AN ACCOUNT OF MARINE FISHERIES OF KUTCH (WITH NAVLAKHI AREA) IN GUJARAT STATE IN INDIA

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ABSTRACT

AN ACCOUNT OF MARINE FISHERIES OF KUTCH
(WITH NAVLAKHI AREA) IN GUJARAT STATE IN INDIA

by Niranjan D. Chhaya

The state of Gujarat in India has a coast line of 1,031 miles. Two of the most prominent gulfs of India, the Gulf of Cambay and the Gulf of Kutch, are a part of this coast line. Kutch Region--which forms a northern boundary of the Gulf of Kutch--has a rich potential for fisheries activities. Unfortunately, almost no fisheries work has been done in this area. The only authoritative data available is from one souvenir published by the government of Gujarat and the annual reports of the state fisheries department. Even here, Kutch does not get its due importance.

Despite the economic opportunities offered by the Gulf of Kutch, little is known about it. The purpose of this project was to attempt a survey of Kutch Region of the Gulf of Kutch. The emphasis was laid on the following aspects of the fishing activities:

1. Geographic and climatic conditions.
2. The fishing community.

3. Transport, refrigeration, marketing, and landing facilities that exist today.
4. Present fish curing and preservation methods.
5. Fisheries and fishing seasons, types of fishes available, etc.

In spite of the various difficulties in transport, refrigeration, marketing, social taboos, and primitive nature of the boats and gear, the annual fish catch of this region amounts to about 2,000 tons. There are great possibilities to increase this catch to at least 10,000 tons or more with improvement in fishing techniques and other facilities.

Gujarat State is a food deficit area, and this easily improvable fish output can provide cheap and rich protein which is lacking in the diet of people of this area.

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By

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INTRODUCTION

The state of Gujarat was declared a political and administrative unit on May 1, 1960, when the composite bilingual Bombay state was split into two states. The area of Gujarat is 72,137 square miles. Within the 17 districts of this state (of which Kutch is one) live over 20 million people. The southernmost point of Gujarat is about 70 miles from Bombay city, and the northernmost area borders the territory of Pakistan (see Figures 1, 2, and 3).

The coast line of Gujarat is 1,031 miles long, broken by several bays, inlets, roadsteads, estuaries, and marshlands. Two of the most prominent gulfs of India, the Gulf of Kutch and the Gulf of Cambay, surround the peninsula of Saurashtra. The state also has 26,000 square miles available for the fishing enterprise--most of this is continental shelf.

Kutch Region--which forms the northern border of the Gulf of Kutch--has a rich potential for fisheries activities. Unfortunately, this area is dry, scarce in water, lacks transport and other facilities, and thus has long been neglected. Almost no fisheries work has been done in this area, and the only authoritative data available is from one souvenir published by the government of Gujarat

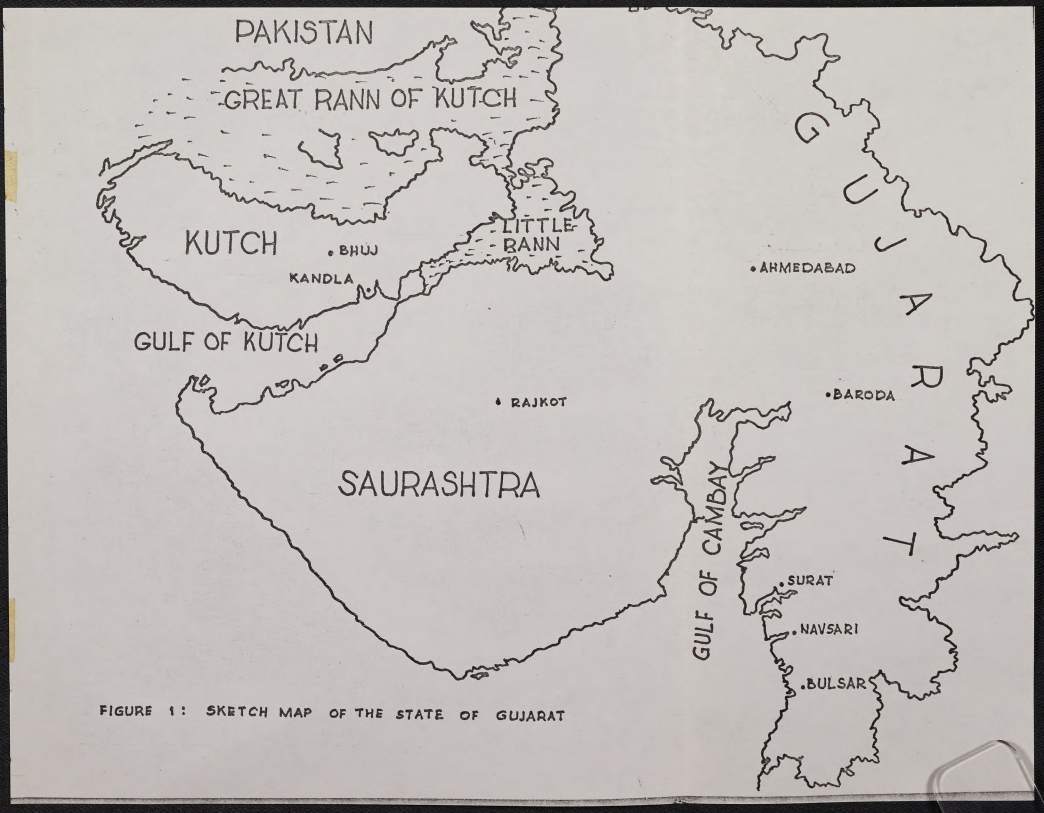


FIGURE 1: SKETCH MAP OF THE STATE OF GUJARAT

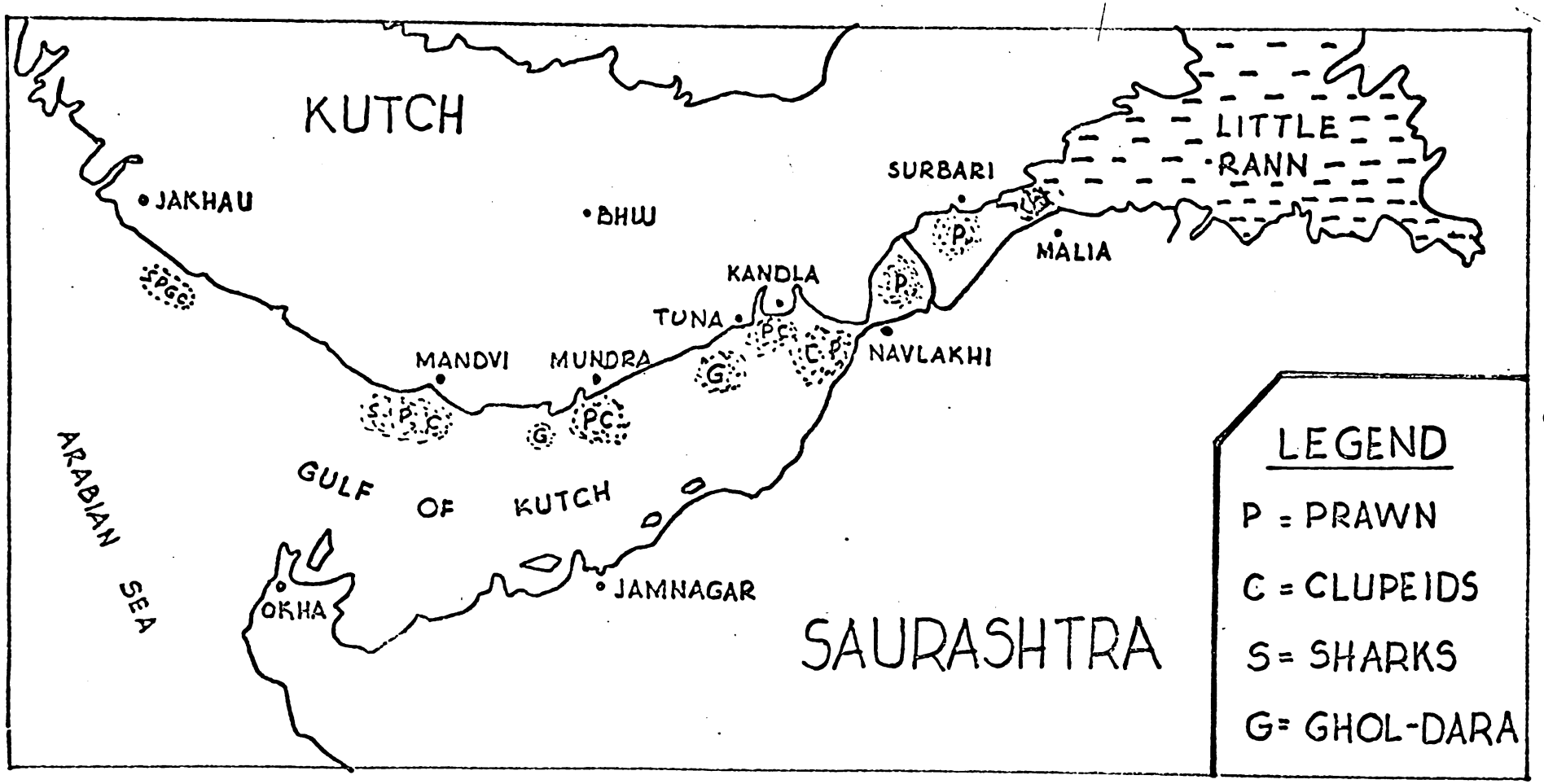
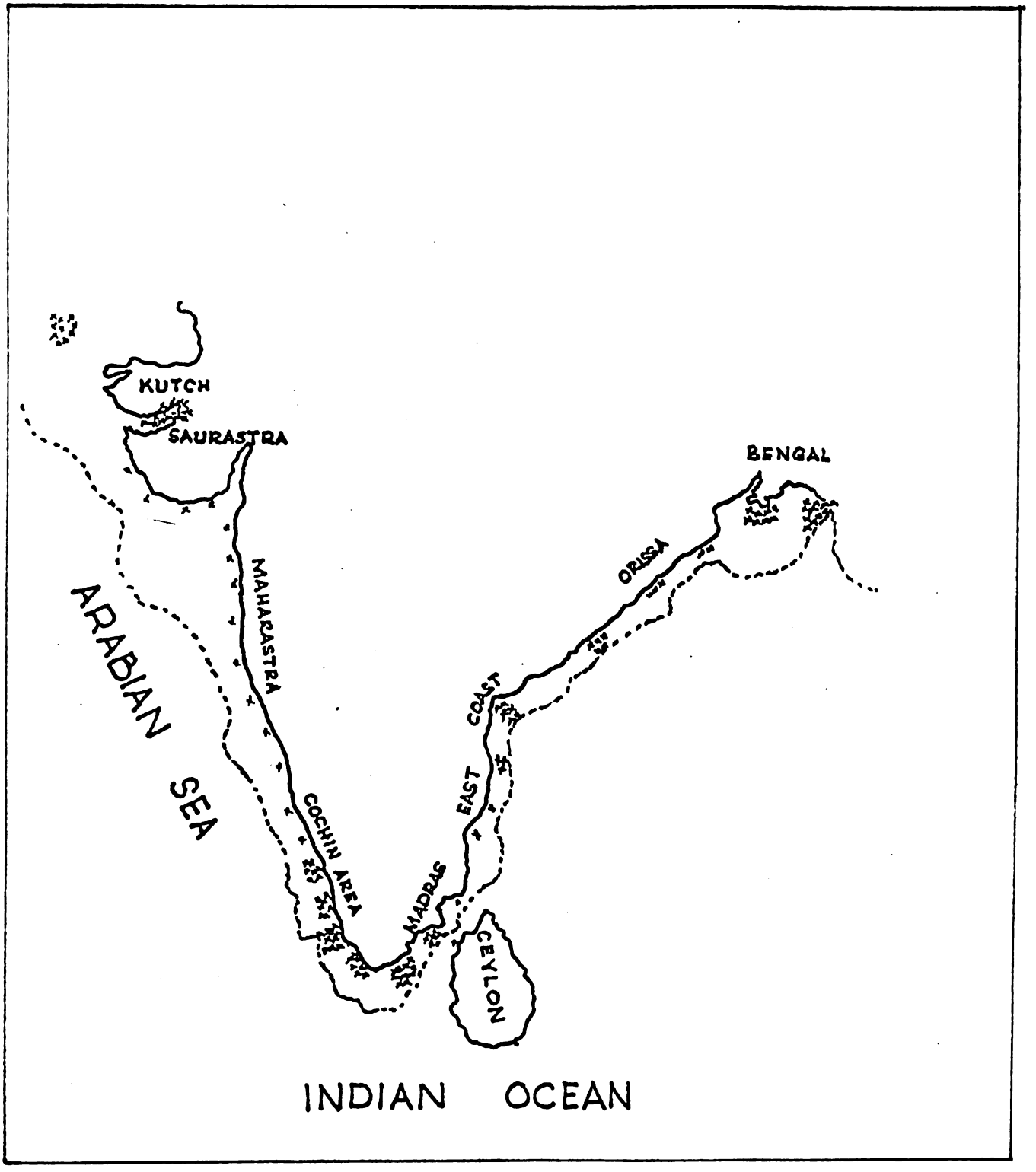


FIGURE 2. MAIN FISHING GROUNDS IN KUTCH REGION - GULF OF KUTCH

FIGURE 8

PRAWN CONCENTRATIONS IN INDIAN SEAS



1. ---- 100 FATHOM LINE

2. CONCENTRATION OF PRAWNS

LARGE CONCENTRATIONS ARE FOUND IN
1. GULF OF KUTCH
2. COCHIN AREA
3. BENGAL DELTA AREA

and the annual reports of the state fisheries department. Somehow, even here, Kutch is not given much space.

Considering the extremely rich potential of this area in terms of availability of fish, the author undertook a thorough survey of this region. Due to lack of transport facilities and other difficulties of language, etc., it took one full year to gather the data from which the present thesis is developed.

GEOGRAPHIC AND CLIMATIC CONDITIONS

Kutch (the seacoast island) is situated between 22°47'N and 24°N and between 68°25'E and 71°11'E, comprising a mass of land 160 miles from east to west and about 35 to 70 miles from north to south. To the south the deep inlet of the Gulf of Kutch, an estuary arm of the Arabian Sea to the west, divides Kutch from Saurashtra. The eastern arm of the Rann (desert) of Kutch, sometimes called the Little Rann, cuts off Kutch from Gujarat on the east, while the Great Rann lies between Kutch and Sind province of Pakistan on the north. At one period, geologists say, the Rann was a branch of the sea which entirely surrounded Kutch; and, even now, during the monsoon season, a great deal of the 8,000 square miles which make up the area of Rann is covered by water. On the south and west there are 125-140 miles of open coast line and about 150-170 miles of inland waters, coast line, and creek mouths, etc. Thus, surrounded by sea on one side and by Ranns on the other, Kutch has been throughout much of its history, a place apart, unknown and uncared for.

Lying along the parallel line of Tropic of Cancer, Kutch is almost beyond the rain-bringing influence of the southwest monsoon. The annual rainfall is about 10 inches.

Along the seacost, throughout the year, the climate is agreeable, and over the whole tract for nearly eight to nine months it is cool and healthy. But in April and May burning heat and dust storms prevail, and again during October the heat becomes excessive. In 1965, the temperature attained a maximum of 33.6°C in May and fell to a minimum of 26.5°C in January, with a mid-spring peak of 33.3°C in October (see Tables 1, 2, and 3).

TABLE 1

STATEMENT OF MONTHLY AVERAGE OF DRY BULB TEMPERATURE IN CENTIGRADE RECORDED AT NEW KANDLA OBSERVATORY IN KUTCH, INDIA

Month	1963		1964		1965	
	Dry Bulb Temperature		Dry Bulb Temperature		Dry Bulb Temperature	
	0830 Hrs.	1730 Hrs.	0830 Hrs.	1730 Hrs.	0830 Hrs.	1730 Hrs.
January	15.7°C	25.3°C	14.1°C	22.3°C	17.9°C	26.5°C
February	19.0	28.8	17.5	26.7	18.7	27.1
March	22.1	30.1	23.0	31.5	21.8	30.0
April	25.7	31.9	26.0	33.5	25.5	31.9
May	28.5	33.5	28.8	33.0	28.3	33.6
June	29.9	33.8	29.2	32.9	29.6	33.2
July	28.9	31.7	28.3	31.3	28.1	30.8
August	27.8	30.5	28.0	30.6	27.4	30.8
September	26.7	31.3	27.0	31.2	27.0	31.5
October	25.7	32.0	25.0	32.5	26.4	33.3
November	23.2	29.2	19.8	28.7	22.1	30.5
December	18.6	26.1	16.3	24.9	16.3	26.5

Source: Executive Engineer's Office, Kandla Port.

TABLE 2

STATEMENT OF RAINFALL RECORDED AT NEW KANDLA OBSERVATORY FOR THE PERIOD 1963 TO 1965 IN KUTCH, INDIA

Year	1963	1964	1965
Month	Rain in Millimeters	Rain in Millimeters	Rain in Millimeters
January	Nil	0.6	21.2
February	Nil	Nil	Nil
March	Nil	Nil	T*
April	0.2	Nil	T*
May	Nil	Nil	T*
June	2.8	72.8	T*
July	8.2	117.0	317.6
August	48.6	154.7	38.4
September	40.4	35.0	T*
October	45.6	Nil	T*
November	23.2	Nil	Nil
December	T*	Nil	Nil

*T indicates rainfall trace but not measurable.

Source: Executive Engineer's Office, Kandla Port.

TABLE 3

AVERAGE RESULTS OF SALINITY AND TEMPERATURE OF KANDLA CREEK WATER FROM NOVEMBER, 1963, TO APRIL, 1965, IN KUTCH, INDIA

Year	Month	Salinity Reading °/₀₀	Temperature in Centigrade of Creek Water	Remarks
1963	Nov.	11.5	. .	1. No observations have been made regarding P.H. values; however, the P.H. value of creek water varies between 7.8 to 8.4.
	Dec.	12.0	. .	
1964	May	10.5	29°C	
	June	11.5	30.5	
	July	10.5	29.5	
	Aug.	11.0	30.0	
	Sept.	10.5	31.0	2. There is no major difference between the salinity readings and temperature of the creek water at the surface and at the mid depth.
	Oct.	10.25	28	
	Nov.	11.5	22	
	Dec.	11.5	21	
1965	Jan.	11.5	21.5	
	Feb.	12.0	22	
	March	12.0	23	
	April	11.5	28	

Source: Executive Engineer's Office, Kandla Port.

THE FISHING COMMUNITY

The fishing population of this zone is born as a community to engage in fishing, as anywhere in India. During the reign of princes, the fishermen were severely excluded from society. Because of this, many of them left their vocation and took up jobs as unskilled laborers in salt works--which abound in this region--and other industries which are springing up at a rapid pace. Many work as "Tindels" (helmsmen) and "Khalasis" (sailors) in the trading country crafts. Since Independence, the state government has given good assistance and encouragement by providing them with subsidized loans to build boats, purchase machines and nylon yarn. As a result, fishermen are slowly returning to their natural vocation.

There are two principal fishing communities in this region--both Muslim. They are the "Vaghers" of the western area and "Mianas" of the eastern side. They are extremely poor and are dominated by superstitions. They are a very sturdy race and are well known for endurance. With the available primitive craft and gear, fishermen are able to fish only in the inland waters and in a narrow coastal belt. Though they work very hard and in most difficult conditions, their returns are very meager.

In the area under survey the ownership of the equipment can be put into two categories:

1. Individual ownership.
2. Owned by middlemen and given to fishermen on a contract basis.

Many individuals who own equipment hire fishermen who do not own boats, etc., on a percentage basis.

Those who do not possess the necessary equipment can get loans from cooperative societies either to build boats, install engines, or to purchase cotton and nylon twine for making nets. There are five working cooperative societies, viz., Malia, Navlakhi, Kandla, Modhwa, and Jakhau in this region. (Table 4 shows the number of fishermen in various villages; see Tables 4 and 5.)

TABLE 4

NUMBER OF FISHERMEN BY VILLAGE[1]

S No.	Name of Village	Total Fishing Population	Men	Women	Children	No. Actually Engaged in Fishing	Off Season Occupation and Other Occupation
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1.	Lakhpat	52	17	14	21	12	
2.	Koteshwar	. .	. .	. .	. .	. .	
3.	Jakhau	64	19	21	24	16	
4.	Suthri	110	35	31	44	27	All of them work for daily wages at Kandla Port and various other salt works (4) in this zone and at the Caltex, Burma Shell, and Standard vaccuum oil depots.
5.	Sandhan						
6.	Bambdai	45	13	14	18	10	
7.	Sindhodi	75	20	25	30	19	
8.	Layja	64	25	19	20	25	
9.	Mandvi-Salaya	115	20	26	69	15	
10.	Modhwa	181	64	64	53	60	
11.	Targadi	46	18	16	12	10	
12.	Navinar	72	16	22	34	9	
13.	Jarpara	77	20	24	33	16	
14.	Mundra	. .	. .	. .	. .	. .	
15.	Sekhdia	52	18	20	14	10	
16.	Luni	185	60	55	70	40	
17.	Bhadreshwar	70	21	20	29	18	
18.	Ramper	20	7	8	5	7	
19.	Sanghad	48	14	16	18	12	
20.	Tuna-Takkra	300	80	90	130	75	
21.	Kandla Old and New	414	97	104	213	54	
22.	Kharirohar						
23.	Cherai	212	64	51	97	33	
24.	Surbari	436	132	105	199	106	
25.	Adesar	246	62	58	126	45	
26.	Navlakhi	753	214	229	310	197	
27.	Malia	455	140	129	186	123	
28.	Hanjiasar	300	85	93	122	52	
29.	Kajarda	162	49	46	67	32	
30.	Zajasar (Karasova)	120	33	28	59	26	
	Total	4,674	1,343	1,328	2,003	1,049	

[1]Data collected personally.

Population figures are given for persons in the fishermen community who are directly or indirectly connected with fishery.

TABLE 5

SECTIONS OF COAST LINE OF KUTCH AREA, THEIR PRINCIPAL FISHERIES AND GEAR USED

Serial No.	Section	Coast Line in Miles	Fishing Area in Square Miles	Principal Fisheries	Gear Used
1.	Kandla Creek[1] to Tuna	8	16	Prawn Hilsa Catfish Mullet	Gunja Rachh Patti
2.	Tuna to Mandvi	28	154	Prawn Hilsa Ghol-Dara Cybium Mullet Catfish	Gunja Wirral Patti
3.	Mandvi to Jakhau	84	150	Prawn Mullet Cybium Shark Coilia Pomfret Bombay-duck	Gunja Rachh

[1]Between Navlakhi and Kandla there are extensive Prawn fishing grounds within creeks. This area is not completely shown in the table.

Source: Government of Gujarat. Fisheries Department Annual Administration Report, July 1, 1962 to June 30, 1963.

TRANSPORT, REFRIGERATION, AND MARKETING

A serious handicap in the marketing of a perishable commodity like fresh fish is a lack of transport, ice, and cold storage facilities in this region. Large quantities of fish, which could be made available to people in fresh condition, either perish and have to be converted into manure or have to be dried or salted.

There are only four ice factories in Kutch with the total production capacity only 25 tons per day. The ice is prohibitively costly for commercial use so that private trade has not shown any interest in utilizing ice for the preservation of fish. One ice factory, however, with a 12-ton per day capacity and with cold storage facilities, has been built at Kandla Port by the state fisheries department. These facilities are not being fully utilized at present, but it is expected that they will be of great significance for the fishing industry in this area in the near future.

The fish are carried by head loads or by bullock carts and camel carts to the local markets which are 8 to 14 miles and even 20 miles away from fishing villages and landing places.

With only 44 miles of railroad from Kandla to Bhuj and another linking Kandla with Gujarat, and the poor condition of roads, it is extremely difficult to transport fresh fish from fishing villages for export or even local consumption in Kutch.

The state fisheries department has, however, undertaken a pilot scheme for marketing fresh fish in Bombay markets. With a population of about 5 million, Bombay is a lucrative market. Insulated van and ice boxes of the department have been pressed into service for collecting fish from landing centers--most of which are far away from railway stations--packing them in ice, and dispatching the same to Bombay and Surat markets.

Local Markets

There are no regular fish markets in this region, but in important towns like Bhuj, Mandvi, Gandhidham, etc., there are certain wooden stalls or special areas where fish are sold. The sanitary conditions of these places, however, are deplorable.

Outside Markets

The export trade of fish, mostly sundried, is in the hands of petty fish traders who buy the fish from middlemen called "Mundars" at rates which are fixed annually. The main export centers are Bombay, Surat, and Ahmedabad.

The prices fixed by these merchants are far too low, and the fishermen are ruthlessly exploited. Cooperative societies at various places have slowly taken up fresh and dry fish marketing and are obtaining nearly double the prices offered by merchants.

Landing, Navigation, and Harbor Facilities

There are no landing, navigation, or harbor facilities provided exclusively for the fishing trade in this region. The government of India has, however, recently constructed a fishing jetty at Kandla Port. This will facilitate the fish landings of this area to some extent.

FISH CURING AND PRESERVATION

In the absence of adequate supplies of ice, facilities of cold storage, and rapid transport, large (almost all) quantities of the catch are dried and cured all along the coast, usually under conditions that are not altogether hygenic and economical.

Sun-drying

The fish are dried on the beach on sea sand or mats (rarely) for 2-4 days with an occasional turning over. By far the largest quantities of fish are cured by this method. Small and lean types of fish like Prawns, Bombay-ducks, Coilia, Trichiurus, etc., are cured in this manner. Of these, the sun-drying of Prawns and Bombay-ducks is of special interest.

The Prawns are boiled in kerosene tins in salt-water solution (sea water) for 20 to 30 minutes and spread on sand or bamboo-mats (if available) for drying, for nearly 48 hours, after which the Prawns are placed in gunny bags and beaten. The shells of Prawns, except the telson and a little of the carapace, are completely removed, and the contents then are seived. The product remains good for about 4 to 6 months, but the size is very small--200 to 300 to a pound--and hence does not find a good market.

For Bombay-ducks (Harpodon sp.), specially raised bamboo poles are constructed and thick coir ropes are tied horizontally to them. The poles are about 6 to 7 feet apart. The fish are washed in sea water; two fish are interlocked by jaws and hung on ropes, one on each side. After completely drying, they are packed in bundles of 1,000, each bundle being called "Bhara."

Salt Curing

Only fishes like "Gol" (Sciaena sp.), "Dara" (Polynemus sp.), "Sharks," and "Catfish" are salted and dried in this region.

"Gol" and "Dara" are gutted on board and salted at a proportion of 1 salt to 3 fish by weight. Only Gujarat fishermen who come to this area for Gol-Dara fishery do this kind of curing and take the cured fish with them to their home ports. The product is reported to be good for a couple of months.

"Sharks" and "Catfish" are gutted and cleaned with sea water and salted in proportion of 1 salt to 4 fish by weight. The salted fish are stacked for only a few days and then sun-dried. The product is not very satisfactory from the standpoint of keeping quality.

Many times the quantity of salt used is not adequate, and the product generally is liable to insect attack and putrefaction. There is a good fish curing yard at Tuna

and one under formation at Modhwa. During the several visits to these places, it was noticed that these yards were unused and uncared for.

Icing and Chilling

Fish are packed in pinewood tea-boxes and each amount of fish is packed with equal quantity of ice. Very finely crushed ice is sandwiched between layers of fish, ensuring good preservation. This method is not very popular in this region, except at Navlakhi, during peak season, due to difficulties of transport, scarcity and resultant cost of ice.

FISHING CRAFT AND GEAR

There is no selectiveness in fishing boats. They vary in size from 0.5 tons to 10 tons. Most of the boats are between the range of 0.5 tons to 3 tons. They are, however, in a way, quite suitable for the work done by them. The flat-bottomed boats of Malia-Surbari area are efficient in their own zones. Some of the boats of Kutch, especially of Luni-Sekhadia area, are large and very well built. In the opinion of Olef Jan Traung (F.A.O. 1953), the design of Saurashtra-Kutch sailing boats is ". . . indeed a magnificent contribution towards sailing naval architecture. . . ."

Flat-bottomed Boats of Surbari-Malia

These boats are generally used for Prawn fishing in the shallow creeks and tidal areas in the little desert of Kutch. They are plank-built and with a flat bottom. Due to the flat bottom they are very suitable for fishing in these shallow water areas. They can be handled easily and safely in muddy bottoms, during low tides. Each boat costs about $100 to $170, depending on the size of the boat (see Table 6).

TABLE 6

NUMBER OF BOATS AND NETS BY VILLAGE[1]

S No.	Name of Village	No. of Boats	No. of Nets[2] (a)	(b)	(c)	(d)	Remarks
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1.	Lakhpat	. .	. .	. .	. .	. .	Only cast nets operated from shore, each fisherman having at least one cast net for himself. Cast net is locally known as "Chakkr" or "Chhort fal."
2.	Koteshwar	. .	. .	. .	. .	. .	
3.	Jakhau	1	. .	. .	. .	. .	
4.	Suthri						
5.	Sandhan						
6.	Bambdai	. .	. .	. .	. .	. .	
7.	Sindhodi						
8.	Layja	2	130	. .	2	17	
9.	Mandvi-Salaya	. .	. .	. .	. .	. .	
10.	Modhwa	15	80	. .	6	80	
11.	Targadi	3	12	. .	. .	16	
12.	Navinar	. .	45	. .	. .	. .	
13.	Jarpara	3	40	. .	. .	. .	
14.	Mundra	. .	. .	. .	. .	. .	
15.	Sekhdia	2	52	3	. .	. .	
16.	Luni	7	210	9	. .	. .	
17.	Bhadreshwar	. .	72	3	. .	. .	
18.	Rampar	3	14	. .	. .	12	
19.	Sanghad	2	56	2	13	. .	
20.	Tuna-Takkra	45	. .	. .	80	300	
21.	Kandla Old and New	53	260	. .	100	235	
22.	Kharirohar						

TABLE 6--Continued

S No.	Name of Village	No. of Boats	No. of Nets (a)	(b)	(c)	(d)	Remarks
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
23.	Cherai	45	210	. .	56	225	
24.	Surbari	79	400	. .	26	365	Flat-bottomed boat.
25.	Adesar	. .	. .	. .	. .	225	
26.	Navlakhi	51	275	. .	966	410	
27.	Malia	42	117	. .	59	136	Flat-bottomed boat.
28.	Hanjiasar	17	. .	. .	19	55	
29.	Kajarda	11	12	. .	14	45	
30.	Zajasar	12	25	. .	. .	40	
	Total	393	2,010	17	1,341	2,161	

[1]This data was personally collected in 1963, by visiting all these villages.

[2](a) Stake nets (Patti) (c) Gill nets (Rachh)
(b) Wirrals (d) Bag nets (Gunja)

Recently, after the completion of this paper, about a thousand pounds of nylon and a considerable amount of cotton twine was given on loan by the state government to fishermen. This will considerably increase the gear capacity in this area. Loans are also given for building boats, so that four new boats at Tuna and more at other villages have been built. Due to such incentives, more and more fishermen are taking up fishery activity.

Navlakhi-Kandla Boats (Hodies)

These boats are plank-built, keeled, and with pointed stern. They are sturdier than Surbari-Malia types and are locally built at Navlakhi, Kandla, and Mandvi. Each boat costs between $180 and $320. These boats are used for inshore fishing and for carrying mangroves.

Luni-Sekhadia Machwas or Dhangi

These are very sturdy and excellent boats and are locally built at Mandvi with teak wood. Each boat costs between $320 and $1,000. Hornell (1920) in describing a Kothia--similar to Machwa (but bigger)--says:

> . . . to see a great Kothia foaming through the water with a fair-wind, the sun lighting the great spread of white sail and red carred poop, is one of the prettiest sights in the Eastern seas and one that instinctively brightens our respect for the face that has evolved the type, powerful and admirably fitted for deep sea service. . . .

Fishing Gear and Its Operation

The fishermen of this region have only primitive fishing gear. Poverty and discouragement from society have deprived these brave persons from any chances to adopt the better fishing methods of their Saurashtra, Gujarat, and Bombay brethren.

There are four main types of nets utilized in fishing:

1. Gunja or bag-stake net.

2. Patti or stake net.

3. Wirral, a type peculiar to this zone.

4. Rachh or gill net.

Gunja Net

This net is mainly used for Prawn fishing in the Gulf of Kutch, which is one of the richest grounds of Prawn fishing. It is a bag net with a comparatively wide mouth gradually tapering at the throat, funnel, and cod end. The net is nearly 16 to 18 feet long. The cod end is 5 feet long, funnel 4 to 5 feet long, and throat 7 to 8 feet long. The circumference of the mouth is about 22 feet. The mouth is usually squarish. The throat has a mesh of 1-1/2", funnel 1-1/4", the precod end 1/2", and the bag 1/4". The cod end is open but is tied by a coir twine while in operation. The net is made of cotton twine. Each net is made from about 2-1/2 pounds of cotton twine and costs between $5 and $6; it lasts for about three seasons. The net is preserved by a treatment of concentrated solution of the bark of mangrove called "Kharod." The net is staked during low tide with the cod end firmly tied and is let to function during high tide. The creeks at the tide have about 5 to 7 feet of water. During the first high tide the cod end is emptied and the net is left to perform its function again. Gunja remains staked for 8 to 9 days and then is removed for repairs. The fishes caught in this type of net

are Prawns, Mullets, Sea-perches, small Jew fish, and small Sharks, etc. The net is operated mainly in the inner Gulf of Kutch during August to December.

Patti Net

These are rectangular pieces of nets which are closely interlaced and are used for creek fishing and in tidal basins. Dimensions vary according to the size of the net and its functions. Each piece is about 50 feet long and 3 to 4 feet wide, the mesh being 1/2" to 1" size. A bamboo stick is laid at intervals of 10 feet as a stake. This net is preserved by "Kharod." The net is fixed to sea bottom during the low tide in the creeks and tidal basins. With the rise of tide, the net gets distended and encloses fish that go up during the tide. This method of fishing is very primitive, and the returns are extremely poor.

There are also larger stake nets which have a depth of 6 to 9 feet and have mesh of the size of 3-1/2" to 4". They are called "Katri" and are made from coir twine. The preservative used is "Kharod." The fishes caught in these nets are Mullets, small Hilsa, Polynemus sp., Perches, small Pomfrets, Bombay-ducks, etc. The nets are operated all year except in monsoon.

Rachh Net

This is a gill net or a drift net and is used in inshore and offshore waters. It is made from cotton yarn,

though a few fishermen do possess nylon gill nets. Each piece of net is about 110 feet to 120 feet in length and 10 to 12 feet deep. The mesh size is 4" to 4-1/2". The preservative used is "Kharod." The head rope is 1/4" in diameter with wooden floats every 12 to 13 feet. There are usually nine floats to a net. The ground rope is also of the same thickness and has small stone sinkers every 25 feet. During operation, one end of the net is buoyed by a drum and a flag and the other end is tied to the boat. The net is kept in operation from 4 to 6 hours from the flow of tide to the beginning of the ebbs. The net is operated from March to mid-May.

The Gujarat fishermen, who come in this area for Gol-Dara fishery, use gill nets made out of Italian hemp. The nets are about 180 to 200 feet in length and 10 to 12 feet deep. The mesh size is 5-1/2" to 6". The fishing area for this type of net is in deeper waters.

Wirral Net

This type of net is only used by fishermen of Sanghad, Luni, and Mundra area. The net is made out of coir twine and is 7 to 8 feet deep and with 2" to 4-1/2" mesh. The net is in the form of an inverted "L" with a longer arm about 700 to 750 feet long and a shorter arm about 450 to 500 feet long. At intervals of every 20 to 25 feet, long bamboo sticks are tied to the net. During the

low tide the net is distinctly visible and is considerably below water during the receding tide. One Wirral generally covers the entire area of a small creek. The catches are mainly Sharks, Catfishes, Polynemus, Hilsa, and small Sciaena, etc. One net is usually owned by several families, and the catch per day--which comes to about 70 to 100 pounds--has to be divided between them.

Many fishermen who do not have boats and nets, e.g., fishermen from Layja to Lakhpat area, use only cast nets which are called "Hathjal" or "Chakkar-jal."

Fishing with lines is not yet popular in this region and very few fishermen, if any, possess hooks and lines.

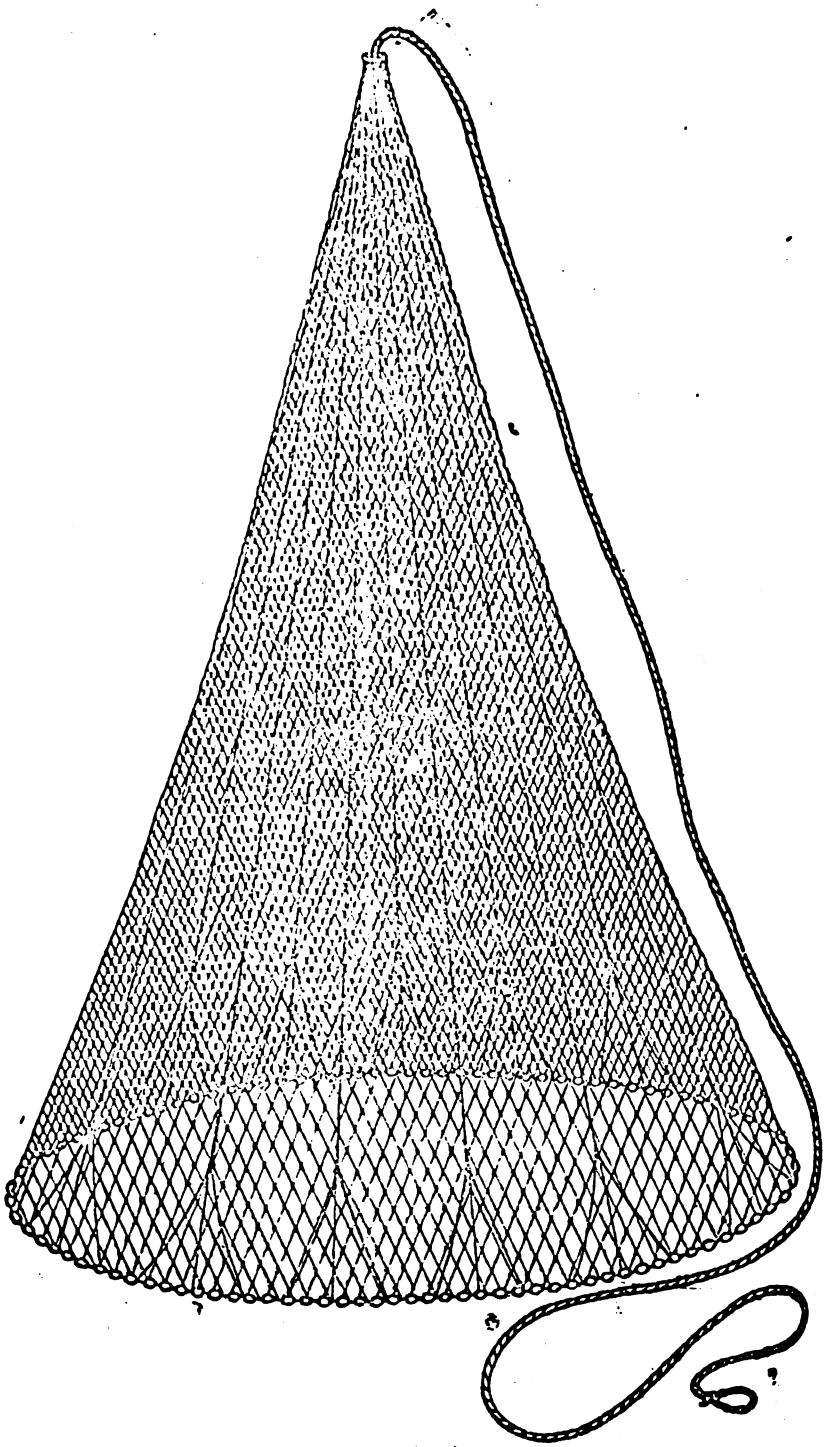


Figure 4 : A STRINGED CAST NET

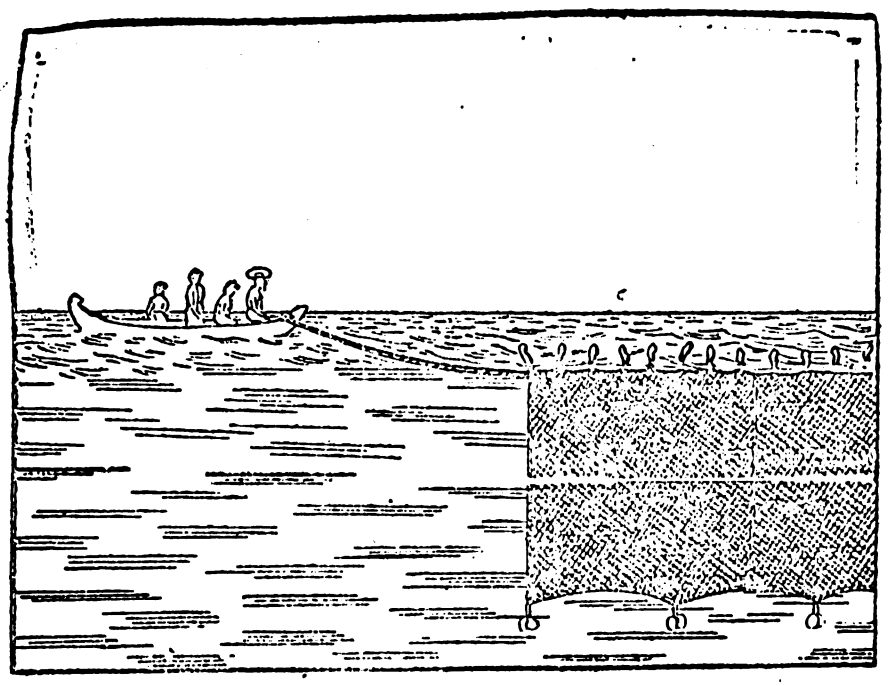


FIGURE 5 : OPERATION OF A DRIFT OR GILL NET

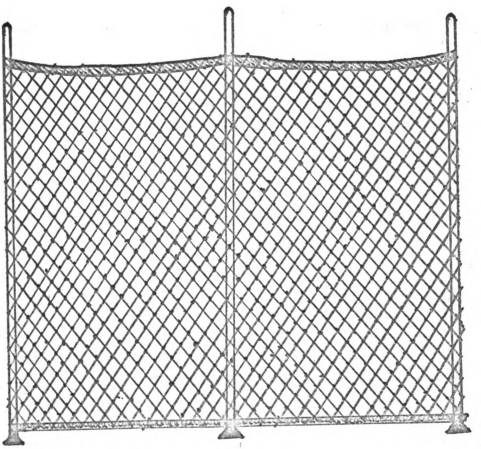


FIGURE 6 : A STAKE NET

FISHERIES

That the Gulf of Kutch abounds in fish is amply borne out by the fact that nearly 100 Gujarat boats every year from February to May come to this place. This is further supported by the considerable amount of fish caught by the state fisheries power crafts. It is unfortunate that the fishermen of the Kutch Region are not able to land fish in good quantity. This is only because they do not possess the proper gear--both in quality and quantity--and have to rely upon primitive and out-dated gear like Wirrals and Patti (see Tables 7, 8, and 9).

Some Important Commercial Fisheries

Prawn Fishery

Among the commercially important fishes of this region, Prawns without doubt occupy the first place by virtue of the magnitude and value of the fishery they support.

With the exception of *Leander* sp. which is fished in good quality, all the Prawns belong to the Penaeid group. The species noted are *Peneaus carinatus*, *P. monodon*, *P. indicus*, *P. canaliculatis*, *Metapenecus monoceros*, *M. affinis*, *M. dobsoni*, *M. brevicornis*, and *Parapeneopsis stylifera*.

TABLE 7

SOME IMPORTANT FISHES AND THEIR COMMON AND LOCAL NAMES

S No.	Common Name	Local Name	Scientific Name
1.	Mullet	Chhodi	Mugil cephalus
2.	Mullet	Boi	Mugil spegleri
3.	Mullet	Gandhio	Mugil dussumeri
4.	Prawn*	Keshndo	Penaeus sp.
5.	Prawn*	Bhundaui	Metapenaeus sp.
6.	Prawn*	Kadiary	Parapenoeopsis sp.
7.	Prawn*	Nakri	Leander sp.
8.	Indian shad	Chaksi	Hilsa ilhisa
9.	Giant herring	Palla	Hilsa toli
10.	Thread fin	Dara	Polynemus indicus
11.	Indian salmon	Rawas	Polynemus tetradactylus
12.	Seer fish	Surmai	Cybium guttatum
13.	Seer fish	Surmai	Cybium commersoni
14.	Silver bar	Lampdi	Chirocentrus darab
15.	Anchovy	Phampti	Engraulis mystax
16.	Anchovy	Palli	Pellona moerogaster
17.	Sea bream	Dhoma	Umbrina sineater
18.	Jew fish	Ghol	Sciaena sina
19.	Jew fish	Ghol	Sciaena glauca
20.	Jew fish	Ghol	Sciaena diacanthus
21.	Golden anchovy	Mandeli	Coilia dussumeri
22.	Silver pomfret	Vichuda	Pampus argenteus
23.	White pomfret	Adadio	Pampus chinesis
24.	Black pomfret	Malva	Parastromateus niger
25.	Ribbon fish	Vagti	Trichiurus savala
26.	Bombay-duck	Bumla	Harpodon nehereus
27.	Catfish	Khagga	Arius caelatus
28.	Catfish	Khagga	Mystus aor
29.	Horse mackrel	Chapri, Bhagda	Caranx hippos
30.	Flat fishes	Khetar	Cyanoglossus lida
31.	Flat fishes	Khetar	Pseudorhombus oligodon
32.	Flying fish	Kunga	Cypsilurus oligolepis
33.	Half beak fish	Kunga	Hemirhamphus sp.
34.	Full beak fish	Kunga	Tylosurus strongylurus
35.	Sea eel	Waaun	Murenesox cinereus
36.	Moon fish	Chanal	Drepane punctata
37.	Scat	Vada	Scatophagus argus
38.	Leather jacket	Chholia	Chorinemus lysan
39.	Dogfish	Magra	Carcharias limbatus
40.	Dogfish	Magra	Carcharias slaticanelus

TABLE 7--Continued

S No.	Common Name	Local Name	Scientific Name
41.	Sawfish	Vakhen	Pristis cuspidatus
42.	Skate	Karaj	Rhynchobatus djiddensis
43.	Hammer headed shark	Bhuther	Sphyrna blochii

*The general common name of Prawn is "Jinga" or "Sonia."

Source of scientific names: Day, Francis--1878: Fishes of India, Vols. I and II.

Almost all these local names are peculiar to this region only and are usually not found in other parts of the state.

TABLE 8

PRODUCTION OF VARIOUS FISH SPECIES
IN KUTCH REGION IN 1962-63

Serial No.	Name of Fish	Total Production (Weight in Kilograms)
1.	White Pomfret	23,490
2.	Black Pomfret	Tr
3.	Bombay-duck	41,207
4.	Prawn	565,044
5.	Ghol-dara	12,889
6.	Cleupids	528,383
7.	Coilia	Tr
8.	Mullet	72,546
9.	Catfish	9,439
10.	Shark	54,138
11.	Miscellaneous	536,671
12.	Manure	13,287
	Total	1,857,094

Source: Government of Gujarat. Fisheries Department Annual Administration Report, July 1, 1962 to June 30, 1963.

TABLE 9

FISH CATCH-EXPORT-LOCAL CONSUMPTION IN KUTCH REGION IN 1962-63 (WEIGHT IN KILOGRAMS)

Month	Export Weight	Export Weight			Local Consumption[1]	Total Production
		Sea	Rail	Land		
1962						
July	81,322	656	80,666	. .	4,619	85,941
Aug.	429,472	. .	. .	429,472	14,396	443,868
Sept.	273,753	6,575	266,221	957	8,901	282,654
Oct.	216,990	22,488	168,864	25,638	15,138	232,128
Nov.	171,551	31,800	10,246	129,505	5,908	177,459
Dec.	95,066	48,364	18,590	28,112	4,727	99,793
1963						
Jan.	78,798	19,956	24,524	34,318	4,727	83,525
Feb.	34,548	3,988	. .	30,560	3,463	38,011
March	76,635	9,242	46,770	20,623	6,562	83,197
April	203,319	169,076	11,100	23,143	4,520	207,839
May	103,304	94,397	. .	8,907	4,716	108,020
June	9,053	. .	. .	9,053	5,606	14,659
Total	1,773,811	406,542	626,981	740,288	83,283	1,857,094

[1]Local consumption forms only 8.5 per cent of the total fish production in this region.

Source: Government of Gujarat. Fisheries Department Annual Administration Report, July 1, 1962 to June 30, 1963.

Among the fresh water types that are drifted into the estuary--apparently for breeding--Palaemon idal is commonest.

The main fishing grounds of the Gulf of Kutch (quantitatively) are situated in the extremity of the gulf where the rivers Banas, Sarasvati, Machhu, etc., empty their maximum waters from July end to about November end. These grounds extend from Surbari in the Kandla Creek to Hansthal near Navlakhi and Tuna and have a total area of about 125 square miles. The grounds in Kandla-Malia area are in Kandla and Hansthal Creeks and the tidal waters between them.

A number of temporary camps are established at various tidal points as Jungi (Sosaria), Tapal, Bhawada, Lambidui, Mathal, Cherowari, Surbari, Nangawad, Bagadbeti, Lakhiasar, etc., where the Prawns are caught as shown in the earlier pages. The lowest water level in these areas is never more than 2 to 5 feet.

Fishermen from nearly the whole Kutch zone (with Navlakhi) migrate to these places temporarily. These areas are not easily accessible as they are surrounded by desert. Fresh water is not freely available in these places, and so also the firewood for processing Prawns has to be brought from mangrove tracts some distance away from these places. Transportation is a big problem as there are no routes

leading to these areas, and camels and bullock carts are the only carriers.

The grounds in Navlakhi-Tuna area are in deeper waters in the sea. A lot of fishing is conducted near the Takara point off Tuna for large size Prawns. Fishing starts in October and ends by February. The same holds true for Tuna-Mandvi area.

The Prawn catch generally varies in sizes according to seasons and localities. Normally the sizes are bigger as the fishing areas move progressively in season to the open and deeper waters of the gulf.

Almost all the catch is sun-dried; the cured product fetches between $5 and $8 for 40 pounds. The main market is Bombay, where they are sold for about $10 to $15 for 40 pounds. The Prawns are locally called "Zinga" or "Sonia."

Hilsa Fishery

Hilsa toli and Hilsa ilhisa constitute the Hilsa fishery of this region. They are locally called "Palla" and "Chaksi," respectively, the former dominating the latter quantitatively. The fishing starts in March and ends by the middle of May. The fish are caught in Rachh. Almost all the catch is composed of Hilsa toli.

It was believed till recently that March to mid-May was the only period for Hilsa fishery and that only Hilsa toli were available in this region. But the author has

noted a considerable amount of Hilsa ilhisa which are caught in Surbari area from the middle of June to the beginning of August.

These fish are in good demand in markets of Baroda, Surat, and Bombay and fetch about 25 to 50 cents per one fresh fish. They are usually salted except at Navlakhi where they are iced and sent to Surat and Bombay.

Polynemus Fishery

P. tetradactylus and P. indicus constitute this fishery. They are locally called "Rawas" or "Ser" and "Dara," respectively. The fishery lasts from mid-February to the end of April in Navlakhi-Tuna-Luni-Modhwa area. The fish are caught by operation of gill nets with heavy sinkers by Gujarat fishermen and by operating Wirrals by the local fishermen. The fish are salted and are in heavy demand in markets of Bombay, Baroda, Surat, and Ahmedabad. Each good sized fish fetches between $1 to $1.50.

Sciaena Fishery

The Sciaena fishery in this region is mainly constituted of Sciaena sina, S. glauca, and S. diacanthus. They are locally called "Gol." Umbrina sinoata, locally called "Doma" is also caught in good quantity. The season lasts from February to April end. These fish are only caught by the Gujarat fishermen who possess gill nets with larger mesh size. Local fishermen from Bhadreswar-Luni-Sekhadia

area catch small Sciaena sp. in Wirrals. They are in very good demand in Surat and Bombay markets; and a big size fish fetches between $2 and $2.50.

Mullet Fishery

Mullet fishery is mainly constituted by Mugil cephalus, M. spegleri, and M. dussumeri. They are locally called "Chhodi," "Boi," and "Gandhio," respectively. Pillai (1948) has also noted M. oligolepis, M. troschelli, M. waigiensis, and M. jerdoni. Mullet, being tasty and without fine bones, are relished even in the general fishing season, and they thus help to maintain supplies of wholesale fish throughout the year. Mullet are fished all the year round, but their peak period is April-July in Kandla-Tuna-Luni area. They are caught in Gunja, Patti, or Wirral. Mullet are in good demand locally as well as in Surat and Bombay.

Other constituents of fisheries here are Bombay-ducks, Pomfrets, Cybium sp., Catfish, and Sharks.

Small to medium sized Pomfrets are caught from November to February in Tuna-Luni-Modhwa area. Bombay-ducks are caught in good quantities during the same period. Cybium sp. is also landed in considerable quantity, especially at Modhwa-Luni region during the period of March-April. Other fish are also available in moderate quantities at various periods of the year.

SUMMARY

An account of fishermen communities of this region is given.

An account of different methods of curing and landing, harbor facilities, refrigeration, transport, and marketing facilities is given.

An account of craft and gear of this region is given.

An account of important commercial fisheries, together with other commercial fish, is given.

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