RIVERINE FISHERIES

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INTRODUCTION

- India is blessed with a vast inland water resources in the form of rivers, estuaries, natural and man made lakes, brackish water impoundments and mangrove wetlands.
- This largest peninsula of the world enjoys a coastline of 8041 km length.
- The inland water bodies have been divided into five riverine systems and their tributaries extending to a length of about 29,000 km in the country – Indus, Ganges, Brahmaputra, east flowing riverine system and west riverine system.
- Riverine system and other aquatic bodies such as brackish water, estuarine water, lakes , ponds, irrigation canals and channels constitute vast water resource which is yet under exploited wisely to boost Indian economy and economics.

Introduction

- Further inland fisheries can be divided into capture and culture fisheries.
- Fishing from natural stocks is known as capture fisheries. Capture fisheries in inland waters are usually poor. Moreover, their development is expensive and time consuming.
- The culture fishery resources are affected by ecological changes brought about by the floods, construction of dams and barriers and pollution. It may also be noted that most of our inland water (90-93%) are alkaline.

Introduction

For convenience, the capture fisheries have been considered in the following sections.

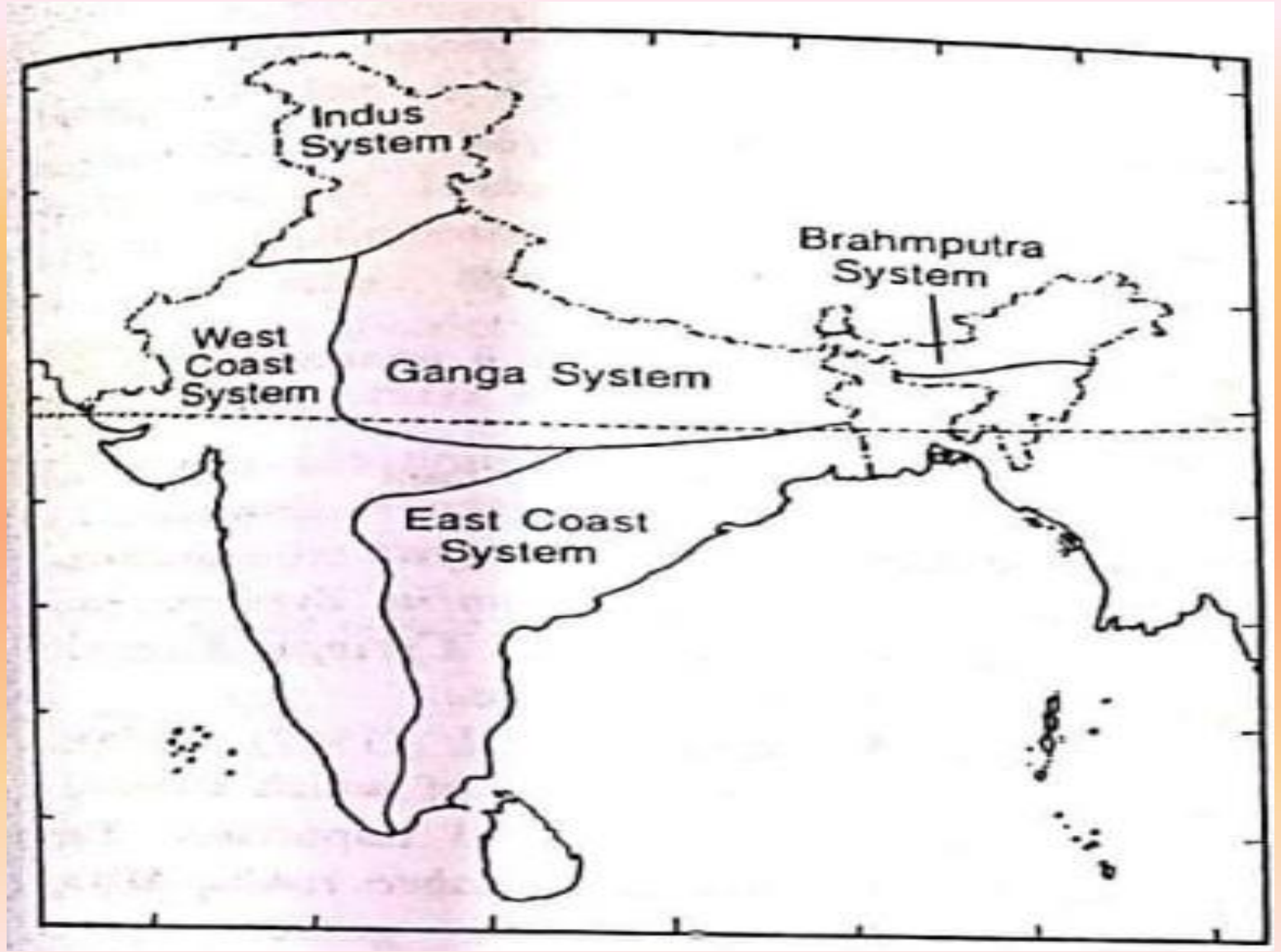
1. Riverine fisheries
2. Lacustrine fisheries
3. Cold water fisheries
4. Estuarine fisheries

Riverine Fisheries

- Rivers in India constitute the backbone of capture fisheries .
- There are 113 major and minor rivers along with their principal tributaries ,having combined length of 45,000 km of which 80% of the total length is contributed by 14 major rivers.
- For convenience riverine fisheries of India comprises of five major river systems.
    1. Ganga river system
    2. Brahmaputra river system
    3. Indus river system
    4. East coast river system
    5. West coast river system

These riverine systems are represented in Figure 1.

Fig. 1 Map of India showing 5 major riverine fisheries.



1. Ganga River System

- Length: About 8047 km (regarded as the largest river system in the world).
  - **Origin:** Gangotri in the Himalayas at a height of about 3129 km above the sea level. After origin, it drains the southern slopes of the central Himalayas.
  - **States of India:** Ganga passes U.P., Bihar, some parts of Rajasthan, M.P., and West Bengal. It joins finally the Bay of Bengal.
  - **Tributaries:** It has a number of tributaries and Yamuna river is one of the major tributaries of this system, which is about 1000 km long. The other tributaries are – Ram Ganga, Gomti, Ghaghra, Gandak, Kosi, Chambal, Betwa, and Ken. Further more, it has numerous lakes, ponds and Jheels, both perennial and seasonal.
  - **Total catchment area:** 9.71 lakh sq. km.
  - **Annual rainfall:** 25 -77 inches.

Ganga River System

Physicochemical characteristics

Temperature range	16.5°C in January-31.5°C in June to December
pH	7.4 during June to August and maximum 8.3 during January to May.
Turbidity	100 ppm in January-1100 and 2170 ppm during July to September.
DO_2	0.6 ppm – 10.0 ppm
Chloride	4.0 – 35.4 ppm
Phosphates	0.05 -0.21 ppm
Nitrates	0.08 – 0.22 ppm
Silicates	4.0 – 20.3 ppm
Carbonates	1.0 – 12.0 ppm

Ganga River System

Common phytoplankton: Phytoplankton are generally poor during the monsoon and autumn months. Common phytoplankton found in Ganga river system are – (i) Members of *Bacillariophyceae* – like *Amphora, Asterionella, Cymbella, Fragilaria, Navicula,* and *Synedra* etc. (ii) Members of *Chloropyceae* – like, *Chlorella, Closterium, Denticula, Desmidium, Pandorina* and Spirogyra etc. (iii) Members of *Myxophyceae* like *Anabaena*, *Nostoc*, *Oscillatoria*, *Rivularia*, etc.

Common zooplanktons: *Rattulas, Rotaria, Keratella, Filuia, Notopus, Pedalion, Monostyla, Polyarthra* etc.

Fisheries of Ganga river system: The Ganga river system supports a large number of commercially important fish species including major carps, minor carps, catfishes, clupeids, murrels, mullets, featherbacks, freshwater eel and prawns.

Ganga River System

Major carps- *Labeo rohita, Labeo calbasu Catla catla* and *Cirrhinus mrigala*.

Minor carps- *Labeo fimbriatus, L. bata, Cirrhinus reba.*

Catfishes-*Wallago attu, Mystus aor, M. tengara, Clarias batrachus, Heteropneustes fossilis.*

Feather backs- *Notopterus notopterus, N. chitala.*

Murrels- *Channa marulius, C. striatus,* and *C. punctatus.*

Mullets- Mugil corsula.

Eels- *Anguilla.*

Herrings-*Setipina phasa*

Hill stream fishes- *Mahseers.*

Clupeids-*Hilsa ilisha.*

Others- *Pangasius pangasius, Silonia silondia, Gudusia chapra, G. godanahial, Bagasius bagasius, Eutropchthys vacha etc.*

Ganga River System

Prawns- *Macrobrachium malcolmsonii, Palaemon lamarii etc.*

The Ganga river system also constitutes a rich source of fish eggs and spawn collection. About 89.5% of the total fish seed collection of India is contributed by the Ganga river system.

Gears used: The principal gears used in Ganga river system are dragnets, cast nets and bag nets.

2. Brahmaputra River System

Length: 2900 km.

Origin- Great glacier mass near Mansarover lake in Himalayas. It runs through Tibet where it is called Tsangpo. From Tibet, it changes its course towards Arunachal Pradesh, Assam, Bangladesh and finally joins the Ganga at Goalundu.

Tributaries-

- Principal tributaries of Brahmaputra on the north side include the Hiodhal, Subansiri, Ranganadi, Dihrong, Burai, Bargang, Jaibharti, Dhansiri, Phulamari, Ail, Manes, Champamal, Sankosh and Gangadhar.
- All these tributaries are shallow, large and contain silt charges.
- Tributaries on south include the Bibru, Dihang, Disang, Dikhu, Jhanji, Kalong, Digru, Kulsi, Krishna and Jinari. These are rather deep and contain low silt charges.

Brahmaputra River System

Physicochemical characteristics

Total alkalinity	50 – 240 ppm
Free CO_2	1.0 – 10.00 pm
DO_2	3.6 – 10.4 ppm
Nitrate	0.01 – 0.07 ppm
Phosphates	0.05 – 0.32 ppm
pH	6.95 – 8.0 ppm
Specific conductivity	0.150 – 0.170 µ mho/cm at 25°C
Soil	Sandy – sandy loam

Brahmaputra River System

Phytoplankton- *Spirogyra, Ulothrix, Gomphonema, Navicula, Oscillatoria, Zygnema* etc.

Zooplankton- *Brachionus, Cyclops, Bosmina, Daphnia, Lecanae, Nauplius etc.*

Fisheries:

- **Motwani** et al. (1962) reported occurrence of 126 fish families of which about 41 constitute fishery of commercial importance.
- The important are *Wallago attu, Labeo gonius, Mystus menoda, Eutropichthys vacha, Mystus bleekeri, Rita rita, Channa species, Heteropneustes fossilis, Notopterus notopterus, Mystus aor, M. cavasius, M. seenghala, Catla, Cirrhinus mrigala, C. reba, Labeo calbasu, Nandus nandus* and prawns.
- Catfishes (23.26%), predominated the catches, followed by major carps (17.85 %), minor carps (14.26%), Hilsa (12.75%), and prawn (4.93%).

3.Indus River System

- This system is represented by small portion in India.
- The important rivers are Beas, Sutlej, Chenab, Jhelum, Ravi and Indus. The network covers the states of Himachal Pradesh, Punjab and Haryana.
- This system is of growing importance, because of having several species of carps like *Catla*, *Rohu* and catfishes like *Wallago attu*.
- The fish fauna are richer than the Brahmaputra river system. In upper reaches of Beas and Sutlej are found the exotic rainbow and brown trouts.
- In lower sections, the carp and catfishes constitute fishery of considerable commercial value.
- Spawn collection is chiefly done in Punjab districts.

4. East Coast River System

- This system constituted by four principal rivers viz, Mahanadi, Godavari, Krishna and Cauvery drains the entire peninsular region, east of western glass in the west and southern parts of central India including Chotanagpur region.
- Of the four rivers, Mahanadi, the principal river of Orissa supports a rich fishery of major carps and other fishes as in Ganga river system.
- The remaining three rivers harbor a large number of indigenous species. These are poor in the fishery of major carps and hence these have been transplanted from the north to enrich the system.
- A comparative account of the three rivers of east coast river system is illustrated in Table 1.

Table 1. Showing certain details of three rives of East coast River system.

Parameters	Godavari	Krishna	Cauvery
1. Origin	In Doolali hills near Nasik in north Western Ghats.	In Western Ghats region, South of Poona	Brahmagiri hills on Western Ghats an elevation of 1340 m
2. Length	1465 km	1401 km	800 km
3. States covered	Maharashtra, A.P., and M.P.	Maharashtra, Karnataka and A.P.	Karnataka and Tamilnadu
4. Temperature	27.5 – 36.4 °C	Similar to Godavari	26 – 30.9 °C
5. pH	7.2 – 8.3	" "	7.6 – 8.5
6. DO_2 mg/l	1.26 – 18.2	" "	1.47 – 5.03

Table 1(Cont.)

7. Free CO2 in ppm	0.0 – 6.6	Similar to Godavari	0.0 – 5.4
8. Bicarbonate (ppm)	45.8 – 192.2	“ “	23.18 – 366.0
9. Drainage	Bay of Bengal	East coast	Bay of Bengal in Thanjavur district of Tamil Nadu
10. Catchment area in sp. Km	Over 315,980	233,229	4,70,000
11. Tributaries	Primary- Manjira , Wainganga Sub tributaries - Paingunga and Wardha, Minor- Puma Maner and Sabari.	Bhima (annual) and Tungabhadra (perennial)	Bhavani, Noyil and Amaravati

East Coast River System (Fishery)

- Godavari - *Labeo calbasu, L. fimbriatus, Cirrhinus mrigala Catla catla, Mystus seenghala, M. aor, Wallago attu, Pangasius pangasius, Bagarius bagarius, Hilsa ilisha and* Prawns
- Krishna- Similar to Godavari
- Cauvery : *Acrossocheilus hexagonolepis, Tor putitora, Barbus carnaticus, B. dubius, Labeo kontius, L. ariza, Cirrhinus cirrhosa, Mystus aor, Mystus seenghala Pangasius pangusius, Wallago attu, Silonia silondia, Glyptohorax madra spatanus, Channa marulius, Notopterus notoptenus,* Gangetic carps such as *Catla catla, Labeo rohita, Cirrhinus mrigala* and the exotic species, *Cyprinus carpio, and Osphronemus goramy* have been transplanted in Cauvery river system.

East Coast River System (Fishery)

Fishing Gears

Godavari-

- The fishing gears applied in river Godavari fall under two categories viz., gill nets which include set gill nets, drift gill nets, drag gill nets (bendu vala).
- Seines which include shore seine (jarugu vala), large seine (allui vala) and drag net (konte vala). Cast nets are also employed for fishing.

Krishna- Similar to Godavari river system

Cauvery – Similar to Godavari river system

5. West Coast River System

- The west coast river system comprises the river Narmada and Tapti, both of which flow in westerly direction of the country and drain the narrow belt of peninsular India west of the Western Ghats.
- Further in the north, the system forms basins of Narmada and Tapti and drainage of Gujrat.
- Important characteristic features of both these rivers have been illustrated in Table 2.
- *Tor tor* is one of the most important fishery of the river Narmada and Tapti both.

Table 2. Important characteristic features of West Coast river System.

Parameter	Narmada	Tapti
1. Origin	In Amarkantak hills of M.P. at an elevation of 1,057 m above sea level.	In mount Vindhya of Satpura range at and elevation of 670-1000 m above the sea level.
2. Length of river	1,280 km	720 km
3. States covered	M.P. and Gujrat	Maharashtra, M.P. and Gujarat.
4. Rainfall (annual)	15” – 115”	As Narmada

Table 2 (Cont.)

5. Drainage	Gulf of Cambay in Gujarat	Arabian sea at Dumas near Surat in Gujarat 48,000 sp. Km.
6. Catchment area	94,235 sq. Km of Narmada and 6330 sp. Km of its all tributaries.	48,000 sq. Km
7. Number of tributaries	16 in M.P. and 2 in Gujarat	Mainly rainfed

Table 2 (Cont.)

Fishery

1. Narmada - Carp group (60.45%)

Tor tor , Labeo fimbriatus, L. calbasu, L. bata, L. gonius, Cirrhinus reba, Cirrhinus mrigala, Puntius sarana, Catla catla.

2. Cat fish group (34.1 %)

Rita pavimentata, Mystus seenghala, M. aor, M. cavasius, Wallago attu, Clupisoma garua, Ompak bimaculatus.

2. Tapti- *Tor tor, Mystus seenghala, M. aor, Wallago attu, Labeo calbasu L. fimbriatus, Puntius sarana, Cirrhinus mrigala, C. reba, Chupisoma garna, Channa spp. Mastocembalus armatus.*

Fishing Gears

1. Narmada - Cast nets, gill, nets, and long lines.

2. Tapti - Cast nets, gill nets and long lines and also Mahajal.

Suggested Readings

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Thanks