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## Session 5

# INLAND CAPTURE FISHERIES RESOURCES IN INDIA



# **INLAND CAPTURE FISHERIES RESOURCES IN INDIA**

# INTRODUCTION

- India has the distinction of being one of the seven largest producers of fish in the world and **ranks second (1.462 MT) in terms of total inland capture fish production** after China and above Bangladesh (FAO, 2018).
- All in all, this sector has been recognized as a powerful **income and employment generator** since it stimulates the growth of a number of allied industries and also is source of cheap animal protein.
- It is an instrument of **livelihood for a large section of economically backward population** of the country.

- Of the two sectors viz. **marine** and **inland** in the Indian fisheries
  - ▣ the **inland sector remains a sector of much promise.**
- Unlike agriculture, because of expansion of culture based fisheries enterprise, the contribution of inland fisheries sector to grow domestic product has been increasing at a significant rate.
- Inland sector is a complex enterprise which operates under the intensified network of natural resources, other enterprises with fisheries and other socio-political variables.

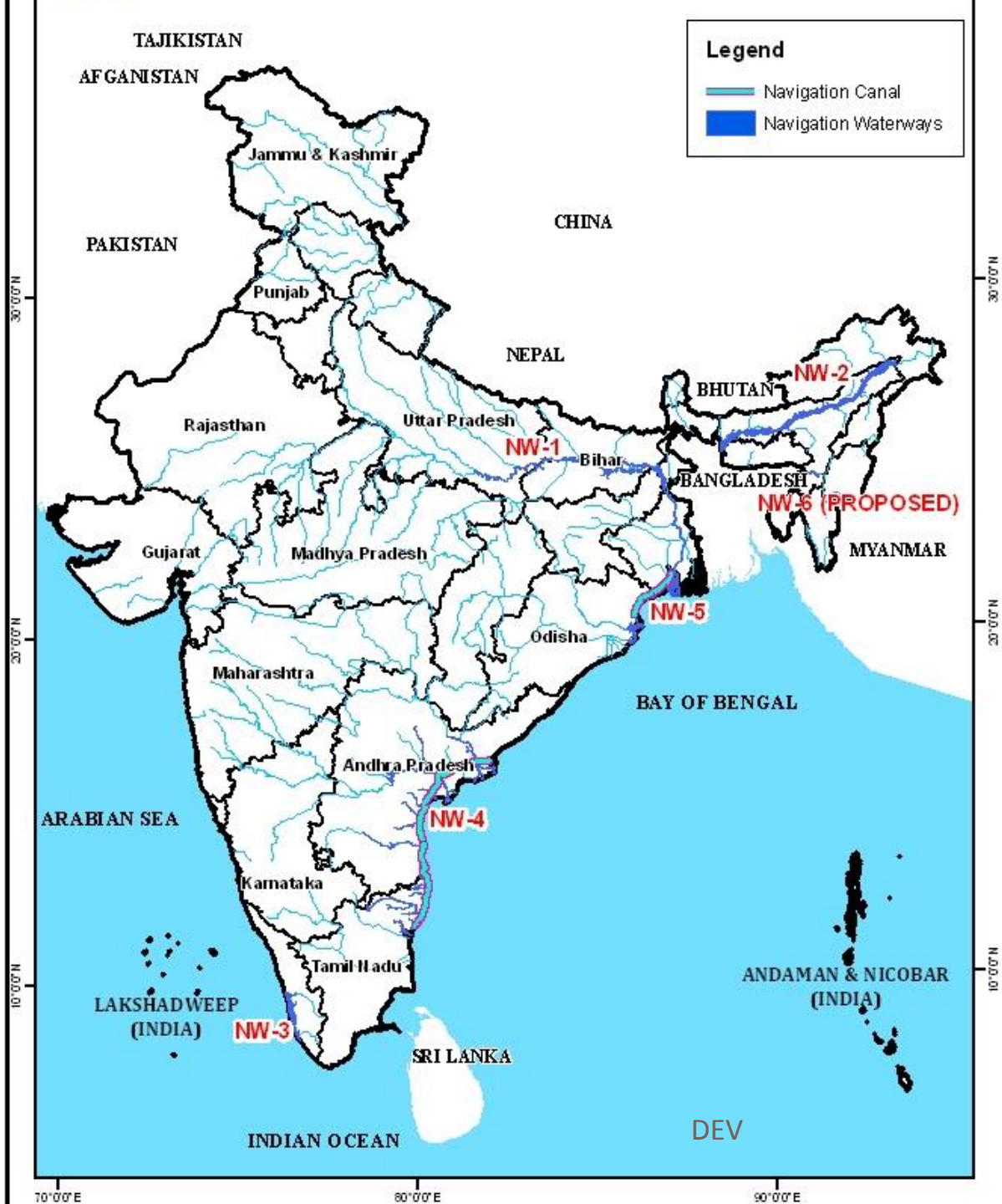
# Inland fisheries resources of India

- The inland fishery resources of the country comprises of the **rivers and canals, reservoirs, tanks and ponds, estuaries, brackish water lakes, backwaters, floodplain lakes (oxbow lakes)** etc. while the **marine water bodies are mainly used for capture fisheries resources**, the **inland water bodies are widely used for culture and capture fisheries**.
- Inland capture fisheries of India has an important place; it contributes to **about 30% of the total fish production**. The large network of inland water masses provides great potential for economic capture fishery.



**An oxbow lake is a U-shaped lake that forms when a wide meander of a river is cut off, creating a free-standing body of water.**

**This landform is so named for its distinctive curved shape, which resembles the bow pin of an oxbow.**



- India has a **total water surface area of 3,14,400 sq km** with water resources in the form of numerous rivers, streams, wetlands, lakes etc., and receives an **average annual rainfall of 1,100 mm.**
  
- The country as a whole has a
  - ▣ River length (including canals) of **1,95,210 km**
  - ▣ Reservoirs of **3.150 million ha**
  - ▣ Tanks and ponds of **2.414 million ha**
  - ▣ Flood plain lakes and derelict water bodies of **0.798 million ha**
  - ▣ Brackish water areas of **1.240 million ha**
  - ▣ Estuaries of **0.290 million ha**



- A major part of the **river stretches and canals** are concentrated in the states of Uttar Pradesh, Jammu and Kashmir, Madhya Pradesh, Maharashtra, Andhra Pradesh, Karnataka and Tamil Nadu.
- Much of the **reservoir areas** falls in the states of Tamil Nadu, Karnataka, Maharashtra, Orissa, Gujarat, Andhra Pradesh, Madhya Pradesh, Uttar Pradesh and Rajasthan.
- **Tanks and ponds** are concentrated in the states of Andhra Pradesh, Karnataka, West Bengal, Arunachal Pradesh, Rajasthan and Orissa.

- A large part of the area under **flood plain lakes** and derelict water bodies is found in Kerala, Orissa, Uttar Pradesh and Assam.
- **Brackish water areas** are concentrated in the maritime states of Orissa, Kerala, West Bengal, Gujarat, Goa, Andhra Pradesh and Tamil Nadu and in the Union territory of Andman and Nicobar Islands.

- **Total area under water bodies (excluding rivers and canals)** is found to be **maximum in Orissa**, followed by Andhra Pradesh, Karnataka, Tamil Nadu, West Bengal, Kerala, Uttar Pradesh, Gujarat, Maharashtra, Rajasthan, Madhya Pradesh, etc.
- There are **several wetlands being shared** with neighbouring countries too as in case of Ladakh and Sunderbans.

The major river basins of the country are the Ganges, Brahmaputra, Narmada, Tapti, Godavari, Krishna and Cauvery.

# Inland fishery resources by states and union territories

State/Union Territory	Rivers & Canals (km)	Reservoirs (Lakh ha.)	Tanks & Ponds (Lakh ha.)	Flood plain lakes & Derelict water (Lakh ha.)	Brackish water (Lakh ha.)	Total water bodies (Lakh ha.)
Andhra Pradesh	11514	2.34	5.17	-	0.60	8.11
Arunachal Pradesh	2000	-	2.76	0.42	-	3.18
Assam	4820	0.02	0.23	1.10	-	1.35
Bihar	3200	0.60	0.95	0.05	-	1.60
Goa	250	0.03	0.03	-	Neg	0.06
Gujarat	3865	2.43	0.71	0.12	1.00	4.26
Haryana	5000	Neg	0.10	0.10	-	0.20
Himachal Pradesh	3000	0.42	0.01	-	-	0.43
Jammu & Kashmir	27781	0.07	0.17	0.06	-	0.30
Karnataka	9000	2.27	2.93	-	0.08	5.28
Kerala	3092	0.30	0.30	2.43	2.40	5.43
Madhya Pradesh	17088	2.27	0.60	-	-	2.87

<b>State/Union Territory</b>	<b>Rivers &amp; Canals (km)</b>	<b>Reservoirs (Lakh ha.)</b>	<b>Tanks &amp; Ponds (Lakh ha.)</b>	<b>Flood plain lakes &amp; Derelict water (Lakh ha.)</b>	<b>Brackish water (Lakh ha.)</b>	<b>Total water bodies (Lakh ha.)*</b>
Maharashtra	16000	2.79	0.59	-	1.10	3.48
Manipur	3360	0.01	0.05	0.04	-	0.10
Meghalaya	5600	0.08	0.02	Neg	-	0.10
Mizoram	1395	-	0.02	-	-	0.02
Nagaland	1600	0.17	0.50	Neg	-	0.67
Orissa	4500	2.56	1.14	1.80	4.30	9.80
Punjab	15270	Neg	0.07	-	-	0.07
Rajasthan	5290	1.20	1.80	-	-	3.00
Sikkim	900	-	-	0.03	-	0.03
Tamilnadu	7420	5.70	0.56	0.07	0.60	6.93
Tripura	1200	0.05	0.13	-	-	0.18
Uttar Pradesh	28500	1.38	1.61	1.33	-	4.32
West Bengal	2526	0.17	2.76	0.42	2.10	5.45

State/Union Territory	Rivers & Canals (km)	Reservoirs (Lakh ha.)	Tanks & Ponds (Lakh ha.)	Flood plain lakes & Derelict water (Lakh ha.)	Brackish water (Lakh ha.)	Total water bodies (Lakh ha.)
A and N Islands	115	0.01	0.03	-	1.20	1.24
Chandigarh	2	-	Neg	Neg	-	0.00
Dadar & Nagar Haveli	54	0.05	-	-	-	0.05
Daman & Diu	12	-	Neg	-	Neg	0.00
Delhi	150	0.04	-	-	-	0.04
Lakshadweep	-	-	-	-	-	0.00
Pondicherry	247	-	Neg	0.01	Neg	0.01
Chhattisgarh	3573	0.84	0.63	-	-	1.47
Uttaranchal	2686	0.20	0.01	0.00	-	0.21
Jharkhand	4200	0.94	0.29	-	-	1.23
<b>Total</b>	<b>195210</b>	<b>29.07</b>	<b>24.14</b>	<b>7.98</b>	<b>12.40</b>	<b>73.59</b>

# Open water fishery resources of India

Resources		Mode of management
Rivers (km)	29000	Capture fisheries
Mangroves (ha)	356000	Subsistence
Estuaries(ha)	300000	Capture fisheries
Estuarine wetlands / bheries (ha)	39600	Aquaculture
Backwaters/lagoons (ha)	190500	Capture fisheries
Large & Medium reservoirs (ha)	1667809	Enhancement (stock and species)
Small reservoirs (ha)	1485557	Capture based fisheries
Flood plain wetlands (ha)	202213	Capture based fisheries

The above table shows that **large and medium reservoirs constitute the most important resource base for inland fisheries**, followed by **small reservoirs, flood plain wetlands, mangroves, estuaries and backwaters/lagoons**, in that order.

# RIVERINE FISHERY RESOURCES

S.No.	River	Total length (km)	Distribution over states	Length (km)
1.	Ganga	2525	(a) Uttar Pradesh	1450
			(b) Bihar	445
			(c) West Bengal	520
			(d) Boundary of Bihar and U.P	110
2.	Brahmaputra	916	(a) Arunachal Pradesh	218
			(b) Assam	698
3.	Indus	1114	Jammu & Kashmir	1114
4.	Brahmani (Birbhum)	799	(a) Orissa	541
			(b) Jharkhand	258
5.	Krishna	1401	(a) Maharashtra	640
			(b) Andhra Pradesh	386
			(c) Karnataka	375



<b>S.No.</b>	<b>River</b>	<b>Total length (km)</b>	<b>Distribution over states</b>	<b>Length (km)</b>
6.	Mahanadi	851	(a) Madhya Pradesh	357
			(b) Orissa	494
7.	Sabarmathi	371	(c) Rajasthan	48
			(d) Gujarat	323
8.	Narmadha	1312	(a) Madhya Pradesh	1079
			(b) Gujarat	159
			(c) Boundary of M.P and Gujarat	39
			(d) Boundary of M.P and Maharashtra	35
9.	Mahi	583	(a) Madhya Pradesh	167
			(b) Rajasthan	174
			(c) Gujarat	242

<b>S.No.</b>	<b>River</b>	<b>Total length (km)</b>	<b>Distribution over states</b>	<b>Length (km)</b>
10.	Tapti	724	(a) Madhya Pradesh	228
			(b) Maharashtra	228
			(c) Gujarat	214
			(d ) Boundary of M.P and Maharashtra	54
11.	Godavari	1465	(a ) Andhra Pradesh	771
			(b ) Maharashtra	694
12.	Pennar	597	(a) Karnataka	61
			(b) Andhra Pradesh	536
13.	Cauveri	800	(a ) Karnataka	320
			(b) Tamilnadu	416
			(c) Boundary of Karnataka and Tamilnadu	64
14.	Subarnarekha	395	(a) Jharkhand	269
			(b) West Bengal	64
			(c ) Orissa	62

Much of the

- Ganga flows through Uttar Pradesh
- Brahmaputra through Assam
- Indus through Jammu and Kashmir
- Brahmini through Orissa
- Krishna through Maharashtra
- Mahanadi through Orissa
- Sabarmati through Gujarat
- Narmada through Madhya Pradesh
- Mahi through Gujarat

- Tapti evenly through Madhya Pradesh, Maharashtra and Gujarat
- Godavari through Andhra Pradesh and Maharashtra
- Pennar through Andhra Pradesh
- Cauveri through Tamil Nadu and Karnataka
- Subanarekha predominantly through Jharkhand

# RESERVOIR FISHERY RESOURCES

- Reservoir is the single largest inland fisheries resource in terms of resource size and production potential.
  
- India has
  - ▣ **19,134 small reservoirs** with a total water surface area of 14,85,557 ha
  
  - ▣ **180 medium reservoirs** with 5,27,541 ha
  
  - ▣ **56 large reservoirs** with 11,40,268 ha

# State and size-wise distribution of reservoirs in India

State	Small reservoirs			Medium reservoirs			Large reservoirs			Total		
	Area (ha)	(% of total)	Yield (kg/ ha)	Area (ha)	(% of total)	Yield (kg / ha)	Area (ha)	(% of total)	Yield (kg/ ha)	Area (ha)	(% of total)	Yield (kg /ha)
Tamilnadu	315941	21.27	48.50	19577	3.71	13.74	23222	2.04	12.66	358740	11.38	22.63
Karnataka	228657	15.39	---	29078	5.51	--	179556	15.75	--	437291	13.87	--
M.P	172575	11.62	47.26	169502	32.13	12.02	118307	10.38	14.53	460384	14.60	13.68
A.P	201927	13.58	188.00	66 429	12.59	22.00	190151	16.68	16.80	458507	14.54	36.48
Maharashtra	119515	8.05	21.09	39 181	7.48	11.83	115054	10.09	9.28	273750	8.68	10.21
Gujarat	84124	5.66	---	57 748	10.95	--	144358	12.66	--	286230	9.08	--
Bihar	12461	0.84	3.91	12 523	2.37	1.90	71 711	6.29	0.11	96 695	3.07	0.05

Small reservoirs				Medium reservoirs			Large reservoirs			Total		
State	Area (ha)	(% of total)	Yield (kg/ ha)	Area (ha)	(% of total)	Yield (kg / ha)	Area (ha)	(% of total)	Yield (kg/ ha)	Area (ha)	(% of total)	Yield (kg /ha)
Orissa	66047	4.45	25.85	12 748	2.42	12.76	119403	10.47	7.62	198198	6.29	9.72
Kerala	7975	0.54	53.50	15 500	2.94	4.80	6 160	0.54	--	29 635	0.94	23.37
U.P	218651	14.72	14.60	44 993	8.53	7.17	71 196	6.24	1.07	334840	10.62	4.68
Rajasthan	54231	3.65	---	49 827	9.45	24.47	49 386	4.33	5.30	153444	4.87	24.89
Himachal	200	0.01	---	---	---	---	41 364	3.63	35.55	41564	1.32	35.55
North-east	2239	0.15	---	5 835	1.11	---	---	---	---	8 074	0.26	--
Haryana	282	0.02	---	---	---	---	---	---	---	282	0.01	---
W. Bengal	732	0.05	---	4 600	0.87	---	10 400	0.91	---	15 732	0.50	---
<b>Total</b>	<b>1485557</b>	<b>47.11</b>	<b>49.90</b>	<b>527541</b>	<b>16.73</b>	<b>12.30</b>	<b>1140268</b>	<b>36.16</b>	<b>11.43</b>	<b>3153366</b>	<b>100.00</b>	<b>20.13</b>

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# COLDWATER FISHERY RESOURCES

- Fisheries in streams and lakes, situated in high altitude regions of the country comprise indigenous fishes, chiefly the **mahseer**, the **snow-trout**, and the exotic species, mainly trout.
- Natural lakes situated in the colder upland regions of India cover an area of **7,20,000 ha**. But, these lakes have not been studied for their fishery potential.
- Until recently, the developmental work in cold water fisheries was directed towards establishing trout fishery which is the most popular sport fish in the world.



- There has, however, been growing realization for developing indigenous cold water fisheries.
- The production from cold water fisheries is however not of much significance in the total inland fish production of the country.
- On account of their limnological characteristics, they are suitable for developing cold water fisheries.



***Tor remadevii*, the orange-finned mahseer, also known as the hump-backed mahseer, is a critically endangered species of freshwater fish endemic to the Western Ghats of India. It is restricted to the Kaveri river basin.**

**Known to grow to in excess of 120lb**

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***Tor putitora*, the Putitor mahseer, Himalayan mahseer, or golden mahseer**, is an endangered species of cyprinid fish that is found in rapid streams, riverine pools, and lakes in the Himalayan region. Its native range is within the basins of the Indus, Ganges and Brahmaputra rivers. It is a popular game fish, once believed to be the largest species of mahseer, and **can reach up to 2.75 m (9.0 ft) in length and 54 kg (119 lb) in weight**, though most caught today are far smaller. It is threatened by habitat loss, habitat degradation and overfishing, and it already has declined by more than an estimated 50%. This omnivorous species is generally found near the surface in water that ranges from 13 to 30 °C (55–86 °F).

# ESTUARINE FISHERIES RESOURCES

- National Commission on Agriculture stated that **“under the term estuarine fisheries is included the fishery output from the mouth of rivers, the large brackish water lakes, the innumerable creeks and backwaters along the coast and the coastal canal system”**.
- The fisheries in estuaries of India are above the subsistence level and contribute significantly to the production.

- The major estuarine systems noted by the National Commission on Agriculture are

**(1) Hooghly-Matlah**

**(2) Mahanadi**

**(3) Godavari**

**(4) Chilka**

**(5) Pulicat**

**(6) Vembanad**

- Of these six estuarine systems, Chilka lake, Pulicat lake and Vembanad lakes are considered as the brackish water lakes.
- Among the estuaries, the **Hooghly Matlah estuarine system is the largest in terms of area**, followed by Chilka, Pulicat and Mahanadi estuaries.
- **Mangroves**, though apparently the largest in terms of total area reported, are subject to **maximum encroachment and destruction, in the wake of other developments in the coastal zones of the country.**

<b>Estuarine system</b>	<b>Estimated area (ha)</b>	<b>Production (t)</b>
Hoogly – Matlah	234000	20000-26000
Godavari Estuary	18000	5000
Mahanadi Estuary	3000	550
Narmada Estuary	30000	4000
Peninsular Estuarine system	---	2000
Chilka lake	103600	4000
Pulicat lake	3900	760-1370
Vembanad lake and Kerala back waters	50000	14000-17000
Wetlands of West Bengal	---	---
(a) Fresh water bheries	9600	10-14
(b) Saline bheries	33000	25500
Mangroves	356500 <sup>DEV</sup>	---

# State wise estuarine fishery resources in India

<b>S. No.</b>	<b>State</b>	<b>Brackish Water area (Lakh ha)</b>
1.	Andhra Pradesh	0.64
2.	Gujarat	3.70
3.	Karnataka	0.01
4.	Kerala	2.00
5.	Maharashtra	0.10
6.	Orissa	4.17
7.	Tamil Nadu	0.56
8.	West Bengal	2.14
9.	Arunachal Pradesh	2.16
10.	Andaman Nicobar	0.37
11.	Pondicherry	0.01



# FLOODPLAIN WETLANDS

- The freshwater fishery resources, which have progressively gone into dereliction, comprise the floodplain wetlands/ ox-bow lakes, locally known as **mauns in Bihar, beels in West Bengal and Assam.**
- Floodplain wetlands form an **important fishery resource in Assam, West Bengal and Bihar**, where thousands of poor fishermen are dependent on these water bodies for their livelihood.

State	Distribution Over districts	River basin	Local name	Area (ha)
<b>Arunachal Pradesh</b>	East Kameng, Lower Subansiri, East Stang, Dobang valley, Lohit Changlang and Tirap	Kameng, Subansiri, Libang Lohik, Dihing and Tirap	Beel	2500
<b>Assam</b>	Brahmaputra and Barak valley	Brahmaputra and Barak	Beel	10000
<b>Bihar</b>	Savan, Champaran, Saharsa, Muzaffarpur, Dharbhanga, Monghyr, and Turnea	Gandak and Kosi	Maun, Chaur, Dhar	40000
<b>Manipur</b>	Imphal, Thoubai and Bishnupur	Iral, Imphal and Thoubal	Pat	16500
<b>Meghalaya</b>	West Khasi hills and West Garo hills	Someswari and Jingiram	Beel	213
<b>Tripura</b>	North, South and West Tripura	Gumti	Beel	500
<b>West Bengal</b>	24-Parganas – North and South, Hoogly Nadia, Murshidabad, Meddah, Cooch Behar, Burdwan, North and South Dinajpore and Midnapore	Hoogly, Ichhamati, Bhagirathi, Churri, Kalindi, Dharub, Dharala, Pagla, Jalangi, Behula, Torsa and Mahananda	Beel, Charha and Baor	4250