

A NOTE ON THE PRODUCTION TREND OF MARINE SHRIMPS IN INDIA

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[The paper reviews the production statistics of marine shrimps in the different maritime states of India from 1950 to 1962. It is pointed out that for a correct appraisal of the status of any fishery, it is necessary to have data on effort E and catch per unit effort in addition to the conventional data on catch C. A relationship between U and E has been developed and the status of the fishery of *Metapenaeus dobsoni* has been discussed in this connection with reference to the data on catch and effort obtained from trawler operations off Cochin.]

Among the shrimps producing countries of the world, India ranks second, the leading shrimps producing country being the United States. Based on the annual production figures of 13 years from 1950 to 1962, the average annual production of shrimps in India amount to 96,191 tonnes as compared to the average total annual production of 657,536 tonnes of marine fish. This means that the shrimps contribute on an average nearly 15% to the total annual production of marine fish. Table I presents the yearwise figures of total production of marine fish and marine shrimps in India from 1950 to 1962. It will be seen from the last column of the Table I that the percentage of shrimps in the total annual catch varies quite a deal from year to year, even though the absolute magnitude of prawn catch remains more or less the same in

all years excepting the years 1954 to 1957.

The Table II furnishes the State-wise catches of marine shrimps for each year from 1950 to 1962. From this table it is seen that Maharashtra, Gujarat and Kerala are the major shrimp producing States. These three states together produce about 90% of the total prawns landed in India. The last two columns of the Table II give the average annual production of shrimps in each State and the associated percentage contribution of each State to the total shrimps production in India, based on 13 years figures from 1950 to 1962. Based on the last five years' figures from 1958 to 1962, the average production in each State and the associated percentage contribution to the total all-India production of shrimps are given below :

<i>Average production</i>		
	(tonnes)	p. c.
West Bengal and Orissa	1,306	1.75
Andhra	3,382	4.52
Madras	3,090	4.13
Kerala	18,419	24.63
Mysore	1,175	1.57
Maharashtra	37,782	50.52
Gujarat	9,126	12.20
Mechanized vessels	500	0.67
India	74,780	

TABLE - I TOTAL PRODUCTION OF MARINE FISH AND MARINE SHRIMPS
IN INDIA

(Figures in metric tons)

Year	Total catch	Shrimp catch	p.c. of shrimp to total
1950	580,021	74,877	12.91
1951	533,916	76,797	14.38
1952	528,346	77,001	14.57
1953	581,460	90,687	15.60
1954	588,257	154,225	26.22
1955	595,722	106,626	17.90
1956	718,702	159,552	22.20
1957	875,516	136,813	15.63
1958	755,774	86,699	11.47
1959	584,193	67,529	11.56
1960	878,242	70,600	8.04
1961	683,569	64,806	9.48
1962	644,244	84,266	13.08
Average	657,536	96,191	14.63

On the basis of these figures also, the contribution by the three maritime states of Maharashtra, Gujarat and Kerala towards total shrimp landings come to more than 87%.

For the purpose of assessing the trend in the production of shrimp in each State, the 13 year period has been divided into the following three periods viz., (1) the first four year period from 1950 to 1953 (2) the second 4 year period from 1954-57 and (3) the last 5 year period from 1958-62.

In West Bengal and Orissa, the average annual production of shrimps during the first-four period 1950-53 was only 110 tonnes; it increased to 1649 tonnes during the period 1954-57; and it was 1306 tonnes in the last 5 year period of 1958-62. Thus the production trend shows a slight fall in West Bengal and Orissa since 1957.

In Andhra, the trend in production remains unchanged since 1954. The annual average productions during the three periods were 5678 tonnes, 3340 tonnes, and 3382 tonnes respectively.

In Madras, the average annual production in the first 4 year period was 1958 tonnes, it rose to 4400 tonnes during the next 4 year period but it declined to an average production of 3090 tonnes during the 1958-62 period.

In Kerala the average annual production shows an increasing trend. During 1950-53, the average annual production was 6,119 tonnes, the same rose to 11,367 tonnes during the period 1954-57 and it showed a further rise to 18,419 tonnes in the period 1958-62. No estimates of prawns caught from backwaters and paddy fields are yet available, but if these are taken into consideration Kerala may rank first among the shrimp-producing States of India.

It is surprising that though the two neighbouring States of Maharashtra and Kerala are the major contributors to the prawn production in India, Mysore contributes only a little over 1% to the total production. The average annual productions during the 3 periods considered are 1200 tonnes, 935 tonnes, and 1175 tonnes. These figures indicate that the production in the State has remained almost stationary since 1950.

The average annual production during 1950-53 was 47,466 tonnes in Maharashtra. The corresponding figure for the period 1954-57 was 84,722 tonnes and it was 37,782 tonnes for the period 1958-62. Though the average during the last 5 year period was lower than that during 1st 4-year period, they are still comparable. The rather stiff rise in the annual average during the period 1954-57 is rather puzzling. Prior to 1959 when full fledged sampling survey was introduced for

TABLE II
STATE—WISE BREAK—DOWN OF TOTAL SHRIMP CATCH IN INDIA
(Figures in metric tons)

	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	Average	% to the total
West Bengal & Orissa	171	48	150	71	554	378	3,882	4,783	1,270	631	806	1,616	2,205	1,043	1.08
Andhra	7,431	5,054	4,450	5,778	2,478	3,516	5,191	2,177	3,196	3,822	4,018	3,982	1,892	4,076	4.24
Madras	436	2,096	2,840	2,060	2,567	4,049	8,855	2,116	2,472	2,579	2,969	4,138	3,291	3,113	3.24
Kerala	7,275	8,765	6,305	2,131	4,881	6,556	13,629	20,403	14,852	14,683	12,781	20,541	29,240	12,442	12.93
Mysore	1,008	2,264	1,079	449	474	996	885	1,384	673	1,679	492	614	2,415	1,109	1.15
Maharashtra	43,211	43,305	45,910	57,438	105,687	67,263	92,823	73,113	41,653	31,566	43,931	29,956	41,803	55,204	57.39
Gujarat	15,345	15,265	16,267	22,760	37,584	23,868	34,243	35,678	22,505	12,254	5,307	3,214	2,349	18,972	19.72
Mechanised vessels	—	—	—	—	—	—	44	158	77	315	296	740	1,070	—	
Andamans	—	—	—	—	—	—	—	1	1	—	—	1	1	—	
Goa	—	—	—	—	—	—	—	—	—	—	—	4	—	—	
Total	74,877	76,797	77,001	90,637	154,225	106,626	159,552	133,813	83,699	67,523	70,600	64,803	84,266	96,191	

TABLE - III. TRAWLER CATCHES OF *METAPENAEUS DOBSONI* OFF COCHIN

Year.	Catch (kg)	Effort (Tr. hour)	$U = \frac{C}{E}$
	C	E	E
1957-58	99,301	2,734	36.32
1958-59	146,768	3,526	41.63
1959-60	67,320	3,958	17.01
1960-61	40,073	2,611	15.35
1961-62	174,121	4,547	38.29
1962-63	50,349	3,793	13.27

the estimation of fish landings, the estimation of landings was made on the basis of landings at a few selected centres. It is likely that some local phenomenon of increased prawns shoals at one or more of these centres or personal bias on the part of field staff then engaged in the collection of landing data might be responsible for the rather stiff rise in the production during the period 1954-57. During this period the total production in Maharashtra also showed a spectacular rise. Hence it is likely that due to some reasons or others, the estimates of production in Maharashtra seem to be over-estimated. Hence for any study in the trend of production, it is safer to omit the figures of this period.

The average annual figures during the 3 periods under consideration in Gujarat were 17,409 tonnes, 32,843 tonnes, and 9,126 tonnes. The stiff rise in the production during the middle period is due to similar reasons ascribed for Maharashtra, as before the re-organisation of States, joint estimates of production were made for the erstwhile composite Bombay State. During the recent years, due to difficulties of actual observations, landings of shrimps at certain centres have been reported under miscellaneous fishes. This accounts for the apparent fall in the landings figures of prawns in recent years. It is understood that the estimates are being revised and when these are done, the average annual production during the last period may equal that in the first period.

Thus over the 13 year period for which the statistics of production are available, a definite upward trend in production is noticeable in Kerala which now produces about 25% of the total prawn production. If the figures of production during the 4 year period of 1954 to 1957 are not considered, no noticeable upward or downward trend in shrimps production is noticed in Maharashtra or Gujarat. The production also remains almost stationary in the other maritime States.

It may be mentioned here that production figures are not enough to assess the exact status of any fishery. The reasons for upward or downward trend in production have got to be determined. Increase or decline in production may occur either due to increase or decrease in input of effort or due to increased or decreased abundance of shrimps in the sea or both. Thus the yield

is both a function of effort E and the population abundance P . The catch per unit effort U is defined as C/E and is taken to be an index of abundance of the population, where C is the catch during a year and E is the annual effort. Now the catch per unit effort U has the following characteristics :—

1. When E is constant, U increases or decreases with P .
2. Whatever be the magnitude of P , a gear has a optimum capacity to catch, so that U has a maximum value U_m .
3. When P is constant, U decreases with increasing E .
4. U is zero, when P is zero.
5. U has no meaning when E is zero.

Thus tentatively the following simple functional relationship linking U with P and E can be accepted

$$U = U_m (1 - c \cdot kP) e^{-mE}$$

This equation satisfies all the conditions stated above and contains 3 parameters viz., U_m , k and m . It is extremely difficult to have enough and adequate data from fisheries to get estimates of so many parameters. So, as a first approximation it is assumed that U decreases slowly with increasing E and U increases slowly with increasing P , so that both kP and mE are small. Thus, as a first approximation

$$U = U_m \cdot kP \cdot (1 - mE) \\ = \lambda - \mu E, \text{ when } P \text{ is constant.}$$

This is the linear relation obtained by Schaefer between U and E in case of a stable population i.e., when $dP = 0$, though he derived the relation from an altogether different approach.

The Table III gives the catch C , effort E (trawling hours) and U (catch per trawling hours) of the trawler catches off Cochin of *Metapenaeus dobsoni* for the 6 years from 1957-58 to 1962-63. Plotting U against E , no linear relation or as a matter of fact no other relation between U and E can be discovered. Hence changes in U must not have occurred due to changes in E . That is U which is an index of abundance is fishery-independent. In fact, George (separate communication) has shown a correlation between abundance of larval forms of *M. dobsoni* in plankton collection and fishing success of the shrimp in subsequent years. Hence the present fluctuations in the catches of at least *M. dobsoni* is due to fluctuations in spawning, and fishing

effort has absolutely no influence at all on the *M. dobsoni* stock to account for the variation in the catches. And so long as fishing effort does not affect the stock one way or the other, the fishing intensity can be safely increased and thereby augment the production for the advantage of all.

Acknowledgements

The figures given in Tables I and II are taken from the Annual Report of the Central Marine Fisheries Research Institute. These estimates are based on the data obtained from the Sample Survey carried out by the

Fishery Survey Division of the Central Marine Fisheries Research Institute. The figures given in Table III are obtained from the Crustacean Division of the Central Marine Fisheries Research Institute.

References

1. George, M. J.,
Post larval abundance as a possible index of fishing success in the prawn *Metapenaeus dobsonii*, symposium on Prawn Fisheries in India, (1964).
2. Schaefer, M. B.,
Int. Am. Trop. Tuna. Comm., 11, (6), (1957).