

# THE FISHERIES OF MALWAN

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## INTRODUCTION

MALWAN is one of the important fishing centres on the west coast and it is situated at almost the northern limit up to which the exploitation of the economically important mackerel and oil-sardine fisheries of the west coast extends. In spite of its importance there is hardly any information on the fisheries of this place; and the present work was undertaken with a view to fill this gap in our knowledge of the conditions existing in the major fishing centres of the west coast. The following pages give the result of the fishery survey work carried on at Malwan for a period of six years from 1950 to 1957 (with a gap during 1953 and 1954 when no data were collected). In computing the data the "random sampling" method was used for estimating the total catch, unit-effort, etc.

Malwan (lat. 16° 03' N., long. 73° 26' E) situated about 180 miles south of Bombay, is the taluk headquarters in the Ratnagiri District (Fig. 1). There are four fishing hamlets in the coastal area of Malwan, namely, Dhuriwada, Medha, Rewatala and Wairi-Dandi (Text-Fig. 1 inset). Throughout the Ratnagiri District the shore is very narrow and in many places the hills of the Western Ghats come up to the very edge of the sea. Malwan is an exception to this in having a good shore, about nine miles long, stretching from Malwan in the north to Mobar in the south, and more intensive fishing is carried out here than in any other part of the district. The inshore region of the sea is generally sandy and slopes rather steeply, the five-fathom line being only 20 yards from the shore. Beyond this limit the sea-bed is rocky along the entire nine miles stretch and the rocks jut out from the sea. These topographical peculiarities have influenced the shape and size of the nets of this locality especially the shore seine known as the *rampan*, which is broader and has at the most 100 pieces of net. The drift nets are represented in this area by the (1) *Saranga jal*, (2) *Dhangad*, (3) *Surmai jal*, (4) *Kandali* and (5) *Wairari*. Only one type of boat-seine and gill net, called, the *Jot* and *Bangada jal* respectively are represented here while a number of cast nets bearing different names depending upon the mesh are used. Thus the *Bangada pag*, an unstringed cast net and the stringed variation of

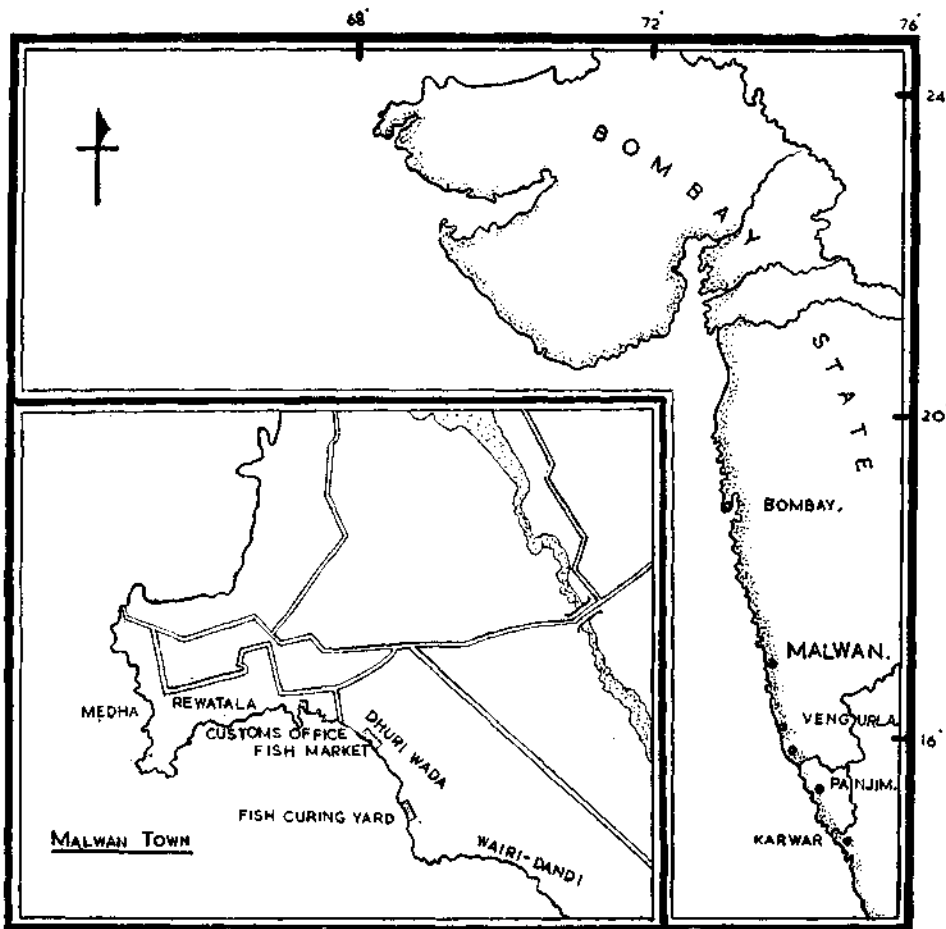


FIG. 1. Sketch map showing location of Malwan. Inset—Malwan town and neighbourhood.

the same called *Shendi*, both of 1" mesh, is used for catching mackerel. The other cast nets are the *Pharaon* ( $\frac{3}{4}$ " mesh) used for sardines, *Leiognathus*, *Ambassis*, etc., *dod pag* ( $\frac{1}{2}$ " mesh) and *aad pag* ( $\frac{1}{4}$ " mesh) used during the quiet spells in the monsoon close to the shore to catch the fry of the fish for one's own culinary purposes. Lines of the *cheira bepu* type of the Malabar coast are also operated at Malwan. These nets are operated from two types of boats, namely, the dug-out canoe and the out-rigger boat (Text-Figs. 2 and 3). The dug-out canoe measures 11'  $\times$  3'  $\times$  2' and is used for operating the drift net, cast net, and the line, while the smaller sized out-rigger of 36'  $\times$  5'  $\times$  4' is used for operating the gill net and the *dhangad*; the bigger out-rigger measuring 48'  $\times$  6'  $\times$  5' is used for operating the *rampan* and the

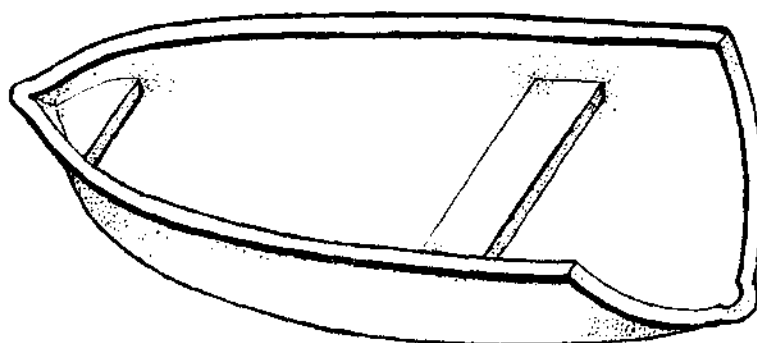


FIG. 2. Keeled Dugout (Malwan).

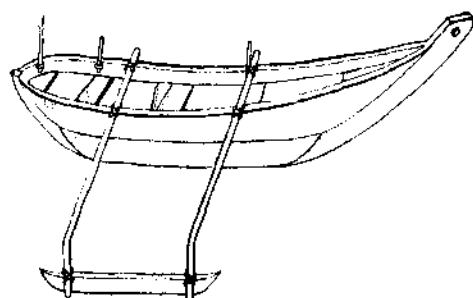
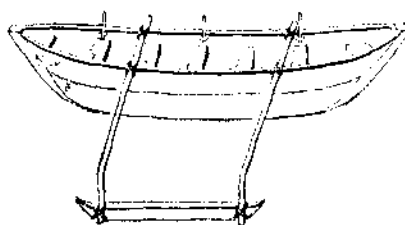


FIG. 3. Out-rigger (Malwan).



Out-rigger (Karwar).

*jot*. As the details of construction cost, etc., of the boats appear in other papers they have not been given here. The number of boats and gear in the different hamlets of Malwan are given in Table I, while Table II shows the seasons of operation and the fishes caught in the different gears. The fishermen of Rewatala do not own either boats or nets, but work in partnership with the fishermen of Dhuriwada and Wairi-Dandi.

TABLE I

Hamlet	Boat			Gear					
	<i>Rampan</i>	Out-rigger	Canoe	<i>Rampan</i>	Drift net	Gill net	Dhangad	Line	Jot
Medha	..	3	16	..	16	3	2	10	..
Wairi-Dandi	7	24	26	7	20	..	6	10	7
Dhuriwada	2	7	10	2	10	..	3	10	..

TABLE II

Gear	Season of operation	Fishes caught
Shore-seine <i>Rampan</i>	.. Sept.-May	All fishes that come near shore
Drift net— Surmai jal	.. March-May & Sept.-Dec.	<i>Scomberomorous, Chirocentrus</i>
Saranga jal	.. " "	Pomfrets
Kandali	.. " "	Smaller pomfrets
Wawari	.. " "	<i>Scomberomorous</i> and pomfrets
Dhangad	.. " "	<i>Scomberomorus, Sciaena</i> , sharks
Gill net— Bangada jal	.. March	<i>Rastrelliger canagurta</i>
Boat-seine— Jot	.. Sept.-Oct.	<i>Sciaena, Arius</i>
Lines— Wawadi	.. Sept.-May	<i>Carcharhindidae, Scoliodon, Sphyrna, Pastinachus, Muranesox</i>

## ANALYSES OF LANDINGS

*Design of Survey and Method of Analyses.*—Based on the information collected during the preliminary survey of 1948-49, the plan of estimating the total landings of fish and their composition was finalised and put into operation from 1950. In accordance with the plan Malwan was visited once a fortnight, the duration of each stay being about 5-7 days. During each day of observation the total number of different units\* landing their catch was ascertained, a fixed percentage of each type of unit was examined in detail to determine the species composition of the catch, together with their weight. The total catch and its composition were estimated based on the average number of units and their average catch per day.

\* A unit denotes one type of boat operating one type of net. Thus, a canoe operating a drift net is one unit; a canoe operating a line is another unit; an out-rigger operating a *rampan* is a third unit; and so on.

*Analyses of Estimated Landings.*—The estimated total landings of the fish for the six years 1950 to 1952 and 1955 to 1957 (data not having been collected for 1953 and 1954) are shown in Table III and the composition of the catch according to the type of fishing unit in Table IV. The monthly fluctuations in the catch for these six years are shown in Table V and Fig. 4. (In the tables and the body of the paper tons mean metric tons, except where otherwise stated.)

TABLE III

Year	Catch (Tons)	Year	Catch (Tons)
1950	681.51	1955	438.79
1951	727.14	1956	907.38
1952	536.06	1957	1140.77

TABLE IV

Year	<i>Rampan</i>	Drift net	Line	Boat-seine	Others	Total (tons)
1950	296.95	20.94	8.62	352.98	2.01	681.50
1951	657.03	28.15	34.68	..	7.28	727.14
1952	194.26	11.47	26.48	303.85	..	536.06
1955	272.82	19.93	142.47	..	3.57	438.79
1956	592.33	104.84	196.37	9.87	3.97	907.38
1957	748.65	21.55	368.05	2.32	0.19	1140.76

It will be seen from the above figures that there is a marked fluctuation during these years. In 1950 the total catch was 681.50 tons. Of this 352.98 tons were landed by boat-seines, 296.95 tons by *rampans*, 20.94 tons by drift nets and 8.62 tons by lines. In 1951 the total catch increased to 727.14 tons. Almost 90% of this was landed by the *rampans* (657.03 tons) while the rest was landed by the drift nets (28.15 tons) and lines (34.68 tons). Boat-seines were a total failure during 1951. In 1952 the total catch (536.06

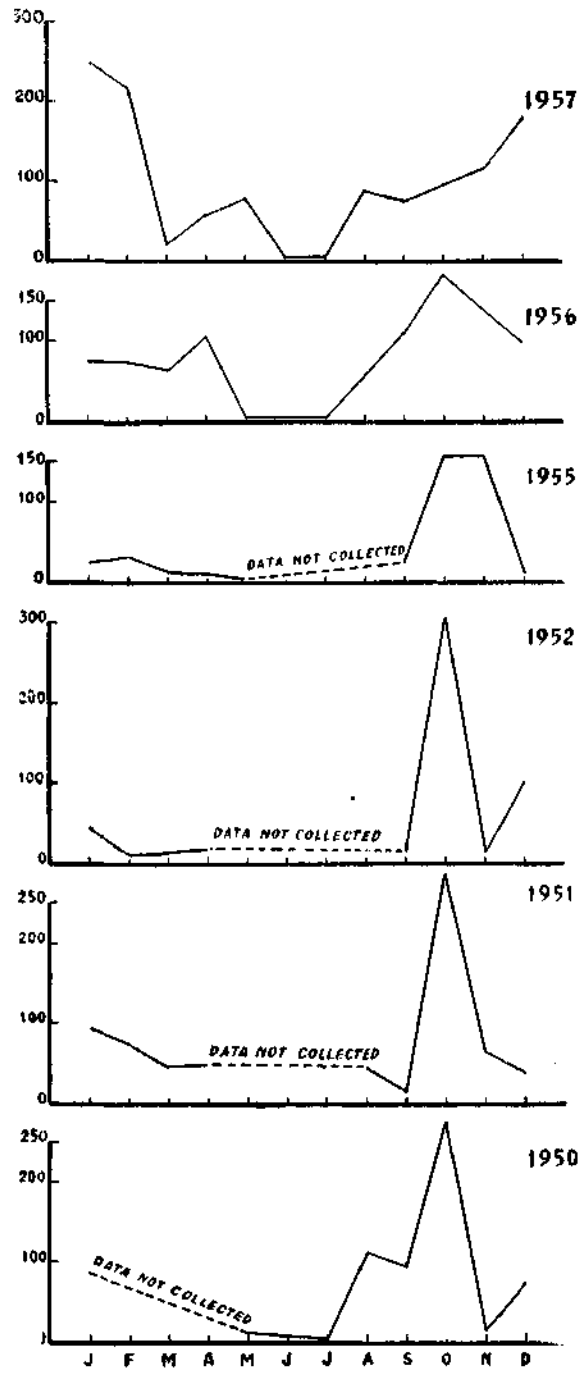


FIG. 4. Monthly fluctuations in fish-catches at Malwan (in metric tons).

TABLE V

Month	1950	1951	1952	1955	1956	1957
January ..	86.39	96.36	47.44	23.93	76.18	203.74
February ..	..	73.86	10.04	31.64	76.29	222.29
March ..	..	47.73	..	13.10	64.29	21.60
April ..	..	44.63	11.00	11.28	109.25	57.58
May ..	9.92	..	22.69	1.13	1.31	72.65
June ..	3.57	..	..	..	0.15	1.33
July ..	1.11	..	..	..	0.95	0.17
August ..	111.22	43.95	..	..	59.69	88.08
September ..	96.33	18.31	15.77	23.97	109.77	76.53
October ..	278.19	292.19	314.84	161.38	185.28	94.99
November ..	16.48	70.43	13.14	155.57	125.05	120.17
December ..	78.30	39.73	101.14	16.79	99.17	181.67
TOTAL ..	681.51	727.19	536.06	438.79	907.38	1140.76

tons) showed considerable decline, the worst affected being the rampan (194.26 tons), and drift nets (11.47 tons), while the line catch (26.84 tons) showed comparatively less decline. The boat-seines (303.85 tons) made over one half of the total catch. In 1955 the catch again declined (438.79 tons), the boat-seines having failed again. The line catches showed a phenomenal increase to 142.47 tons contributing about 30% of the total, while the *rampan* catches showed a 50% rise from that of 1952, amounting to 272.82 tons, which is about 50% of the years total catch. In 1956 the catch was almost double (907.38 tons) that of 1955. The *rampan* catch also was almost double (592.33 tons) that of 1955, the line catches had improved to a certain extent (196.37 tons), while the drift net catches (104.84 tons) were about five times more than in the previous year. The boat seines alone had failed. In 1957 the increase in the total catch was maintained. Also this year's *rampan* catches (748.65 tons) increased by 25% over those of 1956, while the line catches (368.05 tons) almost doubled, and the drift net catches

(21.55 tons) showed a reversal to the 1950 figure. The boat-seines had failed again in 1957 (2.32 tons). From the accompanying graph it is seen that the best period of fishing is during the last four months of the year and that there is a decline in the catch in the first five months, while the three months of June, July and August are the worst. During these months the fishing practically comes to a close because of the monsoon.

The annual catch of the different groups of fishes during the six years as well as their percentage of composition is given in Table VI.

It will be seen from Table VI that there was variation in the landings of the different fishes from year to year. Thus in 1950 the first five principal fishes were *Arius* (299.60 tons, 43.96%), *Sciænids* (139.56 tons, 20.46%), sardines (90.83 tons, 13.33%); mackerel (70.57 tons, 10.36%); and *Trichiurus* (16.81 tons, 2.47%), while in 1951 the five principal fishes in order of importance were sardines (305.43 tons, 42.00%), mackerel (214.86 tons, 29.55%), *Sciænids* (37.76 tons, 5.19%), elasmobranchs (35.58 tons, 4.89%) and crustacea (21.95 tons, 3.02%). In 1952 the most important fishes were *Sciænids* (248.02 tons, 46.38%), sardines (108.24 tons, 20.19%), *Arius* (66.67 tons, 12.44%), whitebait (41.99 tons, 7.83%) and elasmobranchs (21.01 tons, 3.92%); in 1953 the mackerel fishery was a failure (15.27 tons, 2.85%) and was sixth in importance. In 1955 the sardines (129.56 tons, 29.52%) dominated the catch followed by the mackerel (103.50 tons, 24.73%), *Arius* (85.24 tons, 19.44%), sharks and rays (45.93 tons, 10.47%) and *Carangids* (18.25 tons, 4.16%). In 1956 sardines again formed the important fish (203.82 tons, 22.46%) followed by *Sciænids* (148.12 tons, 16.33%), while *Arius* was third in importance (145.20 tons, 15.99%) followed by mackerel (109.76 tons, 12.10%) and *Carangids* (60.63 tons, 6.68%). In 1957 mackerel (305.94 tons, 26.82%) was the most abundant of the fish landed, followed by the sardines (288.07 tons, 25.25%), *Arius* (275.91 tons, 24.19%), *Sciænids* (115.02 tons, 10.08%) and elasmobranchs (82.40 tons, 7.22%). But if the average annual yield of the important fishes is taken into consideration, then the fishes in order of importance were sardines (187.66 tons), *Arius* (147.11 tons), mackerel (137.89 tons), *Sciænids* (115.06 tons) and elasmobranchs (40.88 tons). The whitebait and the crustacea also formed a fairly large percentage of the catch but they are caught in the *raman* along with other fishes like mackerel and sardine and do not form a fishery by themselves.

#### ANNUAL AND SEASONAL FLUCTUATIONS IN THE MAJOR FISHERIES

The fishes of economic importance at Malwan are (1) Mackerel, (2) Sardine, (3) *Arius-Sciæna*, (4) Elasmobranchs, (5) Seer and (6) Pomfrets. These are dealt with in detail below.



TABLE VI

Fish	1950		1951		1952		1955		1956		1957		Total	Average
	Catch	%	Catch	%	Catch	%	Catch	%	Catch	%	Catch	%		
Mackerel ..	70.57	10.36	214.86	29.55	15.27	2.85	108.50	24.73	109.76	12.10	305.94	26.82	824.90	137.89
Sardines ..	90.83	13.33	305.43	42.00	108.24	20.19	129.56	29.52	203.82	22.46	288.07	25.25	1125.95	187.66
<i>Sciaenids</i> ..	139.56	20.46	37.76	5.19	248.02	46.38	1.87	0.43	148.12	16.33	115.02	10.08	690.95	11.16
<i>Scomberomorus</i> ..	2.25	0.33	18.78	2.58	8.44	1.58	10.31	2.35	28.68	3.16	4.32	0.38	72.78	12.13
<i>Thunnida</i> ..	5.72	0.84	0.26	0.04	..	..	9.87	2.25	0.34	0.04	0.79	0.07	16.98	3.39
<i>Clupeoids</i> ..	3.25	0.48	5.57	0.76	2.31	0.43	0.01	..	0.88	0.10	1.80	0.15	13.82	2.29
Whitebait ..	1.18	0.17	12.21	1.68	41.99	7.83	10.69	2.44	25.04	2.76	7.33	0.64	98.44	16.40
<i>Elasmobranchs</i> ..	10.03	1.47	35.58	4.89	21.01	3.92	45.93	19.47	50.32	5.55	82.40	7.22	245.27	40.88
<i>Arius</i> ..	299.60	43.96	10.08	1.39	66.67	12.44	85.24	19.44	145.20	15.99	275.91	24.19	882.70	147.11
<i>Carangids</i> ..	13.86	2.04	19.46	2.68	1.53	0.28	18.25	4.16	60.63	6.68	7.22	0.63	120.95	20.16
<i>Trichiurus</i> ..	16.81	2.47	2.88	0.40	0.18	0.03	0.32	0.07	27.10	2.99	5.86	0.52	53.15	8.86
<i>Stromateus</i> ..	0.92	0.14	5.59	0.77	1.78	0.33	2.20	0.50	7.97	0.88	8.02	0.70	26.48	4.41
<i>Leiognathus</i> and <i>Lactarius</i> ..	4.45	0.65	19.42	2.67	11.17	2.08	4.57	1.05	25.90	2.86	3.95	0.35	69.54	11.60
Perches ..	9.67	1.12	4.08	0.56	0.21	0.04	0.78	0.18	9.70	1.07	5.65	0.50	30.09	5.07
<i>Crustacea</i> ..	5.33	0.78	21.95	3.02	4.54	0.85	2.82	0.64	19.07	2.10	11.98	1.05	65.69	10.95
Miscellaneous ..	7.48	1.10	13.23	1.82	4.09	0.77	7.87	1.78	44.77	4.93	16.50	1.45	93.94	15.65
TOTAL ..	681.51	100.00	727.14	100.00	536.06	100.00	438.79	100.01	907.38	100.00	1140.76	100.00	4431.63	..

*Mackerel Fishery.*—Mackerel is a very important fish at Malwan and bulk for bulk this fish gives the fisherman the maximum returns. If the mackerel season is good then the fisherman can expect to live through the monsoon with comfort. But if the mackerel fishery fails he has to get into debt during the slack season. At Malwan, as in other places, it is an inshore fishery and is carried on by means of the shore-seine, the *rampan*. The net as mentioned earlier consists of about 100 or at the most 125 pieces and the average catch is about  $\frac{1}{2}$  lakh of mackerel. The record catch at Malwan was 2 lakhs. Mackerel is also caught by the gill nets at Malwan. But there are only two gill nets owned and operated by the Malwan fishermen. There is a convention among the fishermen here that the gill nets should not be operated during the months when the *rampans* are operated; hence the operation of these nets is restricted to the months of February–March, that is the end of the mackerel season. The total catch of the mackerel during the six years was 70·57, 214·86, 15·27, 108·50, 109·76 and 305·94 tons respectively. In the first half of 1950 the *rampan* catches were composed of mainly mackerel, but in the latter half of the year, that is, from October–December, there was no mackerel in the catches which were dominated by the sardines. In 1951 good catches of mackerel were landed till about the end of February but again in March the *rampan* catch was mainly composed of sardines with stray mackerel. In the latter half of the year the catch seemed to be very promising and in October each net landed heavy catches of mackerel; but suddenly in November the fishery failed. Line and drift net fishermen, who went out beyond 5 or 6 miles, reported the presence of mackerel shoals there, but they did not enter the inshore regions. As stated above, gill nets are, by convention, barred from operating during the November–February period and there are no boat-seines suitable for the capture of mackerel. Thus a season which started well ended in a failure. In 1952 the season was a total failure. Mackerel were landed in fairly satisfactory quantities in January and February 1955. But the catches declined subsequently till October, and the fishery terminated in November though stray mackerel were landed in December. In 1956 the catches were evenly spread out, fairly good amounts of mackerel being landed in every month except in October when the catch was slightly lower. In 1957 the bulk of the mackerel was landed in the first two months, while in the latter half of the year it was practically a failure.

*Sardine Fishery.*—The sardines are normally caught at Malwan along with mackerel in the *rampan* nets. It is the general belief of the local fishermen that when the mackerel are in plenty the sardines are scarce and *vice versa*. The analyses of the landings indicate such a relationship in

the respective catches. The inverse relationship in the mackerel and sardine fisheries has been indicated by Nair and Chidambaram (1951). The fishery includes four species of the sardines, namely, *Sardinella longiceps*, *S. fimbriata*, *S. albella* and *Dussumieria hassultii*. Table VII shows the magnitude of landings of these four species during the six years and their percentage composition in each year's total catch.

TABLE VII

	1950	1951	1952	1955	1956	1957	Total
<i>Sardinella longiceps</i>	66.29	1.31	44.50	3.20	43.44	74.23	232.97
<i>S. fimbriata</i> ..	2.86	164.17	59.81	126.83	137.40	231.31	703.88
<i>S. albella</i> ..	21.55	90.69	0.99	..	..	..	113.23
<i>Dussumieria hassultii</i>	0.13	49.26	2.93	0.02	22.98	0.53	75.85
TOTAL ..	90.83	305.43	108.23	129.55	203.82	288.07	1125.93
Per cent. ..	13.33	42.00	20.19	29.52	22.46	25.25	

Of the four species of sardines obtained at Malwan, *S. fimbriata* occurs more abundantly and forms a regular fishery; *S. albella* has not been recorded since 1955; *Dussumieria* makes sporadic appearance once every other year. In 1950 *S. longiceps* and *S. albella* were the most abundant species of the group, while in all the subsequent years *S. fimbriata* dominated the catches. The catches of *S. longiceps* declined to a great extent in 1951 as compared to 1950, increased in 1952, declined in 1955 and seem to be increasing since then. The figures indicate that the catches of the three sardines steadily increased during the years while the *Dussumieria* catches were more or less steady with unusually heavy catches during 1951 and 1956. The period of occurrence of the different species of sardines is shown in Table VIII.

**Arius-Sciæna Fishery.**—The fishery for *Arius* (shengala) and *Sciæna* (ghol) lasts for a very short time, about 15–20 days, intermittently during September and October. During the favourable seasons these fishes are caught in large quantities and the gutting process goes on throughout the night. There are instances of heavy catches, the gutting of which continued the next day

TABLE VIII

	1950	1951	1952
<i>S. longiceps</i> ..	January, November, December	January, March, December	December
<i>S. fimbriata</i> ..	January, May, August	January, March, April, September, October, November, December	January, February, April, May, October, November, December
<i>S. albella</i> ..	January, May, August, September, October, December	January, February, March	February
<i>Dussumieria</i> ..	September	January, February, October	February, September
	1953	1956	1957
<i>S. longiceps</i> ..	January	November, December	January, February
<i>S. fimbriata</i> ..	February, March, April, September, October, November, December	January, February, March, July, August, September, November, December	January, February, March, April, May, June, September, October, November, December
<i>S. albella</i> ..	..	..	..
<i>Dussumieria</i> ..	February	February, December	..

till that day's catch came in, when the previous day's catch was disposed of in a tainted condition. On the other hand if the season is a failure, no catch is made, as in 1951. The fishermen go out with the seines on getting news of the presence of the shoals from the drift net or the line fishermen, but operate the net only if the fish are seen in a shoal or if the fishermen think they have a fair chance of catching the shoals; otherwise they do not operate the net but return to the shore. Generally the bigger *rampan* boats are used in the operation. The fishery was a very successful one during 1950, the catch amounting to 253.88 tons of *Arius* and 96.84 tons of *Sciæna*. It was reported that a bumper catch of 51 tons was landed during the interval during two consecutive observations made at this centre. The fishery extended up to October in 1950 and this was the case in all the six major fisheries which appeared late by a month or so during the year. In 1950 this fishery was valued at Rs. 15,000 approximately. The fishery was a total failure in 1951. However, 10.08 tons of *Arius* and 37.76 tons of *Sciæna* were caught in the other types of gear operated during the year. In 1952 this fishery alone

helped the fishermen to make a living for the year; bringing them Rs. 8,000–10,000. During this year the boat-seines caught 244.78 tons of *Sciæna* and 66.67 tons of *Arius*. In the subsequent years the fishery has been declining and in 1955 this fishery again proved a failure. In 1956 and 1957 small quantities of these two fishes, amounting to 9.88 tons and 2.31 tons, were landed valued at Rs. 5,000 and Rs. 1,500 approximately.

*Elasmobranch Fishery.*—Shark fishery is carried on throughout the year except during the monsoon months of June–August. Invariably dug-out canoes are used for the purpose and they go out to a distance of 10–12 miles from the shore. The implements used are the hooks and lines with about 100 hooks to a line. Hooks of size No. 0, 1, 2, 3, 4 and 5 and occasionally home-made hooks of 6" size are generally used. Of these No. 0, 1 and 2 hooks are used during the months of November–February when the boats go to greater depths and No. 3, 4, and 5 are used during the other months of the year. Eels, *Loligo*, small *Arius* and sardines are used as bait. The lines are baited and usually left in the sea overnight and the catch collected the next day, the line rebaited and left again. The catch is generally composed of *Carcharhinus*, *Scoliodon*, *Sphyrna*, *Pastinachus*, etc., but sometimes stray specimens of *Arius*, *Sciæna*, *Euthinnus*, *Muraenesox*, etc., have also been landed. The catch landed by the line boats amounted to 8.62 tons in 1950, to 34.68 tons in 1951, but declined to 26.48 tons in 1952. But in subsequent years the catch has increased and in 1955 the total landings amounted to 142.47 tons, while in 1956 and 1957 the catches were 196.37 tons, and 368.05 tons respectively. Of this the elasmobranchs were 10.03, 35.58, 21.01, 45.93, 50.32 and 82.40 tons in the respective years. The rest of the catch was composed of *Arius*, *Euthinnus*, *Chorinemus*, etc. Heavy catches of *Chorinemus* and *Arius* were observed specially in 1956 and 1957. The value of the catch for these years was estimated to be Rs. 17,000, Rs. 5,000, Rs. 3,200, Rs. 25,000, Rs. 40,000 and Rs. 70,000 respectively.

*Seer-fish Fishery.*—Seer-fishing is carried out on a large scale at Malwan during February–March and October–December. The latter period is considered the best season for this fishery and during this period seer of all sizes are caught by using the different varieties of drift nets such as the *surmai jal*, *kandali*, *wawari* and *dhangad*. The first three types of nets are operated from the canoes. These go out at night at about 11 o'clock and return at about 7–9 o'clock in the morning the next day. The catches are generally better during the darker half of the month. The *dhangad* is operated from the smaller of the out-rigger boats which fish usually during the daytime, going at about 8–9 A.M. and returning between 3–6 P.M. These boats usually land *Scomberomorus commersonii* in large quantities. In addition

to the local boats, boats from as far north as Jaigad and Jaithapur come and camp at Malwan during the season and operate from there. *Scomberomorus guttatus*, *S. kuhlii*, *S. commersonii* and *S. leniolatum* constitute the fishery. Of these *S. commersonii* is the biggest in size, the maximum recorded being 4' 6" weighing 17.24 kg. It is interesting to note that only young ones of *S. guttatus* are caught during the other months of the year. The seer-fish catch has been estimated at 2.25 tons (0.33%) in 1950, 18.78 tons (2.58%) in 1951, 8.44 tons (1.58%) in 1952, 10.31 tons (2.35%) in 1955, 28.68 tons (3.16%) in 1956 and 4.32 tons (0.38%) in 1957. The total returns from these catches to the fishermen during the respective years were estimated at Rs. 800, Rs. 12,000, Rs. 8,000, Rs. 7,000, Rs. 20,000, Rs. 3,200. Other fishes such as the *Hilsa*, *Carcharhinus*, *Arius*, *Parastromateus*, *Chirocentrus*, *Sciæna*, *Chorinemus*, *Rachicentron* and *Histiophorus* are usually caught in the drift nets.

*Pomfret Fishery*.—The pomfret fishery coincides with that of the seer, and pomfrets are caught in the months of February–April and September–November. The boats employed are the dug-out canoes and the net used for the pomfret when it is abundant, is invariably the *saranga jal*. But the usual practice is not to take a net made up of one type of net only but an *aut* which will have a few pieces of all types of drift nets mentioned earlier. The *saranga jal* is used exclusively in the pomfret fishery for only a few days in the year. *Parastromateus niger* forms almost the only species contributing to this fishery, while *Pampus argenteus* is sometimes caught in the *rampan*, or a few may be landed by the drift nets. In 1950 the *Parastromateus* catch amounted to 0.92 tons (0.14%), in 1951 it was 5.59 tons (0.77%) but the next year it declined to only 1.78 tons (0.33%). It has shown a rise in the subsequent years from 2.20 tons (0.50%) in 1955 to 7.97 tons (0.88%) in 1956 and to 8.02 tons (0.70%) in 1957. The estimated rough value was computed to be about Rs. 800, Rs. 1,750, Rs. 5,600 and Rs. 5,000 during the different years. Pomfrets are the prized fish in this region and fetch Rs. 0.75–1.50 per fish depending upon the size and the availability. Almost all of the pomfret catch, unlike the other fishes, is consumed in the fresh condition.

#### DISPOSAL OF FISH

About 40% of the fish caught at Malwan is consumed fresh, the rest being cured or converted into manure. Of the latter (60% of the total caught) 30–40% is cured by the wet process, another 40–50% by the dry process and the remaining 30–10% is beach-dried for manure. Since the different methods of curing have been described in detail by Kalyani (1954)

and others they are not given here as the same system is practised at Malwan. Wet curing is practised in the case of mackerel and seer; only about 10% of the sardine catch, especially *S. fimbriata*, is consumed fresh, while the rest is beach-dried for manurial purposes. *Sciæna* and *Arius* are cured by the dry process and almost the whole of the catch is cured. Sharks are dry-cured to the extent of about 90% of the catch. As there is a great demand for *Parastromateus* in the fresh condition, during the non-peak period the whole of the catch is sold as fresh fish, while in the peak period hardly 20-25% is cured. About 60% of the mackerel is cured while the remaining 40% is sold fresh. The mackerel is esteemed as a food fish by the people along the entire Konkan coast and its availability in large quantities satisfies the needs of a large portion of the population. Prior to 1937 there were no carrier launches and the whole of the catch had to be disposed of locally. Since 1937, however, carrier launches have been introduced and iced mackerel transported to Bombay. Some quantity is sent in trucks, without using any ice, to places within a distance of twenty miles, and small quantities of iced fish are sent to places like Belgaum and Kolhapur. The cured fish, especially the wet cured, is sent to Ratnagiri in country crafts, from where it goes to the Kolaba District and to the interior of the Ratnagiri District. The dry-cured fish is transported in appreciable quantities to places in the interior like Kolhapur and Belgaum and some dry fish is shipped to Bombay from where it is reported to be exported to Ceylon. Almost the whole of the sardine catch is beach-dried and converted into manure. The sardines are taken in launches to Bombay only when the mackerel catch is poor and the sardines are available in plenty. The beach dried sardines are used as manure for cocoanut palms locally and a major portion of it is sent to Bombay from where it is said to be shipped to Europe. The whole of the *Arius-Sciæna* catch is dry-cured after gutting and the *Arius* is almost always beheaded before curing. A small quantity of the product is sold in the ghat areas and beyond, while the greater portion is sent to Bombay. The maws are also shipped to Bombay from where, it is said, they are shipped to Europe. The shark is not valued as a fresh fish and only when there is a scarcity of other fish it is brought to the market. It is not sent up-ghats as the market in these areas is controlled by Muslims, who as a rule do not eat sharks, not considering it a fish because of the absence of visible scales and its viviparity. Because of these reasons almost the whole of the catch is dry-cured. This cured product is in demand along the coast during the monsoon months when there is no fresh fish available and the cost of fresh fish is high. The price of fish fresh and cured, varies greatly depending upon the quantity and the type of fish available. Table IX gives a rough idea of the fluctuations in the price.

TABLE IX

Name of fish	Price of fresh fish		Price of cured fish	
	Wholesale	Retail	Wholesale	Retail
	Rs.	Rs.	Rs.	Rs.
Mackerel ..	30-40/1,000	60-150/Re.	40-50/1,000	2/100
<i>Arius</i> ..	8-50/100	10-75/100	15-70/100	0.25-1/each
<i>Sciæna</i> ..	15-25/100	20-30/1,000	30-45/100	0.75-1/each
<i>Scomberomorus</i> ..	4-6/25 lb.	8-15/25 lb.	5-7/25 lb.	6 each
<i>Parastromateus</i> ..	1-1.75/each	1.50-2/each	200-300/100	2-3 each
Sharks ..	0.50-3/each	0.75-4/each	75-80/100	1-2 each

## SOCIO-ECONOMICS

The soil around Malwan is laterite and vegetables cannot be grown on a large scale and the imported vegetables are beyond the means of the major portion of the population, of 20,000. The population has, therefore, to depend almost entirely on the fish and hence the *per capita* consumption is quite high and is computed at about 45.4 kg. a year. As already stated the fishermen's income is either from the mackerel or from the *Arius-Sciæna* catch. In 1950 the mackerel catch though not so high, yielded good returns to the fishermen. The mackerel catches had not come up to the level expected in the south and consequently the Malwan fishermen got higher prices for their catch. The *Arius-Sciæna* catch was also tolerably good and thus the fishermen earned about Rs. 500 each. In 1951 the mackerel catch was better than that in 1950, but the catch was better still in the south and hence the price which the fishermen got was not favourable. The boat-seine catches had failed completely and the fishermen earned no income from this source. Hence their income dropped to the low figure of Rs. 350. In 1952 the condition of the fishermen was very bad; the mackerel fishery had failed completely nor were there any catches of sardines, but the good boat-seine catches helped them to earn about Rs. 175 per head in this year. In 1955 the same conditions were repeated but as the total catch was somewhat lower than that of 1952 the income could be said to be about the same as that of 1952. In 1956 and 1957 the catch of the commercially important



fishes as well as the others was exceedingly good and the fishermen earned about Rs. 600-800 in these years. Most of the fishermen of Malwan have no subsidiary occupation; and fishing is the only source of their income.

It is estimated that a *rampan* net costs about Rs. 13,000 and the *rampan* boat about Rs. 1,500. Each *rampan* boat requires two smaller boats for miscellaneous work. Each of these boats costs about Rs. 700. Thus each *rampan* unit costs about Rs. 15,000-16,000. Among the drift nets, a *surmai jal* costs about Rs. 25 per piece and *wawari* about Rs. 22. The boat-seine costs about Rs. 2,000 a net, and the lines cost at the rate of Rs. 40 per line of 40 hooks. Based on the price of boats and nets mentioned above, the amount invested in the fishing industry in Malwan aggregates between Rs. 7,95,000 and Rs. 8,50,000. The income from this investment is uncertain; if the season is good then the fisherman earns about Rs. 500-600 in a year; otherwise the income may be as low as Rs. 175 in a year.

#### TREND OF FISHERIES AND CATCH PER UNIT

It will be seen from Tables III and IV that the catches obtained from the different gears varies from year to year. It is therefore necessary to examine if such variations are due to any changes in effort put in or due to other causes. Table X gives the figures of total catch and the catch per fishing unit for the four main types of gear.

TABLE X

*Rampan*

Year	Average No. of units operated	Total catch	Catch/unit
1950	161·36	6,54,662	4058·15
1951	337·38	14,48,518	4293·43
1952	225·55	4,28,288	1898·86
1955	269·88	6,01,462	2228·63
1956	997·41	13,05,852	1309·23
1957	850·71	16,50,476	1940·11

*Drift net*

Year	Average No. of units operated	Total catch	Catch/unit
1950	855.77	46,166	53.95
1951	1320.70	62,070	46.99
1952	1038.56	25,289	24.34
1955	1702.22	43,948	25.81
1956	2049.10	2,31,145	112.80
1957	3113.95	47,150	15.26

*Boat-seine*

Year	Average No. of units operated	Total catch	Catch/unit
1950	61.07	8,88,176	14543.57
1951	49.50	..	..
1952	119.79	6,69,894	5592.23
1955	..	..	..
1956	71.90	21,772	302.80
1957	46.50	5,107	109.83

*Line*

Year	Average No. of units operated	Total catch	Catch/unit
1950	100.86	18,995	188.33
1951	1357.50	76,473	56.34
1952	1334.03	59,396	44.52
1955	3585.41	3,14,092	87.60
1956	6050.82	4,32,924	71.55
1957	9587.65	8,11,417	84.63

In the case of the *rampan* the magnitude of effort is at its lowest in 1950, increases to a certain extent in 1951, but declines in 1952 and 1955, and thereafter shows a considerable increase. A more or less similar picture is presented in the case of the drift net. The annual catch in respect of these nets also follows a similar pattern of fluctuations, that is, with increasing effort increasing catches are obtained. But the trend in the catch-per-unit is quite different. In the case of the *rampan* where the effort has increased more than five times, the catch-per-unit has declined by nearly half. The increase in effort in the drift net during the corresponding period has been nearly four-fold but the catch-per-unit has been reduced to one-third. In the case of the boat-seine there has been variation in the magnitude of annual catch and effort. But the catch-per-unit has considerably declined from 1950-1957. In the case of the line there is considerable variation. The effort has consistently increased from year to year, the total catch also increased along these years, but the catch-per-unit is found at its highest in 1950, declines till 1952, rises again in 1955, to decline in 1956 then rise in 1957. From this no conclusion can be drawn.

In general, however, it must be said that at Malwan there is a decline in the catch-per-unit since 1950. As already stated, the catch-per-unit in the case of the line fluctuates greatly to allow drawing of any conclusions, and it must be noted that comparatively few fishermen own and operate lines. The majority of them work with *rampan* nets, drift nets or boat-seines. Hence the decline in the catch-per-unit, which has been occurring in all these three modes of fishing, affords genuine cause for concern. It becomes necessary to try to find out the causes of such decline. With increasing effort, the catch-per-unit always goes down but not to the extent noticed at Malwan. The cause of the decline may be due to the variation in the availability of the fish population. However a detailed investigation appears to be necessary before the real causes can be determined.

#### SUMMARY

(1) Malwan, the taluk headquarters in the Ratnagiri District, is one of the major fishing centres on the Konkan Coast. Canoes and out-riggers are used for fishing and the gear employed are the shore-seine, boat-seine, drift net, gill net and line.

(2) *Rampans* are operated during September-May. Drift nets of various types are operated during the fishing season depending upon the type of fishes. Gill nets are operated in March and lines from September to May. The catch has been estimated to be 681·51, 727·14, 536·06, 438·79, 907·38

and 1140.77 metric tons for the years 1950, 1951, 1952, 1955, 1956, 1957 respectively.

(3) The major fisheries contributing to the fish production are mackerel, sardines, *Arius*, *Sciæna*, elasmobranchs, seer and pomfrets. The fluctuations of these fishes during the six years of study are discussed in detail.

(4) About 40% of the catch is consumed fresh, of the remainder of the catch 30-40% is cured by wet process, 40-50% by dry process and the remaining 30-10% is beach-dried for use as manure.

(5) Fresh fish is sent in trucks to places in the interior across the ghats, such as Belgaum and Kolhapur and by carrier launches to Bombay. The cured fish goes to the interior and to Bombay for export.

(6) The investment in the fish trade is estimated at Rs. 8,00,000-8,50,000 and the return at Rs. 400 per fisherman in an average season.

(7) The fishery by-products are processed in a crude form and sent to Bombay for export.

(8) The catch-per-unit has been falling steadily in respect of all the gears operated excepting only the line. The fall in the case of the *rampan* is from 4058.15-1940.11. In drift nets it is from 53.95-15.26 and in the boat-seines it is from 14543.57-109.83. In the case of the lines it varies too much to draw any conclusions. Investigations to determine the causes for this falling trend in the fishery appears to be necessary.

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