 motorised crafts were collected twice a week for a period of 5 years between 1988 and 1992. The crafts were of 8 m LOA and fitted with 8 hp outboard engines. Gillnets were the main fishing gear operated. The weekly data on the amount of return and number of trips were aggregated for each month and averaged obtaining month wise revenue per trip. The data were anlysed using a method of modified moving averages to get indices of seasonal variations, trends and residuals. To bring out the features of trends, cycles and residuals clearly, the results are presented in graphs following the statistical methods as in Waugh (1952).

Results and Discussion

The monthly average of gross returns per trip, presented in Table 1, displayed the following features; (i) The average returns showed a well marked cyclical movement within a period of twelve months. They tend to peak during the four months period of May, June, July and August and decrease to a minimum during February and March to pick up once again towards the peak. (ii) the returns exhibited a rising trend over the five year period, posting a percentage rise of 94.7, over 1988-92. The returns, thus almost doubled during the five year period. (iii) Neither season nor trend completely accounted for the sharp swings in the average returns. For example, the average return sharply rose from Rs. 388 in January 1988 to Rs. 694 in the corresponding

Table 1. Monthwise average revenue for trip realized from motorised craft (Rs.)

Months	1988	1989	1990	1991	1992	Month wise average
January	388	694	282	304	510	423
February	221	328	231	348	622	385
March	175	224	250	394	437	328
April	234	294	383	478	626	426
May	258	935	403	905	854	727
June	516	465	574	737	1827	766
July	463	388	766	959	1012	740
August	459	521	376	844	884	632
September	341	335	233	344	695	426
October	467	288	220	397	581	421
November	392	302	324	325	655	418
December	322	296	345	251	531	355
Yearly average	378	446	395	526	736	510

January of 1989 to plunge to Rs. 282 in the succeeding January 1990. Such random swings were noticeable at several points along the length of the sixty month period.

Table 2. Percentage of Average Revenue to its moving total

Months	Revenue Rs.	Moving totals	Percent
January 1988	388		
February	221		
March	175		
April	234		
May	258		
June	516		
July	462	4235	10.90
August	459	4541	10.11
September	341	4648	7.34
October	467	4697	9.94
November	392	4757	8.24
December	322	5439	5.93
January 1989	694	5383	12.89
February	328	5309	6.18
March	224	5371	4.17
April	294	5365	5.48
May	935	5186	18.03
June	465	5096	9.12
July	388	5070	7.65
August	521	4658	11.19
September	335	4561	7.35
October	288	4587	6.28
November	302	4676	6.46
December	296	4144	7.14
January 1990	282	4253	6.63
February	231	4631	4.99
March	250	4486	5.57
April	383	4384	8.74
May	403	4316	9.34
June	574	4338	13.23
July	766	4387	17.46
August	376	4409	8.53
September	233	4526	5.15
October	220	4670	4.71
November	324	4765	6.80
December	345	5267	6.55
January 1991	304	5430	5.60
February	348	5623	6.19
March	394	6091	6.47
April	478	6202	7.71
May	905	6376	14.19
June	737	6377	11.56
July	959	6283	15.26
August	844	6489	13.01
September	344	6763	5.09
October	394	6806	5.79
November	325	6954	4.71
December	251	6903	3.64
January 1992	510	7993	6.38
February	622	6022	10.33
March	437	6022	7.21
April	626	6413	9.76
May	854	6600	12.94
June	1827	6930	26.36
July	1012	7210	14.04
August	884		
September	695		
October	581		
November	655		
December	531		

The figures in Table 1 show, however, the combined or interacting effects of trends, seasonal movements and random

Table 3. Arrays of monthly deviations

Months	Deviations					Median values of monthly Deviations	Index of seasonal variation in average revenue
	1988	1989	1990	1991	1992		
January	-	5.60	6.38	6.63	12.89	6.50	75.49
Febryary	-	4.99	6.18	6.19	10.33	6.19	71.78
March	-	4.17	5.57	6.47	7.21	6.02	69.68
April	-	5.48	7.71	8.74	9.76	8.23	95.60
May	-	9.34	12.94	14.19	18.03	13.57	157.60
June	-	9.12	11.56	13.23	26.36	12.40	143.90
July	7.65	10.90	14.04	15.26	17.46	14.65	170.10
August	-	8.53	10.11	11.19	13.01	10.65	123.69
September	-	5.09	5.15	7.34	7.35	6.25	72.60
October	-	4.71	5.79	6.28	9.24	6.04	70.70
November	-	4.71	6.46	6.80	8.24	6.63	77.00
December	-	3.63	5.93	6.55	7.14	6.24	72.47

Average of median values = 8.61

variations in fishery revenue. In addition, cycles other than annual cycles might also have influenced the values. To get a correct estimate of seasonal movements, other variations such as trends and long period cycles have to be eliminated from the data. Likewise, the seasonal movements have to be eliminated to secure a clear picture of trends or random movements. To do so, the seasonal movements were separated out after eliminating trends and other cycles, by finding out the moving totals that absorb the effects of trends and other cycles.

Twelve-monthly moving totals and the original data as percentages of the moving totals are given in Table 2. These percentages continue to retain seasonal and random movements of the original data but not the secular and long time cyclical movements that go with moving totals and thus can be treated as the indices of deviations from the trendline.

The percentage figures are gathered and grouped in Table 3 as arrays of monthly deviations in the ascending order of magnitude. Their median values and twelve monthly averages are as in column 7. The median values of deviations are converted into percentages of their mean value and presented in column 8. These are the indices of seasonal variations in fishery revenue after isolating them from trends and long period cycles.

It may be observed that column 8 gives a clear pictures of the seasonal variation in fishery revenue. Unmistakably, it points to the four months of May, June, July and August as the peak period of revenue realization. The lowest revenue per trip is realised in March, though September to March can be grouped together as forming a period of trough in revenue earnings. If the indices of lean period revenue range between 70 to 77 a trip, the indices of peak period revenue ranged between 124 to 170. The margin of difference between the two lowest and the two highest values being 77% and 121%. Between the two periods, revenue per trip almost doubles on an average. This

quantitaive difference in revenue realization should be kept in mind in formulating strategies for mobilization of savings, effecting recoveries of loans and in introducing investment plans and technologies.

The seasonal swings discussed above largely obscure the other characters of the original data such as trends and residual movements. To study these more closely, seasonal movements have to be eliminated. The simplest method to get this result is to convert the original revenue data into percentages of the indices of variations. The revenue per trip showed rising trend duing the five year period from an initial amount of Rs. 350 per trip in January 1988 to Rs. 590 in December 1992. (Fig. 1) There are still swings around the trend line which are attributable to random variations which will be isolated shortly for obtaining their own individual picture. There was a rise of about 69% in fishery revenue during the period as is evident from Fig.1. The

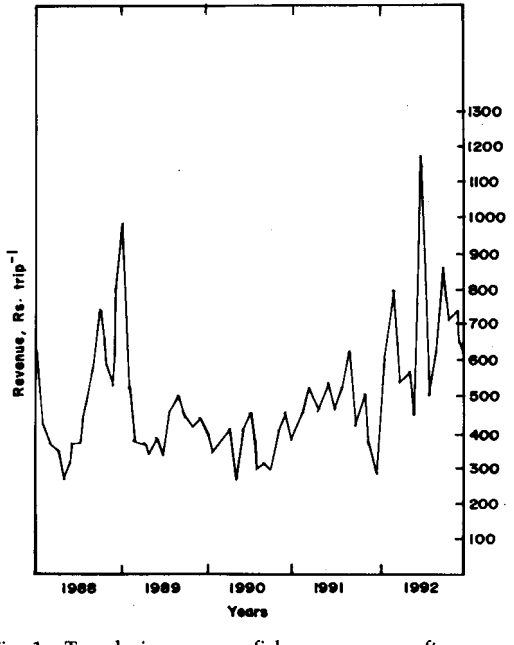

Fig. 1. Trends in average fishery revenue after correcting for seasonal variations

random downswings, though numerous show that the 3 steepest of them has a higher trough than that of their predecessors. Thus the random movements themselves follow the pattern of the trend, and are not entirely delinked from it.

The upward trend was mainly attributable to price gains of the catch during the period rather than to progressive improvement in the quantity of catch (data not shown). The two villages had highly competitive fishing enterprise operating at near saturation level, ruling out an year to year improvement in catch. The revenue rise over the period was thus largely due to increase in price per unit.

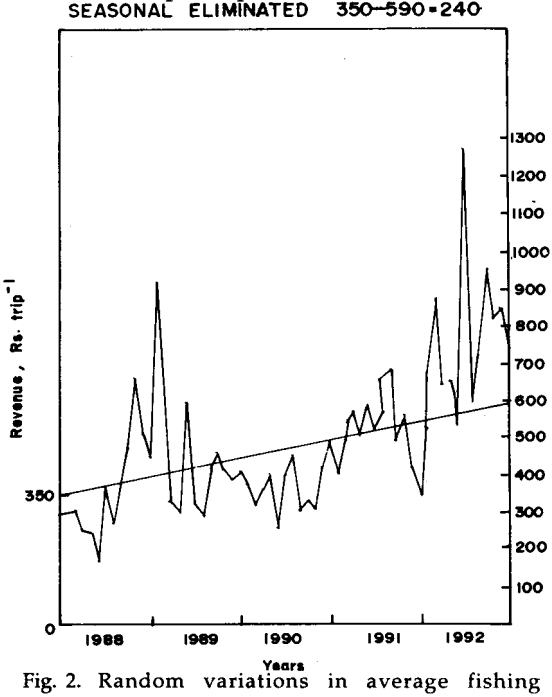

Fig. 2. Random variations in average fishing revenue after correcting for seasonal and trend variations

The revenue rise in the 60 month period was Rs. 240 (Rs. 590-350) and thus the monthly rise in revenue Rs. 4. Half the range (Rs. 120) was added to the initial value revenue to neutralise the effect of trend. Next, to the revenue of each

successive month Rs. 4 less than what was added to the predecessor was added until the 30th month. After subtracting zero from the median year, multiples of 4 were deducted from each successive month till the 60th month. Thus, the trend was eliminated. This correction for trend on figures already corrected for season (Table 4) eliminated all temporal effects which are plotted in Fig. 2.

Tables 4. Values of average revenue after adjusting for seasonal variations

Years / Months	1988	1989	1990	1991	1992
January	514	919	374	403	676
February	309	457	322	485	867
March	251	322	359	565	627
April	245	308	401	500	655
May	164	593	256	574	542
June	359	323	399	512	1270
July	272	288	450	564	595
August	371	421	304	682	715
September	470	461	321	474	957
October	665	410	313	566	828
November	509	392	420	422	850
December	444	408	476	346	733

The random or residual variations indicate effects of skill, technology and investment on the fishery revenue separated out from seasonal and trend movements, in addition to chance factors.

There was a rising trend in fishery revenue over the period largely due to price gains. The difference between the peak period revenue and lean period revenue was in the range of 77% to 121%. For a short period of 4 months of peak earnings in a year, there was a long spell of 7 months of poor earnings. Residual movements were found to be quite significant in fishery revenue. The strategies aimed at saving mobilization, loan recovery and launching of new technology and investment schemes should concentrate their effort during peak earnings period.

Reference

Waugh, A.E. (1952) *Elements of Statistical Methods*, 3rd edn. Mc Graw Hill Book Company, New York, USA