

Chapter 7. Fishing Grounds in the Seas and Oceans

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- Fishing grounds in the Bay of Bengal: Congregation, local stranding and migratory fish species

Chapter 7. Fishing Grounds in the Seas and Oceans

Fishing Ground in Sea and Ocean; characteristics and dynamics

Fishing ground is an area or place in the sea where fishing is done by using different types of fishing gear on commercial basis. Fishes are not available or not equally distributed everywhere because of various factors which are essential for fish abundance. So, fishes are found in that area where they get proper elements (Environment) such as available food, favorable temperature, pH, salinity, nutrients etc.

Characteristics of Fishing Ground: Every Fishing Ground has some specific characteristics, by which we can identify it. These characteristics are given below:

1. Less depth (100m) cause much more soil water interaction
2. Sunlight reaches up to the ocean floor
3. Temperature, water pressure and the amount of sunlight remain fairly constant.
4. More upwelling and mixing
5. Abundant growth of phytoplankton and zooplankton.
6. Available DO to more air-water interaction.
7. Rate of photosynthesis is high.
8. Organic sediment load is available.
9. The benthic zone in the sub-littoral is much more stable than in the intertidal zone.
10. Presence of sea birds.

Types of fishing ground: On the basis of their characteristics, various types of fishing grounds are formed in ocean, such as:

- | | |
|-------------------------------------|----------------------------------|
| 1. Continental shelf fishing ground | 5. Tidal fishing ground |
| 2. Current rips fishing ground | 6. Coral reef fishing ground and |
| 3. Upwelling fishing ground | 7. Sea-mount fishing ground |
| 4. Bank fishing ground | |

1. Continental shelf fishing ground: Since the depth of continental shelf water is relatively shallow, the soil water interaction (mixing of upper and lower water) is also high. Rivers bring nutrient into some areas of the continental shelf and nutrients are spread to the sea water. More sunlight penetrating facilitates the rate of photosynthesis that results in high density of plankton in continental shelf. Most of marine animals spawn in the water of a continental shelf, and after hatching larvae, fingerlings, juveniles are fed on plankton.

2. Current rips fishing ground: Current rip fishing ground found in the area where different current systems and water masses meet. Current rips water systems are different in water temperature, salinity, water color etc.

3. Upwelling fishing ground: In bottom water, bacteria decompose organic matters and they are accumulated as nutrients. Upwelling stream brings them up to the surface and thus utilized by primary producers and a variety of

organisms. Fish then gather in this water and then a good fishing ground is formed. This kind of fishing ground called upwelling fishing ground. Anchovy, horse mackerel and tuna are the major species caught from the upwelling fishing ground of the coast of Peru and chili.

4. Bank fishing ground: Some turbulence of sea water and eddying currents arise around "rises" such as "banks". Some shallow waters marine organism breeds there. There are many fish shelters in and around the ridge where fish like skipjack, inhabits forming schools.

5. Tidal fishing ground: These fishing ground are developed in the tidal water of the coastal regions. The feeding cycle of some marine organisms are directly influenced by tidal movements. Because it carry a huge amount of nutrient from one place to another which is used by marine organisms. Tide as a signal for many marine animals that trigger some biological events, such as migration, reproductive activity, molting etc.

6. Coral reef fishing ground: Coral reefs are the structure produced by living organisms found in marine waters with little nutrients. The accumulation of skeletal material, broken and piled up by wave action and bioeroders, produces a massive calcareous formation that supports the living corals and a great variety of other animal and plant life is known as coral reefs.

Coral reefs support an extraordinary biodiversity; although they are located in nutrient-poor tropical waters. Coral reefs are home to a variety of tropical or reef fish. Over 4,000 species of fish inhabit coral reefs. These types of fish feed either on small animals living near the coral, seaweed, or on the coral itself. Fish also use reef for protection. Fish that feeds on small animals include cleaner fish, bullet fish and *Balistidae* while fish eating seaweed include the *Serranidae*.

Generally, fish that swim in coral reefs are just as colourful as the reef itself. Examples- parrotfish, angelfish, damselfish, and butterflyfish. Fish that eats coral includes the parrotfish and butterflyfish. Fish that swim above and in the surrounding area of the coral reef include predatory fish eg. pompanos, groupers, horse mackerels, certain types of shark, barracudas, snappers etc.

Reefs are also home to a large variety of other organisms, including sponges, Cnidarians (which includes some types of corals and jellyfish), worms, crustaceans (including shrimp, cleaner shrimps, spiny lobsters and crabs), molluscs (including cephalopods), echinoderms (including starfish, sea urchins and sea cucumbers), turtles (such as the sea turtle, green turtle and hawksbill turtle) and sea snakes. Mammals are rare on coral reefs except the group of visiting Dolphins.

7. Sea-mount fishing ground: A sea mount is a mountain rising from the ocean sea floor that thus not reach to the water surface (sea level) and thus is not an island. These are typically formed from extinct volcanoes. An estimated 30,000 seamounts occur across the globe, with only a few having been studied. A classic example is Emperor Seamounts, which are an extension of the Hawaiian Islands, formed millions of years ago by volcanism and have since subsided to below sea level.

The seamount itself may deflect deep currents and create upwelling. This process can bring nutrients into the photosynthetic zone, producing an area of activity in the open ocean. Seamount species are sustained by food carried by passing currents. Suspension feeders, such as corals and sponges filter organic matter from passing water. Sea spiders and lobsters find refuge in the coral and rock outcroppings. Bottom-dwelling animals benefit from nutrient fallout from above. Whales and tunas visit these undersea mountains on their migratory routes. Seamounts are rich in biodiversity, containing large numbers of fish and invertebrates not known to live elsewhere. They typically support long-

and slow-growing creatures extremely vulnerable to disturbance. Due to the larger populations of fish in these areas, overexploitation by the fishing industry has caused some seamount fauna populations to decrease considerably.

Dynamics of Fishing Ground in the Ocean

Fish abundance or fish availability in fishing grounds are greatly influenced by several factors such as:

- a) **Temperature variation:** Temperature is one of the most important factors that greatly influence other physical, chemical and biological factor. Temperature also influences the metabolic activities of fish and dissolved oxygen concentration. A zone or area with suitable range of temperature indicates the suitable production of plankton which further indicates the presence of fish in that area.
- b) **Sunlight:** Sunlight is the main source of energy and regulates the biological production of the ocean.
- c) **Dissolved oxygen concentration:** D.O concentration is very important for respiration as well as metabolic activities of marine organisms.
- d) **Nutrient content:** Different micro or macro nutrient (elements) are essential for the growth of phytoplankton (primary production), which ultimately regulates the secondary production (production of zooplankton, fish, etc.).
- e) **Salinity:** Salinity of the water body also regulates the abundance and availability of fish some species are euryhaline and some others are stenohaline.
- f) **Water depth:** Water Depth significantly influences the abundance of fish to the water as they only tolerate at a particular level of water pressure. Moreover, in the deep sea the sun light cannot penetrate of the deeper zone results less primary production and not or least secondary production.
- g) **Turbidity:** Turbidity due to phytoplankton indicates higher primary production and as well as secondary production. Turbidity that occurs due to suspended materials lower the oxygen level, sunlight penetration and cause mechanical injury to the fish gills. Thus turbidity due to suspended materials indicates less chance of presence of fish to that area.
- h) **pH of water:** Generally, fish can survive at a particular range of pH, in most cases from pH 5 to 9. Water body with suitable range of pH indicates proper primary and fish production. Thus pH study can be another tool for identification of a new fishing ground.
- i) **Water Pressure at Different Depth:** Like temperature, salinity, pH and oxygen content, pressure also influence the distribution of organism to the depth and most of the animals cannot tolerate the high pressure indicates lower production to the deeper zone.
- j) **Plankton Monitoring:** Plankton monitoring is the qualitative and quantitative study to plankton. The presence of this has a direct relation with the abundance of plankton. The distribution of plankton is not equal throughout the year in a particular area, because their production is influenced by various physical, chemical and biological factors. Fish usually tends to move towards the highly concentrated plankton area from lower concentration.
- k) **Earthquake:** Earthquake into the sea also influence the diversification of fishing ground. By the actives of earthquake into the deep sea sediment floor also destroy or affect the plate tectonics into the sea floor. So that the areas of available fish abundance are destroyed by the activity of earthquake into the sea floor.
- l) **Biological characteristics:** the occurrence of marine species - both plants and animals - has largely been controlled by the physico-chemical properties of ocean water. Water discharges from the surrounding river catchments carry huge influx of sediments full of nutrients to the Bay, particularly along the near shore region. This has turned the Bay

into a fertile marine fishing ground of the region. The near-shore up-welling zone not only has a high yield of nutrients, but also is a high primary production area for the phytoplankton and related zooplankton zones.

m) Runoff from upstream or Land runoff: Surface runoff from farming, as well as urban runoff and runoff from the construction of roads, buildings, ports, channels, and harbours, can carry soil and particles laden with carbon, nitrogen, phosphorus, and minerals. This nutrient-rich water can cause fleshy algae and phytoplankton to thrive in coastal areas; known as algal blooms, which have the potential to create hypoxic conditions by using all available oxygen.

Polluted runoff from roads and highways can be a significant source of water pollution in coastal areas. About 75 percent of the toxic chemicals that flow into Puget Sound are carried by stormwater that runs off paved roads and driveways, rooftops, yards and other developed land.

Conclusion: Fishing ground in the sea generally highlights fish availability and resources. These fishing grounds make insure the capture of fishes into sea during operation of fishing vessel. Without identifying a suitable fishing ground it is so much hard to detect /locate the fish resources into the ocean. So that, fishing ground identification is important to capture the available fishes from the different areas of oceans or seas.

Fishing grounds in the Bay of Bengal: Congregation, local standing and migratory fish species

Introduction: The interconnecting body of saline water which is relatively shallower and smaller than sea and some what enclosed by land from its three sides is called Bay. We have a bay in our country named as Bay of Bengal. It is the largest bay of the world. There are four major fishing grounds in the Bay of Bengal, which is most important in aspects of fisheries.

The Bay of Bengal:

The Bay of Bengal, the largest bay in the world, forms the north-eastern part of the Indian ocean is located between latitudes 5 °N and 22°N and longitudes 80°E and 100°E. It resembles a triangles in shape and is bordered by Bangladesh and the Indian state of West Bengal to the north India and Sri Lanka to the west and Myanmar and the Andaman and Nicobar Islands to the east.

Some basic information about Bay of Bengal	
Location: South Asia	Temperature: 28°C (Max. 30°C during May and Min. 25°C during Jan.- Feb.)
Ocean type: Bay	pH: Average 7.0
Primary sources of water: Indian ocean	Salinity: 32-34.5 ppt(open part of the bay) and 10-25 ppt(coastal region)
Coast line: 710km	O ₂ content: 4.8 ppm on surface and 4.0 ppm at 35m depth.
EEZ: 200Nm or 320km	Water circulation: Clockwise(Jan.- July) and anticlockwise(Aug.- Dec.)
Continental shelf: 66440km ²	Water color: Dark blue (dominant), light blue, greenish.
Basin countries: India, Bangladesh, Myanmar, Thailand, Indonesia, Sri Lanka.	Bottom materials: Mostly alluvial, silt and mud. Sand bottom occur in deep ocean.
Area: 2,172,000km ² or 2.2 million km ²	River discharge: 1,222 million cubic meters from Bangladesh rivers.
Maximum length: 2,090km	Tides: semi-diurnal(to high tides and to low tides per day)
Maximum width: 1,610km	Coastal zone characterized by estuaries, mangroves, islands, salt marsh, sea grass and coral reef.
Average depth: 2,600m or 8,500ft	Major commercial fishing ground: Four (4)

Maximum depth: 4,694m or 15,400ft

Bay of Bengal programme(1985) which survey The Bay of Bengal recognized the four major commercial fishing grounds, which are as follows:

Fishing grounds in the Bay of Bengal: *Fishing* the hydrological conditions of the Bay of Bengal is favourable for a variety of shrimps and fishes. Although fishes remain scattered in the Bay in some places they get concentrated and constitute important fishing grounds. Four fishing grounds have been identified so far They are

- South patches,
- South of south patches,
- Middle ground and
- Swatch of no Ground.

A) South patches: Located about 10-15km West of Cox's Bazar and 40km from Chittagong and comprising the squares-302 to 305, 402 to 405, 502 to 505 and adjacent islands.

- Location: 91.10°E to 92.10°E and 20.55°S to 21.52°S.
- Area: 3,662km²
- Nearest distance of the ground: from Chittagong and Cox's Bazar is 40 km and 10 km respectively.
- Depth: 10-100m(90% area are less than 40m deep)
- Bottom sediment: Sandy or slightly muddy sand
- Salinity: 26-32ppt(surface), 30-35ppt(bottom)
- Temperature: Average water temperature varies 20-28°C.
- Major commercial species: Indian salmon, Pomfret, Hilsa, Ribbon fish, Bombay duck, Eel, Jew fish, Cat fish, Sharks and rays.

B) South of south patches (West of Elephant Point): Located about 5km from Teknaf, (40miles East of swatch of no ground) and comprising squares 603 to 609, 703 to 709 and adjacent waters.

- Location: 91.30°E to 92.20°E and 20.15°S to 20.50°S.
- Area: 2,538km²
- Nearest distance of the ground: The nearest boundary of this area is 5 km from Teknaf.
- Depth: 10- 100m (within this ground 75% area are more than 40m deep).
- Bottom sediment: Sandy or muddy sand.
- Salinity: 18-34ppt(surface), 28-38ppt(bottom)
- Temperature: Average water temperature varies 22-30°C
- Major commercial species: Pomfret, Ribbon fish, Red snappers, Silver jew fish and Shrimp.

C) Middle ground (East of swatch of no ground): Located about 65km from Cox's Bazar (40miles from East of swatch of no ground) and comprising squares 509t0 512, 609 to 612 and adjacent area.

- Location: 90.20°E to 91.30°E and 20.25°S to 21.20°S.
- Area: 4,600km²
- The nearest distance from Cox's Bazar is about 65 km.
- Depth: 10-100m(70% area are more than 40m deep)
- Bottom sediment: Soft mud or muddy sand.
- Salinity: 22-34ppt(surface), 28-35ppt(bottom)
- Temperature: Average water temperature varies 26-28°C
- Major commercial species: Indian Mackerel, Red snappers, Jew fish, Groupers, Koral, Pangas and sumudra koi.

D) Swatch of no ground: Swatch of no ground is also known as "Ganga Trough". Located 30km away from Dublarchar and 40km from Sunarchar(120miles South-east of Khulna surrounding)and comprising squares 313 to 317, 413 to 418, 513 to 518, 614 to 618 and adjacent areas.

- Location: 89.35°E to 90.10°E and 20.55°S to 21.55°S.

- Area: 3,800km²
- The nearest distance of the ground: 30 km away from Dublarchar and 40 km from Sunarchar.
- Depth: 10-100m (70% area are more than 40m deep)
- Bottom sediment: Muddy sand.
- Salinity: 28-34 ppt (surface), 30-35 ppt (bottom)
- Temperature: Average water temperature varies 24-30°C
- Major commercial species: Shrimp, Hilsa, Pomfret, Ribbon fish, Bombay duck, Jew fish.

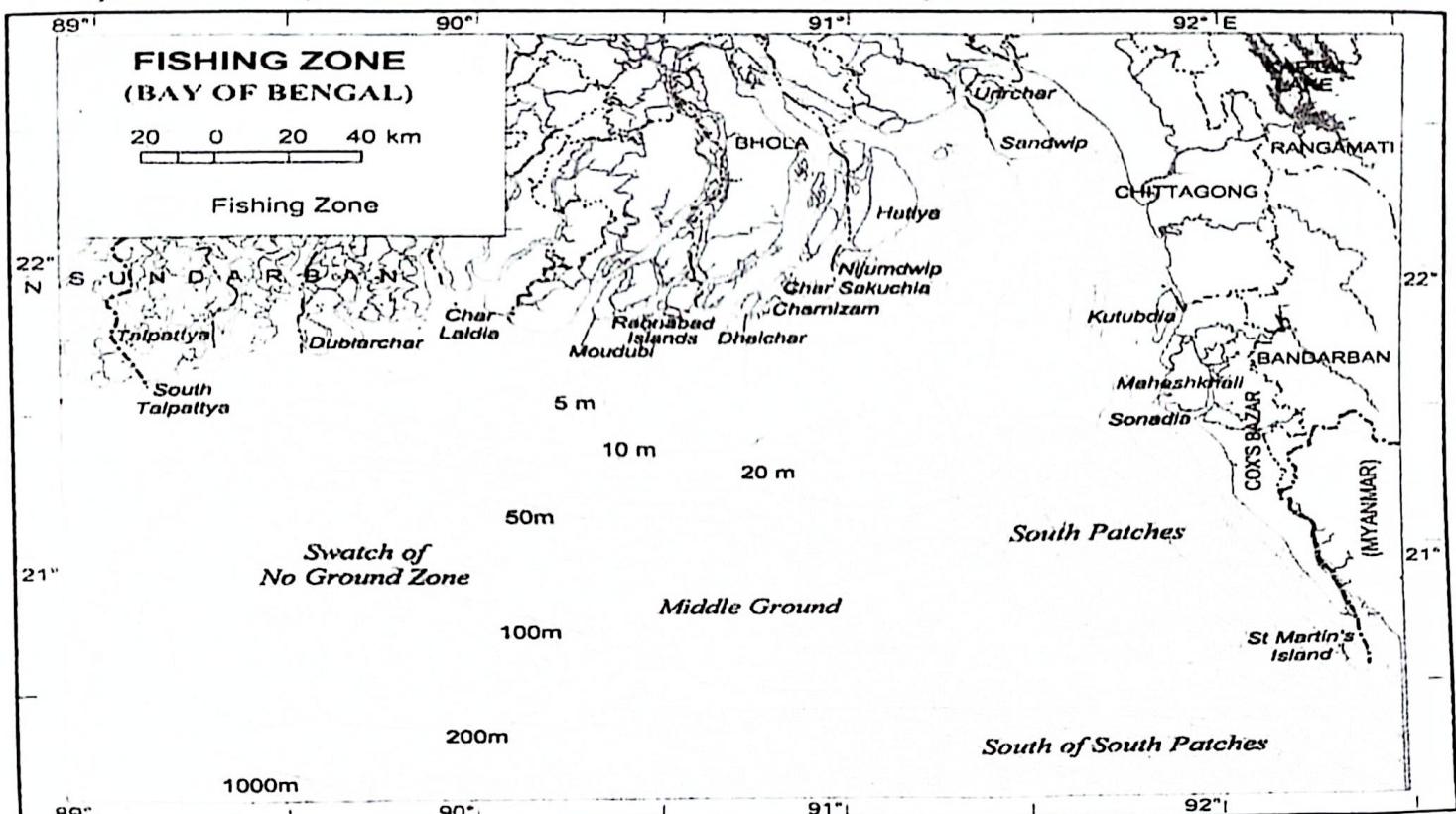
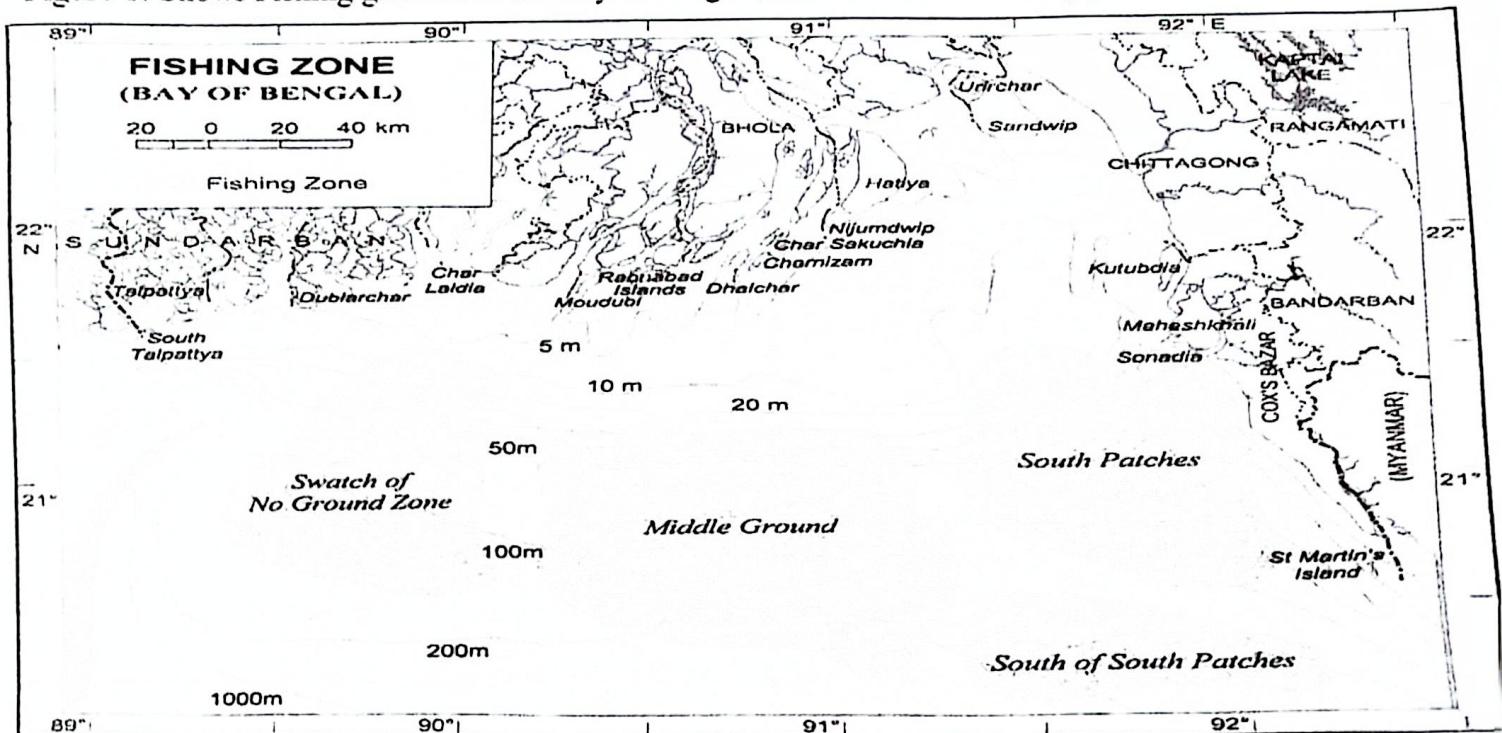


Figure 1: Shows Fishing grounds in the Bay of Bengal (bottom one with fishing ground demarcation)



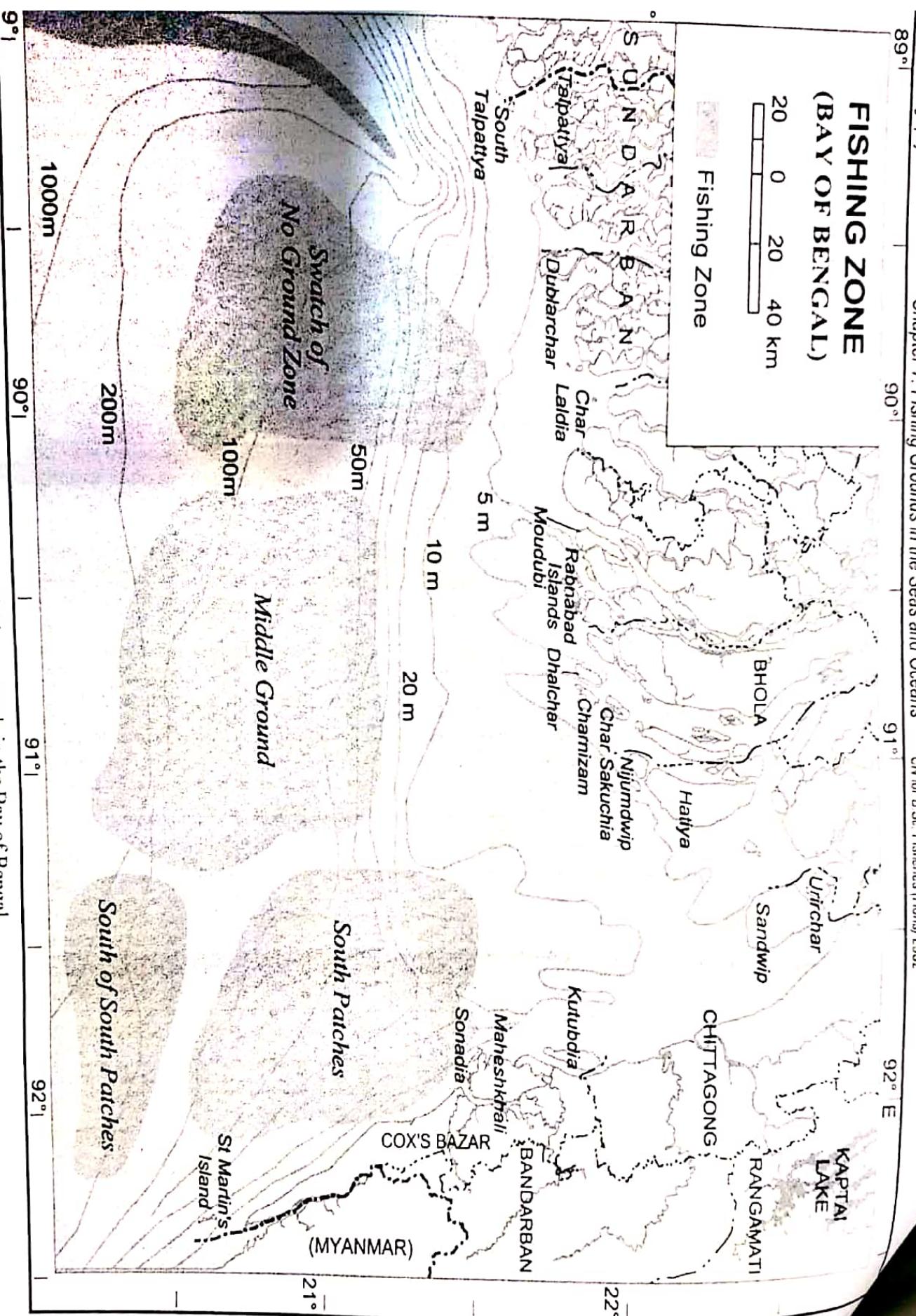


Figure. 2 : Shows Fishing grounds in the Bay of Bengal

Congregation in Bay of Bengal:**Coastal and Marine Biodiversity in Bangladesh:**

Category	Total number of species
Flora	
Algae/Seaweed	168
Fauna	
Sponges	3
Corals	66
Mollusks Marine	336
Shrimp/Prawns	56 (24+36)
Crabs (Marine + Freshwater)	16
Lobsters	3
Echinoderms	4
Fish	442 (475)
Amphibians	22
Reptiles	17
Birds	628
Mammals (Marine + Inland)	3

Source: IUCN, 2000; Ahmed and Ali, 1996; Khan, 1991

Local standing fish species of Bay of Bengal: All these fishing grounds are potential reserves for fish and shrimp. Most of the known commercial species of shrimps and fishes are harvested from these areas by trawlers or mechanized fishing boats. Commercially important shrimp and fish species include tiger shrimp, karuma shrimp, cat fish, Bombay duck, snapper, flounder, Indian salmon, croaker, seabream, jawfish, mullet, POMFRET, RIBBON FISH, anchovy, HILSA, oil sardine, tuna, mackerel and skipjack [Hossain Zamal]

****Fin fish species:** Should Know at least 30 fin fishes, 10 shrimps and 5 crabs (Scientific, English and local name with family).

SL	Scientific Name	Local Name	English Name
1.	<i>Lates calcarifer</i>	Vetki/Koral machh	Giant seaperch
2.	<i>Cynoglossus lingua</i>	Kukkurjib	Long tung sole
3.	<i>Mystus gulio</i>	Nuna tengra/Guilla	Bagrid cat fish
4.	<i>Ephippus orbis</i>	Hatir kaan	Spade fish
5.	<i>Harpodon nehereus</i>	Loitty machh	Bombay duck
6.	<i>Drepane longimanna</i>	Pann machh	Sicklefish
7.	<i>Lutjanus johni</i>	Ranga choukya	Red snapper
8.	<i>Lujanus sanguineus</i>	Ranga choukya	Blood snaper
9.	<i>Mene maculata</i>	Chan chanda	Moon fish
10.	<i>Upeneus sulphureus</i>	Sonali bata	Goat fish
11.	<i>Liza tada</i>	Gool bata	Tade grey mullet
12.	<i>Pomadasys hasta</i>	Sadha datina	Lined silver grunter
13.	<i>Pomadasys maculatus</i>	Guti-datina	Blotched grunter
14.	<i>Polynemus indicus</i>	Lakhua	Indian salmon
15.	<i>Polynemus paradicus</i>	Tapsi	Paradise threadfin
16.	<i>Platycephalus indicus</i>	Murabaila	Flat-head fish

FISH FARMING AND FISHING IN BAY OF BENGAL: All these fishing grounds are potential reserves for fish and shrimp. Most of the known commercial species of shrimps and fishes are harvested from these areas by trawlers or mechanized fishing boats. Commercially important shrimp and fish species include tiger shrimp, karuma shrimp, cat fish, Bombay duck, snapper, flounder, Indian salmon, croaker, seabream, jawfish, mullet, POMFRET, RIBBON FISH, anchovy, HILSA, oil sardine, tuna, mackerel and skipjack. [Hossain Zamal]

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4.	<i>Ephippus orbis</i>	Hatir kaan	Spade fish
5.	<i>Harpodon nehereus</i>	Loittya machh	Bombay duck
6.	<i>Drepene longimanna</i>	Pann machh	Sicklefish
7.	<i>Lutjanus johni</i>	Ranga choukya	Red snapper
8.	<i>Lujanus sanguineus</i>	Ranga choukya	Blood snaper
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15.	<i>Polynemus paradiseus</i>	Tapsi	Paradise threadfin
16.	<i>Platycephalus indicus</i>	Murabaila	Flat-head fish

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SL	Scientific Name	Local Name	English Name
17.	<i>Psettodes erumei</i>	Samudra serboti	Indian halibut
18.	<i>Otolithes cuvieri</i>	Poa	Less tiger-toothed croacker
19.	<i>Protonibea diacanthus</i>	Kala katina/Kala poa	Spotted croacker
20.	<i>Johnius argentatus</i>	Lalpoa	Silver pennah croacker
21.	<i>Argyrops spinier</i>	Lal datina	Longspine sea bream
22.	<i>Pampus chinensis</i>	Rup chanda	Chinese pomfret
23.	<i>Pampus argenteus</i>	Foli chanda	Silver pomfret
24.	<i>Escualosa thoracata</i>	Hichiri machh	White sardine
25.	<i>Tenualosa ilisha</i>	Ilish/Hilsa	Hilsa shad
26.	<i>Parastromateus niger</i>	Hail chanda	Black pomfret
27.	<i>Trichiurus haumela</i>	Churi	Ribbon fish
28.	<i>Setipinna taty</i>	Phasa	Anchovy
29.	<i>Lobotis surinamensis</i>	Sumudra koi	Triple tail

Shellfish species:

SL	Scientific Name	Local Name	English Name
			Giant black tiger shrimp